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PART 1: 1/8TH SCALE 54" WINGSPAN, FOR ELECTRIC POWER

MILES GEMINI

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PLUS: SUBJECT FOR SCALE

● SCALE THREE-VIEWS

● IN DETAIL



JAPANESE SWALLOW

KAWASAKI KI61 'HIEN' - 1/8TH SCALE FOR .51 ENGINE POWER

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ON THE COVER

Peter Rake designed this 54" span 1:8th scale Heinkel He 51 on special request from Craig Johnson, who built the prototype model. We present it as a free full size plan feature in three parts, starting with this issue. The size is such that it would not fit in less than three plan sheets. Naturally, as with other Rake creations, it's electric powered.

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

CIRCULATION TRADE ENQUIRIES:

Seymour Distribution, 2 East Poultry Avenue, London, EC1A 9PT
020 7429 4000.

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

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

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

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Here at FSM, we try to make a point, regularly, of showcasing examples of full size aircraft that are outside the mainstream of the popular WW1 and WW2 warbirds and the narrow group of civil light aircraft that tend to catch the attention of flying scale modellers - particularly in the choice of kits and ARTFs.

One such subject that has been in our sights for quite a while now as a 'Subject for Scale', is the Miles Gemini, which was the last mass production design of the original F.G.Miles Ltd. organisation before the Company folded in 1947. First flown in October 1945, Miles produced 130 examples in the first year of production - a number which, considering the 'down-on-our-uppers' state of the British economy in the immediate aftermath of WW2, tends to indicate that this highly attractive four-seat twin engine, retracting undercarriage touring aircraft hit acceptance levels among potential customers squarely on the head! In the 'export-or-die' environment prevailing in UK at the time, two-thirds of Gemini production was sold overseas.

So here we go with a four-way collective effort to entice any among our readers to rise to the challenge of modelling the Gemini. Gordon Whitehead produced the detailed 1:40 scale three-views, Richard Riding contributed excellent 'period' photographs from his extensive archive and the editor captured in close-up detail the fully airworthy Gemini Mk.1a held on display for public viewing at the Shuttleworth collection. Finally, a casual last minute conversation with Alex Whittaker indicated that he had a 'Walk Around' in the can of a 118" wingspan (1:3.68 scale) example built and flown by that reclusive scale modeller who revels in the pseudonym of 'Spartakus'.

It's all here in this month's issue in the hope that it will generate interest. A scale of 1:5 would produce a very nice, manageable model of 87" (2204mm) wingspan and if there's anyone out there willing to rise to the challenge with a view to eventual publication of a finished plans feature in FSM, we'll be happy to donate the appropriate enlargement of our scale three-views to get you started.

Any takers?



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Looking every inch the pugnacious warplane the He-51 has proven a good flying model.

Heinkel He-51

PART 1: A 54" span, electric powered model designed by Peter Rake, with the prototype model built and described by Craig Johnston.



Once again this model has proved sufficiently large that it needs to be spread over three issues if it is to fit within free plan format. Yes, that does mean you need to buy all three issues to get the entire plan, but that's still cheaper than having to buy the plan. Besides, just think of all the other interesting stuff you'd miss if you didn't buy the magazines.

So, since Craig has done such a grand job of describing his build I will, without further ado, pass you over to him for all the details. Please note that Craig's notes are based on the prototype design and some things may well have been altered slightly in light of points he raised.

After a fair bit of pestering, and adding the type to the list whenever Pete brought up the topic of what he should draw up next, he finally relented and agreed to draw up a Heinkel He-51. I am very grateful, as it is from the 1930s which is not his favoured period, and also suffers from having a rounded fuselage that requires a shell type fuselage to aid in accurate construction.

The He-51 was the Luftwaffe's first fighter, and a development of the He-49 'sports plane'.

First introduced in 1934, it saw front line service in Spain in 1936. Although successful initially as a fighter, the type was soon out-classed by the higher performance Polikarpov I-15 and I-16 flown by the Spanish Republican Air force. The Heinkel was soon suffering heavy losses and was relegated to support roles where it was instrumental in the development of the close support tactics used so effectively during the early stages of the Second World War. The type was also used as a floatplane, and a fighter trainer up until the middle years of WWII.

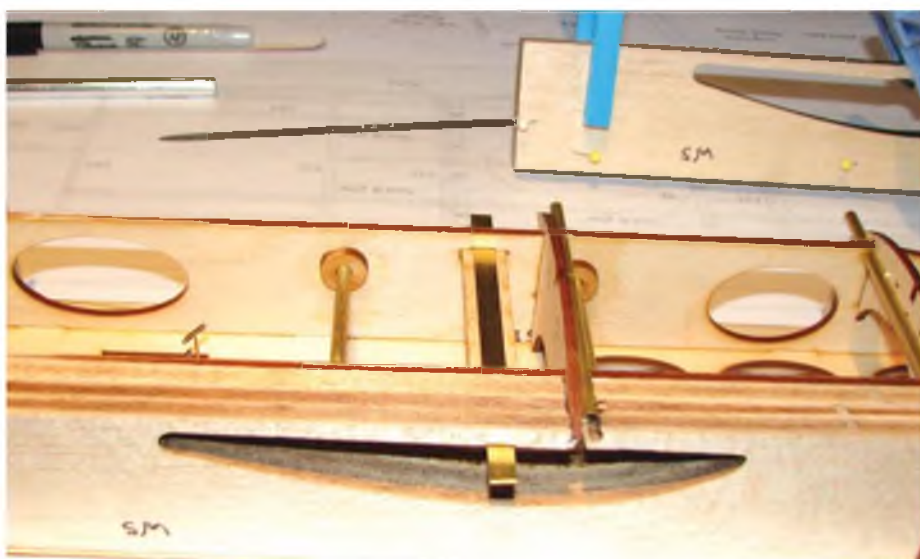
POWER SYSTEM, ELECTRICS, ETC.

The model has a 54" wingspan which equates to 1/8th scale. It came out at 5.1/2 lb and is fitted with a Turnigy 3542 1000KV motor spinning a 12x 6 APC propeller. A 60A Turnigy Plus ESC was used, drawing power from a 3S, 3000mAh LiPo, a combination that produces 400W and has more than enough get-up-and-go for the model.

Four Hitec HS-82mg servos were used for the elevator, rudder, and ailerons, I also used two HXT900 servos and a Turnigy servo reverser/speed reducer for the flaps which Peter kindly agreed to let me incorporate in to the build. (Flaps are not shown on the plan, and subsequently proved unnecessary for the model to fly well. PR) The receiver is an AR7600 unit. A 2.5" plastic spinner, and some 3" wheels are also required. I also purchased a 1/72 scale plastic kit of the He-51 so as to aid in shaping the forward fuselage when the time came.



The two basic shell halves. This style of construction means you can do most of the work on the separate shells before joining them.



The notching of the side pieces Craig mentions in his write-up.



Being able to pin down the halves while sheeting and stringers are added results in less risk of twisting them.

FUSELAGE CONSTRUCTION

An evening was spent going through the short kit that had been supplied to build from, labelling parts against the three plan sheets, the quality of the balsa and ply components was top notch.

The job proper started the next day with the test fitting and assembly of the upper and lower forward fuselage sections over the plan. These are all self jiggging and aligned perfectly over the plan. After sitting one of the WS pieces in position, I marked out the slot that needed to be created for the F4B former to be cleared in the lower forward fuselage, I also cut a small notch for the forward undercarriage wire and brass tube to pass through. All six of the 1/4" WS sections were slotted the same, then glued into two sets of three. When dry these were glued into place in the lower fuselage sides.

All of the rear fuselage formers that required joining or laminating were done next, followed by positioning and gluing K5B, and K6B to the forward section. The appropriate formers were glued in position and squared up with K4 and the K6B side keels. The lower brass wing joiner tubes and their ply reinforcement rings were added next.

The upper fuselage was assembled in the same manner as the lower with regards to the upper and side keels and formers. The tailplane seat and tail post were then squared up and mounted



The plastic model Craig used as a guide and the resulting nicely shaped nose section.

in position.

The next task was to install the stringers to the top and bottom fuselage sections. The plan calls for 1/16" x 3/16" bass, but being unable to find any I stripped down some 1/16" ply sheet to suit. Both fuselage halves were pinned back over the plan in turn and the stringers cut and glued in position. The ends were glued with thin CA so as to keep them anchored due to the slight curve they follow, and carpenter's glue was used where these contacted the other formers. Applying the stringers on alternate sides helps reduce the chances of building any tension or twist into the fuselage halves.

The brass tubes for the centre section struts were wired and epoxied into their relevant positions in the top fuselage section, the same was done for the undercarriage mounts in the lower half.

Apart from the areas under the tailplane seat all of the sheeting was now done, it is all 1/16" balsa which after being cut to rough shape was thoroughly wet down with water and then towelled off, after about 5 minutes they were flexible enough to be glued into place with medium CA. The tailplane seat area was left unsheeted at this stage so as to allow me access to the area when setting up the elevator control for which I decided to use Sullivan Gold'nrod.

I next made a start on roughing out the nose/cowl area. For the cowl a couple of pieces of balsa block were glued together, and cut to the correct length. The four CT nose sections were then laminated together and glued into position on the upper fuselage, the same was done for the CB lower

fuselage nose pieces. Once all was dry I sat my previously mentioned cowl block in position and marked out the rough profile, including air intake, and gun troughs using the 1/72 plastic model as a reference. When I had the block marked to my liking I attacked it with the razor saw, and my favourite tool the razor plane, while constantly referring to the plastic model. The gun troughs were gouged out using some 7/16 brass tube that I sharpened an edge on the end of. Also, using some adhesive emery tape stuck to the tube helped smooth things out. When happy with the basic shape I left this area until the motor was mounted so as to account for the thrust line and spinner location.

The lower fuselage access hatch, and tail blocks were made in the same manner as the cowl block, again gluing together some balsa block, cutting to size and shaping while referring to the model, and various 3 view drawings.

The stringered area of the fuselage halves were given a going over with the sanding bar to make sure they were all at the same level as the sheeted areas, I use some pvc duct tape on the sheeted sections next to the stringers and using the sanding bar sanded to this level, when the tape started scuffing I knew that I was pretty much flush with the sheeting.

The cockpit opening was cut next, after covering the area with duct tape to help stop me cracking or tearing the wood. The plastic model was again used as a reference for the size and shape of the opening and a half template was made, taped along the centre line and traced around, then flipped so

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HEINKEL HE-51

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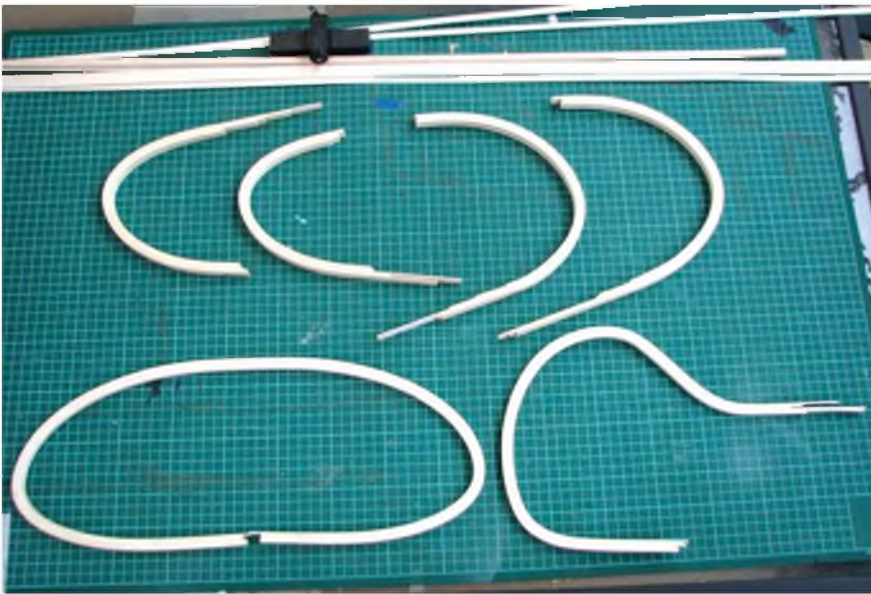
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Probably the hardest part of the tail surfaces, the dreading laminated outlines. The wing tips are also seen in this shot.

as to do the other side. With the basic fuselage halves completed they were left at this stage so that the tail surfaces could be constructed as I wanted a good idea of how the elevator control was going to work out before I closed it up and joined the halves together.

TAIL SURFACES

I had an extra set of plans printed for the purpose of making the tail surfaces, these plans had the required sections cut out and glued to pieces of 1/4" balsa sheet these were cut out to create forms for the tail surface outlines to be laminated around. The forms were given a good rubbing around their edges with candle wax to stop the laminated pieces sticking to them. I stripped down some 1/16" sheet into strips just over 1/4" wide, they were soaked with water, and six layers were

wrapped around the forms with watered down Titebond with pins keeping them tight against the forms.

Once dry these laminated parts were framed up as complete units using a combination of kit parts, and balsa strip that was cut from sheet stock. Once framed and dry these parts were sanded down smooth, then the elevators and rudder were separated from the surfaces, marked and slotted for CA hinges, and drilled for the elevator link wire. The link was bent up over the plan from 2mm music wire, the brass control horn was cut

Like the fin and rudder, the tailplane and elevators are built over the plan and separated once completely dry and basic sanding is done.



Nothing very complicated about the fin and rudder construction.

and drilled and soldered into position.

After the elevator was completed it was dry assembled and checked for fit. When happy with the assembly the tailplane was sat on the tailplane seat of the upper fuselage half and the rear anchor for the Gold'nrod sleeve was made up from balsa and glued between the tailplane seat and the side keels. The inner rod and clevis was slid through the sleeve and hooked up to the elevator horn and checked for the amount of travel and binding. ■



The model shows off her intricate, but not particularly complicated structure.



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SUMMER SWALLOW!

THE FIGHTER THAT THE ALLIES CODE-NAMED 'TONY', IS PROBABLY THE BEST-KNOWN JAPANESE W/W2 FIGHTER AIRCRAFT (EXCLUDING THE 'ZERO'). BRIAN BRASSEY PRESENTS A 1/8TH SPORT SCALE REPLICA OF THIS ELEGANT MACHINE FOR .51 SIZE MOTORS



W

hen Allied pilots first encountered the Hien (Swallow) over New Guinea in 1943, they thought it was a

licence-built Messerschmitt Me 109. The engine installed in the 'Hien' was indeed a licence built German product, the Daimler-Benz DB 601 (as used on the '109), but the Kawasaki Ki.61 was Japanese designed through and through.

The Japanese tested the Ki.61 against the Me 109 (tortuously transported from Germany) and captured Curtiss P-40s and considered their machine superior to both in all respects.

Why a model of the Ki.61? Well it's a very pleasing looking aeroplane with a layout and moments that are ideal for R/C

aerobatics and for anyone contemplating modelling the type there were some very colourful camouflage schemes applied to examples in Imperial Japanese Army service during WW2.

Wing construction

The wing on the prototype model Ki.61 consists of a foam core, skinned with balsa sheet, but an alternative built-up construction is shown on the plan available via FSM Plans Service. Covering is 1/16" balsa sheet, butt-joined with P.V.A. glue and stuck to the foam with *Copydex* type glue. Wing tips are block balsa and are sanded to shape before the ailerons are cut out. Five degrees of wash-out is incorporated into the wings at the foam-cutting stage.

Retracting undercarriage applied on the prototype model was one of the air-up/spring down types. To accommodate the retract units, I made an undercarriage box in each wing underside, from 1/8" ply sheet which consisted of a rear dihedral brace, front leading edge brace and six part-ribs.

I cut out the wing underside to allow the box to fit in after joining at the correct dihedral angle (shown on the plan). I then cut out the wheel wells and refitted the off-cut foam. The wheel wells were lined with 1/64" ply as was the top of the box.

Ailerons were cut from the wing panels and lined with 1/4" balsa sheet. I used one centreline located servo for the ailerons, set in a lite-ply box behind the dihedral brace. Aileron actuation is by





1: View aft looking at the fuselage firewall and the wing seat, showing the ply plate for the wing retainers studs. **2:** The dummy radiator scoop in the bottom of the fuselage behind the wing. **3:** Wing upper surface centre section showing the servo wells for the aileron servo and the retract air switch with its servo. Note the full-depth plywood braces that define the cut-out for the retracting undercarriage installation. **4:** Wing underside showing the wells for the retracting undercarriage mechanism and the wheel wells. **5:** Here the full forward section of the fuselage can be seen including the tank bay. The base plate for the wing fairing, with its shape-forming gussets can also be seen. **6:** The fuselage nose section showing the glass fibre cowl, moulded as described in text. Note the deep wing fillet, made from thin plywood. **7:** The cockpit area, showing the well of the cockpit, dummy head-rest and a further view of the plywood wing fillet.

nylon snakes, let into the foam core on the underside. However, the use of a servo for each of the two ailerons, mounted further out in each wing panel would be a simple modification.

The servo that actuates the retract air valve is mounted in front of the wing

brace, leaving a 1/2" gap for the air pipes to come up through the wheel wells. The leading edge is 1/4" balsa sheet.

Fuselage construction

The hardest parts to make are the engine cowl and cockpit canopy. The engine

cowl on the prototype was glass fibre, so for anyone wishing to make their own here's how I did mine.

The plug was made from white foam although blue foam would be better. When carved and sanded to shape, I used *Polyfilla* to fill any holes and seal the



surface of the foam. I then covered this in lightweight tissue, using thinned P.V.A. glue. When dry, the surface was sanded with wet-or-dry, used dry, followed by more thinned P.V.A. The process was then repeated until the surface satisfactory for mould-making

I made my mould in two halves as my intention was to vacuum-form and use the resulting plastic pieces as a female mould, but you could either make a female mould from glass-epoxy, or for a one-off, sand the outside and dig out the foam when finished. The cowl has to be made first as the inside dimensions determine the shape of the engine bulkhead over which the cowl fits.

The two engine bulkheads are cut from 1/8" plywood. To do this, first take the completed cowl, mark the inside dimensions onto the ply and cut out. One bulkhead is then cut to shape to facilitate fuselage box construction (see photo). The fuselage sides are 1/8" balsa sheet with a 1/64" ply doublers. Choose the balsa sheet carefully as it has to curve both across and with the grain.

Make a former F.3 from 1/2" x 1/4" balsa, which is fitted to the rear of the wing seat. At the same time, epoxy glue into place the cut-out portion of the front bulkhead. Use set-squares to make sure these are true. When dry, turn the assembly upside down over the plan and glue on the other side of the fuselage. When dry, add 3/16" balsa curved fillets with cyano; this makes the cross-grain curvature of the side to the rear of the wing seat.

Next, draw in the rear of the fuselage over the plan. This ensures no banana shaped fuselages. Add 1/2"x1/8" doublers to the bottom of the fuselage. These are necessary as foam top and bottom decks

are used. Leave assembly to dry.

Next, remove from the building board and add 1/2"x1/8" doublers to the top edge of the fuselage behind former F3. The pieces cut off the engine bulkhead can now be added, with the second lamination of 1/8" ply. These are glued with epoxy, as is former F1 which can be added at the same time. The tank bay is made from 1/8" balsa sheet.

The foam upper rear decks were cut from foam block with a hot wire but could, alternatively, be sheeted with 1/8" balsa using appropriate formers. A 1/8" ply plate for the tail wheel fixing was let in at the rear of the fuselage.

The cockpit floor is 1/16" sheet, applied cross-grain. This stiffens up the fuselage sides over the wing cut-out. All the fuselage decks are foam, with 1/16" balsa sheet covering. I made the deck over the tank bay removable for access to the tank, battery, and remote glow lead.

The fuselage/wing fillet is 1/32" lower and 1/64" ply for the curved fillet.

The air intake and exhaust stacks were made from balsa and ply, finished with dope and talcum powder and then vacuum-formed. The advantage of this is that you only need to make one exhaust stack and it leaves a flange around each, which looks very metallic.

The underwing radiator is made from 1/4" balsa with a 1/16" ply doubler at the joint between wing and fuselage.

Cockpit canopy

A mould plug was made from carved blue foam, filled and sanded in the same way as for the engine cowl. When I was satisfied with the finish, I vacuum-formed a surface shell using white styrene sheet; this



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8: View of the wing fairing and wing underside air scoop on the finished model. **9:** Underside of the finished wing, showing the wells for the undercarriage. **10:** Installation, on the wing centre section upper surface, of the servo and air valve for switching the retracting undercarriage. **11:** Side-by-side installation of the rudder, elevator and throttle servos in the fuselage. **12:** Although the nose is slim, it hides MOST of the O.S. four stroke motor, but the muffler inevitably protrudes. **13:** Detail of the nose, showing the dummy exhaust stacks. Details like this give realism.



remains in place to form the finished surface of the mould 'plug', to which thin strips of styrene sheet were stuck on to simulate cockpit frame lines.

When finished, I then vacuum-formed the cockpit canopy in clear plastic, which gives a very clear canopy moulding with no lines in the wrong places.

Tail surfaces

The elevator and rudder on the full size Ki.61 were fabric covered, therefore they were assembled over a central core of 1/8" sheet balsa, with laminations of 3/16" sheet top and bottom for the leading edge and 1/16" sheet for the ribs. This was then sanded carefully to aerofoil shape. The trim tabs are 1/8" lite-ply let in to the 1/8" sheet.

The fin and tailplane are laminations of two pieces of soft 3/16" sheet with a centre 1/8" sheet core making 1/2" in total. Laminating makes a strong yet lightweight structure. These were then carved and sanded to aerofoil shape.

Engine installation

The elected power for the prototype model was an O.S.52 Surpass, but it's not possible to completely hide the engine inside the cowl no matter at what angle you position it. What would help would be an extension shaft so that the engine

could be set further back in the cowl. I used one of the (very) old Fox 3/4" extension shafts, long since unavailable, but if you have access to someone with a lathe who could turn one for you, that would be great.

I opted to mount the engine absolutely inverted as I am using retracts, but anyone wanting to dispense with undercarriage entirely and rely on a take-off dolly, that is perfectly feasible with this size model, but the engine should then be mounted so that neither the head nor the exhaust can take an impact on landing. The O.S. 52 engine has ample power.

Covering and finishing

The whole airframe was sanded, filled and sanded again, then finished off with wet-or-dry paper. When satisfied with the surface preparation, I gave it a coat of *Balsaloc* and then covered everything in standard *Solartex*, applied with an iron. Look along each surface under a low light source to check for correct surface adhesion. If you do not ensure that the covering has properly adhered at this stage, it will bubble when the sun gets at it and spoil your nice finish.

When you are satisfied with this part of the process, apply a coat of thinned cellulose dope mixed with talcum powder

to the whole airframe (apart from the rudder and elevator, which are fabric covered). When dry, sand with wet or dry and repeat with at least three coats. When you are happy with the finish, clean the airframe. I use a vacuum cleaner with a soft brush attachment and then a damp piece of kitchen roll.

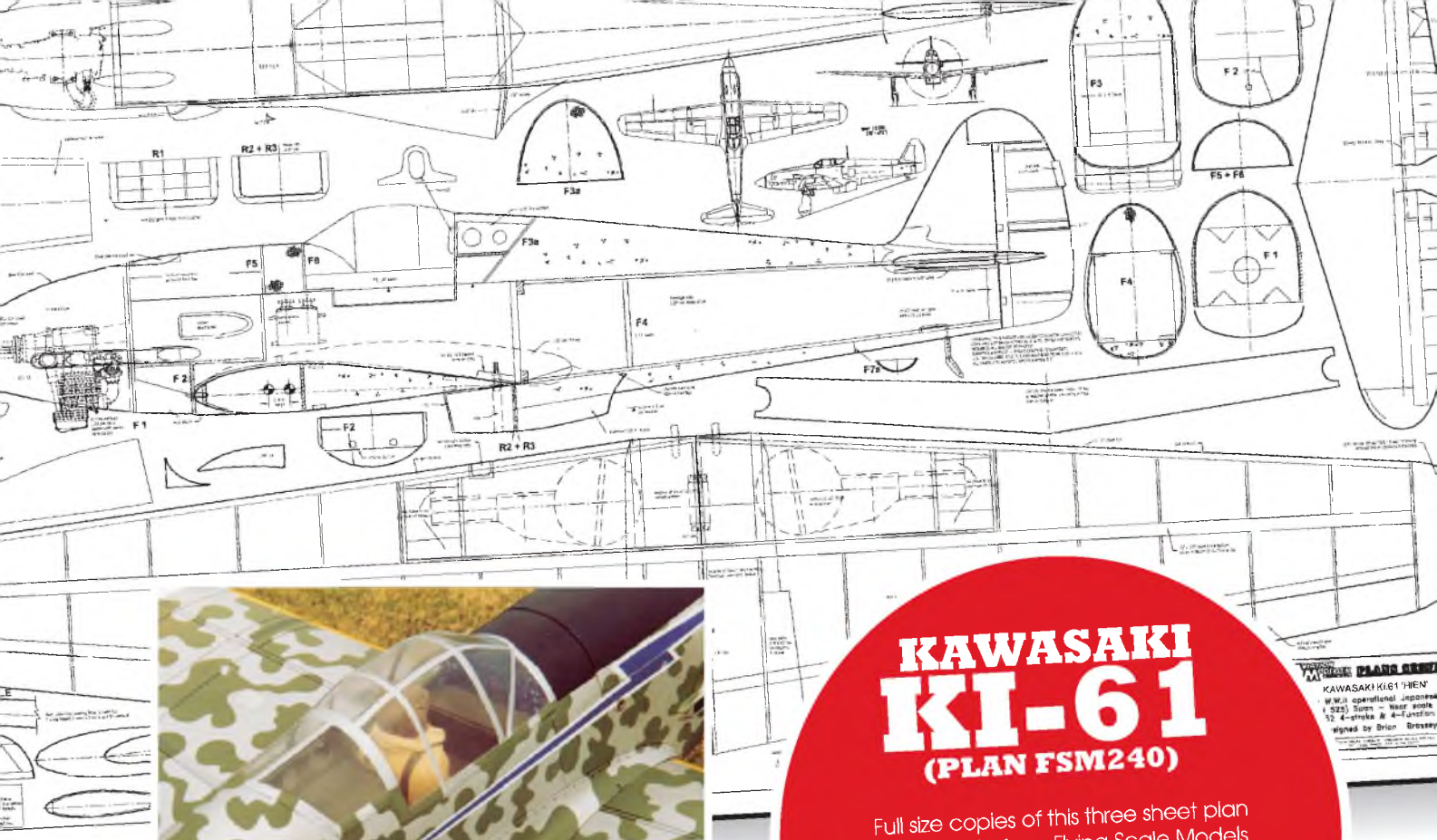
Warpaint

The colour scheme I chose appears in a book entitled 'Flying Colours' by William Green & Gordon Swanborough published by Salamander and is of the Headquarters chutai, 244th Sentai, Chofu, Tokyo in the winter of 1944-1945. It was employed in Defence of the Japanese Home Islands. No particular pilot is mentioned.

The scheme consists of an overall aluminium finish with irregular patterns of dark green and white bands underneath the Hinomaru national insignia (extremely visible). I used *Halfords* spray white undercoat and aluminium for the basic finish and Humbrol enamel for the dark green pattern, red Hinomaru, yellow leading edge and black cowl top.

To get the correct camouflage pattern, I traced it from the book onto tracing paper and scanned this into a computer before enlarging by 1760% to suit the scale of the model.





ABOVE & BELOW: Two views of the cockpit canopy, also showing the dummy fuselage mounted guns.

KAWASAKI KI-61 (PLAN FSM240)

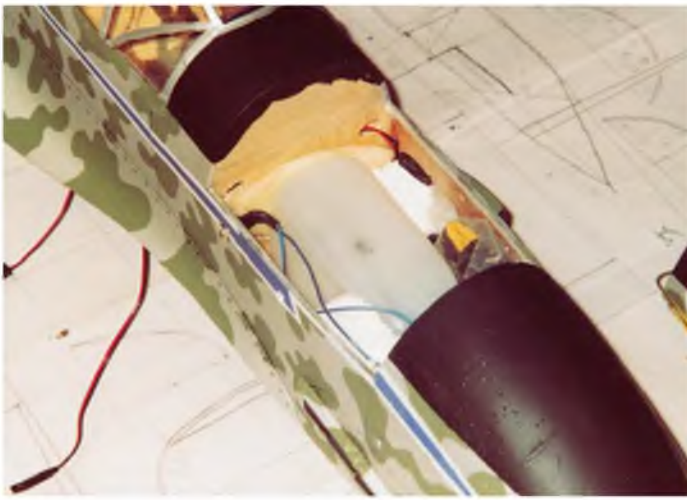
Full size copies of this three sheet plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Tottenhamhoe, Bedfordshire,

LU6 1QX. Tel 01525 222573

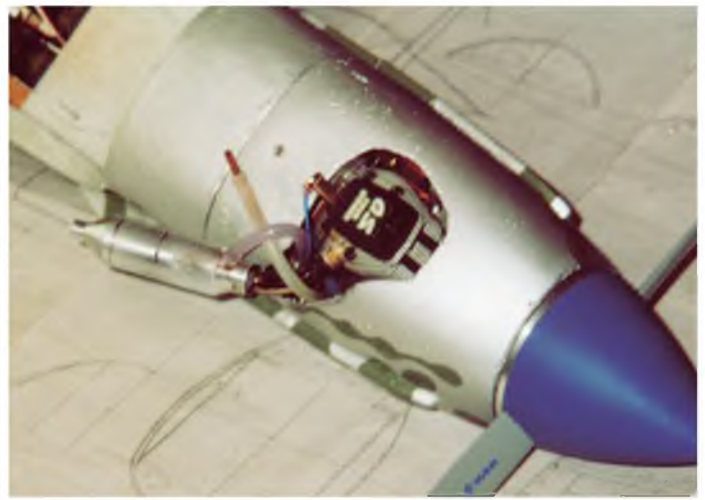
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(U.K £2.50; Europe £4.00;
Rest or World £6.00.





Hatch, forward of the cockpit, removes for easy access to the fuel tank.



The installation of the O.S. four stroke engine. Not much hangs out in the breeze.

Because my printer used A4 sheets (297mm x 210mm), the maximum size of the pattern we could do from the illustration was approximately 39mm x 27mm.

This we did and I then taped the sheets together for the main pattern on the wing. I then retraced the pattern onto tracing paper because the lines were also enlarged by 760%.

Anyone spraying could make masks using this pattern. I used thin card and cut out the shapes, placing the pattern on the wing to draw round in soft pencil. I then hand painted each one - two coats. It is tedious, but it's well worth it when you see the finished airframe. The fuselage sides are awkward to do, especially round

the intake and exhaust stacks. Unfortunately only one fuselage side is shown, so I just reversed the pattern for the other side.

The lightning flash design was done using white inkjet vinyl. I cut out the blue shape first, then stuck that onto the white and cut again leaving a white surround. This combined image was then carefully lined up and stuck on the model. Where a cut was necessary around the cowl and tank hatch, a little cyano was applied to make sure it can't peel off. I then sprayed the whole airframe with *Flair* matt fuel-proofer.

Flying

This is the bit that most modellers read first (I'm no exception), because if it's a pig to

fly, it's not worth building. When I first finished the model, it weighed in at 6lb.8 ozs.

Take-offs and flight characteristics are much the same as for a sports tail-dragger. The wide undercarriage makes it track very true during take-off run, but as with most World War Two fighters, you need to take care on landings. Keep a little throttle on and fly it in. Thanks to the wing wash-out, it doesn't drop a wing, but as soon as the wheels touch, chop the throttle and pull full up elevator to keep the tail down.

In flight, all the normal manoeuvres are possible; large loops, barrel or axial rolls, split esses. Anyone who can fly an Acrowot will be able to fly the Ki.61. ■



SCALE 1:50

Ki-61 II KAI

Fitted with the 1500hp Ha 140 engine, max. speed was raised to 610 kph at 6000m(375mph at 19685 ft), but few examples of Model II saw operations due to a shortage of engines

note revised canopy, larger Fin area, length increased by 220mm.

air intake to supercharger
(port side only)

just one example was tried with surface evaporation cooling on the wing surfaces to replace the ventral radiator

the Kawasaki Ha 40 engine was a licence-built DB.601A but which had some development problems
Armament: Early examples had two 12.7mm (1/2") bore machine guns.
Later, two fuselage-mounted 20mm cannon with two wing-mounted cannon or 1/2"(12.7mm) MG's

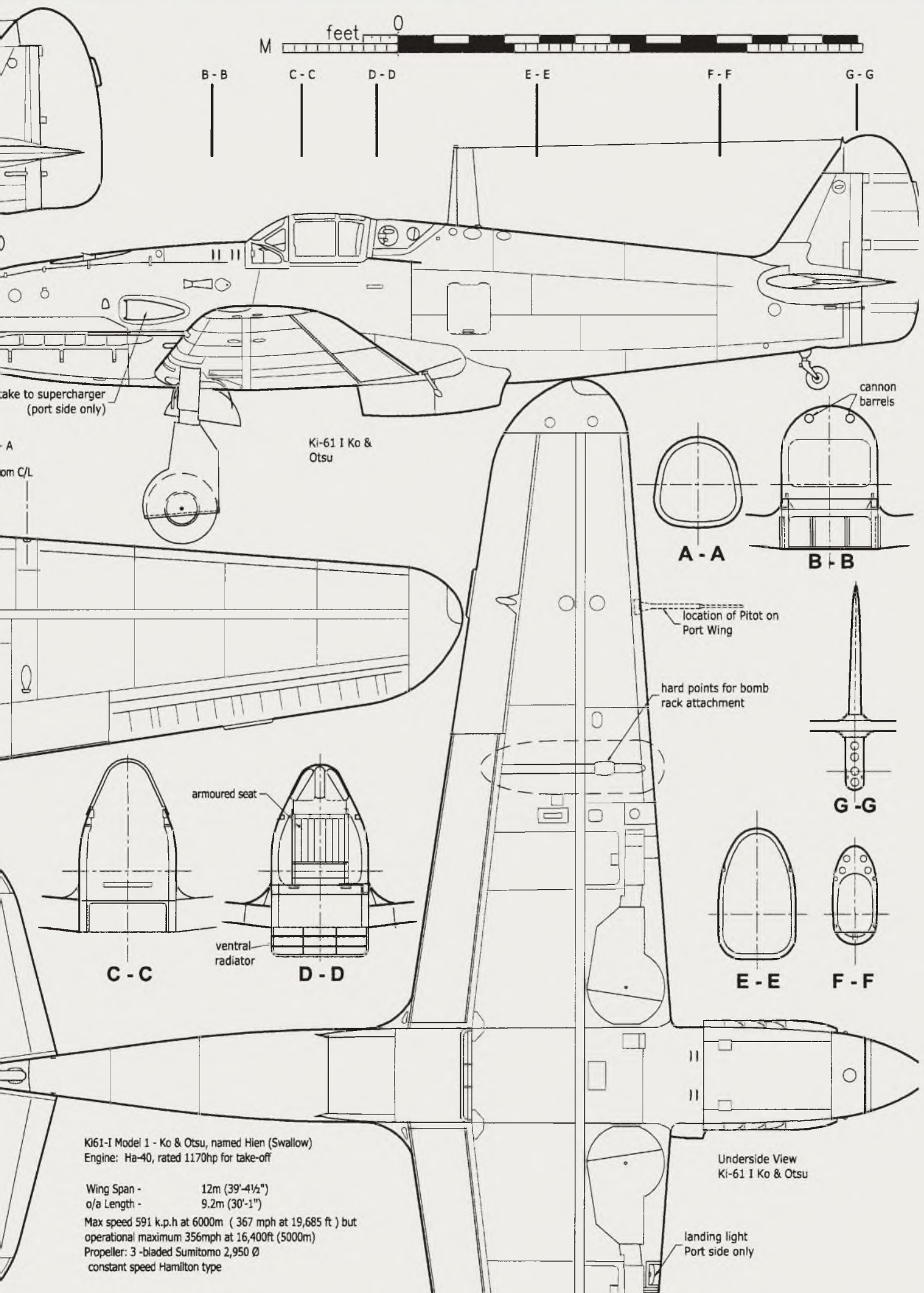
PLAN VIEW
Ki-61 I Ko & Otsu

KAWASAKI KI-61

TYPE 3 FIGHTER 'HEIN' (SWALLOW)

production of Model I totalled 2,654

Front View Ki-61
II - KAI



M feet 0

B-B C-C D-D E-E F-F G-G

intake to supercharger (port side only)

Ki-61 I Ko & Otsu

cannon barrels

A-A

B-B

location of Pitot on Port Wing

hard points for bomb rack attachment

G-G

armoured seat

ventral radiator

C-C

D-D

E-E

F-F

Underside View
Ki-61 I Ko & Otsu

landing light
Port side only

Ki61-I Model 1 - Ko & Otsu, named Hien (Swallow)
Engine: Ha-40, rated 1170hp for take-off

Wing Span - 12m (39'-4 1/2")
o/a Length - 9.2m (30'-1")

Max speed 591 k.p.h at 6000m (367 mph at 19,685 ft) but operational maximum 356mph at 16,400ft (5000m)

Propeller: 3-bladed Sumitomo 2,950 Ø constant speed Hamilton type

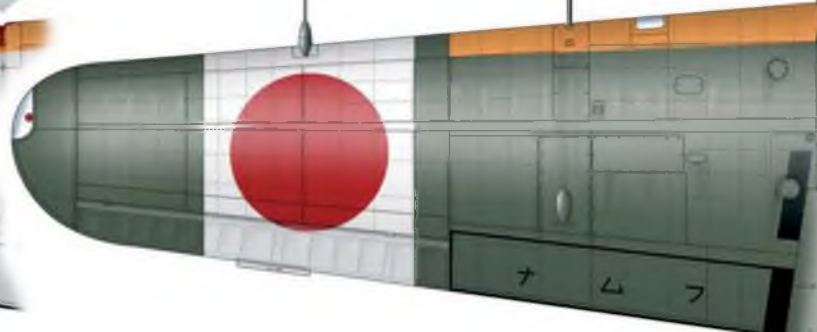
WARPAINT FOR THE KAWASAKI KI-61 HIEN



Kawasaki Ki-61-I-Hei 'Hien', 27, 56th Sentai, 1945. Dark green upper-surfaces with natural metal undersides. Hinomaru over white bands in all positions. White rear fuselage band, unit marking on tail and '27' on rudder



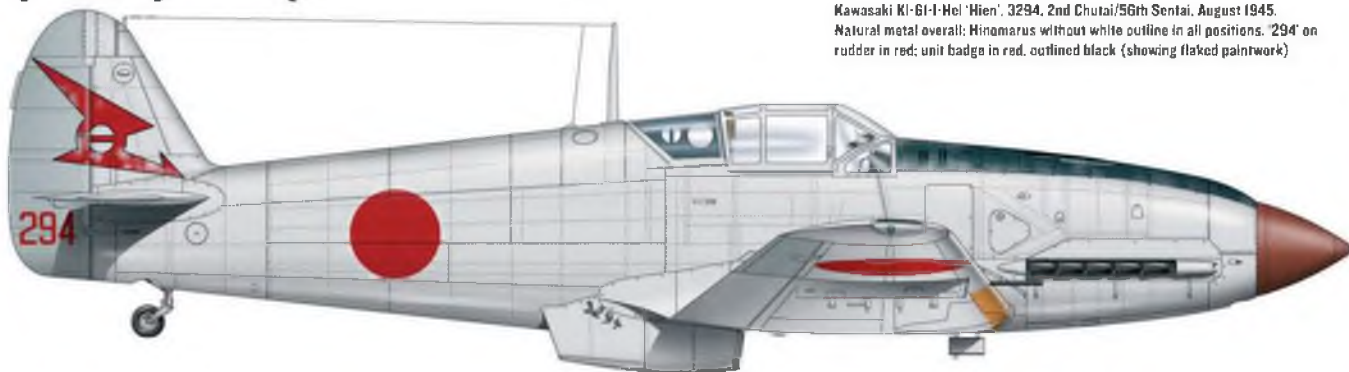
Note: Red 'star' marking sometimes applied to gun ports



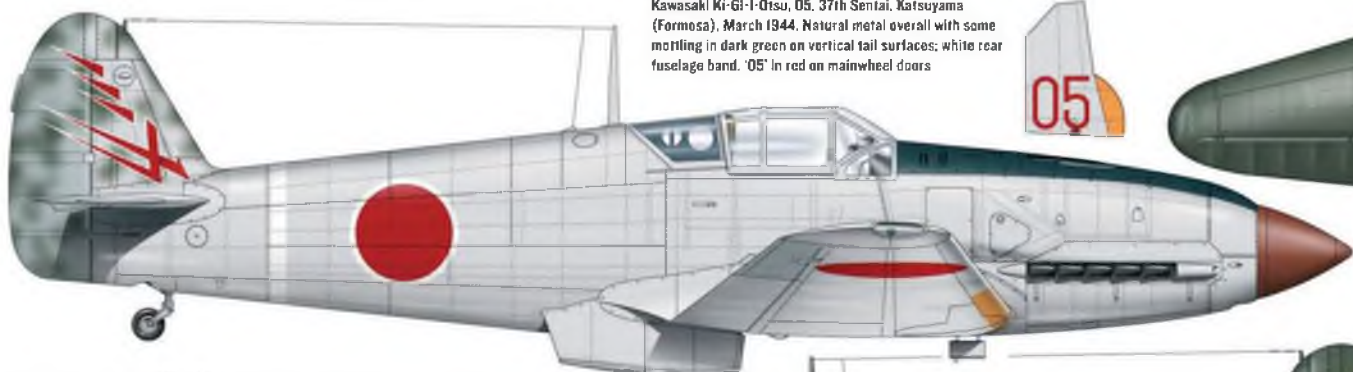
scale: 1/48



Kawasaki Ki-61-I-Hei 'Hien', 3294, 2nd Chutai/56th Sentai, August 1945. Natural metal overall; Hinomarus without white outline in all positions. '294' on rudder in red; unit badge in red, outlined black (showing flaked paintwork)



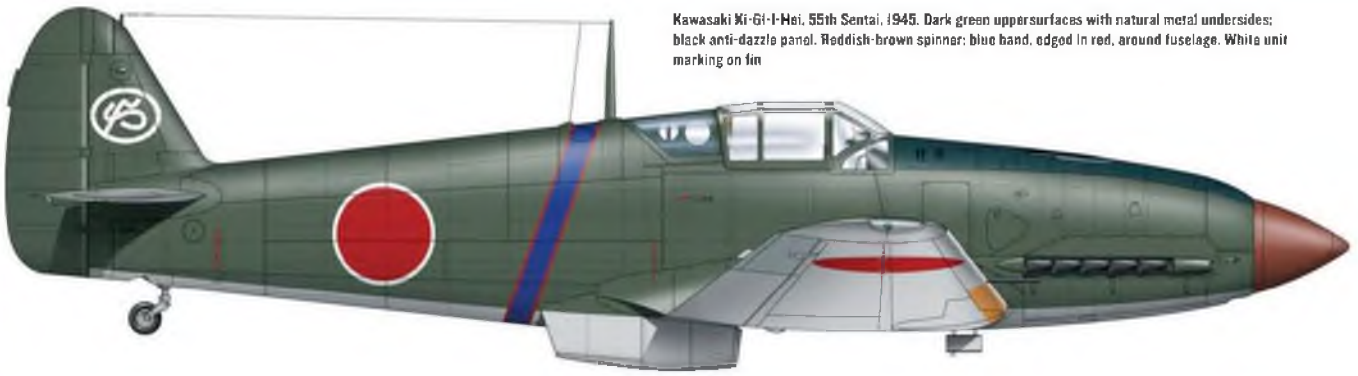
Kawasaki Ki-61-I-Otsu, 05, 37th Sentai, Katsuyama (Formosa), March 1944. Natural metal overall with some mottling in dark green on vertical tail surfaces; white rear fuselage band. '05' in red on mainwheel doors



Kawasaki Ki-61-I-Kai-Hei 'Hien', 244th Sentai, flown by CO substitute Chuichi Ichikawa, Mofu, August 1945. Dark green upper-surfaces and natural metal underised; yellow band around rear fuselage and tail motif. Bright green shamrock, outlined in white. 12 kills on front fuselage



Kawasaki Ki-GI-I-Hoi, 55th Sentai, 1945. Dark green upper surfaces with natural metal undersides; black anti-dazzle panel. Reddish-brown spinner: blue band, edged in red, around fuselage. White unit marking on fin



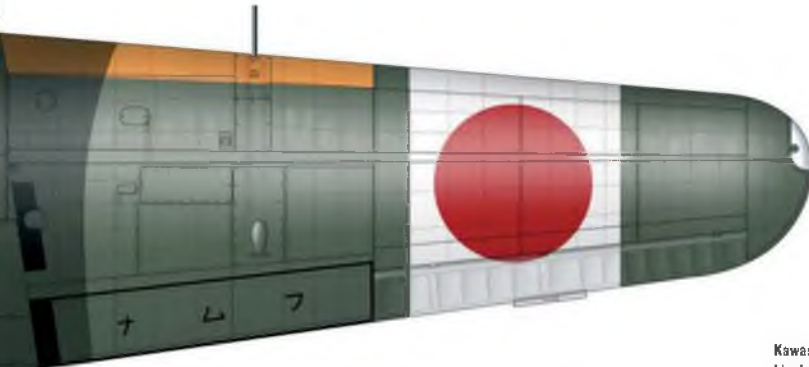
General Note

Canvas-covered areas (ailerons, rudder, elevators) were usually painted in light grey-green when aircraft were delivered in natural metal finish (see scrap view far left). A black anti-dazzle panel was also added and sometimes this was retained when aircraft were painted in dark green on upper surfaces.

When aircraft were painted (e.g. upper surfaces in dark olive green) these areas were painted in the corresponding colour; wing loading edges were always painted in warm yellow.

Spinners were usually painted a reddish-brown

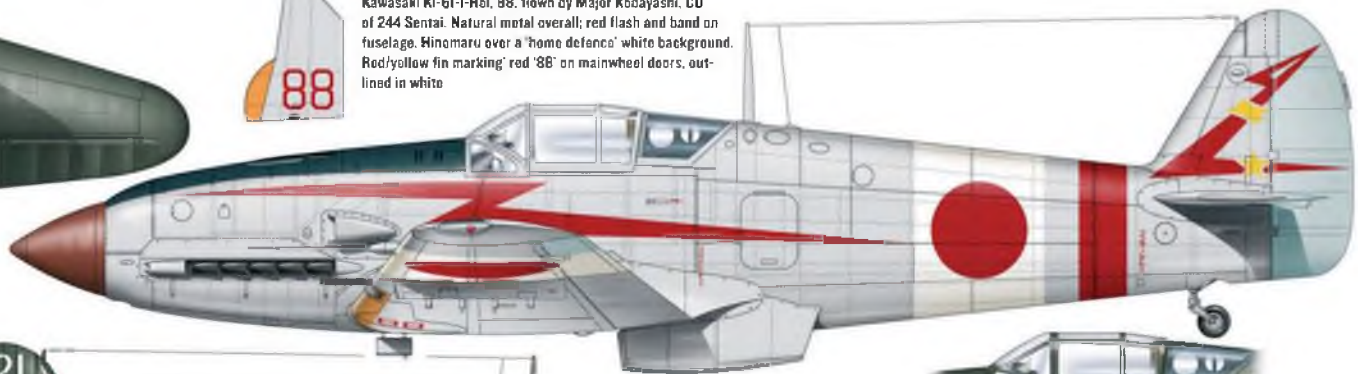
Left: Detail of 'do not walk' markings



Kawasaki Ki-GI-I-Hoi, 244th Sentai, 1945. Natural metal overall with black anti-dazzle panel; reddish-brown spinner. Red tail unit with white unit marking; red band and flash on fuselage. National markings over white bands



Kawasaki Ki-GI-I-Hoi, 88. flown by Major Kobayashi, CO of 244 Sentai. Natural metal overall; red flash and band on fuselage. Hinomaru over a 'home defence' white background. Red/yellow fin marking '88' on mainwheel doors, outlined in white



Kawasaki Ki-GI-I-Hoi, 21, 2nd Chutai, 39th Sentai. Dark green upper surfaces with natural metal undersides; reddish-brown spinner. Red/white unit marking on tail; '21' in white on rudder



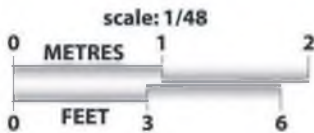
WARPAINT FOR THE KAWASAKI KI-61 HIEN



Kawasaki Ki-61-I-Otsu, 2nd Chutai, 68 Sentai. Natural metal overall with black anti-dazzle panel; dark green applied in streaks over upper surface areas. White band, outlined in red, and having red inscriptions around fuselage aft of cockpit; white band around rear fuselage. Unit marking in red and white; reddish-brown spinner



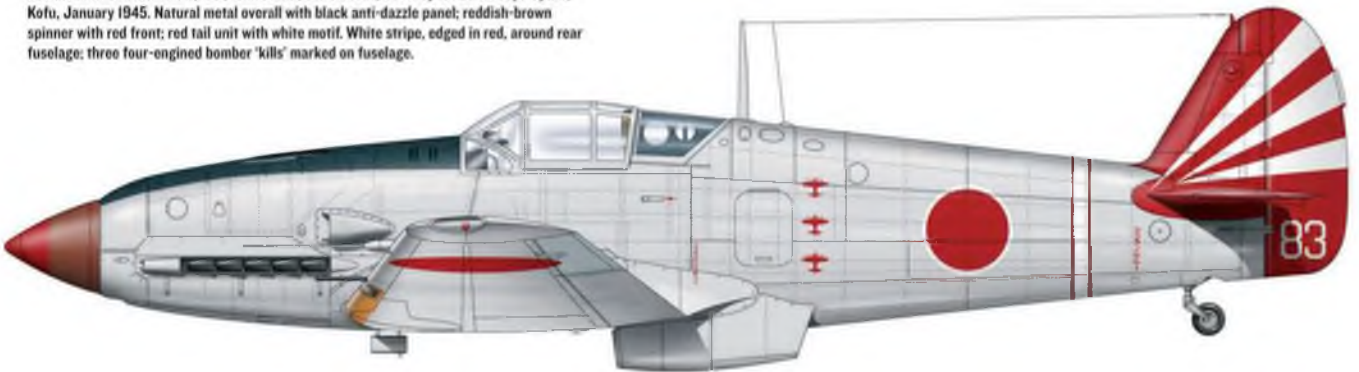
Kawasaki Ki-61-I-Hei 'Hien', HQ Chutai, 244th Sentai, Chofu (Tokyo), winter 1944-45. Natural metal overall with dark green mottling on upper surfaces; black anti-dazzle panel. Cobalt blue fin/rudder, spinner and flash on fuselage (the latter outlined in white; white 'home defence' bands underneath all Hinomaru (those above the wings not overlapping onto the ailerons). White rear fuselage band



Kawasaki Ki-61-I-Hei, 3rd Chutai, 19th Sentai, Okinawa, early 1945. Dark green upper surfaces with natural metal undersides; reddish-brown spinner; white rear fuselage band; yellow/white unit marking, '53' in white on rudder



Kawaskai Ki-61-I-Hei 'Hien', '83', 18th Sentai/6th Shinten, flown by 1st Lt. Mitsuyo Oyake, Kofu, January 1945. Natural metal overall with black anti-dazzle panel; reddish-brown spinner with red front; red tail unit with white motif. White stripe, edged in red, around rear fuselage; three four-engined bomber 'kills' marked on fuselage.



Kawasaki Ki-61-I-Kai-Hei, 23 Independent Chutai, Yontan (Okinawa), Spring 1945. Dark olive green upper surfaces, lightly sprayed over the rear fuselage, natural metal undersides; black anti-dazzle panel. Reddish-brown spinner; fuselage Hinomaru border in yellow. Red fuselage band; red/white tail motif



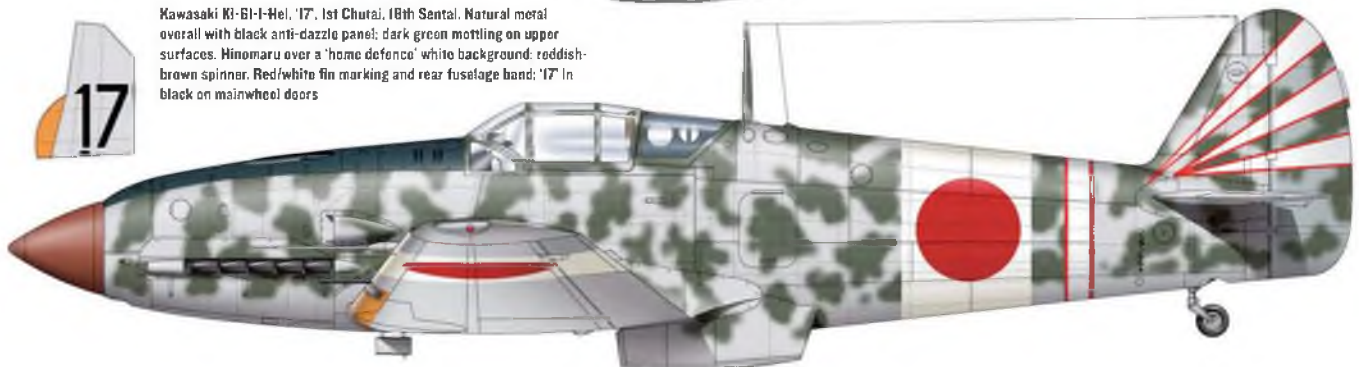
Kawasaki Ki-61-I-Hei, '21', 2nd Chutai, 39th Sentai. Dark green uppersurfaces with natural metal undersides; reddish-brown spinner. Red/white unit marking on tail: '21' in white on rudder. Victory markings on port side only



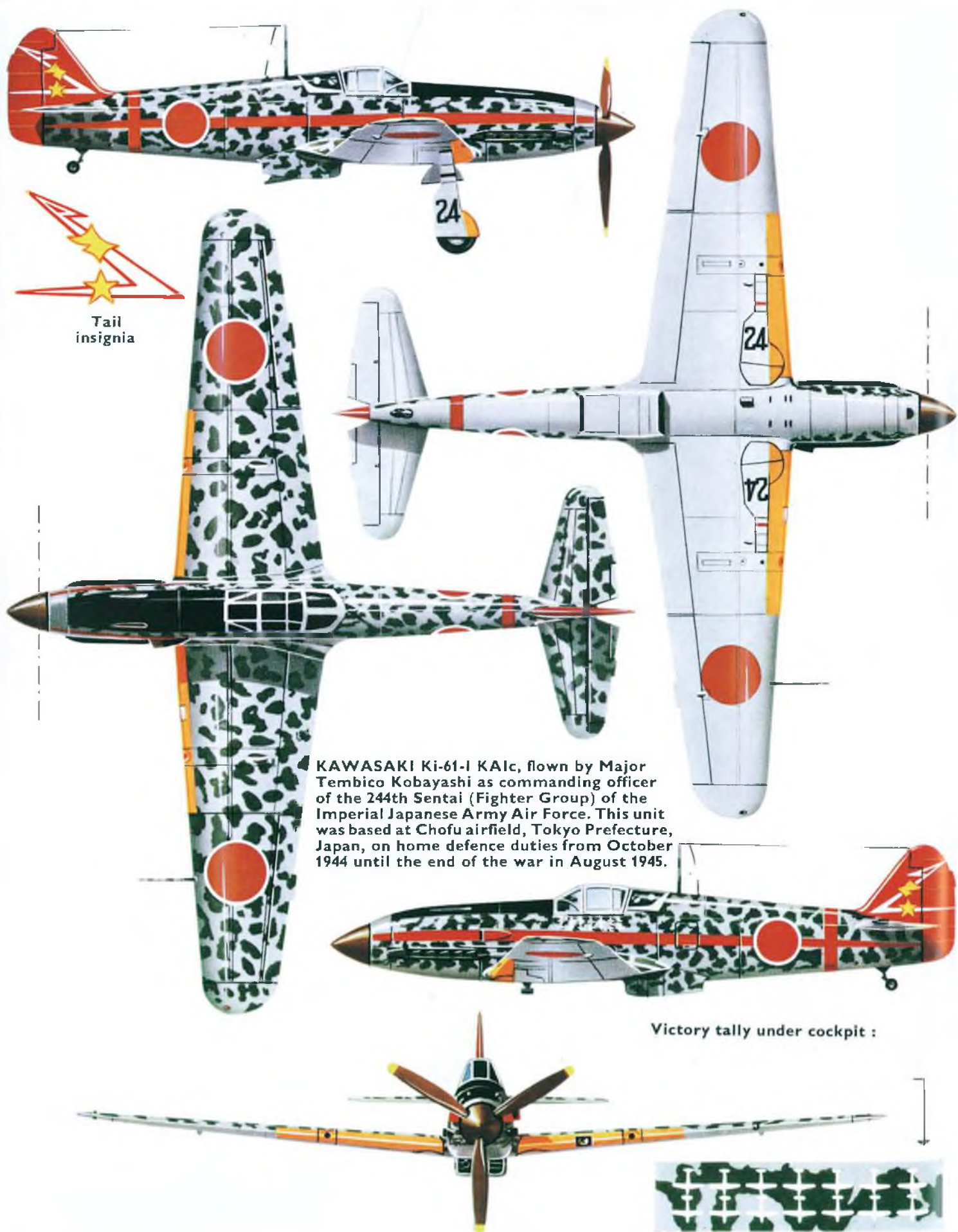
Kawasaki Ki-61-I-Hei, flown by Sgt Tadao Sumi, 2nd Chutai, 244th Sentai, Chofu, November 1944. Natural metal overall with black anti-dazzle panel; red flash and band on fuselage. Hinomaru over a 'home defence' white background; reddish-brown spinner. Red fin marking



Kawasaki Ki-61-I-Hei, '17', 1st Chutai, 18th Sentai. Natural metal overall with black anti-dazzle panel; dark green mottling on upper surfaces. Hinomaru over a 'home defence' white background; reddish-brown spinner. Red/white fin marking and rear fuselage band; '17' in black on mainwheel doors



WARPAINT FOR THE KAWASAKI KI-61 HIEN



Tail
insignia

KAWASAKI Ki-61-I KA1c, flown by Major Tembico Kobayashi as commanding officer of the 244th Sentai (Fighter Group) of the Imperial Japanese Army Air Force. This unit was based at Chofu airfield, Tokyo Prefecture, Japan, on home defence duties from October 1944 until the end of the war in August 1945.

Victory tally under cockpit :

KAWASAKI KI-61 'HIEN'

Known to its operators as the 'Swallow' and by its adversaries as the 'Tony', this was arguably Japan's most elegant fighter of the W.W.2 era. It entered service soon after the high-point of Japanese expansion and served until the bitter end in August 1945

When the Kawasaki Ki.61 first appeared in combat over New Guinea in the early months of 1943, it was entirely unknown to Allied forces and, at first, was assumed to be a licensed-built version of the Messerschmitt Bf 109E - not least because Allied intelligence indicated that such licensing had been contracted and in fact, two examples of the German fighter had reached Japan in the Spring of 1940, long before Japan entered WW2.

However, as the shape of the new Japanese fighter became more recognisable to Allied pilots, the intelligence view switched to the possibility of a connection with the Italian Macchi 202 Folgore which, like the '109,

had a Daimler Benz DB601 inline engine and in support of this supposed connection, the Ki.61 was given the Allied code name of 'Tony' - short for 'Antonio'. The connection with the Macchi 202 could possibly have been the similarity of the wing and fuselage nose section shapes.

Such supposition was however, well wide of the mark, for the 'Hien' (Swallow) was in fact an entirely Japanese product, although it did use a licensed built version of the Daimler Benz DB601, drawings and samples of which reached Japan at the same time as the examples of the Messerschmitt Bf 109E and the engine went quickly into production by Kawasaki at the Ha-40.

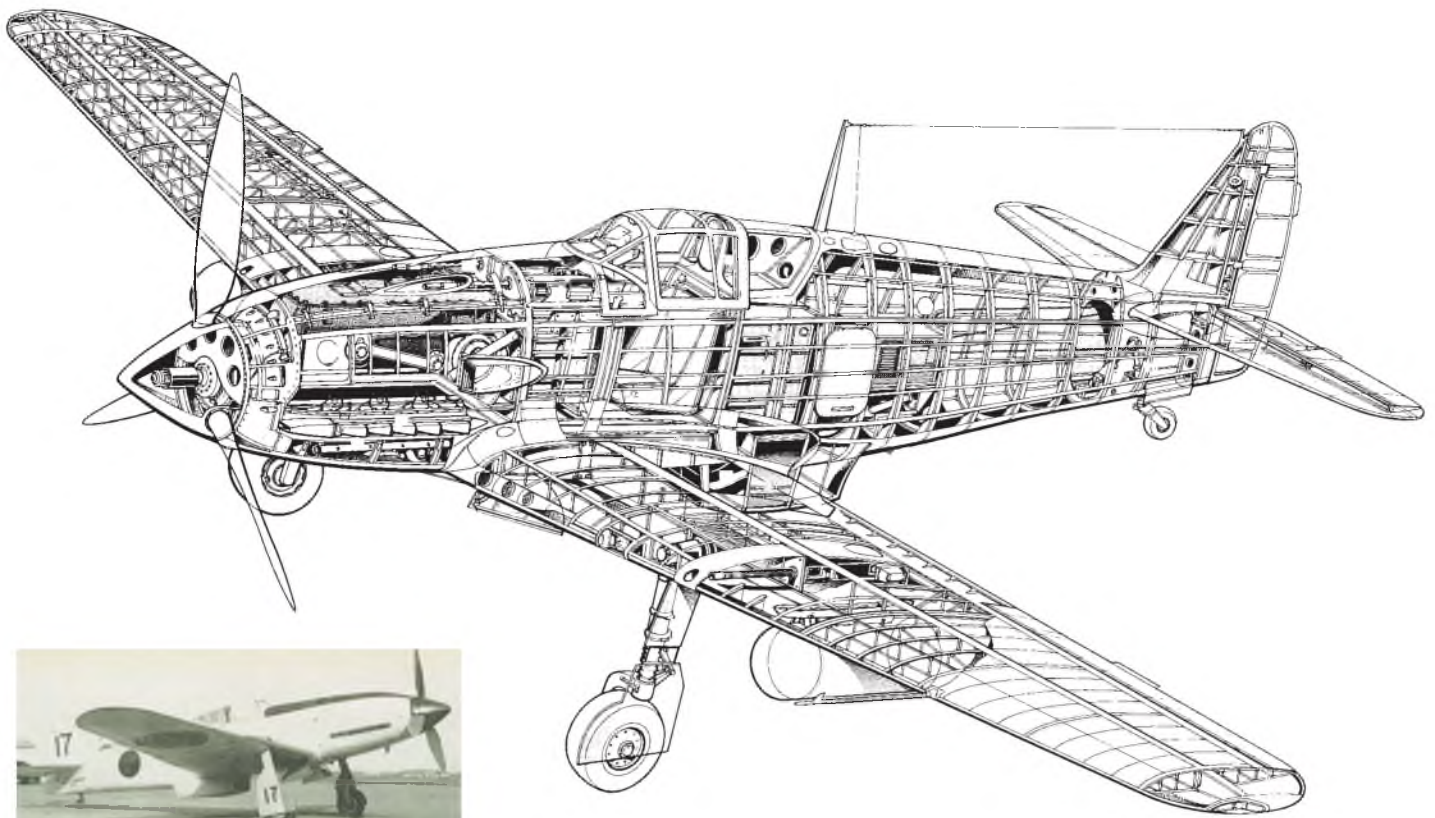
Kawasaki was an aircraft manufacturer

with origins that went back to the early 1920s with a design team that had been German led. Many of its line of fighter and bomber designs went against the general grain of Japanese aircraft specification in using liquid cooled in-line engines when most were wedded to the air cooled radial concept.

When Japan attacked Pearl Harbour on Oahu in the Hawaiian Islands in December 1941, Japanese fighter aircraft were structurally lightweight, without armour protection, self-sealing fuel tanks and were relatively lightly armed. The manoeuvrability this design formula imparted became an immediate headache for Allied fighter pilots, but for every problem, there's an answer somewhere and U.S., British and Australian

This is a 'Hien' of the 105th Sentai, photographed after capture on Okinawa in April 1945.





Although several thousands were built, only one example survives today. This is a Ki-61-II which was captured shipped back to U.S.A. It was finally presented back to Japan by the U.S. Air Force, where it was restored to mint condition for static display.

pilots in the South West Pacific combat area eventually learned to neutralise the nimble qualities of the Japanese A6M 'Zero' and Nakajima Ki.43s 'Oscar' with diving, hit-and-zoom attacks that avoided any tight turning combat, so that, by late 1942, air superiority in the Pacific theatre of combat operations began to turn in favour of the Allies.

Something different

From the outset, the Kawasaki design team set out to endow the Hien with greater speed than existing Japanese fighters, installing armour protection for

the pilot and self-sealing fuel tanks. Armament on the initial production versions, the Ki.61-I and Ki.61-II was no great advance on existing types, with two 0.5" (12.7mm) machine guns in the nose, firing through the propeller arc and two 0.303" (7.7mm) guns in the wings, but later versions soon had a far bigger punch in the form, at first, with imported German Mauser MG 151 guns in the wings and even later, with Japanese H0-5 cannon in both wing and nose positions.

The result, on service debut, was a machine that could dive fast and thus mix it with Allied fighters on more than equal terms, against such types as the Curtiss P-40, to regain air superiority. In turn, this led to the introduction, into the South West Pacific combat area, of the

Lockheed P-38 Lightning, previously reserved for the European theatre of combat.

To the bitter end

With a clear performance advantage over existing types in service with the Imperial Japanese Army air force, production of the 'Hien' was rapidly expanded, so that the aircraft saw service in much of the South West and central Pacific combat areas. As Allied forces gradually closed the ring on Japan, successive variants of the Ki.61 were met over the Philippines, Okinawa, Formosa and the Japanese home islands.

Initially, the 'Tony' generally offered good serviceability, but the liquid cooled engine had a tendency to overheat in tropical climates (as did other types in the combat theatre such as the P-39 Airacobra). However, degenerating production standards in Japanese industry led to airframe and engine deficiencies, the latter leading to problems of oil circulation and bearing breakdowns.

Development nonetheless continued. External drop tanks, one under each wing increased range by 300 miles (important for operations in the wide expanses of the Pacific area) and the Ki.61-II KAIa received an updated engine, the Ha-140 to produce the only aircraft in the Japanese Army inventory capable of successfully intercepting the high-flying Boeing B-29s that began to systematically



Airborne pictures of 'Hien's are rare. This one, a Ki-61-1b is a captured example evaluated in USA at Wright Field, Ohio, where it was matched against such US fighters as the P-51 Mustang.

ravage the Japanese home islands from late 1944 onwards.

However, it was the engines, or the lack of them, that finally brought production of the Ki.61 to a halt when, in January 1945, B-29 bombers all but totally destroyed the factory making the Ha-40 and Ha-140, and led to the metamorphosis of the aircraft into the Ki.100 by the expedient of taking engineless Ki.61 airframes and grafting on the air-cooled Mitsubishi Ha-112-II 14 cylinder radial to produce the most effective fighter that the J.A.A.F ever received during WW2.

The Ki.61 as a model

A quick glance at the scale drawings of the 'Tony' in this issue will immediately reveal a first class layout for a good-flying model. There is a long tail moment, quite lengthy nose and the wing offers adequate area and relatively high aspect ratio, which should impart good glide characteristics for landing approach.

The main undercarriage has a very wide track and, as with most Japanese WW2 fighter types, the main legs have none of the forward/backward rake so characteristic of Allied types like the Spitfire, Hurricane, Mustang and Me 109, avoiding the installation problem of the dual-angle set-up to achieve forward rake when the undercarriage is down and backward rake when retracted into the wing. It is also worth noting that later versions of the Ki.61 had a fixed, non-retractable tailwheel.

Japanese fighter squadrons (Sentai) that operated the 'Hien' had some quite flamboyant colour schemes imposed over the basic camouflage which go towards the appearance of a very attractive, sleek aircraft, well worthy of modelling. ■



ABOVE & BELOW: Two views of Ki-61s with Chinese insignia and operated by Nationalist forces prior to the advent of the Chinese communist era.



BELOW: Nearly 400 Ki-61-I 'Hien' were with the installation of a Mauser MG 151 20mm cannon in each wing to improve the 'punch' necessary to be effective against well protected Allied fighters and bombers.



A Ki-61 of the 37th Sentai in overall natural metal finish, with unit markings on the fin and rudder, plus anti-dazzle matt black panel on the nose section, ahead of the cockpit.



THE QUIET ZONE

R/C SCALE ELECTRICS WITH
PETER RAKE

Here we go again, another helping of electric flight nonsense. Now, for those of you who were expecting details of more helicopters,

you should know better than to expect anything too definite from this column. So, as they say on the TV, in a change to our scheduled programme, instead of flying egg whisks, we have a rather nice little

profile scale model for you.

Don't get all up in arms about this having appeared before because it hasn't - very similar yesmodel, but not this particular model. I gave up on this type of model when the supply of very thin foam ran out and I became disenchanted with the (then) currently available radio gear. However, since I've recently discovered how to produce suitably thin foam myself and some much better radio gear. That being the case, it was time for a rethink about these models and what you see here is the result.

CUTTING IT UP

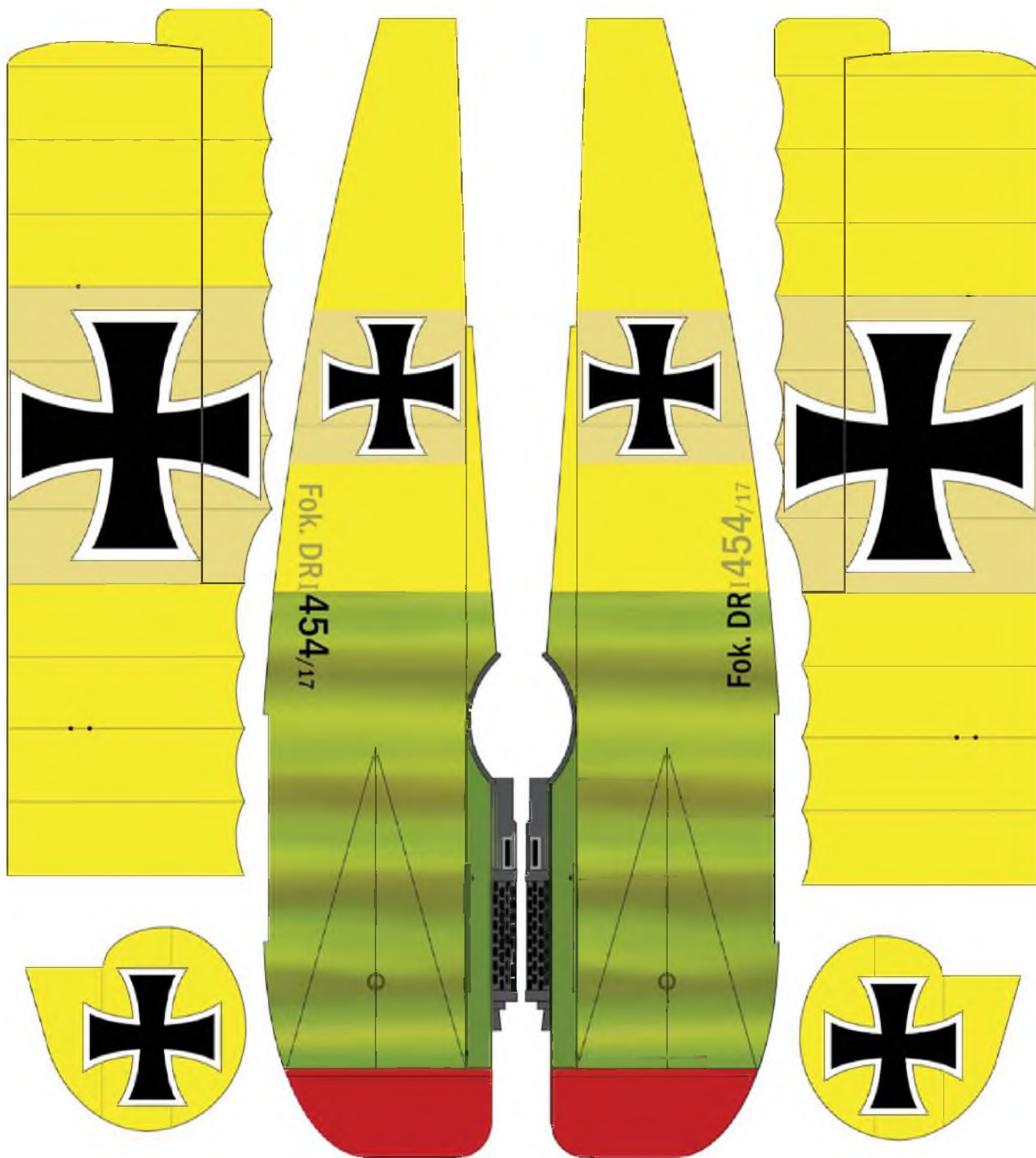
The foam I've been using is a lightweight variant of Depron called *Depron Aero*. Listed as being up to 20% lighter than standard Depron, it seemed promising, but the availability in sheets no thinner than 3 mm was somewhat less promising. The simple solution, of course, was to slice the foam to a thickness that was of use to me. A dead simple cutting jig, consisting of a flat board with strips of 1/32" ply glued to it was made up and with the use of my trusty cutting bow, the one sheet of 3 mm foam quickly became two sheets of thinner foam. One just under 1 mm thick and the other a little over 1mm. As luck would have it, or maybe there was a plan behind what I was doing, both sizes work rather well in my printer which I used to apply the colour scheme.

One effect of the cutting process is that the foam curls slightly, but a gentle sanding of the cut surface will soon result in a virtually flat sheet of foam again - one with two nice smooth surfaces.

WITH THE INDOOR FLYING SEASON WELL UNDERWAY NOW, PETER RAKE OFFERS FULL SIZE PLANS FOR A QUICK ROUTE TO CLUB-NIGHT FLYING SESSIONS WITH HIS PROFILE SCALE DEPRON FOAM FOKKER DR.1

Never more than five feet from the walls the little profile scale Fokker Dr.1 cruises gently around. At just 9.3 grams flying weight, it isn't likely to do much harm if you do hit a wall. It's a slow flying model well suited to flying in a confined space. It is easy to build and great fun to fly - even outdoors on VERY calm days.





IN PRINT

Before going any further with this section I must point out that the foam I'm using appears to have a release agent of some description on its outer surfaces. So far nothing I've tried will remove it but all is not lost. The foam prints very well on the cut and sanded surface provided you treat said surface first. To keep this really simple, the treatment I used is nothing more technical than a couple of coats of firm-hold hair spray applied and allowed to dry. Ink doesn't like bare foam, but with the hair spray to 'key' into, it goes on very well indeed. You have the graphics presented here to scan and use, but I'm quite happy to supply the pdf files for

anyone that would like them.

You don't need a special printer for this. Mine is an Epson 90 degree feed job and that works just fine. 180 degree feed types are likely to cause problems with the thicker sheet, but might well work with the less than 1 mm thick sheet.

BUILDING OUR MODEL

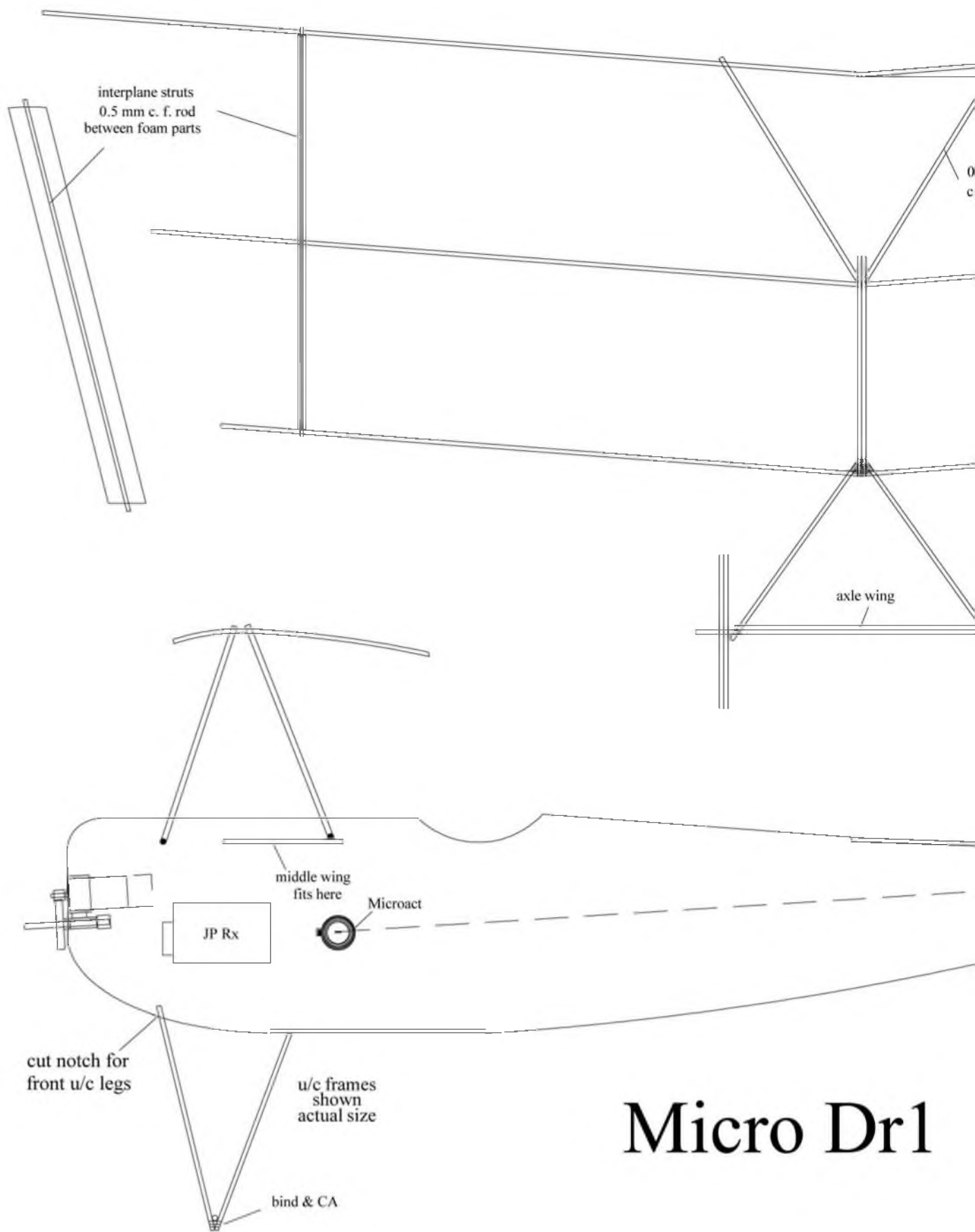
There really is nothing particularly complicated about building these little profile scale models. I use RC Modeller's Glue to join the laminated fuselage, strut and rudder parts. CA for the carbon-to-carbon tabs and Uhu Por for just about everything else.

I started by making up a series of

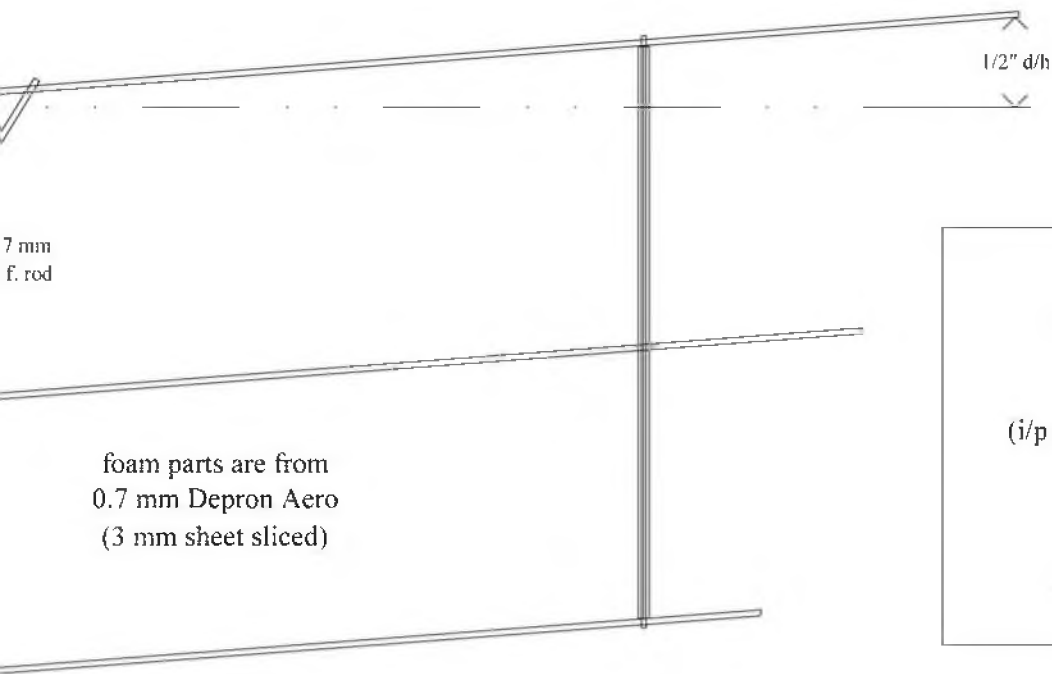
sub-assemblies. One side of the fuselage parts had narrow strips of *Blenderm* tape applied to the inner face as the hinges and the matching half of rudder hinged before applying a thin coat of glue and attaching the opposite sides.

The interplane struts have lengths of 0.5 mm carbon rod glued between the laminations. The ends of these will glue into the top and bottom wing panels.

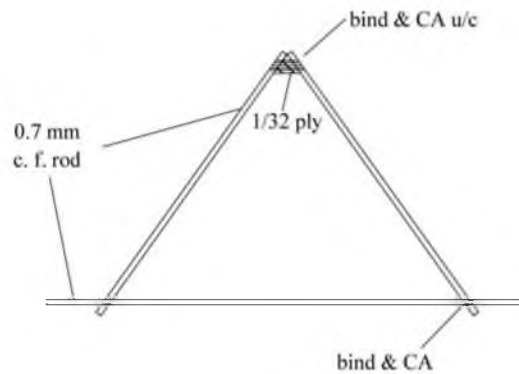
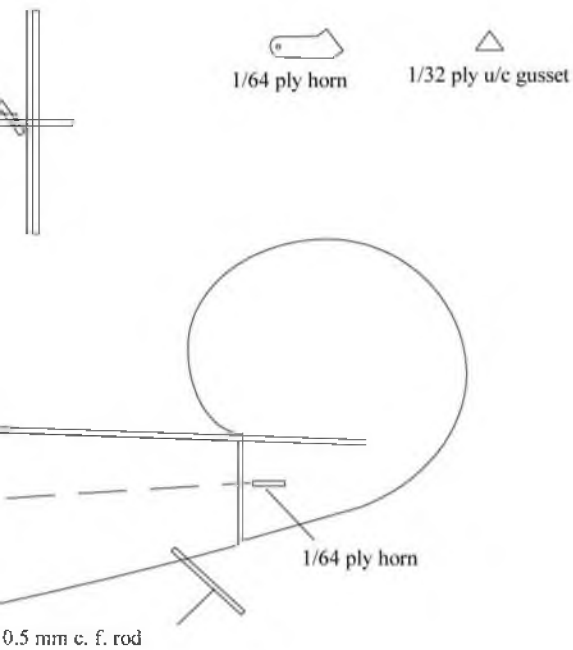
The top wings are drawn over the edge of a table or worktop to induce the desired curve, have their centres trimmed for dihedral and are glued together using *Uhu Por*. For this task, use it as an 'impact' adhesive. Apply a thin coat to each part, allow it to almost dry and CAREFULLY bring



Micro Dr1



- materials**
- 0.7 mm c.f. rod - 19"
(c/s struts & u/c)
 - 0.5 mm c.f. rod - 14"
(i/p struts, pushrod & tailskid)
 - brass wire - 1.5"
(pushrod ends)
 - 1.5 mm heat shrink - 1"
(pushrod ends)



FITTING WINGS

- Glue bottom wing to assembled fuselage
 - Glue interplane struts into middle wings
 - Glue middle wings into fuselage & struts to bottom wing
 - Glue top wing to interplane struts
 - Cut to length and fit c/s struts in situ
- Don't join middle wings before this stage

the two panels together at the correct dihedral angle. I stress the carefully bit because you only get one shot at it, since the glue grabs and holds as soon as it touches. The lower wings are joined in a similar fashion, but without the induced curve.

Once the interplane struts are dry, glue them into the slots in the centre wing panels at the correct angle - the printed on brackets show the angle quite clearly. Do not, under any circumstances, join the centre wing panels or you won't be able to fit them to the fuselage.

Make up the two undercarriage frames over the plan, binding the ends with thread and soaking it in CA to harden the binding. Now glue the front legs to the ply gusset, bind with thread and again coat

with CA to harden.

Bind and glue in the axle and then trim to size and fit the axle wing. I opted for fixed wheels, simply glued on with *Uhu Por*, but you're quite welcome to bush them with aluminium tube and make them functional.

GETTING IT TOGETHER

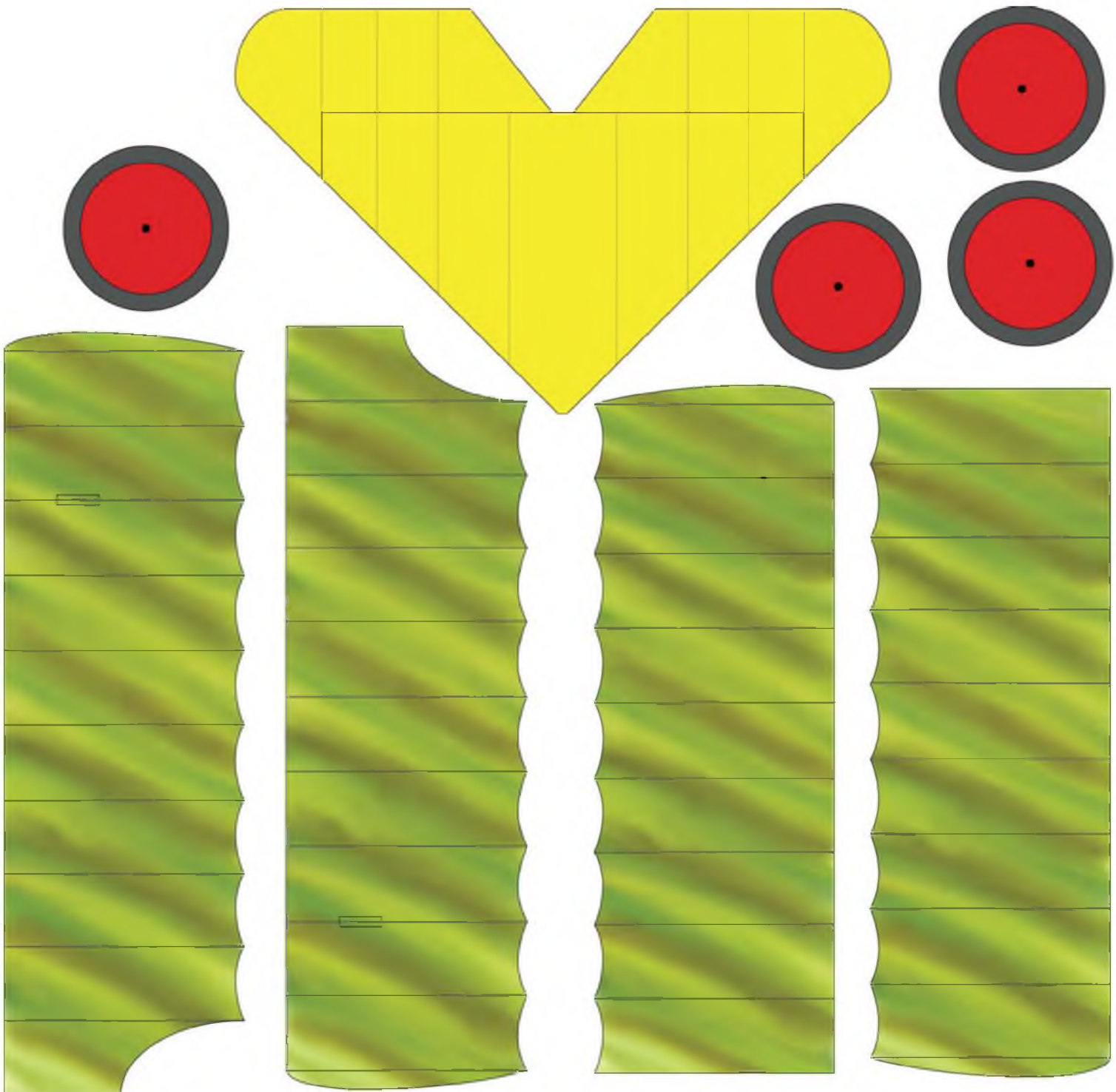
Begin by fitting the bottom wing to the model with *Uhu Por*, then add the undercarriage so your model can stand safely while other parts dry.

Make a cut-out for your chosen motor unit (I used a Nano Stik item) and glue that in place with a little right side thrust. The wires on the Nano Stik motor are quite short, hence the angle at which my receiver (Nano Stik again) is mounted.

Use a sharpened piece of tube to make holes for the battery lead and *Plantraco Microact* and fit the control horn pushrod and actuator while you still have lots of open space in which to work. My pushrod is 0.5 mm carbon rod with brass wire ends secured with heat shrink tube and a spot of CA.

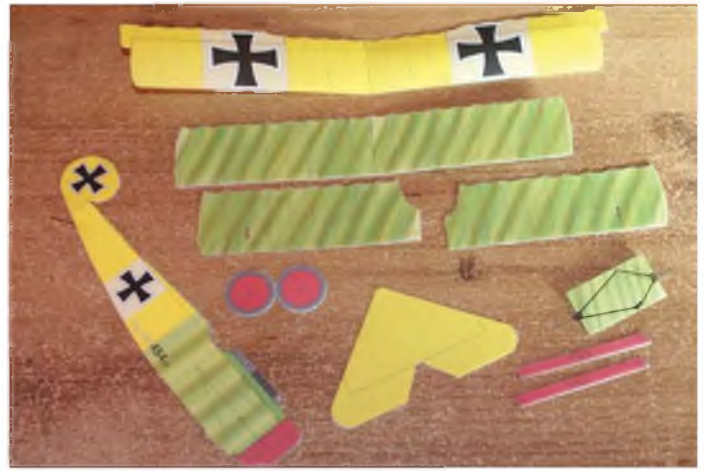
Now it's time to fit those centre wing panels. Glue these into the fuselage slot and glue the lower interplane strut stubs into the holes in the lower wings. Tweak for alignment and allow to dry. While you're about it, and now you have something with which to align it, you may as well fit the tailplane.

Right, now we come to the technical part, fitting the top wing. Glue that onto the interplane struts, check that it aligns





Hardly high tech but this simple foam slicing set-up works well.



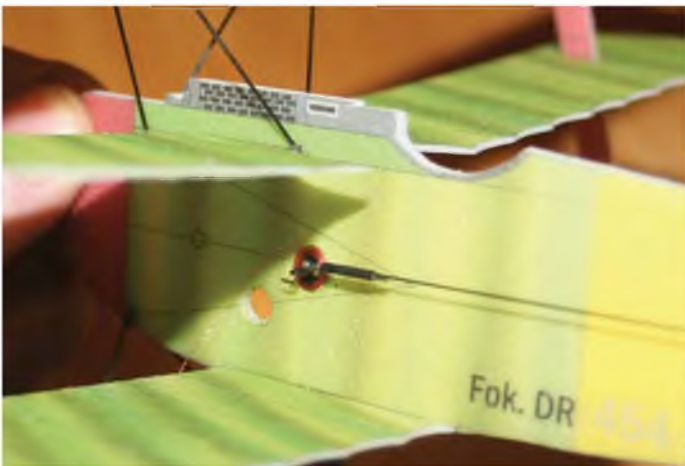
The basic sub-assemblies all ready to begin the real assembly process.



How the carbon rod is trapped between the i/p strut laminations to provide locating stubs at top and bottom.



The u/c is assembled from 0.7 mm carbon rod, bound and glued using thread and CA. Uhu Por secures the axle wing.



Here you see how the Microact fits, along with the brass wire ended pushrod. Remember it's a magnetic actuator, so don't use steel wire.



The 1/64 ply control horn is more than adequate for a model of this type. Here you are allowed to use a steel wire pushrod end.

correctly and allow to almost dry. Ensure you have equal dihedral on all three sets of wings, make up the entire section struts in situ and glue them in place. Some fool didn't notice his centre section struts were a little short until AFTER the glue had dried, so I have slightly more dihedral on the top wing than on the others.

Fit the receiver (a small spot of *Uhu Por* secures it nicely) and decide how you intend to retain the battery. Some like Velcro, but I prefer to use a small magnet let into the fuselage because you can slide the battery off that, rather than having to lever it away from the Velcro. Whichever method you choose, try to get

the battery in the correct position to roughly balance the model.

A few test glides over a suitably soft surface (onto the bed?) will determine just how much nose weight you need and where it needs to go. THAT'S where you position the battery. A Nano Stik battery works fine on my model, but use whatever size battery you need to get a decent glide. I'd probably draw the line at a 12 volt car battery though because you've obviously done something very wrong.

FLYING

Just bear in mind that this is a two function model, intended to waft gently around.

You use throttle to ascend or descend and the rudder prevents you flying into walls, spectators or other flyers. The model will fly nice gentle figure eight patterns, left and right circuits and is generally great fun to simply stooze around in a sort of radio-interrupted free-flight fashion. It's a model to relax with, but still capable of being fun. To this end, the plan indicates the option of using a *Vapor* style motor in the Nano Stik gearbox. Just a little more power for those who feel the need.

If you'd like those pdf files, or want to contact me for any other reason, you'll find me at PETERRAKE@aol.com ■

MILES GEMINI

Alex Whittaker admires yet another scale masterpiece from the secretive 'Spartacus'



The Miles Gemini model featured here is 118" in span, weighs 39lbs (which is light for its size), and was originally powered by two Super Tigre glow motors. The Gemini is a

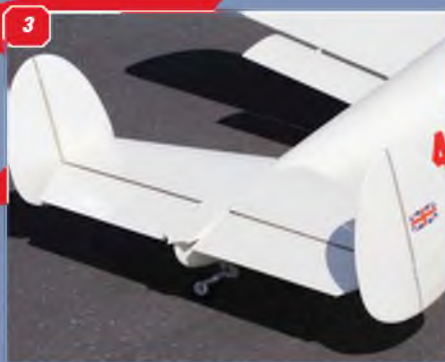
criminally under-modelled scale subject. Older readers will remember Dr Jeremy Shaw's famous Gemini, which was a good bit smaller than the example featured here. Noted scale man Duncan Hutson

also produced a well known and very pretty Gemini.

The example reviewed here is currently under the custodianship of noted scale modeller Steve Woodhead. However, it is



There are not many twins with gull-wing doors.



1: Original Super Tigre ST 2500 glow installation with in-cowl dustbin silencer. **2:** The engine nacelles are quite slim, so the sidewinder mounted engine cylinder head protrudes. **3:** Tail treatment is distinctively Miles. **4:** The later Aries variants had bigger fin and rudder volumes than this Gemini. The model's tailwheel had to be tweaked to overcome ground-looping. **5:** Trailing edge flaps produce a slight nose down attitude on deployment. **6:** It is instructive to compare the relative areas of the aileron and flaps.

on long term loan from the secretive (and reclusive) 'Spartacus'. He is one of the United Kingdom's very best - and most celebrated - large scale model builders, but he is famously elusive and prefers to keep out of the limelight.

Over the years, FSM has featured a number of models that Spartacus has designed and built (often with assistance from Chris Peers). These include his celebrated Miles Messenger, Fairey Firefly, and Percival Proctor. In fact, Spartacus

conceived his Miles Messenger and Miles Gemini as a 'Display Double' for the summer shows. Both airframes display similar Spartacus design features and building techniques.

Construction

Spartacus uses only traditional building techniques, preferring an all-wood construction, plus the addition here and there, of hand-made GRP moulded components where required. The Gemini

uses rolled ply in the fuselage to deliver its distinctive scale appearance. However, the prominent nose cone is not a GRP moulding as might be expected, but is built-up from balsa wood and ply. However, the undercarriage doors are GRP.

Canopy and cabin doors

The canopy mould plug and cabin windows was carved from block balsa, and then the transparent sheet plastic was heated, and hand drawn over the



plug to form the shape. There is a lot of scale detail work in the opening gull-wing doors.

Undercarriage

Much of the sturdy metal scale retracting undercarriage, complete with dampers and shock absorbers, was fabricated on a Myford ML7 lathe, and a milling machine.

Wheels

The 4.5" wheels originally applied were Sullivan Skylites, with home-made scale hubs. Later, DuBro solid types were used.

Engine

The Gemini was originally fitted with twin Super Tigre 2500 glow engines. Steve Woodhead replaced these with his preference for twin Zenoah 25 petrol engines that deliver more power.

Exhaust

Steve modified and fitted twin Zenoah 38 exhausts which are smaller than Zenoah 25 units, and which fit within the cowl, thus avoiding non-scale pretruberences.

Props

In its Zenoah powered state, the model uses twin 18"x8" propellers.

Radio

Steve uses Futaba 2.4GHz radio with seven servos.

Painting and finishing

The model has a traditional dope-and-tissue primary surface finish, with many coats of sanding sealer and lashings of



7: The Gemini has interesting glazing, all neatly executed. 8 & 9: You get some idea of the work in the gull-wing doors from these shots. Note scale catches and door handles. 10: Pilot in the office with full seating.

intermediate sanding down. The final surface finish is Flair enamel paint, which was then fuel proofed and sealed with Ronseal Satin Varnish which provides just sufficient 'flattening' to kill that 'sticky-surface' effect. This was thinned down and sprayed on. Since the prototype is an

all-wood airframe there are not much rivet detail save those on the cowling.

Ground looping

As seems to be the case with other R/C model Geminis, this one was originally prone to ground looping. This

The unique look and stance of the Miles Gemini endears it to many scale modellers.



11



11: Substantial metal work was required for the undercarriage. **12:** Home lathed and milled retracts. The substantial drag links are clearly apparent. **13:** Interesting trademark tail fairing set above the low-drag tail cone.

problematical trend was traced to two causes; slightly binding main wheels, and the scale-position, forward-set tailwheel. The main wheels were changed as above, and the tailwheel geometry subtly altered, which effected a cure.

Flying notes

Spartacus conducted his own test flights at Langar airfield, with later flights at RAF Scampton. After the flying qualities of the model were proven, the Gemini was

loaned to Steve, long-term, by a very generous Spartacus. Steve later re-engined her as previously noted.

Steve reports that she now flies like a trainer on low throttle and a WWII fighter on full power, with no shortage of power at all. Aileron response is very positive, though she needs a touch of top rudder on the steeper turns. Spartacus is famous for the accurate scale 'slit' of his models in the air, plus their correct attitude when flaps are applied on final approach. This is

12



13



*The elegant Miles Gemini first flew in 1945.
By 1947 the Company was finished.*





The distinctive layout of the Miles Gemini can be seen in this shot. Note generous wing area.

to down the well thought out incidences and rigging angles built into the model, and nothing to do with any superficial transmitter mixes. In fact, Spartacus uses simple Y-leads to drive the ailerons and flaps, one channel for each function.

Steve reports that the Gemini is very happy on half throttle and approaches are slow and controllable all the way down. She has a substantial amount of wing area and is not prone to stall. Steve says she is the nicest twin he has ever flown. Readers may remember that Steve

and his father Robin have produced a number of noted twins of their own design over the years, including their DHC Caribou and their Grumman Tigercat.

New colour scheme

Over the 2014/2015 winter building period, custodian Steve is re-finishing the Gemini in new colours. She will be repainted with a predominantly red scheme with a white turtle-deck. This will be the sort of high visibility orangey-red one sees on many Cubs. ■

MODEL SPECIFICATION

Wingspan: 118"
Weight: 39 lbs
Engine: 2x Super Tigre 2500 glow
Props: 2x 18"x8"
Exhaust: Super Tigre
Retracts: Home made by Spartacus
Wheels: Sullivan Skylites 4.5"

NOTE:

The Gemini was re-engined by Steve Woodhead after her first flights with 2 x Zenoh 25 petrol engines. These are fitted with modified Zenoh 38 exhausts. Steve also swapped the original Sullivan wheels for new Dubro solids.



Spartacus achieved an impressively low flying weight with traditional techniques despite a wingspan of 118".

LEADING PARTICULARS

Wingspan	36ft 2in
Length	22ft 2in
Wing area	191.2 sq ft
Wing incidence	
Root	2 deg
Tip	1 deg
Tail incidence	-1 deg
Fin toe-in	1.5 deg
Nacelle tilt	7 deg inwards
Max Speed	146 mph
Cruising Speed	131 mph
Stalling Speed	35 mph (flaps & u/c down)

wing root slat

Root: NACA 23012

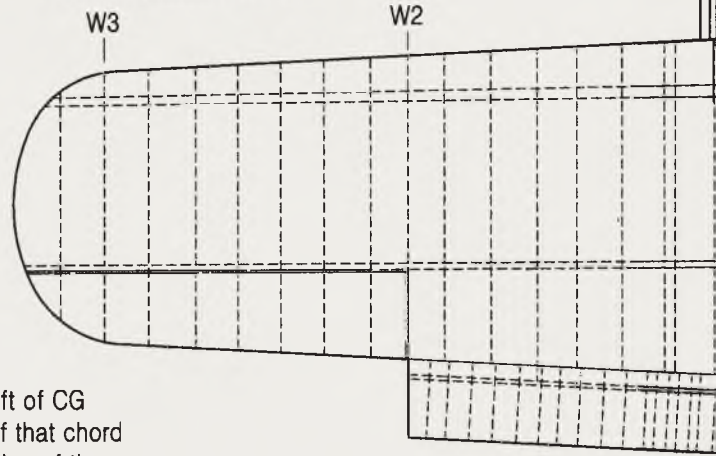
WING AEROFOIL SECTIONS

Tip: NACA 2412

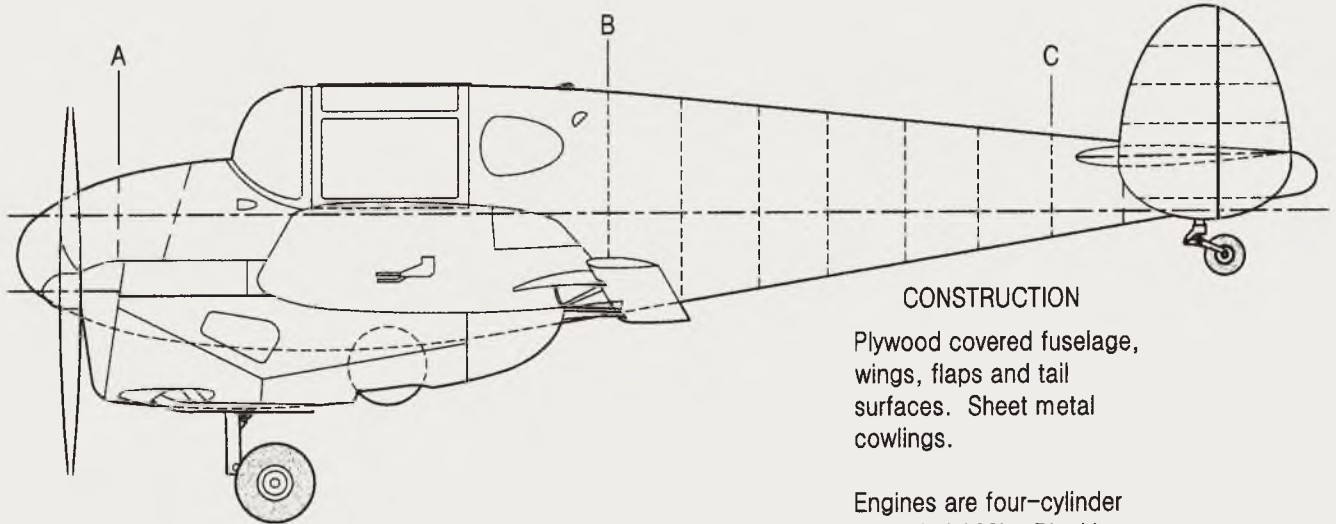


Aerofoil TE underside is canted from wing root out to W33

Aileron lower surface retains normal aerofoil shape



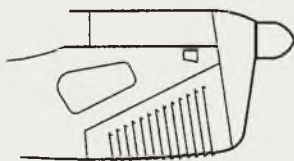
CG range: between 23.3 in and 28.6 in aft of CG datum point, which is defined as the LE of that chord of the wing which is 24 in from the centreline of the aircraft.



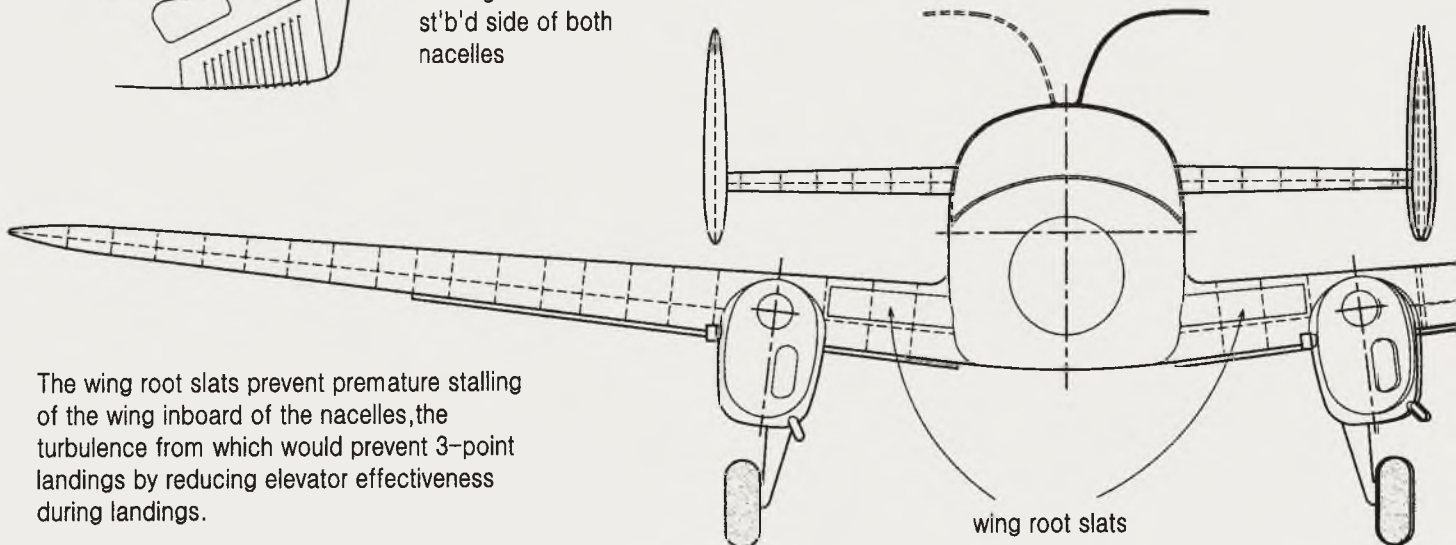
CONSTRUCTION

Plywood covered fuselage, wings, flaps and tail surfaces. Sheet metal cowlings.

Engines are four-cylinder aircooled 100hp Blackburn Cirrus Minor II driving fixed pitch wooden airscrews.



cooling louvres on st'b'd side of both nacelles

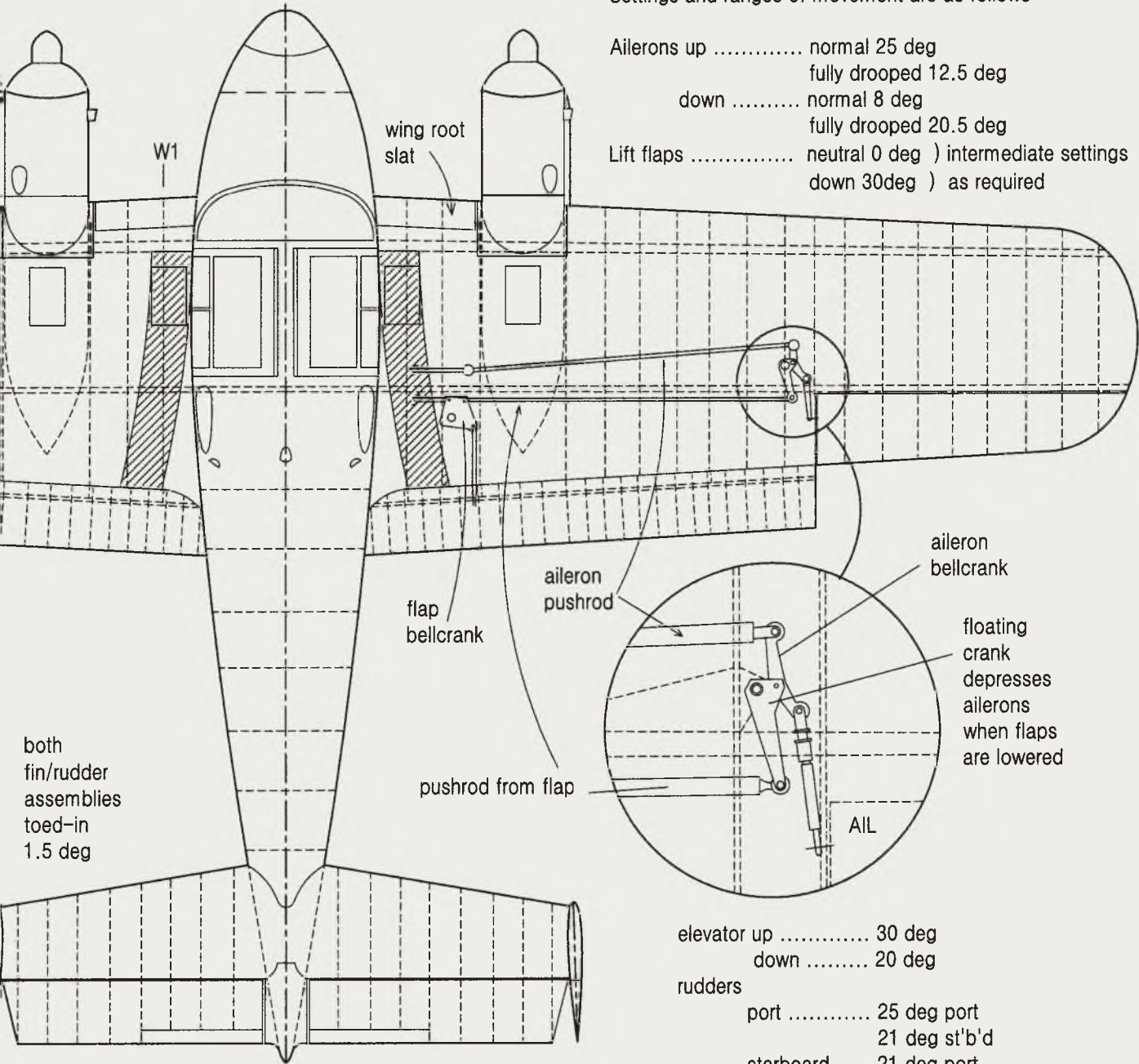


wing root slats

The wing root slats prevent premature stalling of the wing inboard of the nacelles, the turbulence from which would prevent 3-point landings by reducing elevator effectiveness during landings.

Note that ailerons droop when flaps are lowered for landing.
 Settings and ranges of movement are as follows:

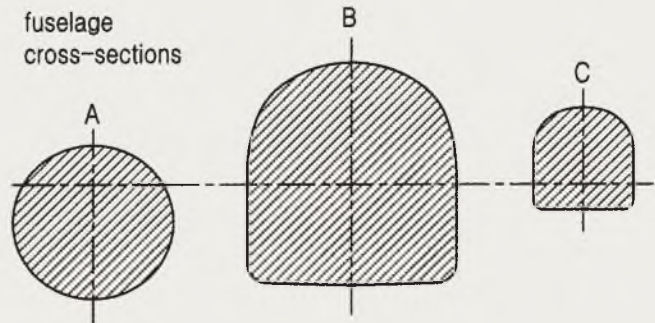
Ailerons up	normal 25 deg	fully drooped 12.5 deg
down	normal 8 deg	fully drooped 20.5 deg
Lift flaps	neutral 0 deg) intermediate settings down 30deg) as required



elevator up 30 deg
 down 20 deg

rudders
 port 25 deg port
 21 deg st'b'd
 starboard 21 deg port
 25 deg starboard

fuselage
 cross-sections



MILES M-65 GEMINI 1A



MILES M.65 GEMINI

A study of Gemini Mk.1a G-AKKH hangared at the Shuttlewoeth Collection, Old Warden.



1: Detail of curved side-strake, on the fuselage, below and ahead of the windscreen. **2:** Head-on view of the nose section and windscreen. **3:** Fuselage forward section, also showing the wing leading edge slat, between the fuselage side and the engine nacelle.





4: Engine exhaust pipe, exits below the engine nacelle. **5:** Close-up of the fairing shroud at the exhaust pipe exit. **6 & 7:** Two views of the front of the engine nacelle. Note that the engine exhaust pipe is offset from the centreline to clear the main undercarriage. **8:** The open well in the bottom rear of the engine nacelle fits the main undercarriage wheel in the retracted position. **9:** further view of the engine nacelle rear section. **10 & 11:** Two views of the lower front of the engine nacelle showing the fixed air-exit gills.

12: Further view of the lower rear engine nacelle, showing the perforated exhaust stack, panel lines and wheel well.

13 & 14: Rearward retracting main undercarriage leg and wheel.

15: Further view of the main undercarriage wheel.

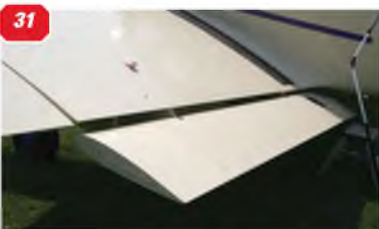


16 & 17: Central rear fuselage fairing between the elevators. 18: Elevator trim tab. 19 - 22: Fuselage cabin window detail and windscreen. 23: View over the wing showing the fuselage-to-wing fairing.





24: Aileron on fully skinned wing. **25:** Wing tip aileron hinge, viewed from below. **26 & 27:** Wing root, showing the cabin access tread plates left and right, plus the wing fairing. **28:** Pitot head on left wing undersurface. **29 & 30:** Two more views of the wing leading edge slats between the fuselage and engine nacelle. **31:** Wing flap, in the 'up' position. **32:** Left wing flap viewed from wing underside, showing the outer hinge and a further view of the pitot head. **33:** Right wing flap, showing both hinges and the flap drive arm.



34: Fin and rudder. Note that the hinge line is not 'cuffed'. **35:** General view of the tailplane and fin/rudder. **36:** The non-retracting tailwheel unit.



MILES M.65 GEMINI

The last hurrah of the original Miles Aircraft Ltd, was the succesful and attractive twin engine four seat tourer, with an elegance of shape that cries out for more attention among scale modellers

At a glance, one might be tempted to assume that the Miles Gemini was basically a twin engine Miles M.38 Messenger (see FSM January 2013) and indeed, the basic shape and layout of the Gemini has undeniable similarity - but the latter was a new design.

Conceived as a four-seat light touring aircraft, the Miles Gemini twin first flew on the 26 October 1945, the prototype being powered by two Blackburn Cirrus Minor 2 engines.

Large-scale production commenced almost immediately at Miles' Woodley, Reading factory, the first Company

demonstrator example G-AIDO receiving CAA certification in August 1946 as a Gemini 1a. It was of plastic-bonded wooden construction and had a retracting undercarriage that folded rearward into the bottom of the extended engine nacelles.

The pretty Gemini was sold as 'The Safest



With photographs from the Richard Riding Archive

Light Aircraft In The World', referring to its twin engines. Large scale production turned out 130 Geminis in the first year, proving popular with customers. However, the Miles Aircraft Company had deep-seated financial problems and ceased trading in 1947. At the time of the Company's collapse there were eight Gemini airframes in various stages of completion, which were later assembled by Handley Page (Reading) Ltd. (2), Wolverhampton Aviation (5), and F G Miles Ltd. (1).

Private owners used the Gemini in its intended role as a safe air-tourer, but soon, some owners were racing them. G-AKDC won the 1949 Kings Cup Air Race. Some were used for charter work and others were pressed into light business transport by the likes of Shell-Mex and BP, and Fairey Aviation.

A variety of engines

Initial variants of the Gemini 1, the A and B all used the 100 HP Blackburn Cirrus Minor 2, except for the one-off Gemini 1A Special which had the 130 HP Lycoming O-290-3/1, while the Mk.2 had the 125 hp Continental C-125-2.

Mks. 3, 3A, 3B, and M.7 had various de Havilland Gipsy Major engines while the final Mk.8 had 155 hp. Blackburn Cirrus Major 3.

In all, 170 were built in the first



Air-to-air of first production Miles Gemini G-AIDO, with retractable undercarriage. Flown as the company's demonstrator it was sold in Sweden in 1952 as SE-BUG.



Flight magazine's (Iliffe & Sons) Miles Gemini 3A (1947) G-AKHC (Gipsy Major 10s)



Air-to-air of Fred Dunkerley's 1947 extensively raced Miles Gemini 1A G-AKKB. (Blackburn Cirrus Minor 2s).



Cream and red prototype Miles Gemini G-AGUS with temporary fixed undercarriage. First flown in October 1945 by George Miles from Woodley, nr Reading, it was sold in Sweden as SE-BUY in 1952 but was written off there in November 1953.

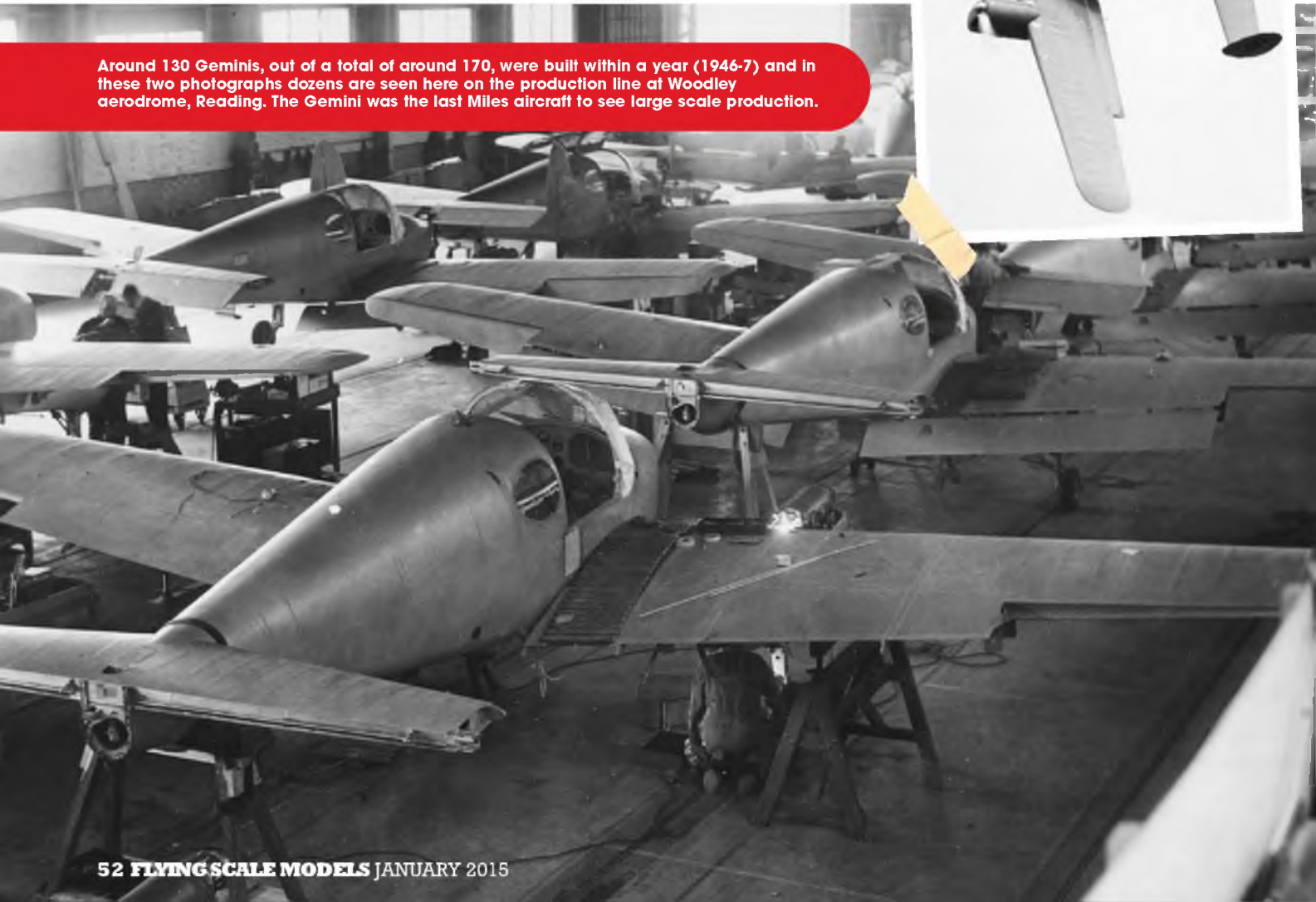
production run, with the last two variants being completed in 1951 by FG Miles Ltd. These distinct types had Blackburn Cirrus III engines, and were fitted with taller enlarged fins, and bigger rudders, then were designated Miles M.75 Aries.

Operational history

The aircraft was popular with private

owners for touring throughout Europe and many were exported to Australia, New Zealand, South Africa and other Commonwealth countries. However, in Australia, 21 September 1962 was a black day for the Miles Gemini, when the Australian Minister for Civil Aviation announced restrictions on eight aircraft types with certain types of wooden

Around 130 Geminis, out of a total of around 170, were built within a year (1946-7) and in these two photographs dozens are seen here on the production line at Woodley aerodrome, Reading. The Gemini was the last Miles aircraft to see large scale production.



Ernest Crabtree racing his 1947 Miles Gemini 1A G-AKEG. It was converted to a 3C in 1958 and withdrawn from use in 1963



construction, because of deterioration of the glued joints which used synthetic resin glues.

Effective immediately, these aircraft types, which included the DH94 Moth Minor, Miles Gemini/Aries, Messenger and Mercury, and Percival Proctor Mk.V were restricted to Private Category operations and limited to owner/pilot operation and without passengers. Certificates of Airworthiness were subsequently withdrawn on 31 December 1963.

The decision had been taken following the investigation into the structural failure in flight of a Proctor 5 and the evidence that this aircraft had been well-maintained and hangared most of its life.

In the late 1940s and early 1950s they were frequently entered in annual UK air races, with G-AKDC flown by J.N.Summers winning the 1949 King's Cup Air Race at 164.25 mph.

Among the more flamboyant private operators was pre/post WW2 motor racing driver Prince Bira (Prince Birabongse Bhanudej Bhanubandh of Thailand) who raced in both Formula 1 and Grand Prix races. London based, in 1952 he flew his Gemini G-AJWH 'City of Bangkok' from London to Bangkok - and presumably back again.

Several aircraft were used as light business transports by commercial firms including Shell-Mex and B.P. Ltd (Gemini 8 G-AMGF) flown by Grp.Cpt. Douglas Bader, Fairey Aviation and B.K.S Engineering. Other examples were flown by UK independent airlines on light charter work within the U.K. and to Europe.

Two examples completed in 1951 by F. G. Miles were fitted with 155 hp (116 kW) Blackburn Cirrus Major III engines and provided with enlarged and heightened fins and were re-designated the Miles M.75 Aries.

Six airworthy examples of the Gemini remain on the British Civil Register, the most publicly accessible example being G-A KKH owned by Mr. Tony Haig-Thomas, hangared at the Shuttleworth Collection, Old Warden, Bedfordshire. ■

SPECIFICATION

Length: 22 ft 3 in (6.78 m)

Wingspan: 36 ft 2 in (11.03 m)

Height: 7 ft 6 in (2.29 m)

Powerplant: two Blackburn Cirrus Minor 2 in-line piston engine, 100 hp each

PERFORMANCE

Maximum speed: 145 mph (233 km/h)

Cruise speed: 135 mph (217 km/h)

Range: 820 miles (1,320 km)

Service ceiling: 13,500 ft (4,115 m)



ABOVE: Percy Blamire's Gemini 1A G-ALZG was assembled in 1950 by Handley Page (Reading Ltd). It was upgraded to Mk 3C in 1958 and raced extensively and is seen at Elstree c. 1959.

BELOW: Miles Gemini 3A G-AMME, powered by de Havilland Gipsy Major 10s was completed by Wolverhampton Aviation Ltd in 1950. Seen here at Elstree c. 1959 it was withdrawn from use in 1971.



ABOVE: Miles Gemini 1A G-AKGD was white overall with burgundy letters, trim, engine nacelles and upper half of the nose. From 1972 the aircraft was preserved for a while at the Historic Aircraft Museum, Southend airport.

BELOW: Miles Gemini 1A G-AMBH was completed by F. G. Miles Ltd at Redhill in 1950 and was upgraded to Mk3A and in 1958 sold in the Belgian Congo as OO-COA.



ASHBOURNE SCALE DAY

Alex Whittaker marvels at the range of scale models on offer at this ace Club bash

Ashbourne has rightly become a very popular fixture on the Clubman Scale calendar. It is held in a beautiful yet accessible part of the country, it is always well attended, and the Ashbourne Club always seems to get the weather right, too. It is a 'Clubman' event in the sense that it is a modeller-to-modeller meeting, free to attend, and you can fly whatever scale model meets your fancy. There are no

restrictions on size or type or model, and there is always a delightfully broad spectrum of models being flown. This year's event brought bumper haul, with everything from large jets to small electric models.

Boeing Stearman

I realise that many readers do not believe that sad scribblers like me actually have any friends, but Lindsey Todd is one of my mates.



MAIN IMAGE & INSET

My Star Of The Show was Dennis Richardson's new Short Admiralty Type 184. 112" span and Laser 80 glow engine power. Dennis's model is built from an enlargement of Gary Sunderland's free flight plan that was published in FSM April 2010 issue





Lindsey Todd's 1/4 scale Boeing N2S Stearman from the Flair kit. Zenoah 45 power.

So I was delighted to see his bright yellow 1/4 scale Stearman in the air again. He hasn't flown her for a while, which is a pity since she is the Flair kit version and not an ARTF. She is fitted with a Zenoah 45 and flies a treat, as they say and is finished in US Navy colours of an N2S.

Yak 54

I like Yaks, though I do tend to mix the numbers up. I admit there is something agricultural and a little unrefined about a number of The Yakovlev Bureau designs, but you cannot deny their presence. Noted warbird Mark 'Sparkie' Roberts was flying his Yak 54, which is powered by a Zenoah 26. Its yellow and black scheme looked really sharp in the cool autumn air.

Fournier RF-4

Ian Redshaw is one of our very best scale pilots, held in great affection by all his mates. On the day, he was flying a

hangar-full of large scale models, but first up, was his huge 34% scale Fournier RF-4 from the ADFA CNC-cut kit. Power is delivered by a Zenoah 26 and the model also has Fema retracts and Fema on-board start.

On one low-ish circuit, the fire went out. No problem; Ian nonchalantly applied the on-board start. Unfortunately, nothing happened. Cue unexpected landing and ribald laughter from his ex-mates. Ian had the long walk to the out-field, assisted by Richard Scarbrough in retrieving the errant model. I can report that all Ian's mates were still pulling his leg when he got back.

Pitts S-2

Tony Murphy was flying a really neat yellow and black 50" span Pitts S-2 (longer fuselage than the better-known S-1 'Special' from an unknown old kit. I thought it was too big for a *Pilot* kit, and it wasn't the *Phil Ramsay* version. It decals

looked like they could be the same as the old Sig version, but I am just not sure. The key point is that this hand-built model looked superb in the air and handled very well.

PZL Wilga 35

Alan Read flew an impressive looking PZL Wilga glider tug. True, this was an ARTF model, from *Black Horse*, but nevertheless, it was very appealing. It spanned 88 inches and weighed in around 14 lbs (6.4 kgs) and is of traditional built-up construction. Unlike the current raft of shiny new grp and carbon ARTF Wilga tugs, which are showing up with alarming regularity. The Wilga's power plant was a beauty: an utterly desirable O.S. 33 petrol engine. The sound was melodic.

Messerschmitt Me 108 Taifun

I have always admired the rather comfy lines of the Me 108, which looks like a light



Richard Curry-Peace's huge English Electric Wren. More details soon.



Black Horse ARTF PZL Wilga 35 glider Tug owned by Alan Read, looked the part in the air.



Ian Redshaw's 34% scale Fournier RF-4 from the ADFA CNC-cut kit. Power is from a Zenoah 26.



Stuart Knowle's Fokker Dr.1 'Lola' from the Balsa USA kit.

aircraft rather than warbird, though to a small extent it did double duty. Stuart Knowle was flying his hand-crafted 90" span Me 108. This was built to his own blow-up of the original Simon Delaney plan, and was powered by a Zenoah 38 petrol engine. It flew well, and I liked the scheme. I have the *Graupner* kit version, which is a little smaller, for a four stroke 15cc glow engine. An eminently practical under-modelled scale subject, and a good Winter Project.

Stuart Knowles' pretty hand-crafted 90" span Me 108 Taifun, 90" span, Zenoah 38 powered.

Fokker Dr.1

Stuart was also flying his Zenoah 25 powered Fokker Triplane from the *Balsa USA* kit. I liked the black and yellow 'Lola' scheme too, making a

refreshing change from the all-red Richthofen confection. A very steady and convincing flyer, looking very good on steep diving turns, where you could see all the wings.

Reds Duo Hawks

Just days before his triumphant *Weston Park In The Dark* initiative, Steve Bishop took some time off to fly at Ashbourne. He and his equally gifted son Matt gave us the sort of display with their 1/4 scale Red Arrow Hawks that you would pay good money for at a commercial show.

Sopwith Pup

Celebrated older modeller Ken Dallow brought his lovely 1/3rd scale Sopwith Pup. She was

built from the Mick Reeves Model kit and spans 111". She is powered by a DLE 111 petrol engine. Ken has finished her in the Lloyd Breedney scheme of No:3 Squadron. A very fine scale model from an old master.

Short Admiralty Type 184

Wow! This was a delightful surprise. I knew Dennis Richards was up to something in his shed, but on this day he wheeled out an absolute pearler! Not just a biplane, but an amphibious WWI biplane. This three-bay beauty was quirky and fascinating in equal measure - a really absorbing and ambitious flying scale model.

Based on Dennis's blow-up of





Steve Bishop and son Matt brought their famed Reds Duo Hawks - note speed brake deployed. Stunning display.

the original 1/12th scale Gary Sunderland free flight plan that first appeared in FSM, his version spans 112" and is Laser 80 glow engine powered. Watch this space a full walkaround with flying shots very soon. You will not be disappointed.

Mustang P-51 D

Young flying scale pilot Ryan Oakley (12) was flying a number of electric scale models throughout the day. He handled

his fast *Duraflly* P-51D very well indeed. Great to see a young modeller making such progress. Hope he is building something balsa this winter.

Piper L-4

My dear mate and noted scale builder Paul 'Limey' Rice changed down a gear from his normal fast WWII fighters to fly his 1/3rd scale *Balsa USA* Piper L-4 - military version of the Piper J-3 Cub. 'Billy' was

finished in an invasion scheme and to my eyes was flown at just the correct speed. I reckon that an honest, well executed, flying scale aircraft that looks right in the air is worth a dozen gimmicky models.

Blackburn B2

Noted scale designer Tim Hooper brought a goodly number of models in his caravan, and he and Netty flew most of them over the weekend. Their very shiny,



Mark 'Sparkie' Roberts flew this Yak 54, which is powered by a Zenoah 26.



Tony Murphy was flying this 50" span Pitts S-2 from an unknown kit.



Paul 'Limey' Rice's 1/3rd scale Balsa USA Piper L-4 'Billy' in invasion stripes.



Tim Hooper's own-design Blackburn B2. 66" in span, Turnigy 42-50 motor, 14"x6" prop, and a 60 A ESC with a 5S 4000mAh battery pack.



Ian Redshaw's HM 14 Flying Flea. Half scale model weighs 19 kgs and is powered by a Zenoah 62 petrol engine.

and unusual side-by-side seater Blackburn B2 was delightful. The model is 66" in span, electric powered, and weighs 8lbs 3ozs. Turnigy 42-50 motor, 14"x6" prop, and a 60 A ESC with a 5S 4000mAh battery pack. A very pretty scale model.

Supermarine Seafire

Paul Marsh campaigned his 64" span *E-Scale* Seafire. This neat (and perhaps just a bit too shiny ARTF) was fitted with an O.S. 120FS Mk3 Pumper. She weighs in around 8lbs 3 ounces. This version of the Seafire seems to be based on the Griffon engined Mk.XV and has excellent flying qualities, though the lettering was bit stark for my taste. I forgot to ask Paul about the oleos, since this was a reported issue with early versions of this otherwise excellent ARTF.

Flying Flea

The Big Show feel continued when Ian



Dennis Richardson's Handley Page Heyford built to 1/13th scale. 69" span, weighs 6 1/2 lbs, twin OS .30 power.

Redshaw flew his 1/2 scale Mignet HM14 Pou du Ciel. This extremely faithful model is three metres in span and weighs 19 kgs. It is powered by a Zenoah 62 petrol engine, driving a 22"x12" prop. FSM will be doing a full exposé on this significant scale model very soon.

Focke Wulf 190D-9

Ryan Edwards' FW 190D-9 from the YT International kit looked every inch a killer. She was powered by an XYZ 50cc petrol twin, and spans 88". She was appropriately fast, aggressive, and

slippery in the air. Mind you, the real one maxed out at 425 mph.

Fairey Delta

As readers may have divined over the years, I am not a natural enthusiast for electric models, but I greatly admire creativity when I see it. Therefore, I was intrigued when I saw a bright blue early British delta take to the air. I confess at first I thought it was a model of a French jet, but the owner soon put me right.

In fact it was a 34" span Depron foam model of the Fairey FD-2, a mid-1950s



Tim Hooper and his own-design Airspeed Courier.



Paul Marsh's E-Scale ARTF Seafire. O.S. 120FS Pumper power and weighs 8lbs 3ozs. Flies well.



Chris Poyser's Mitsubishi A6M Zero suffered retract problems, but he brought her back alive!



Ashbourne Club fly between two working airstrips. As I arrived I had to wait whilst this Aerotechnik EV-97A Eurostar G-CEGO took off.

high-speed test aircraft designed to explore supersonic flight and was the first aircraft in the world to exceed 1,000mph in level flight. In March 1956 test pilot Peter Twiss flew the FD-2 to a new world speed record of 1,132 mph (Mach 1.73). The model was built and flown by Simon Chaddock, to his own unpublished plan. It is powered by a 55mm electric ducted fan Unit, placed right at the back of the fuselage. The model uses a three-cell 1800mAh battery pack and weighs 170 grams. Once she was spooled up and away, she flew very gracefully indeed.

Now it so happens that I have a lathe and a milling machine in my shed, and therefore one or two model engineering books by a certain Professor Chaddock. I

asked Simon if this famous model engineer (who, amongst other things designed the hugely influential Quorn Cutter Grinder) might indeed have been his famous Dad. The answer was in the affirmative, so I was able to tell Simon how much I admired his sadly now departed Dad.

The Verdict

Held this late in the season, the Ashbourne Club cheerfully take an each-way bet with the weather each year, but every year they seem to come up trumps. This is a quietly well-organised and friendly club. Other clubs with pointlessly irritating so-called Safety Regimes should come and see how the Ashbourne Lads get everything right first time, without the

slightest amount of testiness or officiousness. The quality and range of scale models being flown this year was exceptional - easily the match of many a 'paying' show.

Now then, if you are flying or spectating all the long autumn day, the inner man needs support, too.

The catering at Ashbourne is always superb, with their famous Staffordshire Oat Cakes dominating the cuisine, even though we are in beautiful and remarkable Derbyshire. If you were to choose one new scale event to attend next year, I would put Ashbourne at the top of your list. It is a gem. ■



Simon Chaddock's own-design electric powered Fairey Delta 2 looked elegant in the air.



Ken Dallow's fine 1/3rd scale Sopwith Pup. 111" span, with a DLE 111 petrol engine.

On Silent Wings by Chris Williams

SCALE SOARING

W

ell known in bygone days for his range of budget glass sailplanes, Pat Teakle has, these days, reverted to wood and fabric types, seemingly averaging

around two new models a year at the moment. He has completed one very interesting glider from plans that were published when just about all the vintage gliders we know now were in fact brand new!

The blurb that accompanied the plan in the 1944 edition of *Aeromodeller*, seems to be a mixture of fact and fiction. It hints, intriguingly, at the existence of a full-size *Horseman*, although I have seen no mention of it in all the historical literature that I have read over the

years. It also says that the designer/builder, LG Temple, had to immerse himself in the chemistry of nitrocellulose materials in order to achieve a good level of finish, and that it took three hundred hours of rubbing down the fuselage to get the job done. Having been professionally involved in the application of what we used to call 'celly', I have to say that either there was a certain amount of exaggeration involved, or the poor chap needed a new piece of wet-n-dry...!

Pat's version of the *Horseman* has been modernised to feature ailerons, for which I think the original's free-flight dihedral might have been somewhat attenuated, and also top-mounted spoilers. This model certainly looks a treat in flight, and, in its day, must have been decades ahead of its time,

especially when you think that it was fitted with a tow release in the 1940s, possibly four decades before model aerotowing arrived.

The 1940s also saw the production of the one-off HW4 Flamingo, built by two European expats in Brazil. This time, I am talking about a full-size glider and a very attractive looking one at that. I came across some details of this machine in one of Martin Simons' excellent sailplane tomes, included in which was one of his nice three-view drawings. So, in contradistinction to the *Celestial Horseman*, I designed and built this glider in the present day as a model of the full-size back in the 1940s.

The reason I mention both of these models together is that they were photographed flying one splendid Sunday at White Sheet hill in Wiltshire.



Dave Horton's mighty Waco Troop carrier starts another mission.



Glider queue at the Middle Wallop event.



Terry Holland with his newly completed 1:3.5 scale Topaze.



Antonia Gigg's DG 303 Elan in action.



Chris Garrod's impressive ASH 25 with the up-and-go.

Both sailplanes exhibit some of the grace and beauty of a period in time when basic primary gliders were giving way to something a little more sophisticated, and in my view, this was period when the art of working wood reached something of a pinnacle...

**GHOST SQUADRON AEROTOW,
MIDDLE WALLOP,
11-12 OCTOBER 2014**

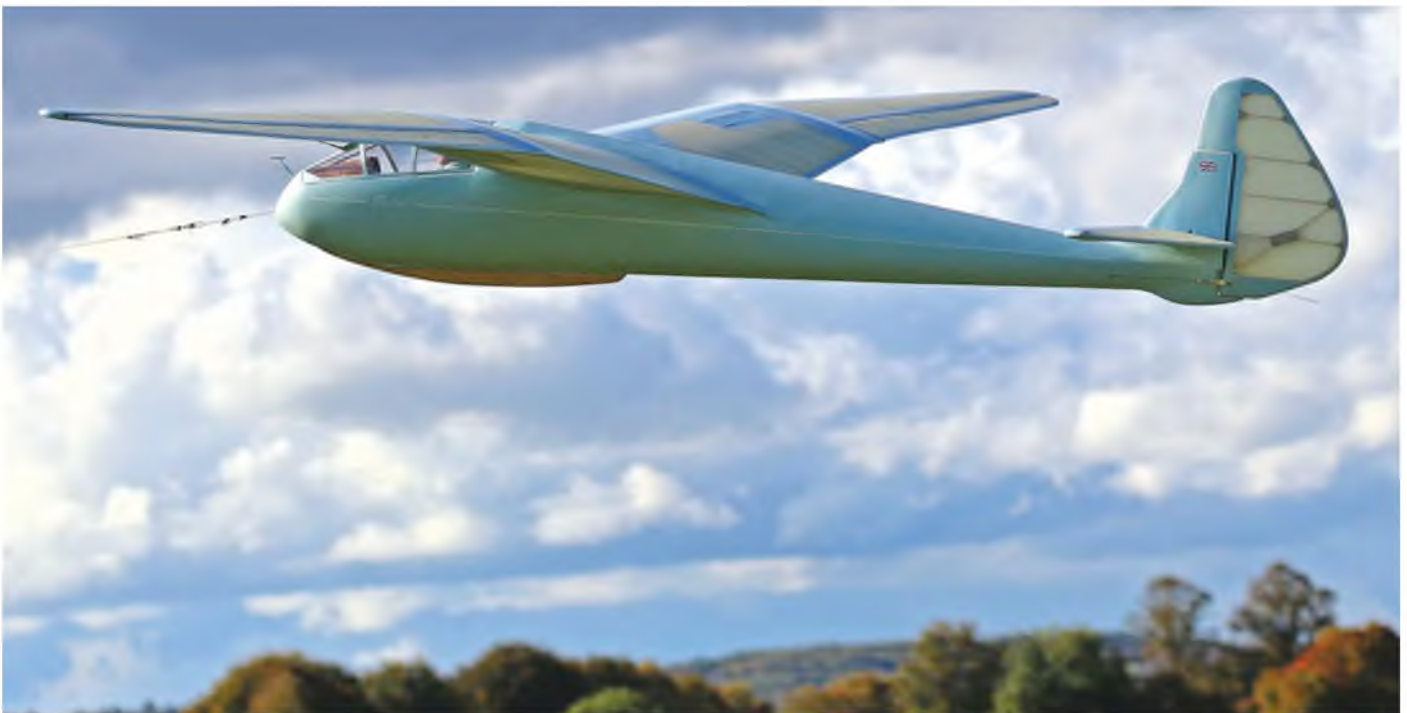
It was something of a miracle that this, the last of the Ghost Squadron events at

Middle Wallop, enjoyed some quite decent weather, considering it was pretty late in the year, with Autumn nipping at our ankles. Once again, the weather forecast was a glass-half-empty jobbie, with the conditions being much better than predicted, and this must have decreased the turn out to a certain extent.

Those with a long memory will recall that, at the last of these events, Terry Holland's experience with his new Antonov A9 was not a happy one, yet here he was, just a few months later with another new

machine, this time the 1:3.5 scale Scheibe-Loravia Topaze. As the designer of this particular model, I witnessed the maiden flight with more than the usual interest, and I'm glad to be able to report that in the capable hands of Dave Stokes, the Topaze performed just as she was supposed to.

Gary Bennett, (another Topaze owner) had this time arrived with a beautifully constructed Reiher. This had been scaled up from a much smaller free plan downloaded from the Internet. The Reiher



Another tug pilot relaxes... Tony Haslehurst's 1:3.5 scale Petrel at the Ghost Squadron event.



Antonia Gigg's DG 303 at rest.



Gary Bennet with his 1/4 scale Reiher, scaled up from a much smaller plan.



Dave Stokes' 1:3.5 Slingsby Petrel on the tarmac at Middle Wallop.

is commonly regarded as one of the most iconic sailplane designs from the 1930s, and in its elegant appearance, shows the efforts that were being made to smooth out the airflow between the fuselage and the wings. Designed with the ever popular Quabeck section that graces many designs these days, the Reiher went on to perform faultlessly over the weekend.

Not dissimilar in appearance to the Reiher, Dave Stokes' 1:3.5 Petrel is another iconic glider from the same period, only this time of British manufacture. Fred Slingsby did in fact base his design on the German Rhoadler, adding a gull wing,

but the design of the fuselage must surely have been influenced by the Reiher. Dave had chosen to model the Petrel as it was in its original configuration, which meant that all the plywood panels and their joints had to be faithfully represented, the result being extremely pleasing to the eye. The Petrel, too, went on to enjoy some extensive flying over the weekend, as did tug pilot Tony Hazlehurst, who was taking some time off to fly his version of the Petrel as well.

Once again, Chris Garrod was campaigning his mighty ASH 25, which he had brought all the way from Switzerland.

This elegant glass machine has a one-bladed up-and-go power unit, although he usually opts for an aerotow take-off to preserve the Lipos. Given the extreme slipperiness of the design, it's not surprising that this glider can make the most of any lift that might be available, and is capable of some pretty extended flight times.

The Ghost Squadron's spiritual leader, John Greenfield, was absent on this occasion, being amongst those present at a GPS Triangle race in Spain, his slot being taken up most capably by tug pilot Pat Marsden. That this was an extremely

**Even Tug pilots have to relax sometime!
Al Machinchy's Super Decathlon tug.**





Author's 1:3.5 scale HW4 Flamingo at White Sheet (Steve Fraquet pics).

pleasant and successful weekend must be credited largely to Pat and the rest of the Ghost Squadron team, and of course all the hard-working tug pilots. As next year's dates are, as I write, being sorted out, that's something we can all look forward too...

DOES SIZE REALLY MATTER...?

It's quite amusing to note that probably the biggest giveaway that the aforementioned Horseman is a model and not a replica of a full size machine

lies in the size of the tailplane. It is an established fact that, for those of us of a certain age, model aeroplanes need enormous tailplanes to prevent them from falling prematurely from the sky in a manoeuvre popularly known as Tuck-Under. When, a few years ago, I came to design a model of the Slingsby Dart 17, I stared aghast at the tiny tailplane on the three-view drawing from which I planned to work.

Didn't Fred know about tuck-under, I asked myself? I then wrestled with the

dilemma known to designers of scale models everywhere: should I enlarge the tailplane for the sake of insurance, or stick to the scale outline? In the end, I plumped for the latter, and that version of the Dart, and a later, larger version both behaved impeccably in pitch. Despite this, and despite the videos I have put up on YouTube of the latter model in action, people still ask plaintively...are you sure that tailplane is the right size...?

(To see the Dart in action, Google AN EVENING WITH THE DART) ■

Pat Teakle with his vintage Celestial Horseman, updated for the modern age.



Techno Scale

Mike Evatt s

The L-13 Blanik is a two seat training glider that was designed by Karel Dlouh of VZLÚ Letnany around 1956, and is allegedly the most numerous and widely used glider in the world. The L-13 was developed as a practical glider suitable for basic as well as aerobatic instruction and cross-country training. **HobbyKing(tm)** at www.hobbyking.com are stocking a 2.3 metre span version that lives up to its namesake of being an easy-to-fly glider, with a low landing speed, and good aerobatic performance. This plug-and-fly model comes with a brushless electric motor and folding propeller pre-installed, however it includes a moulded foam nose-piece which accurately matches the scale profile for those wanting to fly it as a pure glider.

AirBorne Models of Livermore, CA USA have a fine example of a Hawker Tempest MK V displayed on their website at www.airborne-models.com The Hawker Tempest was a British fighter aircraft primarily used by the RAF in the Second World War. The Tempest was an improved derivative of the Hawker Typhoon, intended to address problems with the

Typhoon's unexpected low performance by replacing its wing with a much thinner laminar flow design. It emerged as one of the most powerful fighters used during WW2. This 57 inch span replica lives up the name of its illustrious prototype. It requires 6-channel radio with 6 standard servos and 1 low profile retract servo and can be powered by 2-stroke 0.46-0.55 or 4-stroke 0.70-0.81 engines.

Barton Model Flying Club maintains an extensive website at <http://controlline.org.uk> which gives a clue to its discipline; it is a control-line club! Not only that, it has quite an extensive photo gallery of scale subjects such as the De Havilland 88 Comet shown in the screen-shot. This was designed and built by Tony Bowler of LEMAC using a double size APS plan and is powered by, two PAW 19s.

The **Midland Air Museum** at Coventry represents many years of dedicated commitment by volunteers and staff who have helped to establish one of the country's leading self-funded independent aviation museums. They believe it is very important that their museum provides the opportunity for visitors of all ages to experi-

ence the world of aviation in a friendly and informal environment. Check it out at www.midlandairmuseum.co.uk Just the place to get up close and personal with your next project.

There again if helicopters are your thing then you could try The **Helicopter Museum** at Weston-Super-Mare UK that maintains a website at <http://helicoptermuseum.co.uk> The origins of the Helicopter Museum goes back to 1958, when the founder, aviation writer/historian Elfan ap Rees, began to build up a private collection of rotorcraft documentation and artefacts. Over the next 10 years, his collection grew and in 1969 he acquired his first complete helicopter, a Bristol Sycamore Mk.3. The rest as they say is history!

Carbon Copy's site at www.carboncopyuk.com is basically a catalogue of the parts they supply.

Carbon Copy was established in 2000. All their components are made in-house at their 5000 sq.ft factory in Stevenage UK, where they also produce patterns, plugs and moulds using their own experienced staff. They manufacture Carbon and Fibreglass parts such as Landing Gear Cowlings, spats and tail wheel parts. A true



The L-13 Blanik is a two seat training glider that was designed by Karel Dlouh.



A fine example of a Hawker Tempest MK V from AirBorne Models.



De Havilland 88 Comet shown designed and built by Tony Bowler.



Just the place to get up close and personal with your next project.



The origins of the Helicopter Museum goes back to 1958.



Mick Reeves' Hurricane cowling from Carbon Copy.

urfs hyperspace for more TechnoScale Topics...

British niche-manufacturer supplying both modellers and trade clients.

Dumfries Model Flying at www.dumfries-model-flying.com pride themselves on being one of the foremost suppliers of **SebArt** products in the UK such as the Macchi M.C. 72 shown in the screen-shot. The Macchi M.C. 72 was an experimental seaplane designed and built by the Italian aircraft company Macchi Aeronautica. It was built in 1931 with the intention of contesting for what turned out to be the final Schneider Trophy race, but due to engine problems, the M.C. 72 was unable to compete. However development continued and the M.C. 72 set an outright world speed record for all aircraft which held for five years. In 1933 and 1934, it set a world record speed for internal combustion powered seaplanes, which still stands to this day.

If you still want to buy a plan and possibly a laser-cut wood pack, then take a look at the Republic P-47D Thunderbolt (Razorback) Plan available from Scottish Border Models at www.scottishbordermodels.co.uk This 76" span version is from the drawing board of

champion, Brian Taylor. This larger example of the famous American WWII escort-fighter is available on three superbly detailed plan sheets that produces a magnificent model. Construction is all-wood and features working flaps and retracting undercarriage. Not recommended for beginners. Wingspan: 76" / 1930 mm Scale: 1:6.7 Radio: 6 function Engine: 1.20 to 1.50 cu. in. 4-strokes

If you are taking those faltering steps towards designing and building your very own scratch-built scale model then logging on to

www.rc-airplanes-simplified.com is essential. Here you will find extensive discussion regarding designing your own plane together with tips and tricks to ensure your success. Alternatively you may just want to build the Fairey Fantome shown in the screenshot. R/C model aircraft plans of the Fantome are available as photos and tips from the designer, and downloadable, PDF files of the muffler and required hardware.

Founded in 1959, **MacGregor Industries Limited** has two main business divisions located in Maidenhead, Berkshire. They

are suppliers of engineered plastic and distributors of radio control and model equipment, plastics and adhesives.

What I found of interest on their website at www.macgregor.co.uk were a selection of strong and lightweight carbon fibre sheet. This is a sandwich product with carbon fibre bonded to either side of a filler material of 2 - 6mm Ply, Balsa or Herex. (Herex is a rigid closed-cell foam with a high stiffness to weight ratio. Ideally suited as a core material for lightweight sandwich structures.) I am sure the scratch builder will find many uses for this.

Staying with materials a little longer. **Noggin End Metals** are a company with a physical presence in Stoke on Trent and a web presence at www.nogginend.com They are a small friendly company that supplies raw materials - metals and plastics, mostly to model engineers and hobbyists, but they are happy to supply anyone who needs a small quantity of material. Although their stock is extensive they like a challenge, so if you require strange or unusual material, why not give them a call, and they will see what they can do.



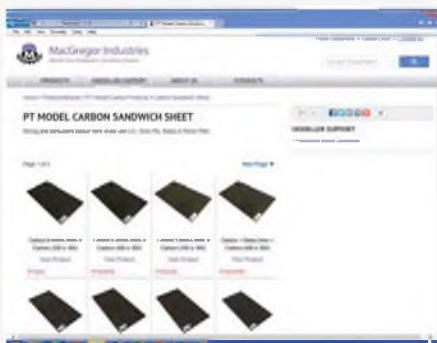
The Macchi M.C. 72 from SebArt available from Dumfries Model Flying.



Republic P-47D Thunderbolt - plan available from Scottish Border Models.



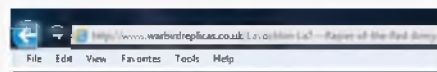
The magnificent Fairey Fantome.



This is a sandwich of carbon fibre bonded a filler material of 2 - 6mm Ply, Balsa or Herex.



Noggin End Metals supply small quantities of metal stock.



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

mikeevatt@hotmail.com

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



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The aircraft that defined the term

Hawker Typhoon CD109

The Hawker Typhoon was a British single-seat fighter bomber, produced by Hawker Aircraft. While the Typhoon was designed to be a medium-high altitude interceptor. 117 images

Hawker Tomtit CD64

Mid 1930s RAF biplane trainer aircraft, from the era open cockpits of silver dope and polished metal. (140 images)

Hawker Tempest Mk 2 CD63

The final development of Hawker

Hawker Sea Fury FB XI CD62

Hottest of all the piston-engine fighter aircraft, the carrier-borne Sea Fury is also admired for its elegant profile. (140 images)

Hawker Hurricane MK1 & MKIV CD61

Two versions of the famous 'Hurri' - one a true Battle of Britain survivor painstakingly restored to perfect authenticity, plus the cannon-armed, Mk.IV 'tank buster'. (170 images)

Hawker Hart & Hind CD60

A combo collection featuring the RAF Museum's Hart bomber and Hart Trainer, plus Shuttleworth's Hind. (115 images)

Hawker Fury CD59

No authentic example now exists, but the accurate replica photographed in extensive detail in this collection is as good a guide as can be found of this elegant 1930s RAF fighter. Includes some general arrangement pictures authentic to the period. (55 Images)

Grumman FM-2 Wildcat CD58

First of Grumman's highly successful line of prop-driven 'Cats', the Wildcat, in guises from F4F-3 to FM-2 held the line after the Pearl Harbour attack and served from then until the end of WW2. It was idea for operations from the small escort carriers. (90 images)

Grumman F8F Bearcat CD57

Hottest of Grumman's prop-drive fighters - it arrived too late for action in WW2 but was standard ship-borne fighter equipment in the immediate post-WW2 era. (90 images)

Grumman F7F Tigercat CD56

The awesome twin engine long range fighter of the late WW2 era operated by US Navy and US Marines. (90 Images)

Grumman F6F Hellcat CD55

The US Navy's most important, and most successful fighter of WW2, photographed, close-up, from nose to tail and wing tip to wing tip. Example shown is part of The Fighter Collection, based at Duxford. (90 images)

Grumman F3F CD54

A study of the faithfully replicated example of the 1930s U.S. Navy biplane as seen at the 2001 Flying Legends Show. (34 images)

Gloster Gladiator CD53

The Royal Air Force's last biplane fighter, star of late 1930s air shows and flown in combat during early WW2, including Battle of France, Battle of Britain, Mediterranean operations and North Africa. (50 images)

Fokker D.VIII CD52

The Fantasy of Flight Museum's example of the late WW1 Imperial German Air Service monoplane fighter, in full detail. (69 images)

Fokker D.VII CD51

The most famous of all the German fighter aircraft of WW1. The collection depicts the RAF Museum, Hendon's authentic, restored example. (44 images)

Focke Wulf FW 190A CD50

Germany's 'butcher bird' fighter of WW2, active on all combat fronts from 1941 onwards.

Fieseler Storch CD49

Arguably the first military STOL aircraft, this storky looking aircraft has long been a modellers' favourite. Two examples are represented, the machine at the Fantasy of Flight Museum in Florida and the RAF Museum Cosford's example. (90 images)

Fairey Gannet ASW1 & T.2 CD48

The Royal Navy's post-WW2 anti-submarine workhorse, that also served with a number of other air-arms. Most images are of Mk.T.2, that was more-or-less the same as the ASW.1. (110 images)

Fairchild Ranger CD47

Elegant U.S. high wing light aircraft in full detail. Two examples shown. (60 images)

Erco Ercoupe 415 & Avalon Ercoupe CD46

The elegant twin finned light/sport aircraft. Both original Type 415 and later Alon resurrection examples. (115 images)

DHC Chipmunk CD45

A bumper bundle of images that provides a vast array of detail pictures, plus photos of examples in both RAF trainer and civil colours. (70 images)

DH Tiger Moth CD44

Much close-up detail of civil register example, plus further detail of the IWM Duxford's example in Royal Navy trainer colours, showing the blind flying hood. (110 images)

De Havilland DH89 Dragon Rapide CD43

Graceful twin engine biplane airliner that saw service from pre-WW2 through to the mid 1950s. Several are still flying and three are shown in this picture collection. (100 images)

De Havilland DH84 Dragon CD42

Forerunner of the more famous DH 89 Dragon Rapide, this collection depicts a superbly restored example. (40 images)

DE Havilland DH 60 CD41

The aircraft that set the British 'club' flying movement on the road to success during the 1930s. (140 images)

De Havilland DH 53 CD40

1920s lightweight low wing sports aircraft designed to a low-power specification. Machine illustrated is the sole remaining example. (60 images)

Curtiss P-40M CD39

One of the later versions of the famous Curtiss Warhawk, the WW2 fighter aircraft that saw service in just about every combat theatre of operations. (100 images)

Curtiss P-40B Tomahawk CD38

Rare, full restored example of the early version of the Curtiss fighter aircraft that was at Pearl Harbour on Dec. 7th 1941 - and survived the attack! (130 images)

Curtiss Jn-4 'Jenny' CD37

An authentic, restored example in full detail. (130 images)

Curtiss Hawk 75 CD36

The 'export' version of the Curtiss P-36 that saw service in during WW2 with Finland and during the 'Battle of France' in May/June 1940. Example shown is a combat veteran. (130 images)

Comper Swift CD35

1930s racing aircraft. Example depicted is the radial engine example at Shuttleworth Mussel (91 images)

Cierva C.30 Autogiro CD34

A study of the example hung in the Fantasy of Flight Museum, finished in RAF WW2 colours. (35 images)

Christen Eagle CD33

The spectacular, stylish aerobatic biplane revealed in close-up. Example shown is the two-seat version. (90 images)

Chrislea Super Ace CD32

Late 1940s civil light aircraft with distinctive twin fins and nosewheel type undercarriage. A fully restored example. (123 images)

Chilton DW1 CD31

Original upright engine version of this diminutive British low wing sports/racer. (90 images)

Chance Vought F4U-1D Corsair CD30

The famous 'bent wing bird' in super detail. (132 images)

Bucker Jungmeister CD29

Radial engine version. Example from Fantasy of Flight Museum. (79 images)

Bucker Bestmann CD28

Authentic example as exhibited at the Fantasy of Flight Museum, in WW2 Luftwaffe colour scheme. (43 images)

Bristol M.1C CD27

Early WW1 fighter monoplane. Example depicted is the faithfully authentic replica built by the Northern Aero Works and operated by the Shuttleworth Trust museum. (100 images)

Bristol F2B Brisfit CD26

Full close-up detail, including photos of engine cowls for both Rolls Royce Falcon and Hispano-Suiza engines. (28 images)

Bristol Bulldog CD25

This collection depicts the example assembled from two donor airframes and restored to superb standard by Skysport Engineering. It can now be seen at the Royal Air Force museum, Hendon. (60 images)

Boeing Pt-13/17 Stearman CD24

Subject aircraft is a current British civil register example used for air-show displays. (54 images)

Bleriot Monoplane CD23

The Shuttleworth Museum's machine, the oldest original example still flying. Much close-up detail showing all the exposed rigging, structure and the "bedstead" main undercarriage, plus Anzani engine. (74 images)

Bell P-39Q Airacobra CD22

Superbly restored example of this much-maligned WW2 fighter aircraft that was used with great success by Russian forces in the ground attack role and with saw much action in the south Pacific, from where this restored example was recovered. (130 images)

Beech D18 Staggerwing CD21

The distinctive back-staggered 1930s biplane with retracting undercarriage. (45 images)

Avro 504k CD20

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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	



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