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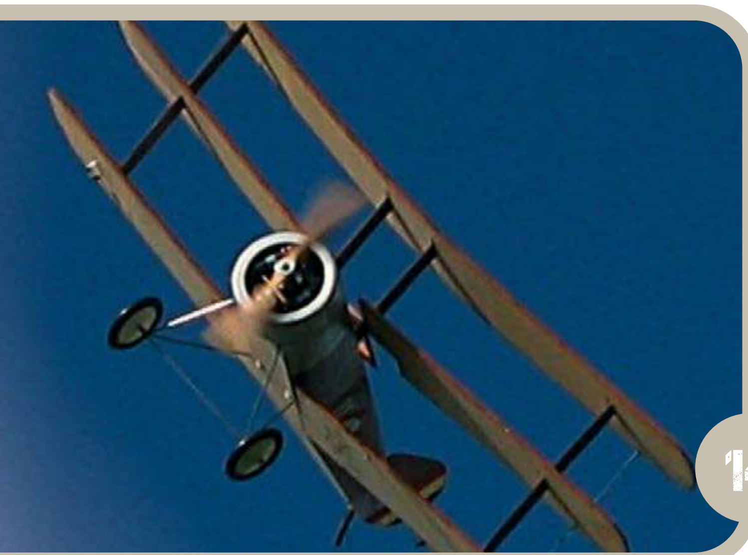

14

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62

ON THE COVER

The Fairey Gannet was one of the largest aircraft ever to be generally opeartional with the Royal Navy's Fleet Air Arm. It's and aircraft and a subject for scale modelling quite out of the ordinarg for anyone looking for simething more than just a bit different. Full construction feature in this issue.

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SOME LIKE IT COMPLICATED!

For many of us, keeping it simple is a good guide to success, not just in our scale modelling, but also in most things. Even so, it's fascinating to read about and admire the ingenuity and determination of anyone who rises to the challenge of making a success of incorporating into a scale model a range of workable functions that were part of the full size aircraft's reason for existence.

The Fairey Aviation Company's Gannet is our lead construction feature in this issue. The Gannet was first developed as a carrier borne anti-submarine type for the Fleet Air Arm back in the days when the Royal Navy still had a sizable aircraft carrier force and I can still remember prototypes of the Gannet AS 1 and its more ungainly looking Blackburn YB-1 competitor performing at the then annual Farnborough Air Shows back in the early/mid 1950s.

Getting back to the model though, ingenious designer Mike Lovell managed to incorporate deployable radar dome and arrester hook, working weapons bay doors and droppable torpedoes, plus flaps and dummy contra-rotating propeller system all of which were part of the Gannet's functionality.

The wing-fold is manual though and one look as the Gannet with the wings, so set, is enough to tell you why!

The Gannet was very much a front line part for post-WW2 British naval aviation, serving with the Fleet from 1955 until 1978 when when the RoyalNavy's last aircraft carrier capable of operationg the type was pensioned off.

Now, our Navy has two very different aircraft carriers but, as I write this piece I also read in one of the better informed, more authoritative Sunday newspapers that planning by military top-rankers for a new round of cuts is being quietly undertaken in which, Army will be paired back, the RAF will be largely dependent on drones and that one of our new aircraft carriers will be put up for hire, possibly to the U.S.Navy.

Perhaps that's the ultimate in Air B & B! Fools to the left of me, fools to the right ...!

WRICKLES ALL OVER

Aviation pioneer Professor Hugo Junkers was indeed a great innovator and lateral thinker; also one of the early aviation pioneers in Germany. Even prior to WW1, Prof. Junkers developed a theory of aircraft construction that eschewed the then prevalent aircraft construction methods involving wood, fabric and bracing wires in which much of the strength of the airframe was in the corrugated sheet metal skins. The first flyable example was the Junkers J.1 monoplane of 1915, followed by the J.2 using the same construction.

Junkers continued to follow this thread with other, post WW1 designs, the most memorable of which, today, is certainly the Ju 52 tri-motor, the Luftwaffe's workhorse during WW2.

Replicating that surface detail is another of scale modelling's challenges, one answer to which, using corrugated cardboard is explained in this issue. And if that's not enough there's a very different and even more lateral-thinking answer to the problem in store of February issue, but we'll leave you guessing on that one!

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SPORT SCALE MASTERCLASS

PART 6: SCALING UP FROM THREE-VIEW DRAWINGS

SCALING UP THE PLAN

We are now ready to start enlarging our three-view to produce working drawings to the scale required. Three-views presented in magazines and descriptive monographs are typically 1: 72 or 1:48 scale although in FSM can be a bit larger at 1:50, 1:40 and sometimes 1:30. In all cases, substantial enlargement will be required to produce a workable flying scale model.

The scheme of work is to draw up side and plan views of the fuselage, and a plan of the wing and tail, followed by fuselage cross-sections. We then use our drawing to help us develop further fuselage former sections sufficient for the size of the model required, and we plan the bulkhead positions and rib stations, before adding final constructional detail. But first let us look at the several 'manual' methods of enlargement available to us.

I'm only going to describe pencil-and-paper methods here, for those readers (i.e. the majority!) without access to Computer Aided Draughting (CAD), or Photo-enlargement at the copy shop.

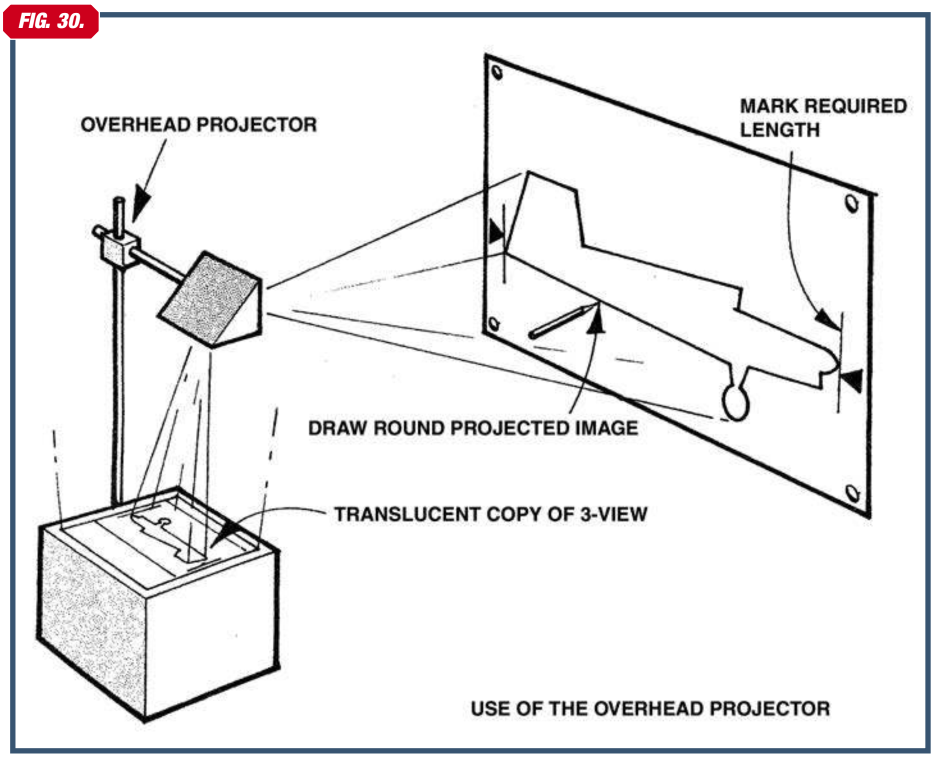
EPIDIASCOPE/OVERHEAD PROJECTOR

With these devices, an optically enlarged image of our three-view is projected on to a sheet of paper pinned to the wall. An epidiascope will project an image directly from the original page plan, whereas an overhead projector (**Fig. 30**) requires the preparation of a special transparency. It is unlikely that a private individual will own either of these types of projector, or a transparency maker, so for this method, one is likely to have to rely on the goodwill of the training department of one's employer, or on the local night school. But don't be put off by having to ask. The production of one's own-designed flying scale aeroplane is surely the kind of technically biased self-educational task that many a high school principal would wish his students to undertake.

The drawing procedure is to mark the required length of the wing or fuselage on to the paper, then adjust the position of the projector until the image is of the required size, taking care to align the projector fully at right angles to the wall to minimise distortion. We can work to really odd scales with this process, as only the final size is important, and we can even scale up those minute three-views which appear in 'Jane's' and in the popular aviation publications.

The disadvantage is that all lines will be magnified to several times their original thickness, so a degree of uncertainty in their position, and therefore a measure of inaccuracy, has to be accepted. One must remember to reconcile wing and tail chords and positions between side and plan views for instance. The method is suitable for up to about 6 x multiplication but can become unwieldy at larger sizes, especially with complicated designs where the detail can get lost in a maze of fuzzy lines.

FIG. 30.



MUILTIPLICATION METHODS: THE FUSELAGE

The other methods of enlargement all use the same general procedure. Firstly a 'datum' or reference line is drawn on the three-view. In most such, the datum line which the draughtsman originally used for his side-view is still shown, so this will be ideal for our purposes. We similarly draw a datum line on our large sheet of paper, allowing enough room to fit the fin and rudder on the paper. The type of drawing paper chosen is unimportant, though it is advantageous for it to have straight parallel edges as these edges form useful guides from which to measure. The datum line often coincides with the engine thrust line, but it may be more convenient to use the upper longeron of a biplane fuselage instead. On the plan view, the datum line is the centre-line of the airframe, of course.

Start with the side view, marking the scaled-up fuselage length between the front of the cowling and the fuselage sternpost. Then, measuring from the nose, mark off key points along the datum: the spinner tip, the cowl front face, where the leading and trailing edges of the wing and tail are, the cockpit position, strut positions, rudder hinge line, and generally where contours change.

Working from nose to tail, double-check that all is accurate in scale; then, using a set-square, draw right-angles above and below the datum at all the points. Then measure up and down these lines and fill in the outline of the fuselage - Fig. 31a.

Mark also the point where the leading edge (L.E.) of the wing root occurs, then draw in the wing chord line, setting the line at the appropriate angle of incidence to the fuselage datum, depending upon the type of model.

A useful rule of thumb here is that a gradient of 1/16” per 3” is equivalent to an angle of 1 degree. So, if we have a 10.5” root chord, then for 1-degree incidence, we will have to drop the wing trailing edge (T.E.) 3.5 sixteenths (i.e. 7/32”) lower than the leading edge. If the wing T.E. edge then protrudes from the bottom of the fuselage, we move the whole chord-line upwards to suit. If we model a type where the wing root T.E. should project below the fuselage, we start from the T.E. point and work forwards (and upwards) towards the L.E., changing the lower cowl line to match in with the wing section if necessary.

The fin and rudder shape can be plotted to each side of the hinge line, using this line in a similar fashion to the fuselage datum.

For short curves, e.g. round the rudder, we can draw round a ‘Flexicurve’, or a ‘French Curve’. These items are obtainable relatively cheaply at stationers and art shops. For long sweeping curves, I use a piece of 3/16” sq. balsa strip pinned in place to produce a smooth curve - also shown in **Fig. 31a**.

Having completed the side view, we repeat the procedure for the plan view, and then sort out the fuselage cross-sections and formers, using either the ‘grid’ method or ‘ratio along diagonals’ method, both being illustrated in **Fig. 31b**. In the first case, a grid is drawn over the original scale drawing, and we then draw an enlarged version of the grid on the model drawing. So, for eight-times enlargement, for example, the original three-view might employ 1/10” squares, whereas the model drawing would have lines 0.8” apart. We now plot the curvature on the enlarged grid by transferring co-ordinates from the smaller grid.

In the ‘ratio along diagonals method’, you first copy the original shape onto another piece of paper, draw a series of lines at convenient separation angles, all radiating from the same point, and use either calculator, scale rule or dividers to lay off the enlargement as shown in the diagram.

FIG. 31a.

TRANSFERRING MEASUREMENTS

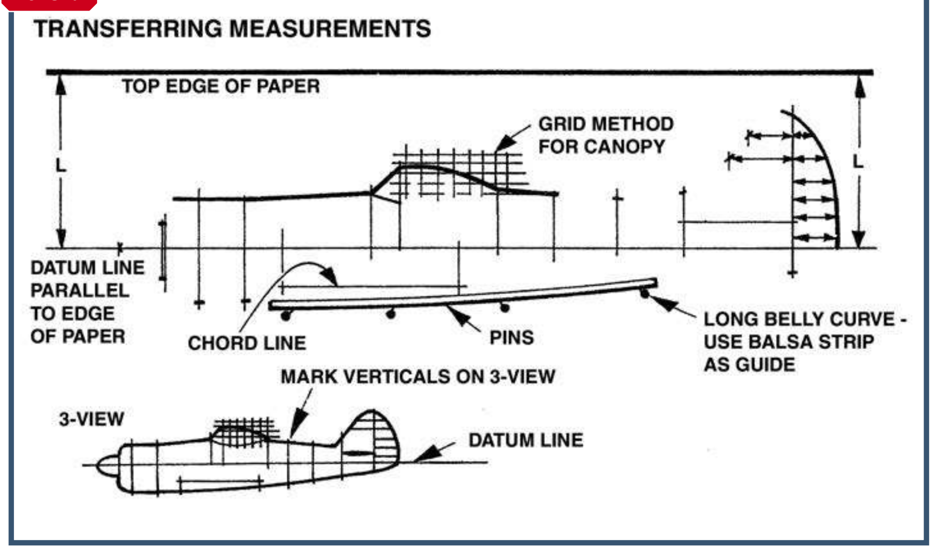
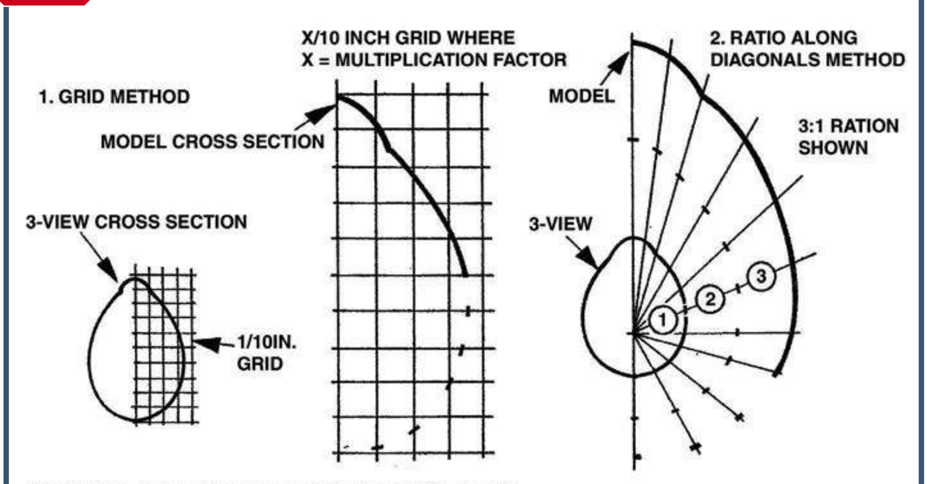
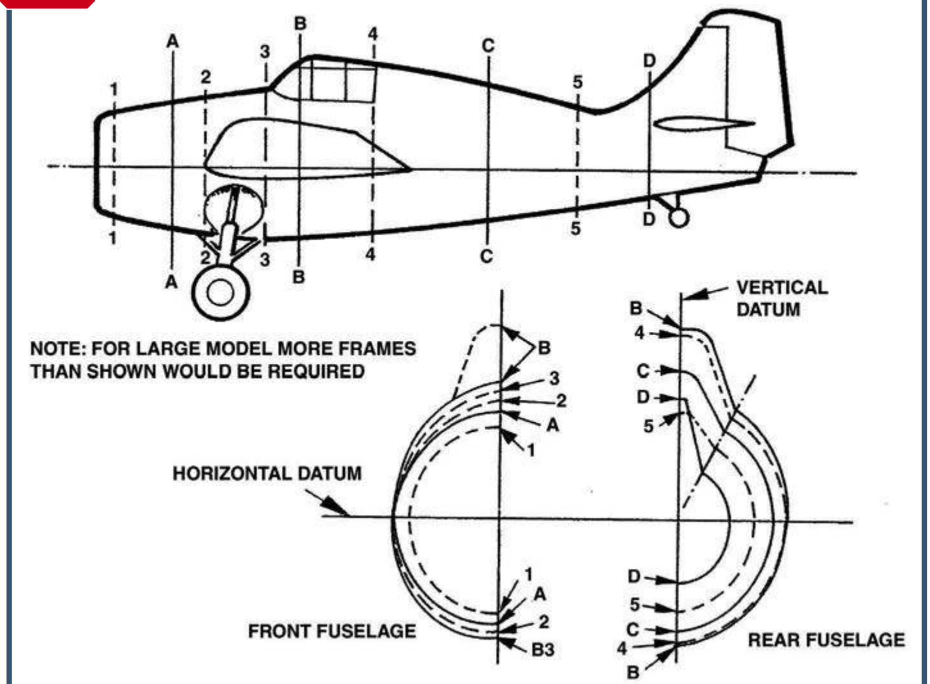


FIG. 31b.



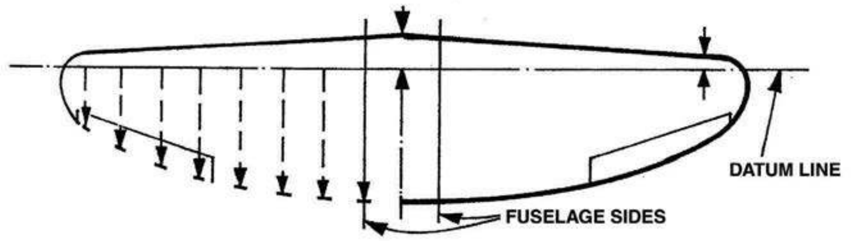
SCALING UP FUSELAGE CROSS SECTIONS

FIG. 32.



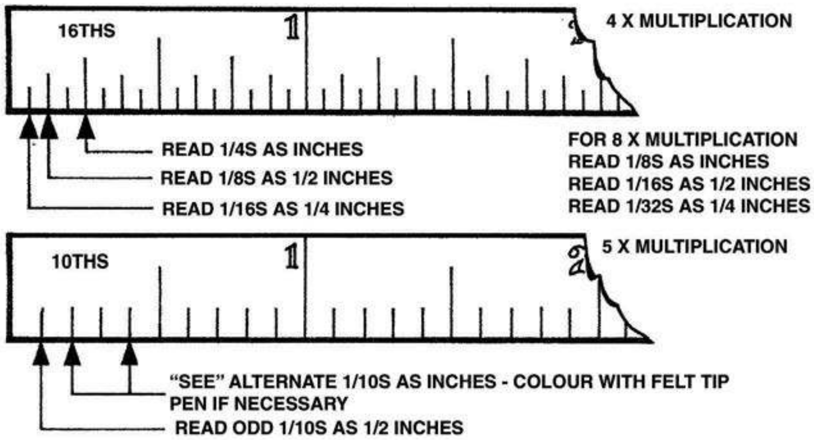
POSITIONING ADDITIONAL FORMERS

FIG. 33.



LAYING P.47 WING OUTLINE OFF FROM DATUM LINE - DASHED LINES INDICATE SUITABLE STATIONS, CHOSEN DATUM LINE DRAWN BETWEEN WINGTIP NAVIGATION LIGHTS

FIG. 34.



USE OF RULER FOR SIMPLE SCALING

FORMERS AND CROSS SECTIONS

There are 'natural' places for formers to go: at the proposed model engine mounting bulkhead, at the rear of a 'Gipsy' cowl, at the wing L.E., cockpit L.E., wing T.E., tail L.E. and so on. The number of formers will depend upon the size of the model and its structure. The position of the formers will depend upon what is being supported, such as wing struts, main undercarriage, engine, and wing bolts. It's best to keep former spacing to 3" or less, and unwise to space them too far apart, as the skin structure can sag, giving a 'starved horse' appearance. Fig. 32 shows some main cross-sections as might be shown on a three-view as 'AA to DD' and the required extra bulkheads and formers as 1 to 5.

First, we draw horizontal and vertical datum lines, and scale-up the known sections AA, BB, CC and DD onto the crossed datums. Then we plot the intermediate sections 1-1 to 5-5 by interpolation along diagonals. It is best to plot only half-sections, then fold the paper down the vertical datum, using carbon paper to trace the opposite half so that the shape is symmetrical.

Now we trace each individual section out separately. The Grumman Wildcat fuselage shown in **Fig. 32** would need to be sheeted to represent the stressed skin, so the next step in this case is to remove the thickness of the skin from our outline. We then plan the other notches and cut-outs needed for the rest of the structure, such as stringers, crutches or box-girders. The way to do this will depend upon the chosen structural design, a subject to be covered in a future instalment. Note that formers and bulkheads need not always be oriented at right angles to the datum, if it is more convenient for some of them to be sloped.

WINGS

Before finalising the fuselage construction around the wing joints, we may have to plan the wing, so that we can identify the best form of wing fixing to be used. The method of draughting the wing plan is similar to that used for the fuselage, using a datum line from which measurements are made. A suitable datum line in the case of a rectangular wing planform would be the wing L.E., but for a double-taper or elliptical wing, one usually picks a span-wise line approximating to the main spar position, laying-off the L.E. and T.E.. from this line. (**Fig. 33**).

Wing tips may be plotted either using the grid method as for the canopy in Fig. 31a. or using a closer pitch of lay-off lines as for the rudder in the same diagram. With the outline plotted, we rub out the geometrical drawing lines and put in the various rib stations, together with spars, l.e. and t.e. according to the desired structure. We must remember to check that the wing root and fuselage will mate up properly.

The horizontal tail is drawn up in the same manner as for the wing. If using an over-scale tail, then it is perhaps best not to 'stretch' it more one way than the other; e.g. for a nine-times enlargement and a 30% increase in tail area over scale (i.e. area x 1.3) multiply the scale drawing of the tail by a factor of:

$$9 \times \sqrt{1.3} = 10.26$$

This will keep the tail to the same overall aspect-ratio, rendering the enlargement less obtrusive.

The new tail should be positioned so that its hinge-line coincides with that of the original. A slight increase in fin and rudder size along the same lines might further mask the increase in horizontal tail area.

I will now describe the various methods of 'multiplying-up' to produce the drawings just described. There are four methods: two-scale rules; proportional dividers; compasses; and direct multiplication.

TWO-SCALE RULE SYSTEMS

One could read this title with a shudder and turn the page, as it often conjures up visions of hard preparation work of a precision nature. Do not despair, because one can use the two-scale rule method and not have to manufacture a single specialist item.

SINGLE RULER METHOD

If the multiplication factor is either x10, x8, x5, x4, or x2, then a standard 12 inch ruler marked in 1/8ths, 1/16ths and 1/10ths is all we need. (**Fig. 34**). The method is illustrated most easily by supposing that we wish to multiply our scale drawing up by a factor of 4. This means that a measurement of 1/4" on the three-view corresponds to a length of 1" on our big drawing.

Taken in isolation, a 1/4" division on a ruler looks rather like a 1" division divided into quarters. We can, therefore, read the required length directly from the small drawing, by merely reading the quarters as whole inches, 1/8ths as half inches, and the 1/16ths as quarter inches, estimating for lengths in between.

We can do the same with the 1/8ths. If multiplying by eight, then the number of 1/8ths measured against the three-view is equal to the number of inches needed for the model, and again we estimate for half and quarter inches using the 1/16" and 1/32" divisions respectively.

If multiplying by five, we have to be more careful in identifying the number of whole 1/5ths, but practice makes perfect. In this instance, the 1/10ths represent 1/2-inches. What one might do is mark every second division on the ruler with a felt-tip pen; then one would not risk mixing up the dimensions. When working to x5 and x10 multiplication in this way, many designers prefer to use the cm/mm scale on the ruler as the smaller units reduce errors in estimating measurements.

When one is in practice, this method is far easier than sitting down and working out, say, (cf **Fig. 35**) 5-times 0.94″ = 4.7″, 5-times 1.5″ is 7.5″, 5-times . . . I'm fed up already

TWO-SCALE RULE METHOD

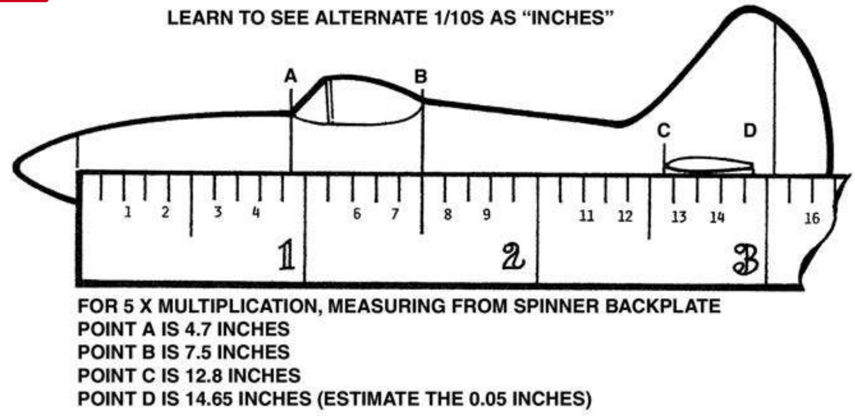
For the two-scale rule system proper, we do have to make a separate mini-ruler, probably from a strip of Plasticard, on which we score the divisions. I will illustrate the manufacture of a two-scale rule with the following example. Suppose that we are designing the model Hawker Tempest Mk.II mentioned earlier, and choose the scale of 1/9.4 instead of 1/9th, perhaps because the smaller wingspan wouldn't need the model to be dismantled to fit in the car. We then need to scale up a 1/72 three-view by a factor of 72/9.4 = 7.7.

Before proceeding with how to make a mini-ruler to perform this multiplication for us, let's see first what we want it to do. Look at **Fig. 36**.

The mini-rule is actually a scale, with a number of equal divisions on it. When we lay it on an appropriate three-view drawing, we want the number of scale divisions of the mini-rule to tell us how many inches we should measure on the model. In **Fig. 36**, the mini-rule tells us that the wing chord is 4.7/8 divisions, and we take this as the number of inches for the model's wing chord. The problem now is how to make the mini-rule (called a scale-rule from now on) with appropriately-sized divisions. In the case of our Tempest, the scale-rule will have 7.7 divisions to the inch. Had we wished to multiply up by, say, 9.3, then the scale-rule would have required 9.3 divisions to the inch, and so on. **Figs. 37a** and **37b** show a geometrical method of dividing an inch into '1/7.7ths'.

STEP 1: Draw a line AB 7.7cm. long, and mark the centimetres and the ends of the line.
STEP 2: Draw a line 2″ long at right angles, and join the extremities of the lines by CB.
STEP 3: Lay a setsquare along CB, and place a firmly held straightedge against it as a guide so that the setsquare can slide to and fro. Draw equally spaced lines parallel to CB passing through the marks on AB, moving the setsquare along the straightedge. Complete lines are not necessary, just intersections on AC.
STEP 4: The 2″ long line AC has now been divided into seven equal divisions, plus a shorter division, which is ignored. The evenly spaced divisions are actually twice the size we need (because making the base-line 2″ long instead of 1″ makes the job easier to draw), so we divide each division in half (by "eye" is quite good enough if you take care).
Each new division is now 1/7.7th of an inch long. The reason for choosing a 2″ baseline is that with the equipment that the average modeller can lay his hands upon, it is unrealistic to try to work with very small divisions. If angle ABC is very acute, it becomes difficult to locate the setsquare accurately on the marks along

FIG. 35.



APPLICATION OF THE SINGLE RULER SYSTEM FOR 5X MULTIPLICATION

FIG. 36.

USE OF HOME-MADE 2-SCALE RULE

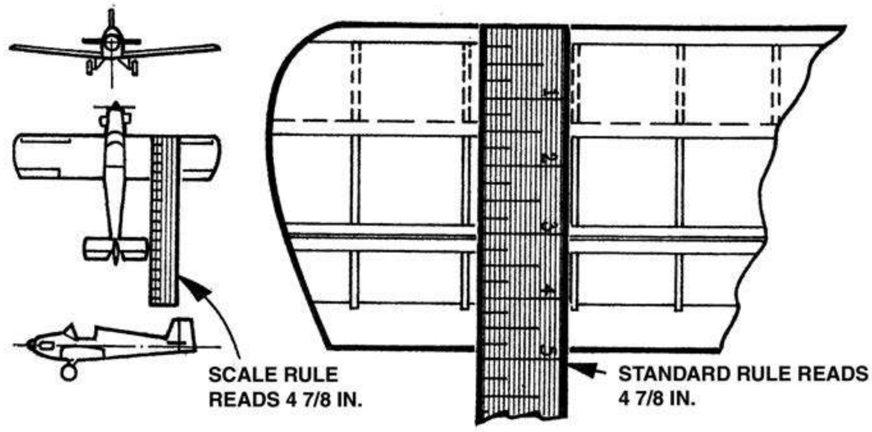
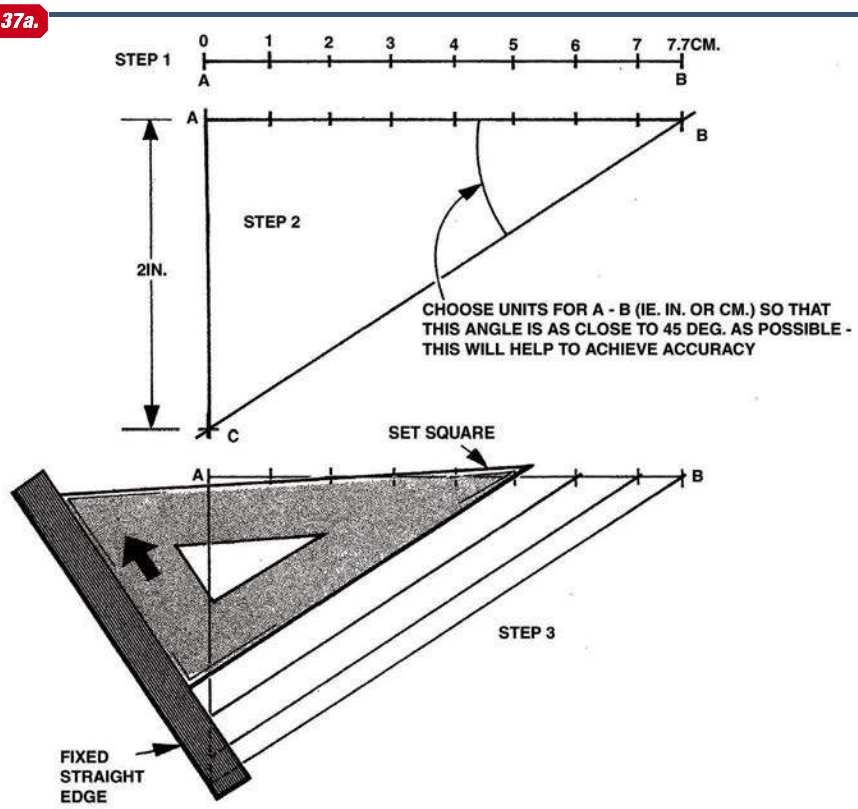


FIG. 37a.



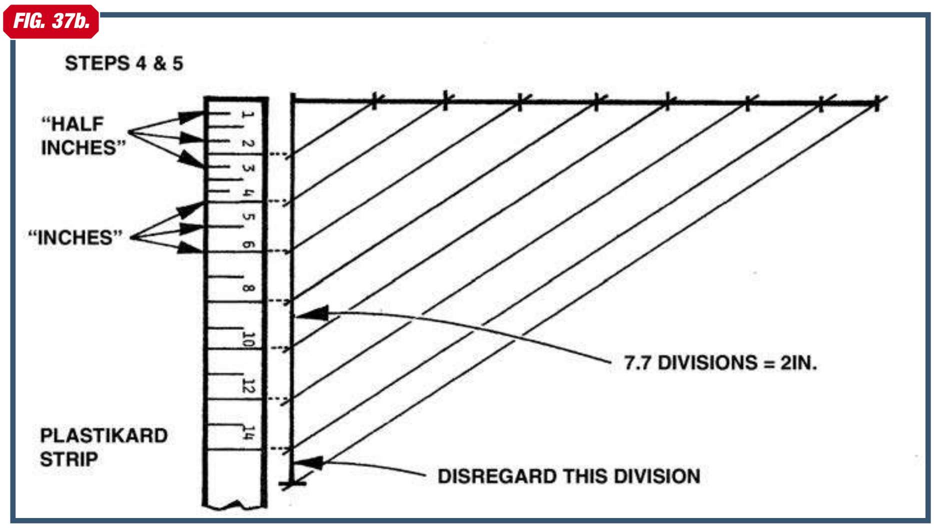
AB. A very sharp pencil is obviously needed.

STEP 5: The final step is to extend the scale-rule. First transfer the existing scale on to a strip of Plasticard then, by successively repositioning this strip, extend the scale as far as is needed. Number the divisions as "inches", and subdivide the divisions as needed - once again by "eye" is good enough for halving and quartering if we're steady enough.

How to use the scale-rule has already been described, and the half-hour's work just outlined can save an awful lot of button-pushing on a calculator when drawing-up commences.

One could use a calculator to help you create your scale-rule with 1/7.7th inch divisions. But the decimal of 1/7.7 is 0.13, and trying to divide up the first inch into 0.13" increments using a ruler is not easy.

FIG. 37b.



PROPORTIONAL DIVIDERS

This device is part of a professional draughtsman's kit. One can fabricate a homemade set to suit any particular scale, and there is an advantage in that no maths is needed, but one must work accurately as any 'slop' in homemade mechanical devices can produce gross inaccuracy. The principle on which the instrument works is shown in **Fig. 38**. Odd scales like 3.7:1 are easily achievable, for instance, by making the arms 4.7" long and hinging them l" from the ends.

The two arms are pivoted together and the ratio of the lengths of the arms each side of the pivot equals the ratio of the distance between the pointers. For instance, if the arms are 5" long on one side and 1" long on the other, the gap between pointers will be in the ratio of 5:1, so a gap of 1/10" between the narrow end will be magnified to 1/2" on the other side. It is safest to limit the multiplication factor to a maximum of 5, using arms no more than 6" long. This type of device would seem handy for plotting formers using the 'ratio along diagonals' method. The commercially produced item is very expensive, however.

COMPASSES

Compasses are only of use where whole-number multiplication is needed. We simply set the compasses (or dividers) to the dimension to be enlarged, and transfer the measurements to the model drawing by marking off an appropriate number of spans of the compasses. The chances of error are quite high, and large multiples should be avoided. This system works for up to four-times enlargement, but for no more. Any small error becomes magnified too, and a 1/64" error at the gap between the points multiplies up to a 1/16" error on a four-times enlargement, which may be unacceptable, especially for formers.

FIG. 38.

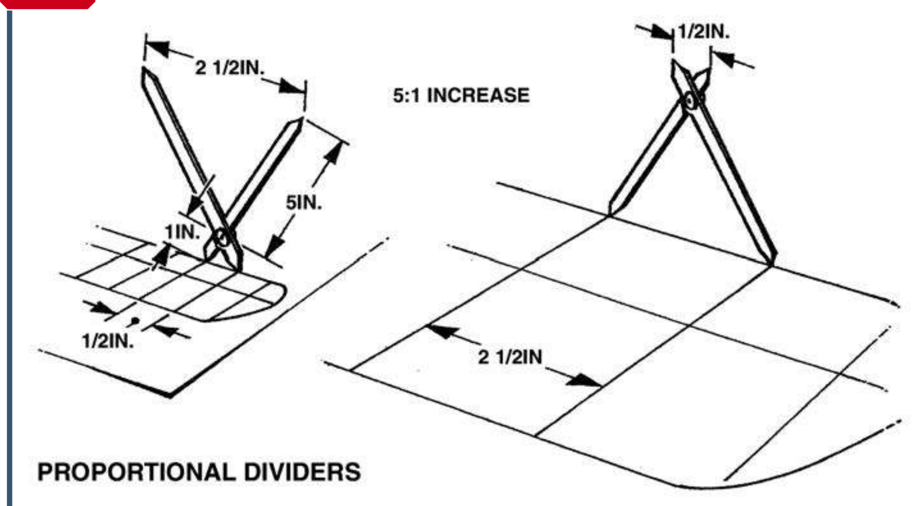
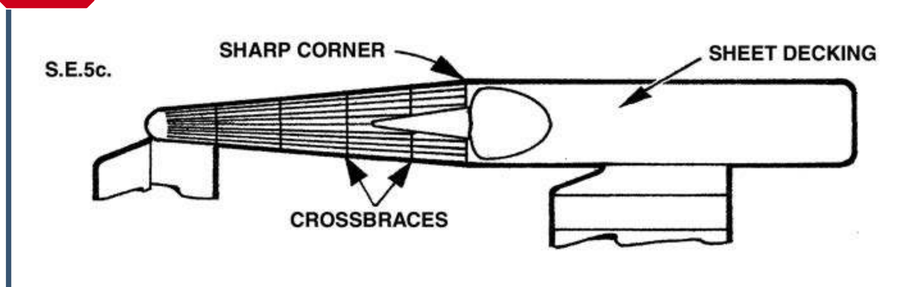


FIG. 39.



DIRECT MULTIPLICATION

Even the cheapest electronic scientific calculator makes direct multiplication a convenient method of scaling-up a three-view, especially when very strange multiplication factors are necessary. Lengths are merely measured on the 3-view in inches and tenths, or mm, and multiplied up at the touch of a few buttons. The 'constant' facility makes child's play of complicated multiplication factors like 7.28 or some such; squares and square roots are a doddle, and the sine, cosine and tangent functions make child's play of working out incidence angles, and the lengths of struts for biplanes and undercarriages using trigonometry. However, the calculator can be tedious for repetitive simple multiplication, like 8 x or 5 x, for which enlargements the single-ruler or 2-scale rule method has much to commend it.

EIQUIPMENT FOR SCALEING UP

The tools required for producing a working drawing do not need to be very specialised, and are obtainable cheaply.

1. DRAWING BOARD - The drawing board need not by anything other than the back of your building board. A 5ft x 2ft 6in piece of chip-board is a good size, and the writer has designed many a model using just this facility. (You need to be able to pin your drawing paper down, so don't attempt to use the dining table by itself!)

2. PAPER - The lining-paper as sold by wallpaper shops is cheap and effective. Cartridge paper available from art shops and stationery suppliers withstands repeated rubbing-out better but is more expensive. Computer listing paper is also a good strong material, and a box of the 14.1/2" wide paper would last a designer forever.

3. PENCILS - The writer prefers an "H" pencil for drawing as it is fairly easily erased, whilst producing a sharp enough line. A softer pencil smudges easily, whilst a harder one grooves the paper and is difficult to erase properly. Drawing pens are useless for initial drawing, so you will not need any of these.

4. DRAWING INSTRUMENTS - As I am not a draughtsman, my drawing instruments are basically of the cheapest available. A browse round any large stationers will reveal: French Curves in sets of three; reasonably-priced articulated compasses (which enable pencil and compass points to remain vertical - especially useful when marking-out roundels with a pen attachment); a circle template for drawing circles of diameters in the range 1/16" to 1.25" and 1mm to 36mm - easier to use for small radii than compasses; a 12" 'Flexicurve' for drawing weirdly curved lines too difficult for standard French Curves; 45 deg. and 30deg - 60deg. - 90 deg. (7" hypotenuse) set-squares; a 180 deg. protractor, and a good quality foot rule marked in 10ths, 16ths and cm/mm.

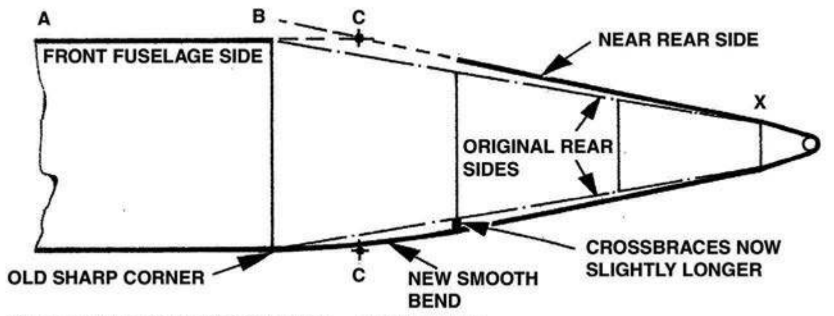
A long straightedge will also be needed, for drawing wing outlines and datum lines. A one metre long steel rule is the best tool for this purpose, as it can also be used as a guide for cutting lengths of balsa from sheet. One does not need a tee-square because the edge of the building board will not be true. For long sweeping curves, typically fuselage sides in plan view, I use a length of 3/16" sq balsa pinned to the board as a guide - useful as the stripwood is bound to take up the same curve as the fuselage member being drawn. Apart from a rubber - and a strong back for bending over the table - that is all we need.

METHOD TO ELIMINATE SHARP BENDS IN LONGERONS ETC.

Some aircraft, notably the SE5a, have sharp corners in plan view, to which wooden longerons could not conform unless either cracked or scarf jointed. (**Fig. 39**). The writer sometimes chooses to 'design out' these bends and obviate the need for a joint in the wood. See **Fig. 40** where the SE's top view is drawn wildly out of proportion for illustrative purposes. First extend the line of the forward side, shown as AB, to a point C, midway between the original bend and the next cross-brace to the rear. Then join the rear-most point X of the original side to C, dotting the line from the cross-brace forward to C. Join the new rear fuselage side to the front fuselage side with a smooth curve.

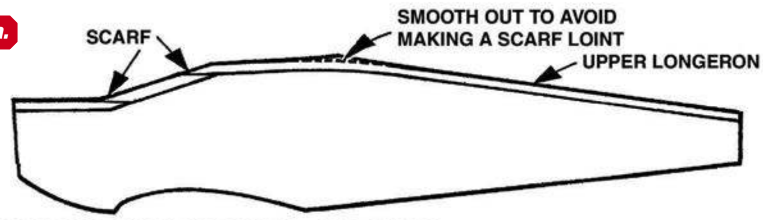
Using the above method, there will be no difficulty in drawing all cross-braces to their proper lengths, or in subsequently cutting them out accurately. The method can also be used on an aeroplane profile view, as shown in **Fig. 40a**. In this example the top longeron has to negotiate several sharp bends, the one just aft of the cockpit being suitable for the treatment just described. ■

FIG. 40.



"BLENDING OUT" CORNERS - PLAN VIEW

FIG. 40a.



"BLENDING OUT" CORNERS - SIDE VIEW

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FULL SIZE FREE PLAN FEATURE

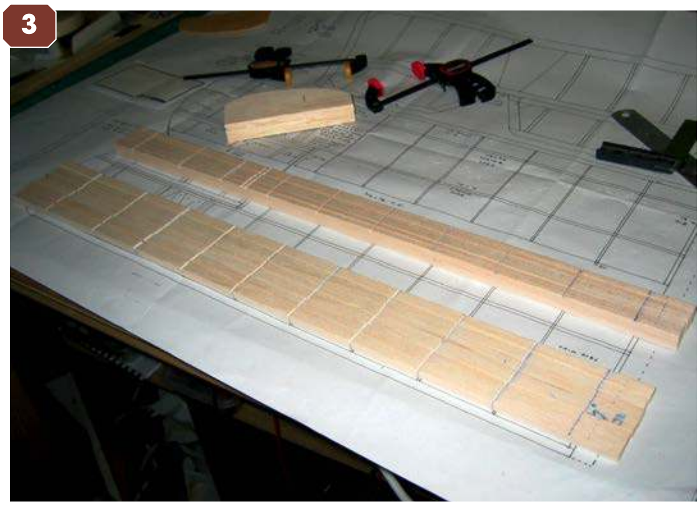
SOPWITH TRIPLANE

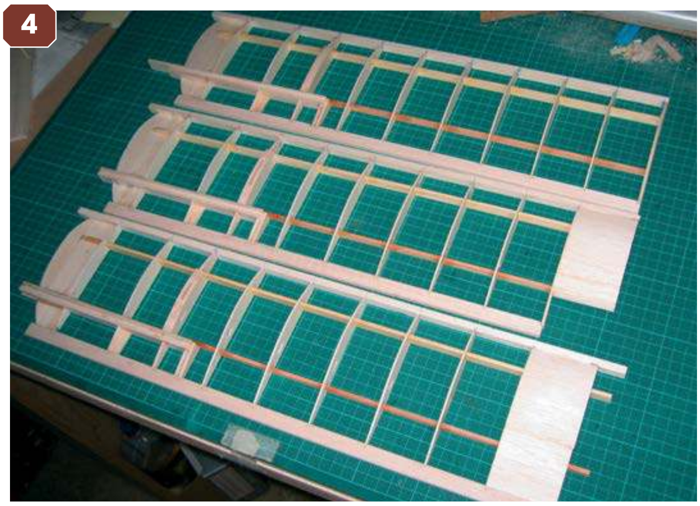
A truly international 45" span electric model, designed in the UK by the late Peter Rake, with test models built by Robert Hoffman in the USA and Rodd Perrin in Australia

Of all the fighter aircraft produced during WW1, the Sopwith Triplane possibly had more effect on fighter design than any other type. Although the type's service career was relatively short-lived, and despite only being produced in quite small numbers, virtually every other combatant nation was sufficiently impressed with this little Sopwith to produce triplanes of their own. However, apart from the most famous of them all, the Fokker Dr1, virtually all the others disappeared into rapid obscurity. Considering what monstrosities many of them were, that is not necessarily a bad thing.

THE MODEL

This isn't intended as an exact scale copy of the full-size aircraft. It is an easy-to-build scale model of the type that you are likely to see at your local flying





1: Have a sandwich! Basic wing rib blanks, clamped together between ply templates on a pair of long threaded rods, ready for sanding to shape. 2: After sanding - the wing rib sandwich. Note that spar slots have been cut in the underside. 3: A full set of wing spars, both front and rear, knotched to take the wing ribs, egg-crate fashion. 4: A full set of wing panels for the port (left) side. All are essentially the same. Ailerons are built integral with the wing panels, and are separated after trimming and sanding.

field on most good-weather Sunday mornings, very representative of the original, and capable of being well detailed, but not 100% scale.

In order to avoid the problem of assembling three wings complete with ailerons on each wing every time you go the the Club field, it has been designed as a one-piece model. Such is not to say that, with minor alterations, it couldn't be built to disassemble, just that it's an awful lot of bother on a model that will fit easily into most family cars in one piece. Also, like many of P.R. models, she is intended to take advantage of economy power plants and just seven or eight-cell battery packs.

When first designed, the power train of choice would have been one of the 'hotter' 600 types mated to either a Graupner or Master Airscrew, offset gearbox and retained using shell clamps. Rodd fitted his prototype model with a 4:1 geared ND10 motor and 10 x 3000 mAh NiMHs, while Robert's model flew extremely well on more or less the combination intended, i.e. - a Graupner Speed 600 (No. 6309), a Master Airscrew 2.5:1 gearbox and eight CP2400 Ni-Cads.

So tailor your present state-of-the-electric-flight-art power train to suit those parameters.

WINGS

Before starting assembly, study the fuselage plan and familiarise yourself with the different way each wing is fitted to the model. The top wing, which is built and joined to the centre-section with ply dihedral braces, is the one that sets the dihedral for all three wings. The outer centre-section ribs are cut to seat accurately onto the ends of the ply centre-section struts.

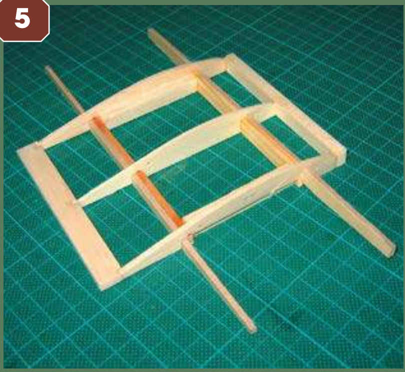
The middle wings, which have the 1/4"x 1/2" balsa extensions, have their root ribs slotted to fit accurately over the 1/4" square balsa strip fitted to the centre-section strut and also have the two inboard ribs of each panel trimmed back to allow for the top sheeting to be fitted.

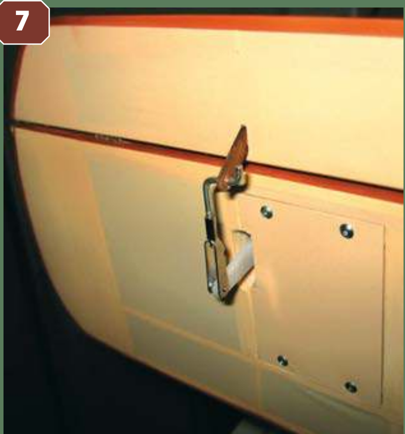
The root bay ribs for the bottom wing panels are also trimmed for sheeting, but these wings rely on the 3/16" locating dowels to ensure that they go on at the correct incidence angle. In addition to these points, all ribs inboard of the aileron servos will require the hole for the aileron servo extension leads to pass through.

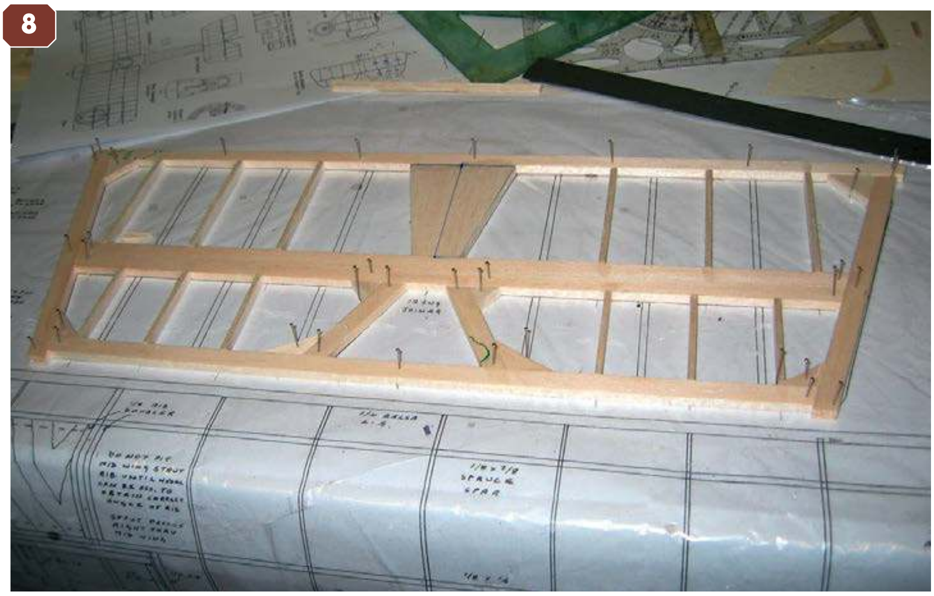
The final task, before you reach for the glue, involves the interplane strut ribs. Once again, use the fuselage side-view to determine exactly where and how much the rib should be cut away to take the struts. In the case of top and bottom wings, this simply means small notches, which are then faced both sides with the doublers. However, since the interplane strut passes right through the middle wing panels, they will require the entire strut area to be removed. Assemble these rib/doubler assemblies over the side-view, and then add the opposite doubler.

So, with all the ribs prepared, the spars cut to length, notched and tapered to clear the tip, and with the other wing components to hand, NOW you can reach for the glue and begin some serious wing building.

Pin down the leading edge, trailing edge and wing tip, gluing as required, then pin down the spars, gluing them to the wing tips. Now trim the ribs for the ailerons and glue the ribs in place. Lean the root ribs in slightly to allow for dihedral, but ensure that all other ribs are upright, the only exception being the middle wing







strut ribs which are not fitted until later.

Glue the aileron area false trailing-edge to the spar, pin in place, but only glue to the tip, the aileron leading-edge and fit the aileron ribs and horn plate (bottom wing only). Allow to dry thoroughly and then sheet the root bay of the middle and bottom wing panels. Add the 1/4"x 1/2" balsa pieces to the ends of the middle wings, then trim and sand to shape. Thereafter, separate the ailerons, trimming and sanding the leading edges as shown on the plan.

Add the hardwood rails to the servo bay of the bottom wing panels so that, once the servo hatch is screwed in place, it will be flush with the lower surface of the wing. Any scrap hardwood will do, just so long as you have something to screw to. It is a good idea to also fit the aileron servo leads now because those will be much more difficult to fit if your wing is covered. However, the aileron horns and link horns are better fitted after covering the wings.

CENTRE SECTION

This really is very simple; build it over the plan, applying the ply braces as you proceed. Add the pieces of 1/4" x 3/8" balsa inside the 1/8" ribs, and allow the work to dry. Trim and sand the centre section to shape and then join the top wing panels to it. Cut brace slots in the ribs and glue the panels snugly to the centre-section. Pin them down at the wing roots, but pack up the tips as indicated before allowing to dry.

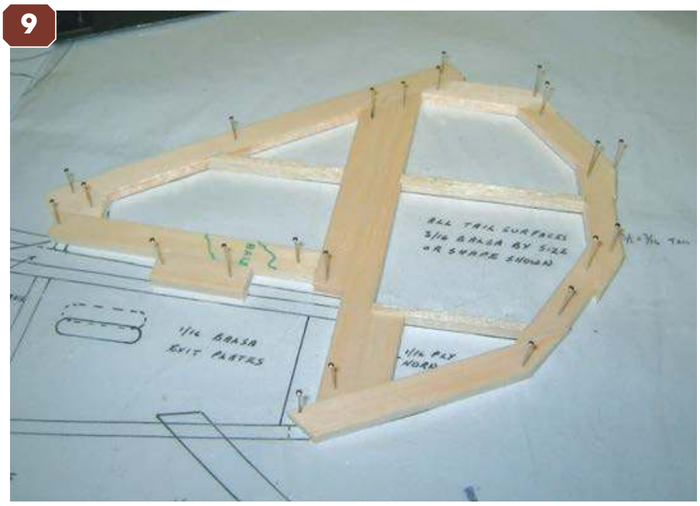
There you have it - effectively, three pairs of wings built.

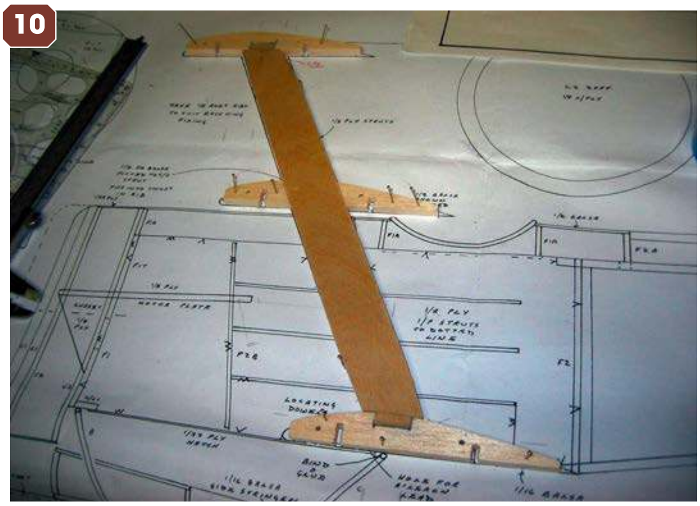
TAIL SURFACES

Since by now you probably feel you deserve a rest, we'll move on to what has to be the easiest part of the entire model - the tail surfaces. However, before starting construction, here are few notes. The horn positions shown on the plan are for a model using balsa and wire pushrods and are not the scale positions. Should you wish to save a little weight and end up with a more accurate model, move them to the correct locations and use a closed-loop control system. Naturally, for this method, double-ended horns that pass right through the control surface (as with the full size Triplane) will be required.

Right, that decided, let's bash some more balsa. Build the tail surfaces over the plan, using 3/16" balsa as indicated on the plan. Allow to dry, round off the edges and sand overall. Join the elevators using the 12 s.w.g. wire (3/32"music wire),

5: Ply dihedral braces are built into the top wing centre-section. Only the top wing has a centre-section. 6: Interplane struts pass right through the middle wing. As an aid to simplification, the strut ribs are not fitted to the wing until the initial assembly stage.Note of the way in which the ailerons on each side are linked. 7: Two aileron servos are used - one in each lower wing panel and linked to the aileron on the wing underside. Servo is hidden by removable ply panel. 8 & 9: Absolutely nothing complicated about the tail surfaces. 10: A vital stage to get absolutely correct. Interplane strut and related ribs are set up over the plan to get the strut cut-outs exactly right.





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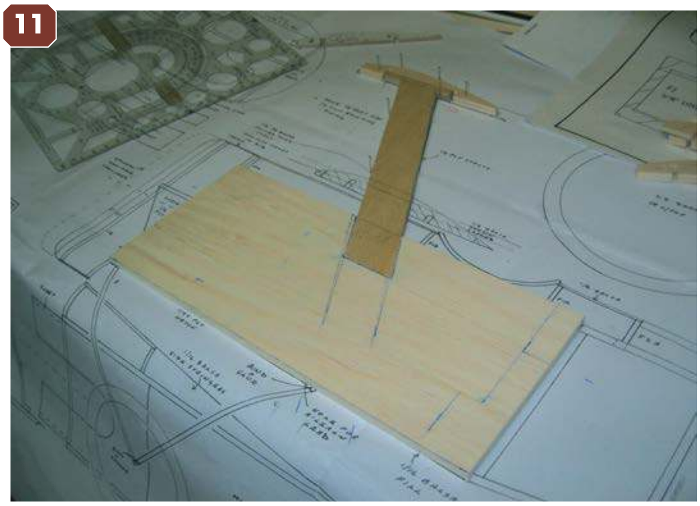

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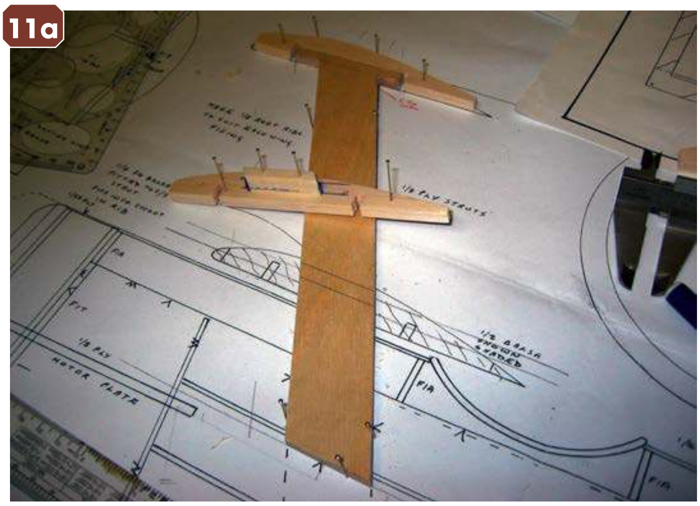

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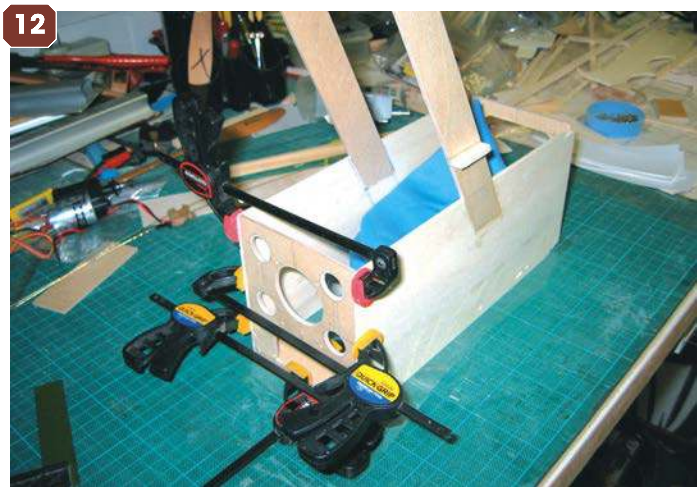

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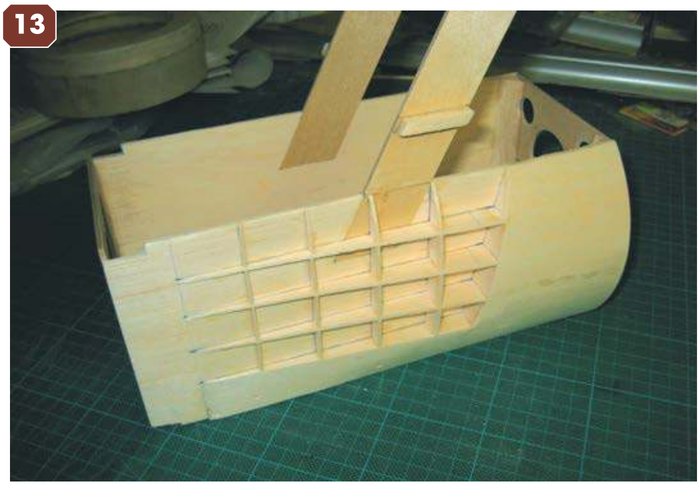

11& 11a: Centre-section struts are let into the sheet fuselage sides; the block at the bottom of the strut and the tongue at the top aid wing alignment during the assembly stage. 12: Once the centre section struts are set into the basic sheet fuselage sides, the basic front fuselage box is assembled. Clamps help set it all in place. 13: The front fuselage assembly taken a stage further. With the side-fairings now in place, it is ready for mating to the fusegae rear unit, built sepatately. 14: The basic box structure of the rear fuselage, built from 1/4" square balsa. 15: Now it looks a bit more like a fuselage - the rear and front section mated.

ensuring that both elevators are level and straight. Once again, horns are added after covering.

FUSELAGE

Okay, your rest is over! Now it's time to move on to the area of the model that is likely to take as long to complete as the rest of it put together. Yes, it's time to make something to fit those wings and tail surfaces to - the fuselage.

The fuselage is built as two separate box structures, the front, sheet sided component and the rear, built-up one. With both basic boxes completed, the two assemblies are joined over the plan and then have all deckings and stringers added. This system is nothing like as strange as it at first sounds, because it is a sure way of achieving a straight, square fuselage. The slight deviation from scale is a small price to pay for a model that flies better.

REAR BOX

Build two side frames, one on top of the other, but separated by some thin polythene sheeting to prevent them becoming one double thickness frame. Allow to dry completely, and then join the two over the plan by adding the cross-braces. Note the way the tail is cracked in and joined; make sure it is also securely glued because free-flight tails are no use to anyone. The tailplane seat pieces and the tailskid plate are designed to help reinforce this area and are in fact the next pieces to be added. The sheet fill pieces in the rear side panels are only really required if you are using pushrod linkages - for closed-loop controls, they may, if you desire, be omitted.

FRONT BOX

The first task here is to edge-to-edge join some 1/8" balsa sheet to the required width to suit the balsa side panels. Then, mark out the sides, noting that these are

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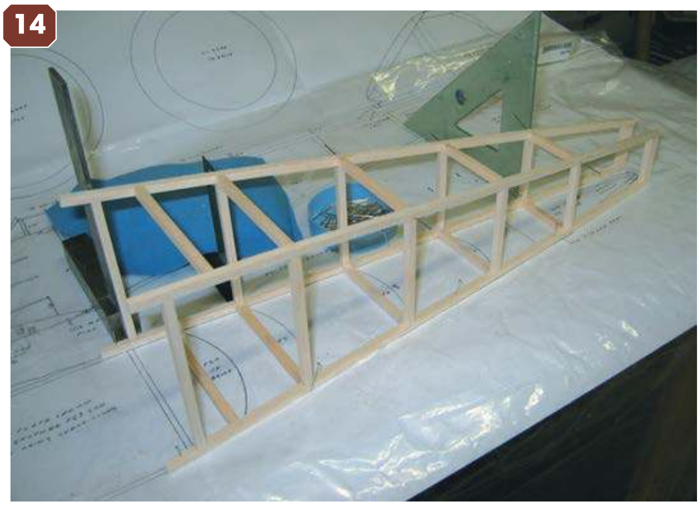

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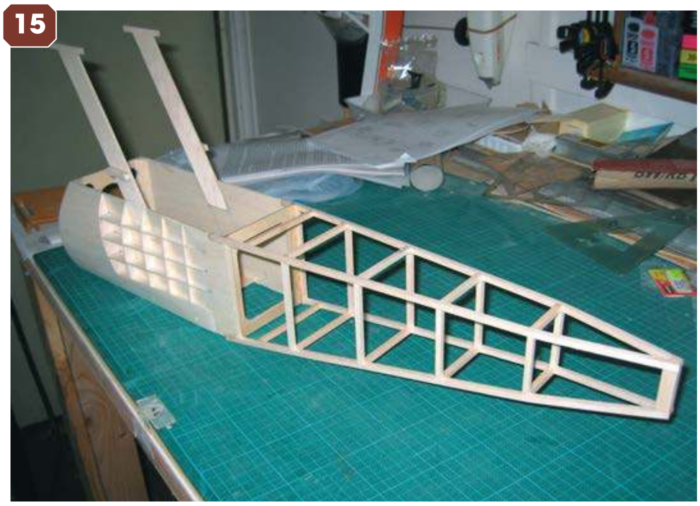
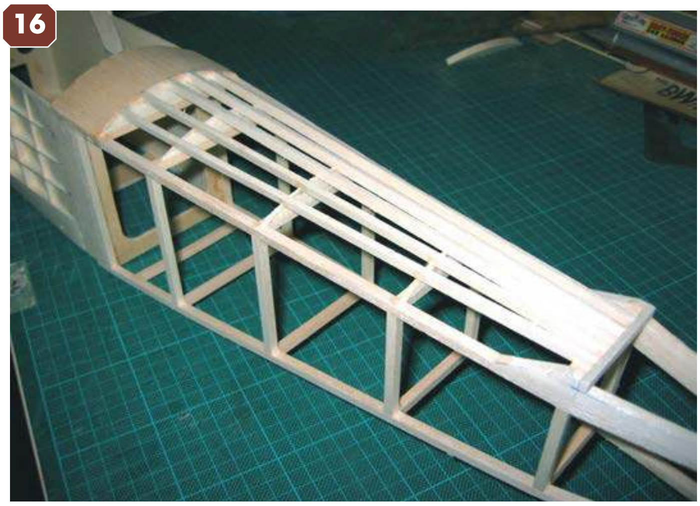
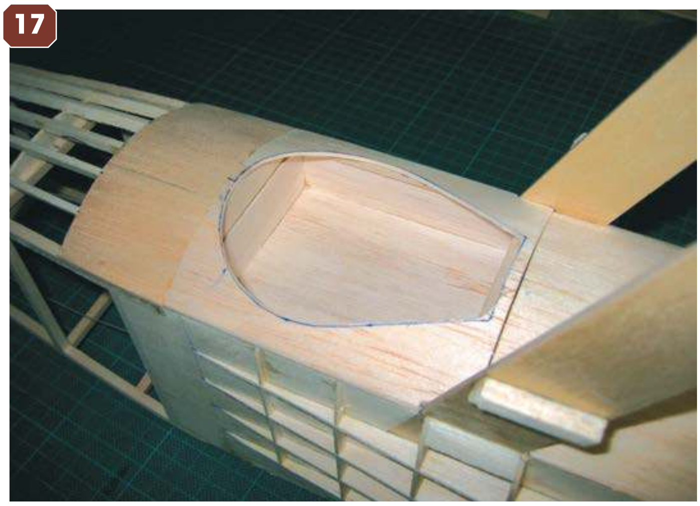
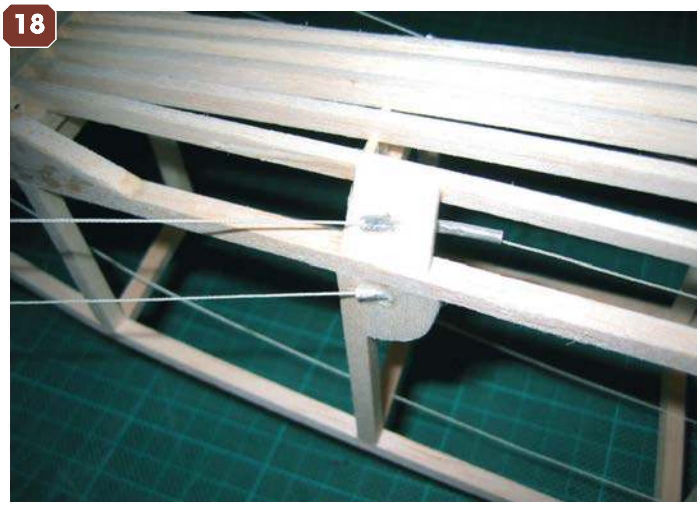
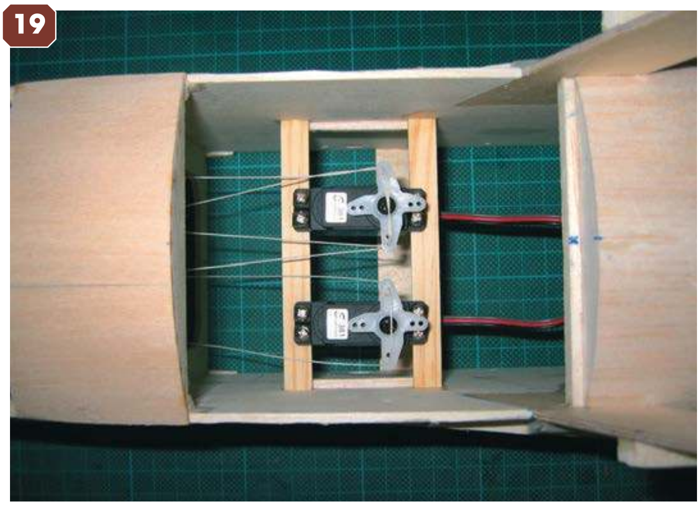










16: **Top decking now in place, with stringered fuselage rear deck. Nose the fairing shape up to the front of the tailplane seat to reproduce the scale shape. 17: The cockpit area with sheet 'floor' in place on which to mount a pilot bust. 18: Detail of the rear fuselage showing how control runs for a scale-like closed loop link to the servos should be fitted. 19: View inside the fuselage before addition of the sheeting at the cockpit, showing the installation of the ruddder and elevator servos - in this case set up with closed-loop control links.15: Now it looks a bit more like a fuselage - the rear and front section mated. 20: The completed fuselage, showing the centre section struts and the key on which the centre wing panels rest to set position and incidence angle. 21: Access panel for the fuselage underside. 22: This simple, marked out jig is a great aid in accurately constructing the wire undercarriage.**

cut around the centre-section struts and should also have the locating dowel and servo lead positions marked at this stage. Cut out two identical side panels, and prepare yourself for an extended fuselage building session. The centre-section struts should be accurately glued into the two sides, and the middle wing locating blocks added while you can still use the plan as a guide. It is vitally important that these pieces are accurate, and almost impossible to do after the sides have been joined with the formers.

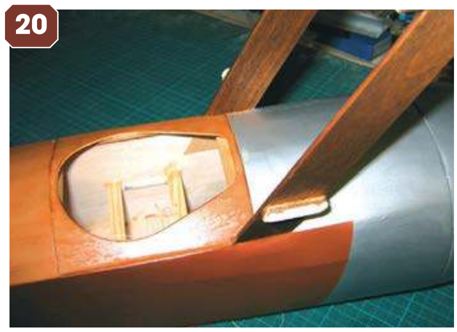
Next, mark in all former positions and the position of the motor plate before using those formers and motor plate to join the sides. It cannot be over stressed just how important it is to ensure that the assembly is straight and square. If it isn't, your centre-section struts won't align correctly, which means you'll have problems when it comes to fitting the wings to your model.

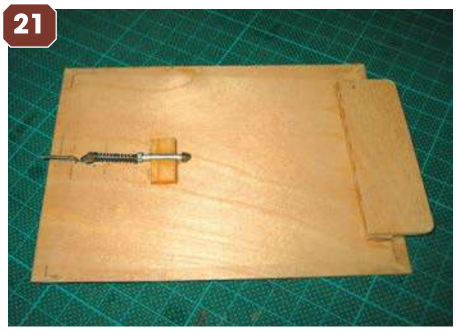
Add the undercarriage plates and the ply motor plate gussets, allow to dry and then join the front and rear basic box structures. Make this assembly over the plan as an aid to producing a straight and square fuselage.

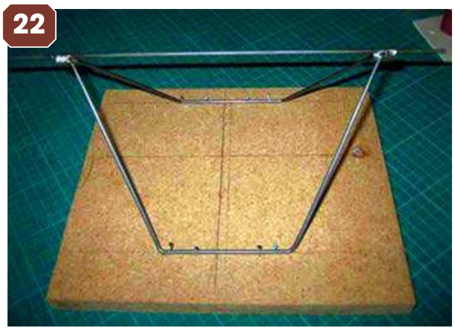
DECKINGS ETC.

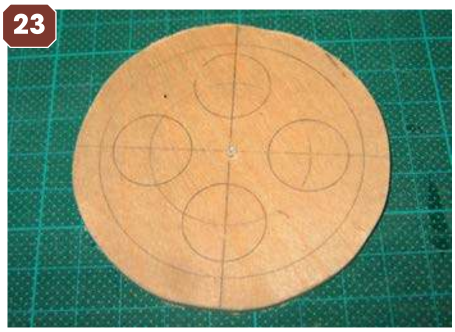
Glue in place all decking and stringer formers, including the piece of 3/16" strip between the tailplane seat pieces, and then apply the top 1/16" sheeting and the stringers. Follow that with the side stringers and the 1/16" side sheeting, noting the way it is cut away round the bottom wing position. This task is made slightly easier by ignoring that fact initially and using the bottom wing panels to mark out the area to be trimmed after the sheet is firmly glued in place. The side stringers are nothing more technical than triangles of 1/16" balsa, cut to match the depth of side sheeting where they fit, but with the bottom one trimmed by the thickness of the side sheet, which is glued over it.

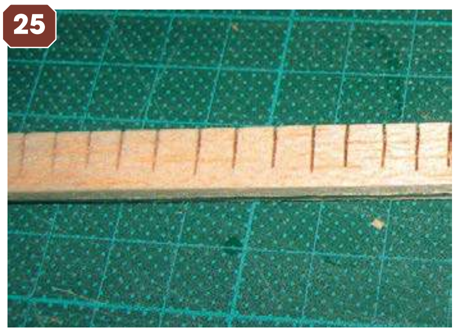
Note that Rodd also added extra side formers to the nose of his model to achieve that showing-through-the-fabric effect so prominent on this aircraft. Glue in place the bottom surface fill-pieces and your fuselage is ready to trim off the











excess longeron and tail seat pieces before sanding overall. Bind the undercarriage wires firmly in place, bind and solder them to the axle and then glue the thread bindings. Alternatively, the undercarriage may be retained with small saddle clamps. Robert and Rodd both used this method, which, as it turned out, was no bad thing (see flying notes).

ENGINE COWL

As you can see from the plan, you have another choice to make - a scale-length cowl or a slightly over-length cowl to help with balancing the model. The choice is entirely up to you; both are made in exactly the same manner. Both Rod and Robert used the scale-length cowl.

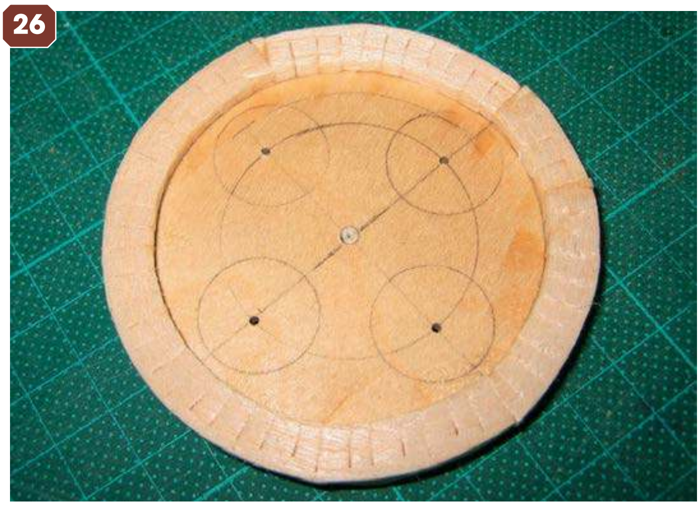
Wrap a strip of 1/32" ply around one former C2, gluing with cyano as you proceed. Once all the way round, leave any excess length until the second C2 has been fitted. Glue the ends of the ply and reinforce all the glue joints with a bead of white glue on the inside.

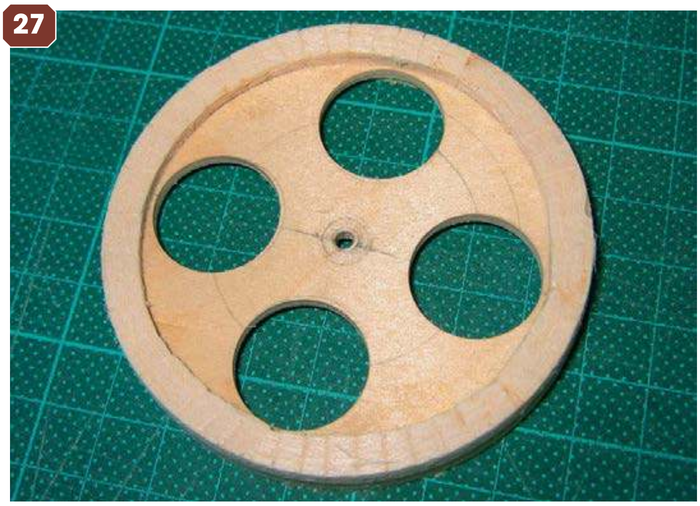
Laminate the C1 parts and then glue them to the front of the assembly. Once dry, trim and sand the cowl to shape before proceeding to fill, sand, seal, sand, prime, sand and finally paint your cowl. The cowl may be either glued in place, or made removable, whichever you prefer. Retaining the cowl with small, rare earth magnets, while using small lengths of cocktail stick as locating pegs, works well.

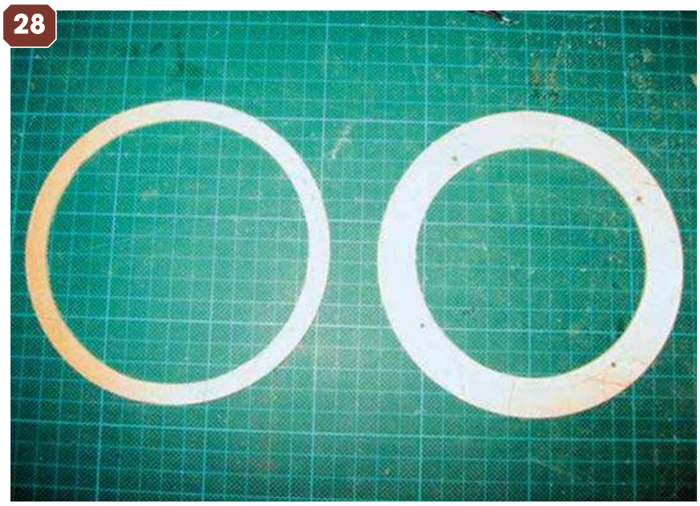
COVERING AND FINISHING

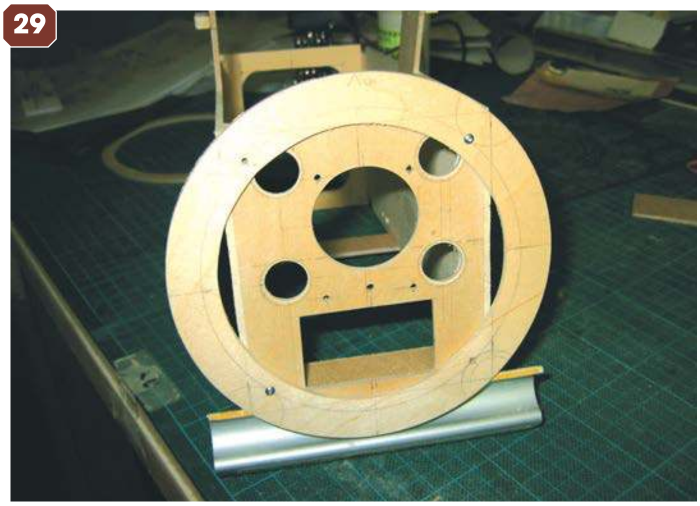
Once again, the test builders chose different methods of arriving at a similar end product. Robert covered his model with Polyspan, shrunk, doped and painted, while Rodd used a film covering called Ozcover, keyed and painted. Although both methods worked out okay, Rodd did have more trouble with the painting stage. Painting film can work, but is not without its hazards, especially if any masking is involved.

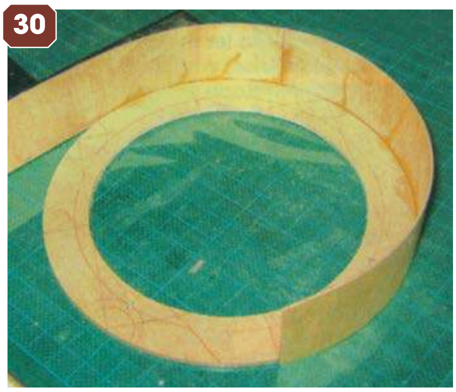
23: Rough-cut plywood main wheel disk, with lightening holes and rim positions marked out. **24:** The Rough-cut disks are spun up in an electric drill for sanding the edges to perfectly round. **25:** Wheel rims are from balsa strip, slotted as shown here to allow the strips to be eased round the edges of the plywood disk. A good overnight soaking may well help. **26:** The balsa rim in place on the plywood disk. **27:** Lightening holes cut into the ply centre disk. **28:** Plywood front and rear formers for the engine cowl. The wide one on the right is the rear position one. **29:** Cowl rear former trial fitted to the fuselage front assembly. There are four retainer points for the cowl.

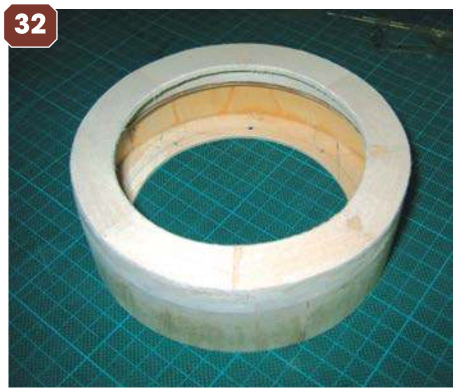


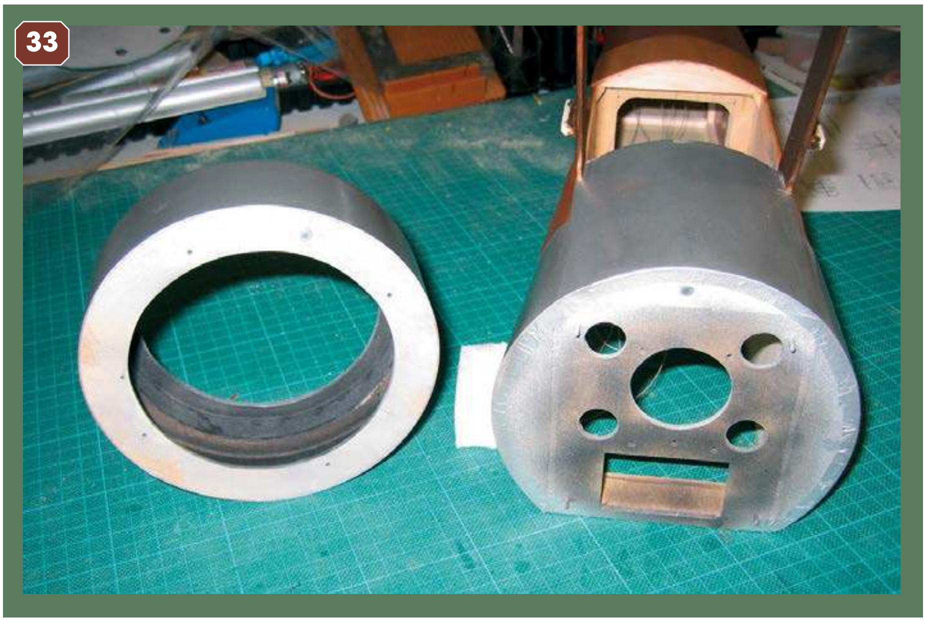












GLUE the strut rib/interplane strut in the wing. Lightly tack glue the strut ends into their locations on the top and bottom wings, and then align the strut rib accurately into the middle wing before gluing it securely in place. Repeat the procedure for the opposite side, and then lightly sand the strut ribs before covering the middle wing panels.

Doing it this way ensures that not only are the strut ribs at the correct angle in the middle wings to prevent the struts bowing, but also that the wing is at the correct incidence at both centre-section and interplane strut positions. For the final assembly, simply glue the top and bottom wings securely in place and glue the interplane struts into them, also gluing the middle wing onto its locating block on the centre-section strut. Since you will need time to align things accurately, a slow setting (30-minute) epoxy is the ideal adhesive for this operation. Use this assembly as a guide when gluing the tail surfaces in place.

Whichever system you choose, do make sure that you keep the tail end of the model light. Too heavy a covering material, or too much paint, in this area can cause major problems when you try to balance the model.

Note how Rodd had to fit some of his batteries in the cowl to get his model to balance.

ASSEMBLY

Start with a trial assembly before the middle wing panels are covered, but after that, the sequence will be just the same for the final assembly.

Fit the top wing onto the ends of the centre-section struts, ensuring that it seats accurately. Feed the interplane struts through the middle wing strut ribs, and use the fuselage side view to ensure they are aligned correctly before gluing them in place. Plug into position the bottom and middle wing panels on one side of the model and position, but DO NOT

EQUIPMENT INSTALLATION

Motor installation is simple, whatever power train you use, just ensure that the propeller drive shaft is on the thrust line. The receiver and ESC should be mounted to the sheet fuselage sides with servo tape, whilst the elevator and rudder servos are screwed to hardwood rails across the fuselage. The aileron servos should be screwed to short hardwood blocks, which are then

30 & 31: The basic engine cowl starts with a plywood strip, wrapped around the front and rear formers. 32: Second stage of cowl construction is to add laminations of balsa forward of the front plywood former, ready for final shaping. 33: The completely shaped cowl, also showing the fuselage nose section. 34: ND10 motor, geared 4:1 and run with 10 cells. 35: Battery installation tray showing the retainer straps. The tray slides into the fuselage through the opening in the fuselage front former that also retains the engine cowl.

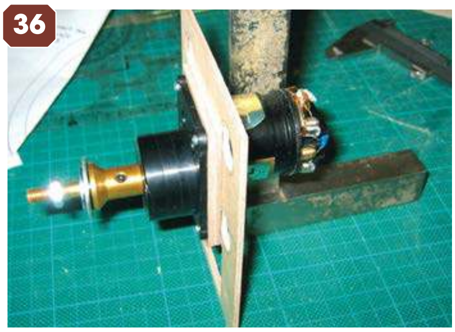
securely glued to the servo hatches with the output arms protruding centrally through the slot. Alternatively, the servos can be glued directly to the hatches using cyano.

The only tricky part of the operation is installation of the aileron link wires. These must be accurately shaped to length, with a 'Z'-bend in each end. Secure all the ailerons at neutral and then slip a link horn onto each end of the link wire. Fit the link horns to the ailerons (middle and bottom wing), checking that they are still at neutral. and glue the horns. Fit the remaining link wire to the middle wing link horn, slip on the other link horn and glue it into the top aileron.

By making top and bottom link horns slightly over-length, you can use that length to ensure that the ailerons all align - either by making up for a slightly short link wire, or by passing it through the wing and trimming off any excess once it has been glued. Thereafter, because it's a one-piece model, the ailerons can't but act in unison and there is no fear of fitting the wrong link wire to the wrong

36: **The motor mounting plate is secured to the front fuselage former by for bolts - one at each corner.** **37:** **The motor, bolted to the plywood mounting plate, ready for installation in the fuselage.** **38:** **The motor, on its mounting plate, bolted into position on the fuselage front former. Note the opening below the motor, through which the battery pack passes, on its mounting tray.** **39:** **The nose of the Sopwith Triplane is typical of WW1 rotary engined aircraft - very short. Achieving the correct balance point can thus be a problem and mounting a couple of the cells of the power pack right inside the cowl is about as far forward as it is possible to go to help drag the balance to the right place.** **40:** **Getting ready for action! The one-piece model can fit easily into the back of almost any car.** **41:** **Detail of the radio installation compartment and the undercarriage mounting.**

36



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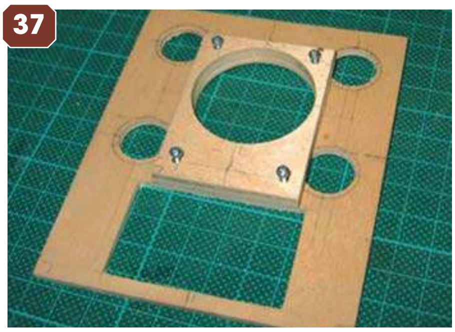

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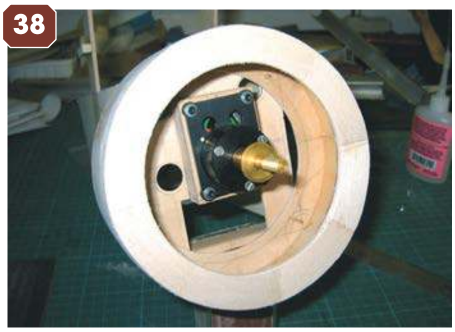

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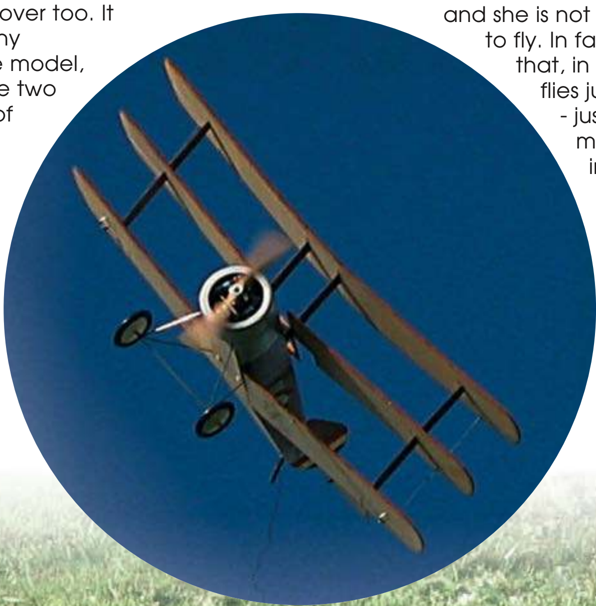
ailerons. Any trim changes will affect all ailerons equally. The one point that has come to light is that the link wires must run as a straight line from bottom aileron to top aileron. Anything less will cause binding.

AIR TEST

Robert was the first to have his model ready for test flights and promptly discovered something of a problem. With the wheels in the scale position, they are almost directly below the balance point. Consequently, as soon as power is applied for take-off, the model tends to nose over. Similarly, during landings, as soon as the wheels touch, the drag causes a nose-over too. It didn't cause any damage to the model, but made these two critical stages of test evaluation unwelcome. Since the model flew extremely well with the balance point as shown, the obvious solution was to move the wheels just a tad further forward to a slightly non-scale position.

Robert made up several new sets of undercarriage, each with the wheels progressively further forward, until he was happy with the result. Rodd, who had received his plan after Robert and builds a little slower, went for the modified undercarriage from the outset.



Now, with the only problem solved, Robert is very happy with his Tripehound. Tracking during take-off is good, resulting in a nice straight run with take off after about 35-40 feet. The model flies very smoothly; turns can be executed without the need for rudder/aileron mixing, and she is not at all difficult to fly. In fact, Robert says that, in his opinion, she flies just like a trainer - just looks a lot more impressive in the air than any trainer. He has flown her in winds of 10 m.p.h., with gusts up to 15 m.p.h. and she handled it well. No problem at all, in fact.

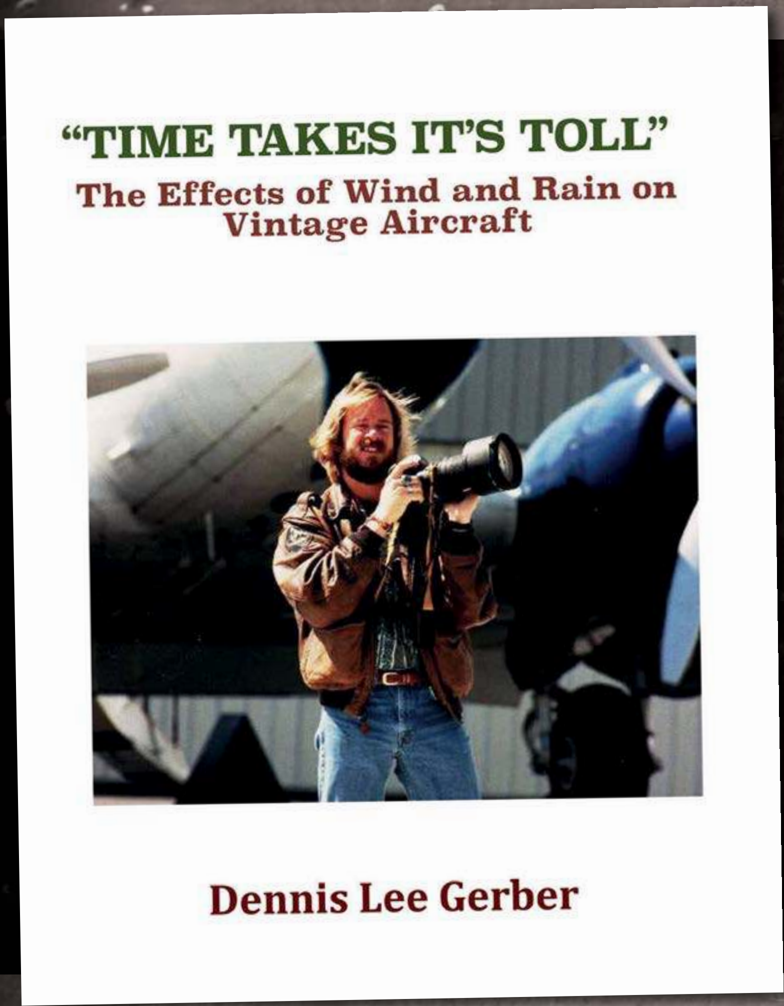
As regards take-off and landing, the secret is to hold her tail down until she's moving, but remember to let the elevator input off again as soon as she is. Otherwise, with all that wing and relatively low wing loading, (even Rodd's slightly heavier model only carries 14.25 oz./sq. ft.), the model is likely to leap into the air before flying speed has been achieved. With this type of model, it is essential that it be allowed to pick up speed before easing her off the ground.

For landing, keep a little power on to help with the roll-out after she has touched down. On one practise flight, Robert did six take-off and landing runs, with some loops in between. Five of the six landings were perfect, the sixth, on which he forgot to keep the motor ticking over, resulted in a nose-over. So, you have been warned!

Rodd has since flown his Tripehound and although only flown once at this point, he says that she tracks straight and has plenty of power with ten cells on board. Just like Robert, he is very happy with the model and promises to fit a pilot, gun and undercarriage fairings, as well as adding those missing underwing markings. ■

TIME TAKES IT'S TOLL

by Dennis Lee Gerber



THE EFFECTS OF WIND AND RAIN ON VINTAGE AIRCRAFT

"Time Takes It's Toll" is not just another Aviation photo book. Most books show shiny refurbished examples housed in indoor museums. This book features hundreds of photos of aircraft that have been parked outside for years out in the elements exposed to the hot sun, wind and rain. They take on a character and beautiful patina that is stunningly amazing in all their faded glory. This book also features some one off examples of aircraft that are the last ones is in existence. It includes propeller and jet engine aircraft and some vintage helicopters. Aircraft enthusiasts and modellers alike will enjoy ***"Time Takes It's Toll"***, a very unique book with some truly amazing photographs along with descriptions of each aircraft.

358 pages and thousands of amazing photos

SOPWITH TRIPLANE

Manoeuvrability, rate of climb and maximum all-round visibility have always been prime requisites for fighter aircraft. The triplane configuration was Sopwith Aviation Company's answer in 1916

THE SOPWITH TRIPLANE evolved in the Sopwith design office during the early months of 1916 in an endeavour to combine maximum of lift and visibility with optimum manoeuvrability. Although its triplane configuration eschewed the then biplane norm, it followed orthodox constructional methods and differed little, basically, from the biplane Sopwith Scout (universally known as the 'Pup') that preceded it and can fairly be regarded is simply a triple-wing 'Pup' with ailerons fitted to all three wings. By using the variable incidence tailplane, the aircraft could be trimmed to fly hands-off. The introduction of a smaller 8 ft span tailplane in February 1917 improved elevator response.

The Triplane was initially powered by the 110 hp Clerget 9Z nine-cylinder rotary engine, but most production examples were fitted with the 130 hp Clerget 9B rotary. At least one Triplane was tested with a 110 hp Le Rhône rotary engine, but this did not provide a significant improvement in performance.

The initial prototype of what was to be referred to simply as *'The Triplane'* first flew on 28 May 1916, with Sopwith test pilot Harry Hawker at the controls. Within three minutes of takeoff, Hawker startled onlookers by looping the aircraft, serial N500, three times in succession! The Triplane was very agile, with effective, well-harmonised controls, but when manoeuvring, however, the Triplane presented an unusual appearance. One observer noted that the aircraft looked like *"...a drunken flight of steps..."* when rolling

Despite its wing configuration the Sopwith Triplane airframe was remarkably simple. The fuselage followed the box girder structure of spruce longerons and spacers, braced in all bays with piano wire as previously applied to the 'Pup'. Fuselage with remained relatively wide as far back as the tailcone, from which point rearward, an acute curve of the longerons into the sternpost (in plan view), was achieved by slitting the longerons vertically with a saw cut for a distance of about three feet, gluing in a strip of three-ply and then binding with tape to achieve the required curve.

At the forward end of the fuselage, a circular sheet steel engine plate was fitted and its 110 h.p. Clerget (and later the 130 h.p.) rotary engine was completely housed in a circular aluminium cowling with additional cooling slots fretted in the lower segment. The upper fuselage contours were faired into the slab sides as far aft as the cockpit over a framework of light stringers, hence the patchwork quilt effect seen in some photographs. Upper decking was curved and the single Vickers machine-gun mounted centrally in front of the cockpit. The curved decking then continued rearward, following the taper of the fuselage with increased radius as far aft as the tailplane.

The Shuttleworth Collection's Sopwith Triplane replica, built be the Northern Aero Works, in action at one of The Collection's weekend air shows at Old Warden, Bedfordshire.

Initially, tail units were near identical to those of the 'Pup', the tailplane being of wood and the elevators, rudder and fin of light gauge steel tube. Later, the tailplane and elevators were revised and reduced in area to improve diving characteristics and general sensitivity.

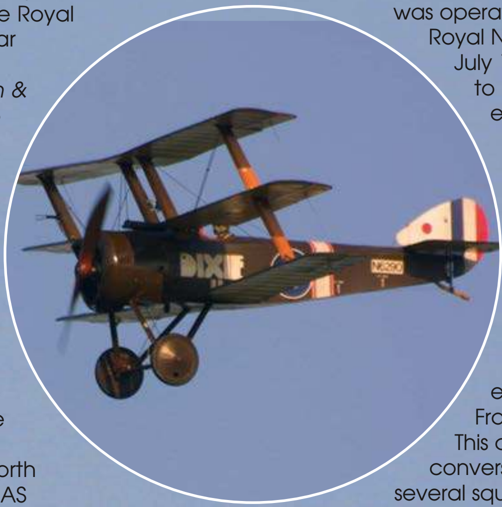
WHY THREE WINGS?

The novel wing configuration had advantages, especially in the narrow chord that was employed, this bestowing an excellent field of view for the pilot (to see is to live!), while at the same time limiting the movement of the centre of pressure with changes of incidence, thereby enabling a relatively short fuselage to be used. Of parallel chord, the wings were of identical span and based on two closely spaced spruce main spars, the full chord ribs being interspaced with two false ribs.

ONLY FOR THE NAVY

Between July 1916 and January 1917, the Admiralty issued two contracts to Sopwith for a total of 95 Triplanes, two contracts to *Clayton & Shuttleworth Ltd.* for a total of 46 aircraft, and one contract to *Oakley & Co. Ltd.* for 25 aircraft. To satisfy an urgent need for aircraft of improved performance for the Royal Flying Corps, the War Office also issued a contract to *Clayton & Shuttleworth* for 106 Triplanes, but in February 1917, the War Office agreed to exchange its Triplane orders for the Admiralty's SPAD S.VII contracts.

Triplane production commenced in late 1916. Sopwith and Clayton & Shuttleworth completed their RNAS production orders, but Oakley, which had no prior experience building aircraft, delivered only three Triplanes before its contract was cancelled in October 1917. The Royal Flying Corps Triplane contract issued to Clayton & Shuttleworth was simply cancelled rather than being transferred to the RNAS, the total production of Sopwith Triplanes, from all contracts amounting to 147 aircraft.



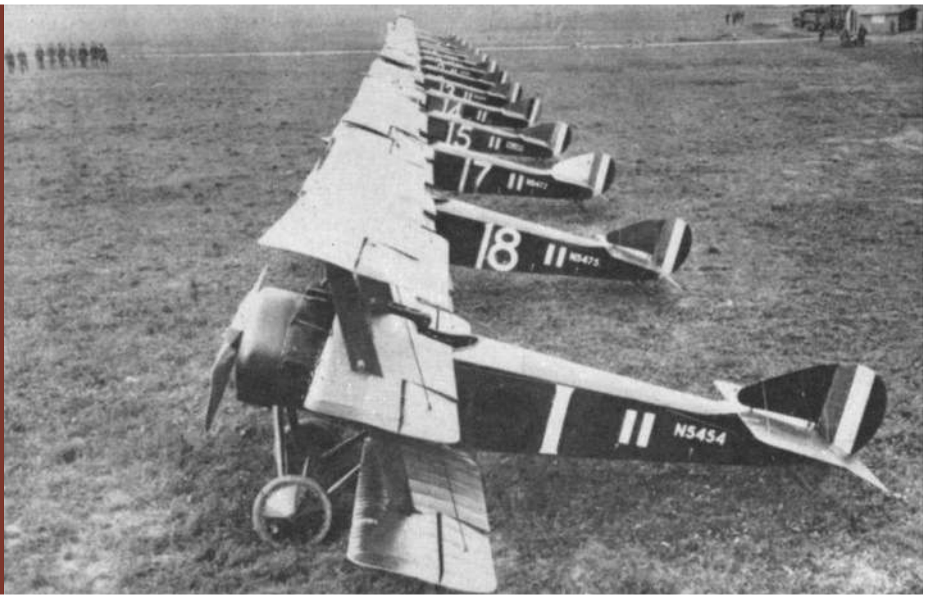
INTO COMBAT

In British service, the Sopwith Triplane was operated solely by the Royal Naval Air Service. In July 1916, N500 was sent to Dunkirk for evaluation with 'A' Naval Squadron, 1 Naval Wing, where it proved highly successful. The second prototype, serial N504, fitted with a 130 hp Clerget 9B. N504 first flew in August 1916 and was eventually sent to France in December. This aircraft served as a conversion trainer for several squadrons.

Having spent several weeks working up on the type, No. 1 (Naval) Sqdn. began their first operational sorties during the opening days of April 1917 at the Battle of Arras. No. 8, 9 and 10 (Naval) Sqdns. were likewise equipped and also began offensive patrols during April 1917.

It was this month of April 1917 that came to be known as *'Bloody April'* by the British flying services, due to the disastrous casualties they suffered, at the hands (or guns) of the slick German Albatros D.III scouts, mainly among the B.E. type reconnaissance/observation type aircraft that equipped many Royal Flying Corps Squadrons. However, the Triplane squadrons soon disabused the Albatros Staffeln

The first prototype Sopwith Triplane shortly after completion, after its Vickers gun armament had been installed.



A line-up of No.1 Squadron, Royal Naval Air Service Triplane a Bailleul, France during June 1917.

of any sense of invincibility and were clearly able to outclimb and outmanoeuvre their stationary-engined opponents.

AT ODDS OF SEVEN-TO-ONE

Evidence of the Sopwith machine's superiority in all but firepower is exemplified by two Triplanes of No. I (Naval) Sqdn. which, flown by Flt. Cdr. Roderick Dallas and Flt. Sub. Lt. T. G. Culling on April 21st, 1917. While attacking a composite formation of fourteen German single and two seaters bound for the Allied lines at 16,000 feet, the two Triplanes harassed their opponents for three quarters of an hour to such effect that they aborted their mission, broke formation and dived ignominiously, three of their Comrades having fallen.

BLACK OR WHAT?

'B' Flight of No. 10 (Naval) Sqd. was originally an all-Canadian flight, and went on to become one of the most formidable fighting units of World War One. In three months, during 1917, they destroyed, between them, no less than 87 enemy aircraft. Triplanes of 'B' Flight variously bore the names 'Black Death', 'Black Maria', 'Black Roger', 'Black Sheep' and 'Black Prince' and in the past were thought to have been painted black or indigo, however opinion now seems inclined to the fact that they were 'standard finish' aircraft with nothing more black about them than their name.

WITHDRAWAL FROM SERVICE

The Sopwith Triplane's combat career was comparatively brief, in part because the Triplane proved difficult to repair, one problem being that the fuel and oil tanks were inaccessible without dismantling the wings and fuselage. Even relatively minor repairs had to be made at rear echelon repair depots and spare parts became difficult to obtain during the summer of 1917, resulting in the reduction of No. 1 Naval Squadron's complement from 18 to 15 aircraft.

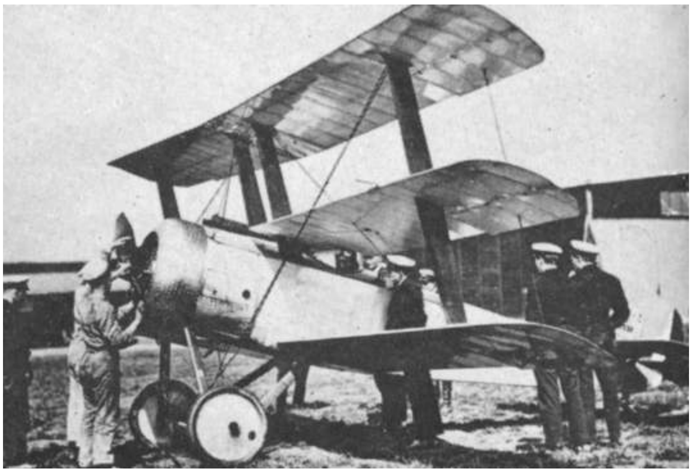
In June 1917, No. 4 Naval Squadron received the its first Sopwith Camels and the advantages of this sturdier, better-armed fighter quickly became evident. Nos. 8 and 9 Naval Squadrons re-equipped with Camels between early July and early August 1917. No. 10 Naval Squadron converted in late August, turning over its remaining Triplanes to No. 1 Naval Squadron, which continued to operate the type until December, suffering heavy casualties as a consequence. By the end of 1917, surviving Triplanes were used as advanced trainers with No. 12 Naval Squadron.

NOT WITHOUT ITS FAULTS

The Triplane gained a reputation for structural weakness because the wings of some aircraft collapsed in steep dives. This

FOR YOU, THE WAR IS OVER!

PFO (Probationary Flight Officer) John Wilford's Triplane N5429, intact, soon after the Sopwith suffered damage in combat with Albatros D.IIIs. which 'downed' the aircraft and seen still in its RNAS finish. Wilford was prevented from burning his aircraft before his capture.



The first production Sopwith Triplane, N500, at R.N.A.S. Station Chingford, shortly after being taken on charge in 1916.

N5429, now in German Air Service markings, ready to test evaluation, which would probably have initiated development of the Fokker Dr.1.

No.1 Squadron R.N.A.S's entire complement of 19 Sopwith Triplanes with their pilots during October 1917.

defect was attributed to the incorrect use of light gauge bracing wires in the 46 aircraft built by subcontractor Clayton & Shuttleworth resulting in a self preservation modification by several pilots of No. 10 Naval Squadron using stronger cables or additional wires to strengthen their Triplanes.

In 1918, the RAF issued a technical order for the installation of a spanwise compression strut between the inboard cabane struts of surviving Triplanes, one aircraft, serial N5912 receiving additional mid-bay flying wires on the upper wing while used as a trainer.

Another drawback of the Triplane was its light armament. Contemporary Albatros fighters were armed with two guns, but most Sopwith Triplanes carried one synchronised Vickers machine gun. Efforts to fit twin guns to the Triplane met with mixed results. Clayton & Shuttleworth built six experimental Triplanes with twin guns, some of which saw combat service with Nos. 1 and 10 Naval Squadrons in July 1917 but performance was reduced due to the extra weight and the single gun remained standard.

Triplanes built by Oakley would have featured twin guns, an engineering change which severely delayed production. By the end of 1917, the Triplanes had been more or less completely replaced by the more powerfully armed Sopwith Camel with its twin Vickers installation. No. 1 (Naval) Sqdn. retained their Triplanes until November 1917 when they returned to Dover to re-equip.

So passed the Sopwith Triplane, one of the few machines with which pilots were reluctant to part and one that was never really out-classed by its opposing scout types.

WHERE TO SEE ONE NOW...

One Sopwith Triplane, remains on static display, in the Grahame White Annex at the Royal Air Force Museum. Hendon. Another, a replica in full flying condition, is operated by the Shuttleworth Collection at Old Warden, Bedfordshire and is regularly in action on their flying days.

Built during the 1980s at the Northern Aero Works to original Sopwith Works drawings, it was inspected during construction, by Sir Thomas Sopwith, who was so impressed with the quality of the workmanship that he decided to re-open the production line to include one addition unit, given a works construction number in sequence with the production that ended in 1917.

A further authentic replica is held at the Fleet Air Arm Museum, at Yeovilton, Somerset, currently placed as part of the Cobham Hall Reserve Collection, which is periodically open to the public several times a year.

Further afield The Hangar Flight Museum at Calgary, Canada has a reproduction of No.10 Naval Squadron pilot Alfred Carter's N6302, and there's another repro in reserve hangar at the Canada Aviation & Space Museum in Ottawa.

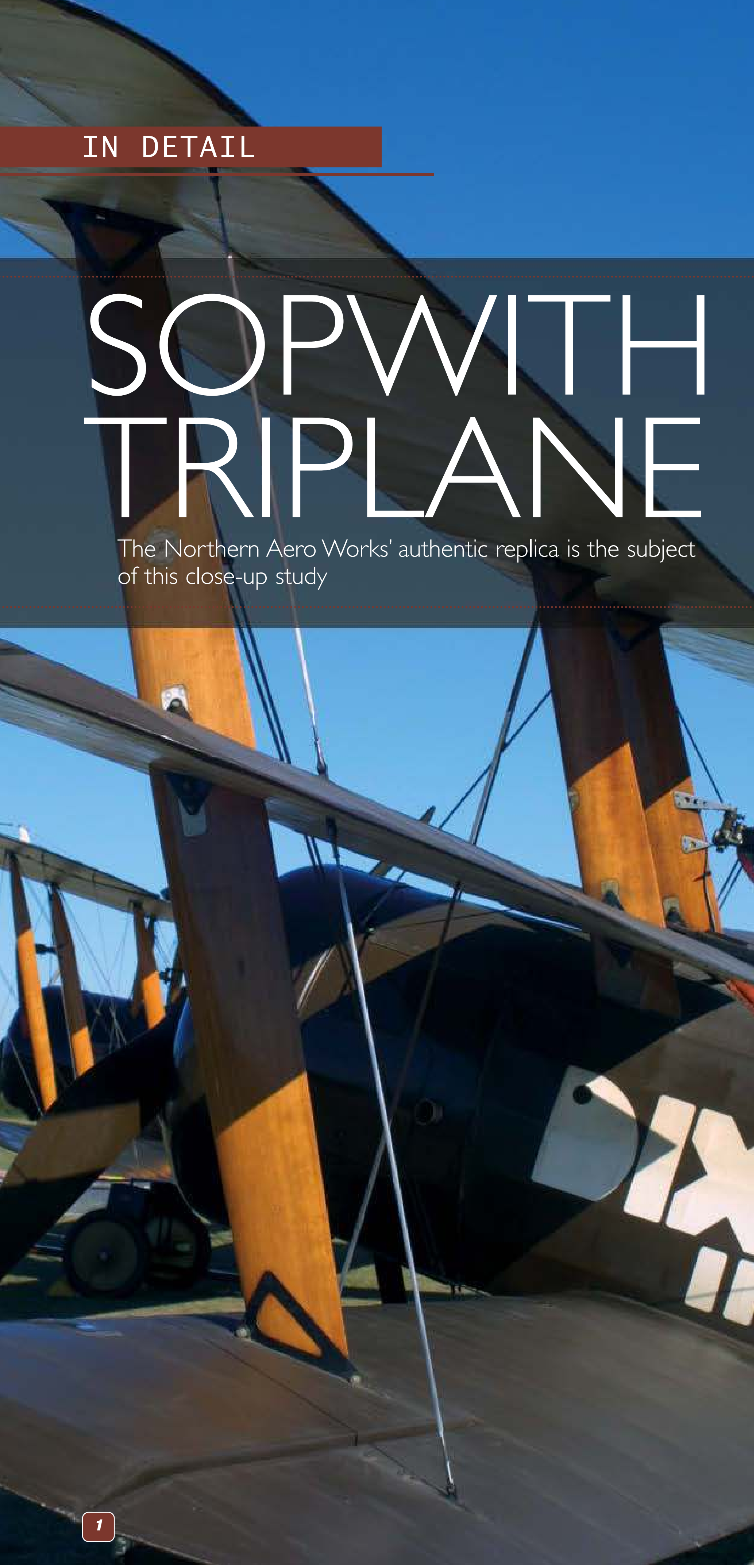
More surprisingly, an original example supplied to the forces of Imperial Russia in June 1917 has survived, after serving with the Red Air Force through a number a rebuilds and is now on static display at The Central Air Force Museum, Monino, Moscow. ■

", Triplane serial N5425, carries Unit No.15. of No.1 Squadron RNAS. The aircraft in the hangar, No.16 was lost in action on August 21.

IN DETAIL

SOPWITH TRIPLANE

The Northern Aero Works' authentic replica is the subject of this close-up study



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1: View of the control wire linking all three ailerons. 2: Upper wing aileron horn. 3: Bottom wing showing aileron hinge line and link-wire to the centre aileron. 4: Close-up of the aileron control link at the centre aileron. 5: Aileron link on the underside of the upper aileron. 6: Main wheel, showing the bungee cord landing shock absorper. 7. Main wheel - the spoked centre is fabric covered. 8: The anchor point for the main undercarriage cross-member.

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9: View of the undercarriage cross-member viewed from above, showing the associated bracing wires. 10: Close-up of the bracing wire centre anchor point on the main undercarriage cross member. 11: Anchor point for the front main undercarraige leg, just behind the engine cowl. 12: General layout of the main undercarriage. 13 & 14: Two views inside the cockpit. 15,16 &17: Three views of the engine cowl, showing the rotary engine and the slots in the bottom of the cowl.

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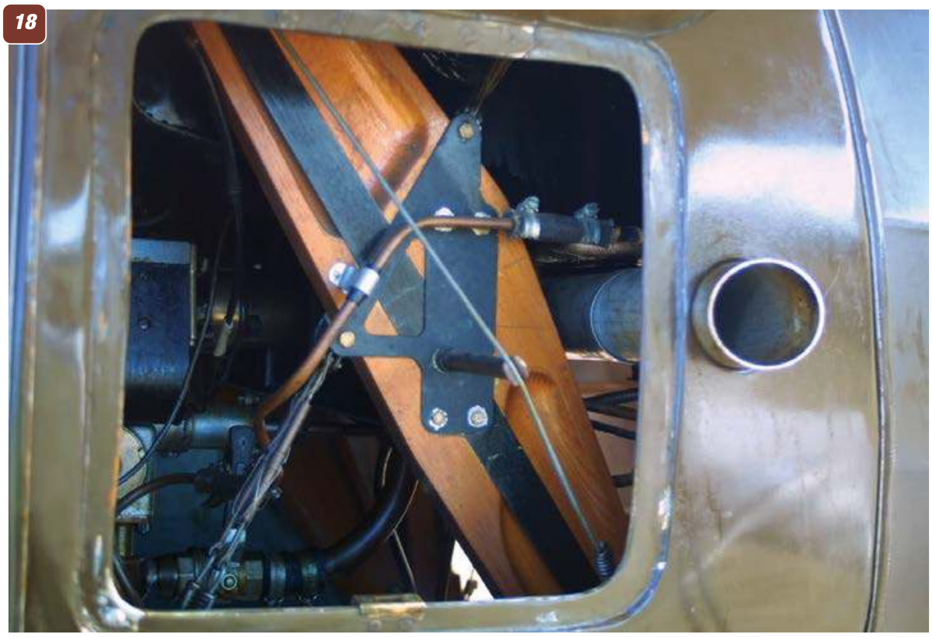
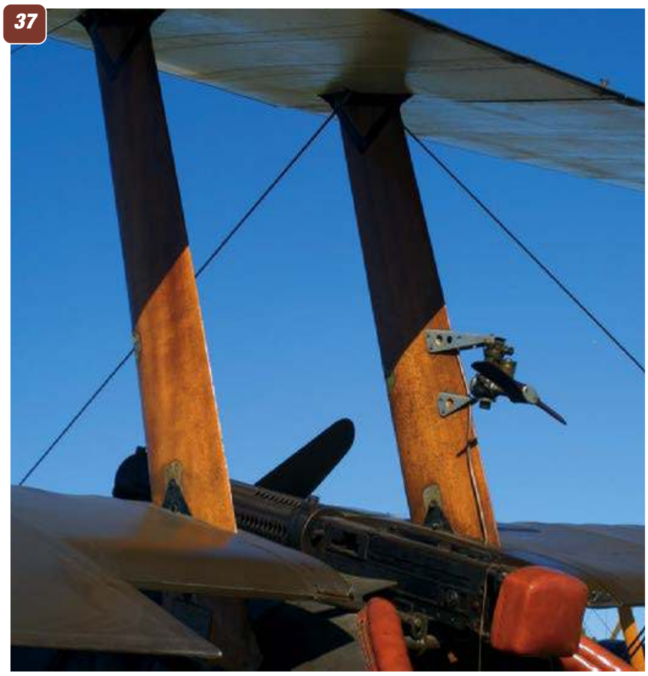
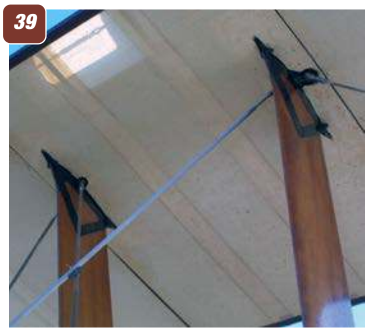
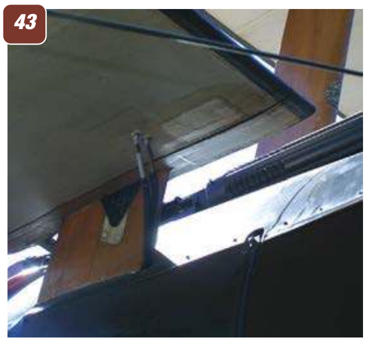


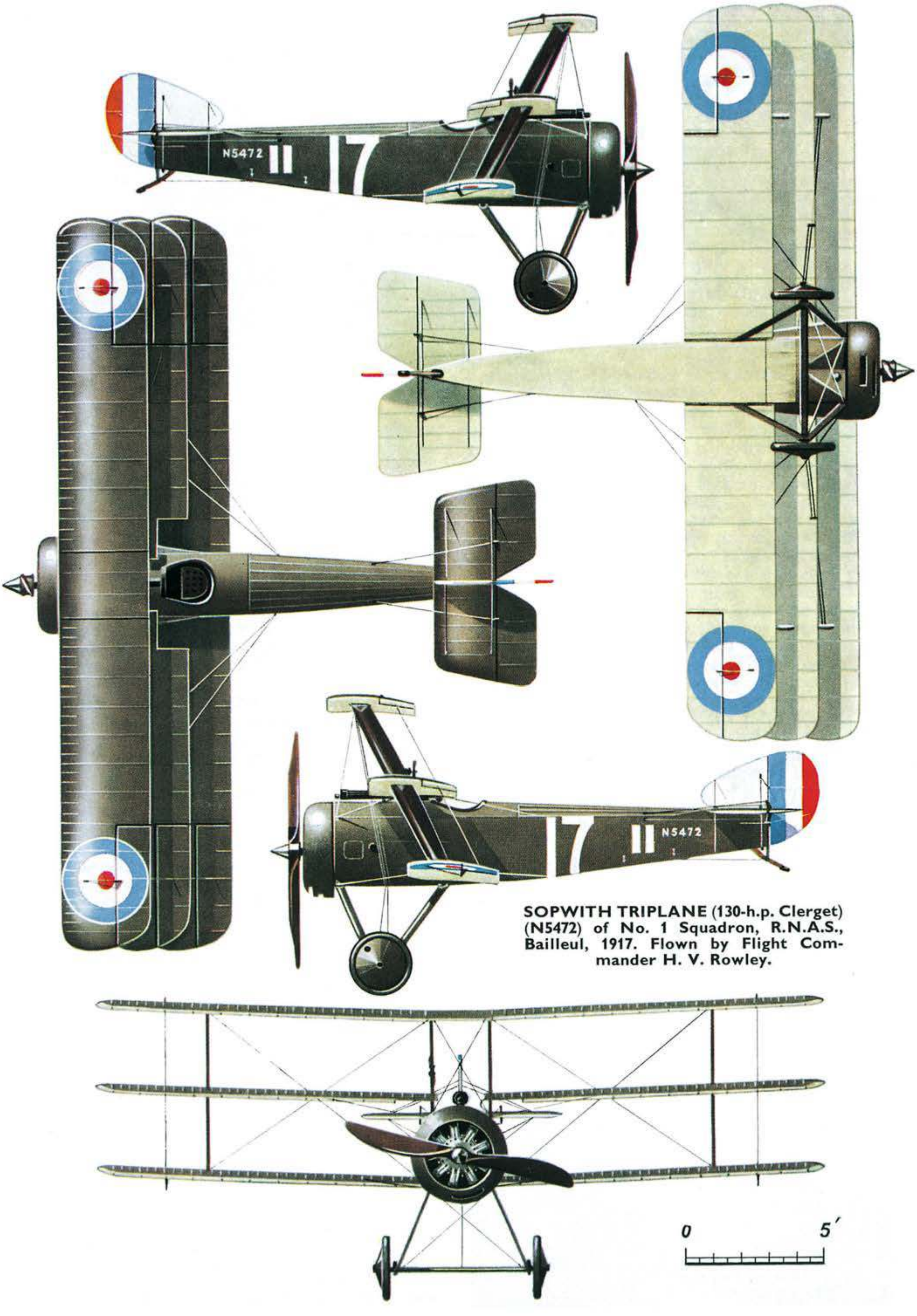
18: View inside the access hatch in the left fuselage side just behind the engine cowling. **19:** Anchor point on the fin for the rear streamline brace between the fin and tailplane upper surface. **20:** Anchour point on the fin leading edge for the front bracie between fin and tailplane upper surface. **21:** Fin, and tailplane upper surface, showing braces and elevator control horn. **22:** Double streamline braces that link the fuselage and upper wing, showing how it passes through the centre wing leading edge. **23:** The bottom anchor point on the lower fuselage side for those same bracing wires. **24:** Brace anchor points on the upper wing underside. **25:** Detail of bracing wire that runs from the rear of the engine cowl to the wing leading edge. **26:** Anchor point for brace in the bottom wing upper surface at the wing root, at about mid-chord. **27:** Attachment point on the centre wing aileron upper surrface for wire linking the three ailerons. **28:** Step in the left bottom fuselage side, just behind the wing for access to the cockpit. Note also the 'eared' nut to the left of the step ... what you might call a true wing nut! **29:** The electric generator, facing rearwards, mounted on the right hand centre section strut between the centre and upper wings. **30:** View of the tailplane leading edge showing elevator contoil runs and bracing wires. **31:** Front tailplane bracing wire anchor point on the upper surface.



32 & 33: The single machine gun is mount fully out in the breeze without any fairing. **34:** Elevator horn and control wire, plus anchor point for the rear brace to tailplane upper surface. **35:** View of tailplane undersurface, showing braces, rudder horn and lower surface elevator horn. **36:** Mounting point for interplane strut on bottomwing upper surface. The triangular shaped metal mounting plate is common to all strut mounting points. **37:** View of the twin centre section struts. **38:** General view of the interplane strut on the left side. **39:** Mounting points for the centre section struts at the upper wing underside. **40:** Pitot head, mounted on the right side interplane strut, just above the centre wing. **41:** Views of the tail skid, showing the uncovered panel in he fuselage underside and the bungee cord landing shock absorber. **42:** Clear vision access panel in the right lower wing leading edge for the aileron linkage cable. Note also tbe bracing wire that runs to the fuselage side behind the cowl. **43:** View of the Centre wire root where it mounts to the centre section strut.

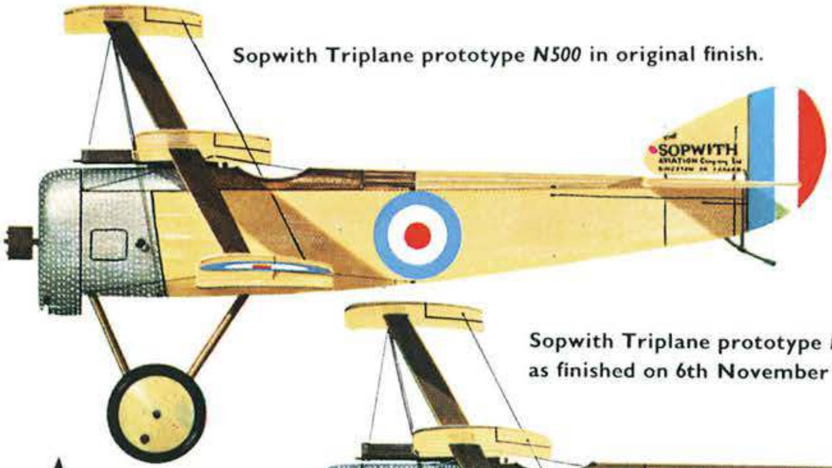






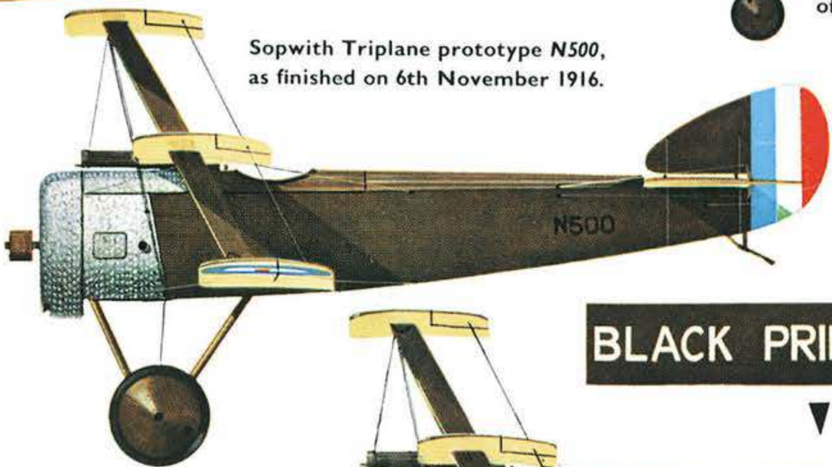
SOPWITH TRIPLANE (130-h.p. Clerget) (N5472) of No. 1 Squadron, R.N.A.S., Bailleul, 1917. Flown by Flight Commander H. V. Rowley.

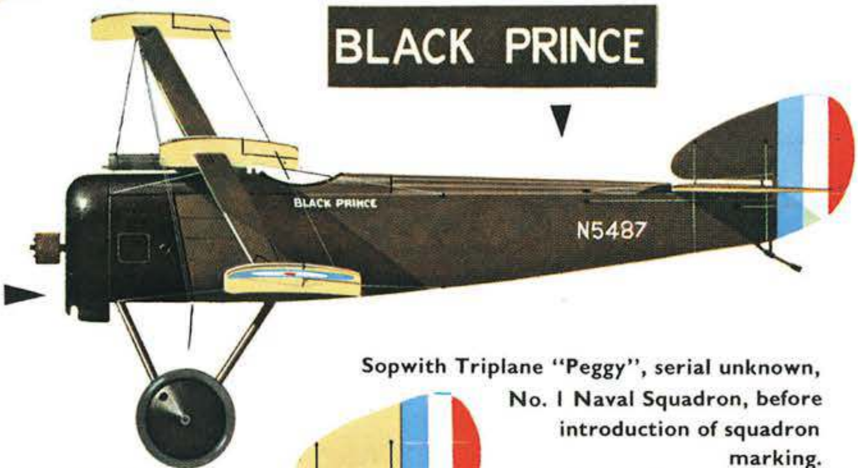
Sopwith Triplane prototype *N500* in original finish.



Sopwith Triplane *N5421* of No. 8 Naval Squadron.

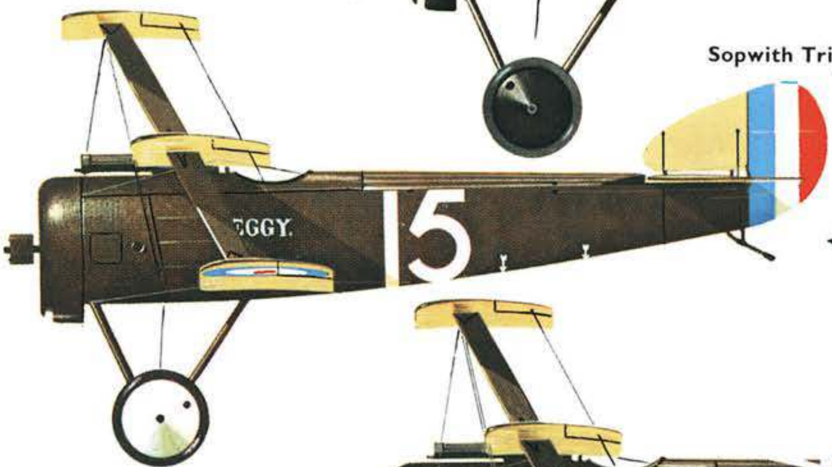
Sopwith Triplane prototype *N500*, as finished on 6th November 1916.



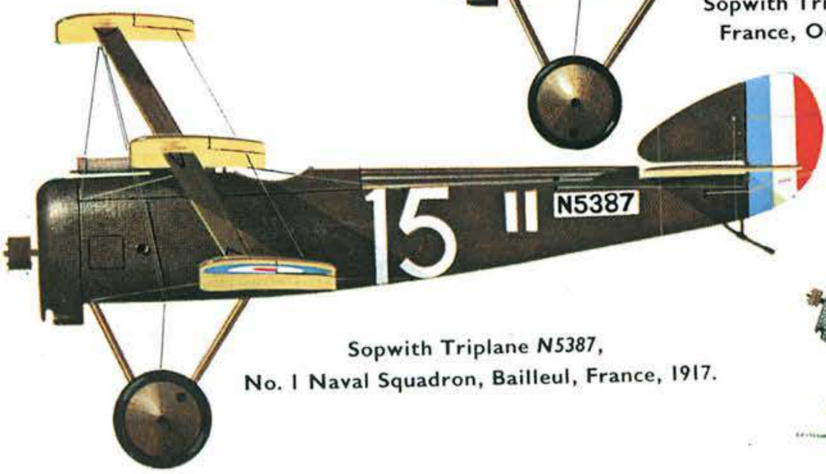


Sopwith Triplane *N5487* "Black Prince" in scheme believed to have been employed when flown by Sub-Lt. Alexander of the "Black Flight", No. 10 Naval Squadron.

Sopwith Triplane "Peggy", serial unknown, No. 1 Naval Squadron, before introduction of squadron marking.



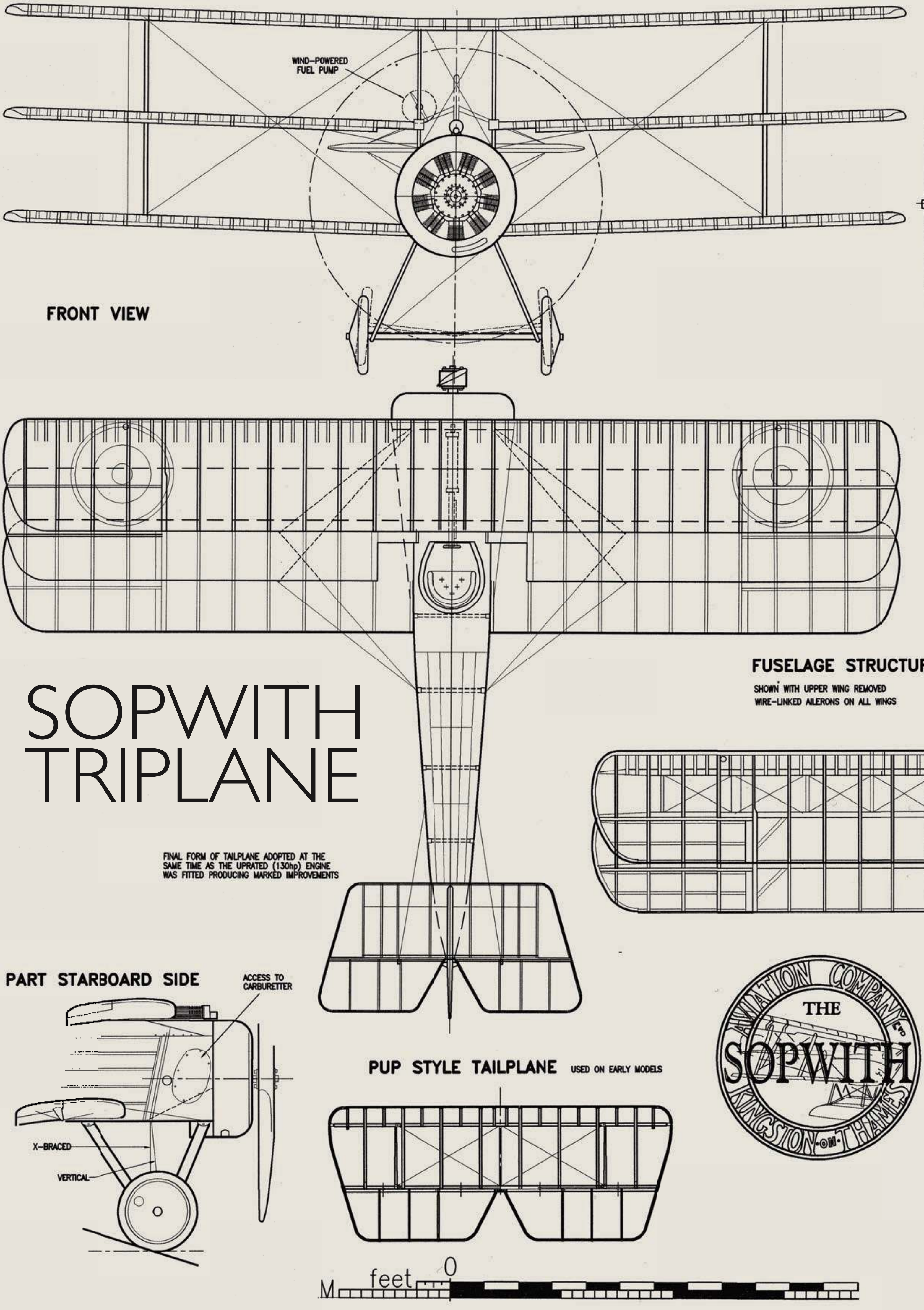
Sopwith Triplane *N5377*, No. 1 Naval Squadron, France, October 1917, after introduction of squadron marking.

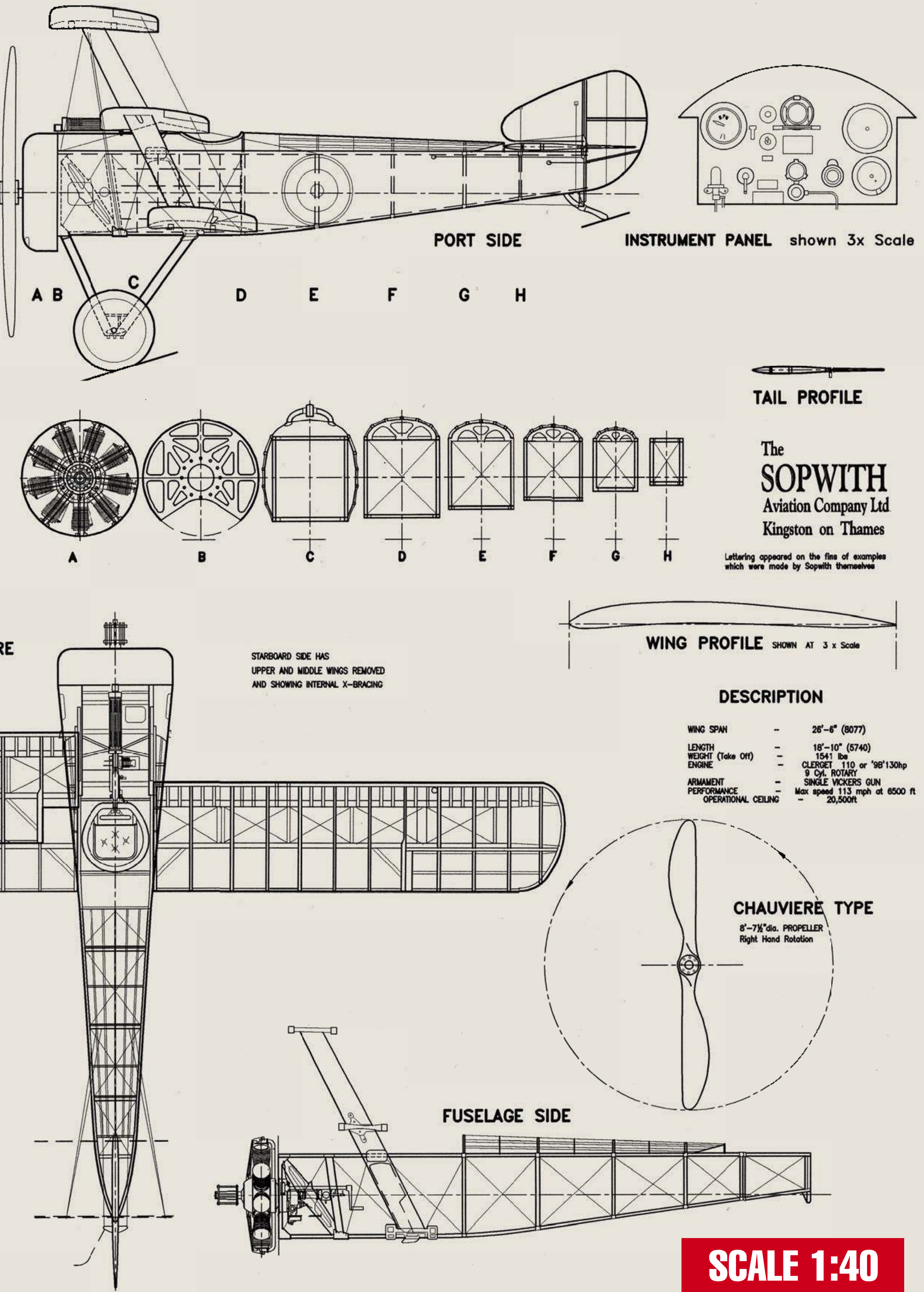


Sopwith Triplane *N5387*, No. 1 Naval Squadron, Bailleul, France, 1917.

Sopwith Triplane prototype *N500* as it appeared when fuselage roundel was carried.

SOPWITH TRIPLANE





PORT SIDE
INSTRUMENT PANEL shown 3x Scale
A B C D E F G H
TAIL PROFILE
A B C D E F G H
The SOPWITH Aviation Company Ltd Kingston on Thames
Lettering appeared on the fins of examples which were made by Sopwith themselves
WING PROFILE SHOWN AT 3 x Scale
RE
STARBOARD SIDE HAS UPPER AND MIDDLE WINGS REMOVED AND SHOWING INTERNAL X-BRACING
DESCRIPTION
WING SPAN - 26'-6" (8077)
LENGTH - 18'-10" (5740)
WEIGHT (Take Off) - 1541 lbs
ENGINE - CLERGET 110 or '9B'130hp 9 Cyl. ROTARY
ARMAMENT - SINGLE VICKERS GUN
PERFORMANCE - Max speed 113 mph at 6500 ft
OPERATIONAL CEILING - 20,500ft
CHAUVIERE TYPE
8'-7½"dia. PROPELLER
Right Hand Rotation
FUSELAGE SIDE
SCALE 1:40

File Edit View Favorites Tools Help

Techno Scale

Mike Evatt s

AK RC & Model Shop at https://akrcmodels.com is a family run shop that was opened by Tony and Christina Hill in July 2018 to try to keep physical R/C shops alive. Although they do have an online shop for convenience, they feel that it is important to try to keep these little shops in business. They stock all kinds of RC Aircraft, Vehicles, Equipment, Accessories, Materials, Static models etc, etc. such as the Arrows Hobby intricately detailed 980mm P-47. Featuring retractable landing gear, a realistic four bladed propeller, removable auxiliary fuel tank, bombs and rocket pods- the P-47 faithfully replicates its full-sized World War II counterpart.

Hobby King's prices are kept so low because of their direct link with factories and their own manufacturing capabilities. Passion, value and service drive them to bring you the very latest at the best price possible. The Avios MiG-17 Fresco is a large 90mm EDF jet made of strong EPO foam with quality scale plastic details and a cockpit with a scale interior. It comes in an eye-catching arctic camouflage scheme that gives an impressive presence in the air. This model is different from the rest and is a classic interceptor from the Vietnam War period. Check it out at https://hobbyking.com

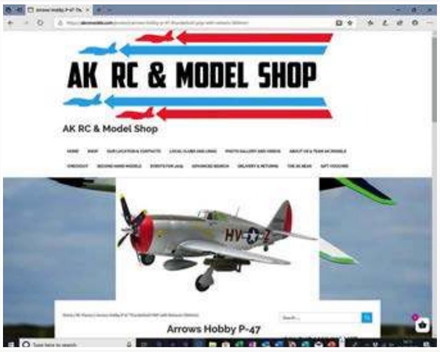
Hummingbird Model Products at https://hummingbirdmodelproducts.com is a small purveyor of fine model aircraft kits, plans, art and tools. They specialize in items related to free flight model airplanes with an emphasis on rubber powered and electric designs. Particularly scale, nostalgia, and old timer subjects as well as some high-performance FAI related products.

On **Bernard Guest's** website you will find the delightful 26" span rendition of Peter Bowers' well known and much loved American homebuilt (first flight 1962). The Bower's 'Fly Baby' kit includes all the sheet parts, plus trailing edges, laser cut strip wood and ply parts.

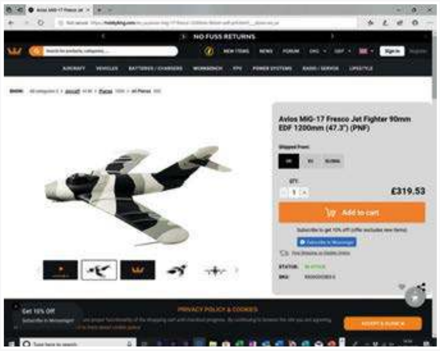
RC Model Aircraft in Australia has a web address of www.rcmodelaircraft.com.au They provide models to the RC hobbyist. They are now selling jets, gliders, helicopters as well as stocking a wide range of other radio-controlled accessories including Li-Po batteries, servos and related connectors. Shown in the screenshot is the most famous aerobatic glider in the world, the MDM Fox has been faithfully recreated by FlyFly at an affordable price with stunning performance. Wingspan: 3000mm Weight: 1700 - 1900g

Hobbylinc.com at www.hobbylinc.com is family owned and operated from Atlanta, Georgia since 1971. Originally a local hobby shop, Hobbylinc.com moved exclusively online in 1994 with the simple idea of offering the largest selection of general hobby items at the lowest prices. Today, Hobbylinc.com has grown into one of the largest online suppliers of general hobby items in the world! The screenshot shows the Williams Brothers 1/8th scale static model of the Pratt & Whitney early version R-1340 engine. I am sure this could be modified to cover a more modern power unit.

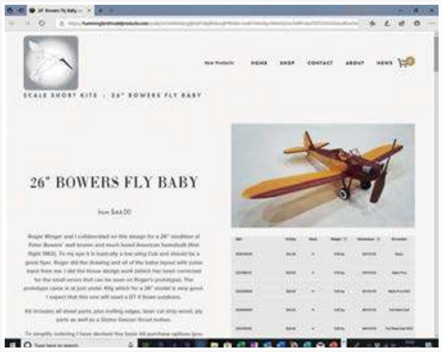
Now! How many aero modellers have



Arrows Hobby intricately detailed 980mm P-47 from AK RC & Model Shop.

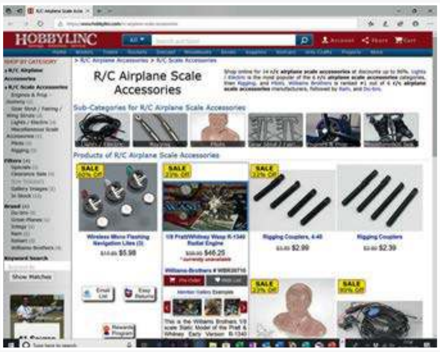


Hobby King's Avios MiG-17 Fresco.



A delightful model of Peter Bowers homebuilt from Bernard Guest.

RC Model Aircraft in Australia stocks the MDM Fox recreated by FlyFly.



Hobbylinc.com is one of the largest online suppliers of hobby items in the world!

Perma-Grit has been supplying abrasive tools to model makers since 1991.

cours Webspace for more TechnoScale Topics

needed to do some serious sanding/abrading only to find a blunt file and a crumpled scrap of sandpaper? It doesn't need to be like that!

Check out **Perma-Grit** at www.permagrit.com This has been a source of abrasive tools to model makers in the UK and internationally since 1991. Whilst traditional tools are not efficient and have a tendency to chip, melt or tear materials, Perma-Grit tungsten carbide grit tools solve this problem.

Top Model are located approximately 15km from Romorantin - Lanthenay, in the Region Central in France. Their premises are surrounded by luscious woodland, but should you wish to combine your visit with a little culture, they are only about 40 minutes from Blois or the magnificent Château de Chambord. However, you don't actually need to go there as they have an excellent web presence at www.topmodel.fr What caught my eye here was their Mirage F1 1.72m span hollow moulded plug-and-play offering. After opening the box, all you have to do is connect the clearly marked pneumatic circuits, route the electrical cables to your receiver and finally mount the turbine.

Billkits at www.billkits.com came into being in 1990, basically by accident!

It all came about when Bill Manley and another member of the Royston model aircraft club spotted an article in a model magazine about some American flyers doing R/C combat in the States. It all started there! BillKits' first venture into the world of scale models is the Slingsby T-67 Firefly basic military training aircraft. The model is an attractive tricycle undercarriage low winger. The prototype model is fitted with an O.S. .40 and weighs 4.5lbs with a wing loading of under 22oz per square foot.

Solo Propellers offer quiet, high performance operation and demonstrate quality workmanship with an exceptional paint finish. Their synchronized hub acts as the brain of the unit doing all the pitch measurements and calculations for you. To set pitch, simply turn a dial the appropriate number of units. This rotates the blades to the desired pitch for the flight conditions of the day. All calculations and measurements are eliminated. Take a quick test flight and then fine tune the pitch to achieve the ultimate performance for your airplane. Check them out at www.soloprops.com

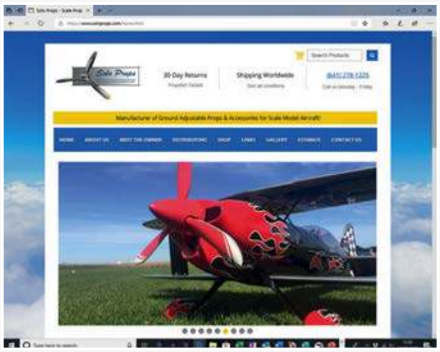
Logic RC is based in Hertford, UK, with a web presence at www.logicrc.com Their online presence is quite awesome. The German Fokker D.VII is frequently cited as one of the best fighter aircraft of the First World War. Hangar 9 brings this Great War legend to life as a remarkable giant-scale ARF with scale details to truly do the legendary Fokker D.VII justice.

The official **Vario UK** outlet is located at www.vario-helicopter.biz/uk This has been operating for about a year and carries a vast range of scale helicopter components.

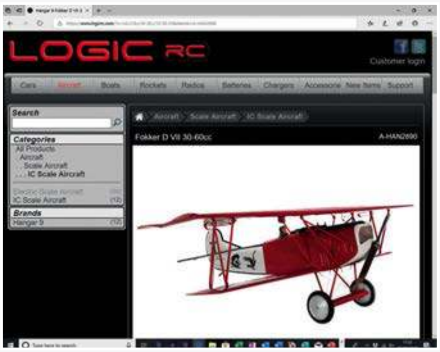
Here you will find not only complete models but a plethora of scale fixtures and fittings to customise and enhance your latest scale helicopter. ■

Top Model's Mirage F1 1.72m span Hollow Moulded Plug and Play offering.

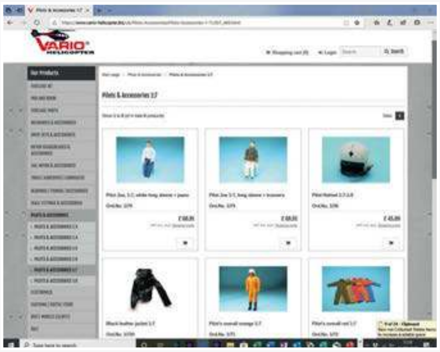
BillKit's first venture into the world of scale models is the Slingsby T67 Firefly.



Solo Propellers offer quiet, high performance operation.



Logic RC stocks Hangar 9's legendary Fokker D.VII.



The official Vario UK outlet has a plethora of scale fixtures and fittings.

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

mikeevatt@hotmail.com

PLAN FEATURE

FAIREY GANNET AS

A 1/8th scale 81" span (2057mm) sport scale model of the Royal Navy's last fixed wing Anti-Submarine Search aircraft for 1.08-1.20 cu.in. engines designed by MIKE LOVELL

Every so often in the history of aviation, an aircraft appears that is so different from the 'norm' that it 'fixes' a place for itself in the memory of anyone with half an interest in aviation, who has seen it! A few of such that come to my mind are the English Electric Lightning, Avro Vulcan, Fairchild/Republic A-10 Thunderbolt II, and I'm sure every reader has a favoured list!

For me, the Fairey Gannet has undoubtedly been one of those aircraft! Never intended as one of aviation's 'beauty gueens', it was the result of a Royal Navy requirement for a Fleet carrier-borne 'Search and Strike' aircraft to fill a hole in Britain's maritime defences, a hole that had previously been ruthlessly exploited during WW2 by the German U-boat 'Wolf-packs' on the north Atlantic convoys.

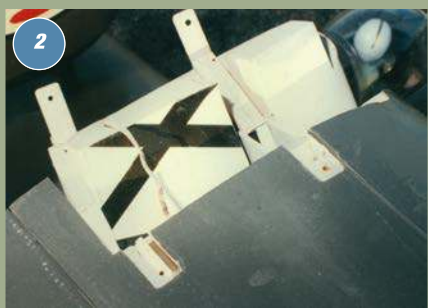
The Fairey Aviation Company had sustantial experience of supplying successful aircraft for Royal Navy requirements, starting with the Fairey Fox biplane fighter bomber, then the famous Swordfish which, despite its obvious obsolescence even when it first entered service, served throughout WW2, and also the Fairey Fulmar monoplane fighter.

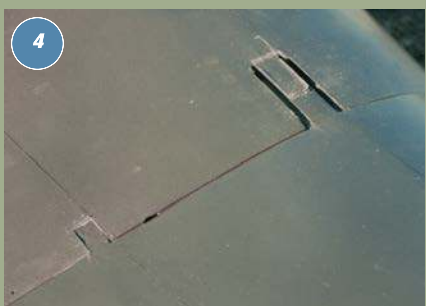
Less celebrated was the 'Barracuda' torpedo bomber of WWII and the successful Firefly which went on to serve the Fleet long after WWII.

The Gannet emerged in prototype form during 1949 to naval specification 17/45 issued in 1946 and known, at first, as the 'Fairey 17'. Initially, it was a two seater. Several prototypes were built and many revisions to requirements implemented, until, in March 1951, a production order was awarded. The first production machine flew in 1954 and the first operational units were formed during the following year, with the AS.1, (Anti-Submarine Mk 1.) the version that is the subject of this plan feature.

For its time, it was a truly remarkable aircraft and it is worth a brief look at the task the design team were set in designing this aircraft:

1. Carrier based (primarily) with extreme range and economy.
2. No hi-octane fuel! i.e.; petrol (naval req.)
3. Bomb bay capacity for torpedos, bombs, dept charges, or combination of same.
4. Sufficient power for (assisted) carrier launch fully loaded
5. Large fuel capacity for long sea sorties
6. Twin engines for reliability
7. Crew space for pilot, navigator and radar operator
8. Retractable radar installation
9. Landing speed low enough for deck-





landings

10. A massively strong undercarriage (retractable).

I could go on, but all of this had to be packed into a clean airframe, with a large enough wing (54ft span) to lift all of this, with the ability to 'minimise' itself to fit a carrier deck lift. Remarkable indeed... and a great credit to the people who designed and built it!

Power was provided by an Armstrong Siddeley 'Double Mamba' turbine unit designed specifically for the Gannet, driving two four bladed (Rotor) conta-rotating props. The aircraft could 'cruise-set' with one half of the 'Mamba' unit shutdown and one prop feathered for economy and range. The engine could use anything from kerosene to light diesel!

The Gannet saw many changes and versions in its 28 years of service, one of the last being the A.E.W. 3 (Airborne Early Warning) and the last unit operating the Gannet was disbanded from RNAS Lossiemouth in 1981, leading, in part at least, to a costly deficit for the Fleet during the Fauklands conflict, but by then, there were no fixed wing carriers in the Royal Navy from which to operate the Gannet anyway!

THE MODEL; HISTORY AND THEORY

During the spring of 1995, my local R/C flying club were in the process of planning their annual public display for August of that year, when I was asked if I had any project planned for inclusion. I had not, but the Fairey Gannet had been a long time favourite of mine and one I had considered modelling on several occasions. But, like many other scratch-builders, I was put off by a few problems with the layout, which needed some serious mental application to solve.

I had been designing R/C model aircraft since the late 1960s and over the years, have always enjoyed a challenge, so, out came the scale drawings for another look. Would the Gannet be suitable as a display model - after all, it's not aerobatic? In fact, I had been privileged to see the full-size fly at R.N.A.S. Yeovilton (HMS Heron) and, whilst impressive in it's airborne presence, it never did more than a low fly-by.

1: The inner left wing-fold line, showing the metal spar joiner plates that key and lock into the spar of the centre section wing stub.

2: View of the folded right wing outer panel that sits horizontally, in the folded state. The intermediate panel stands close to vertical and here shows its undersurface. Note the locator keying tabs that are screwed in place when the wing is extended.

3: Further view of the left wing hoizintal outer and near-vertical intermediate wing panels, again showing the locator tags that are secured by bolts when the wing is fully extended.

4: The inner/centre sections fold-line with the wing extended and locked.

5: The outer/centre sections fold-line with the wing extended. The locking tags are countersunk for the locking bolts.

6: Designer Mike Lovell sets and locks the wing panels ready for flight.

What it does have, is a unique individuality of shape, the appeal of which could be enhanced by the operable inclusion of the type's many auxiliary functions including the arrester hook, opening/closing weapons-bay doors, extending and retracting search-radar dome and, of course a fully retracting tricycle undercarriage.

So, after much consideration and, I must admit, to being intrigued by the challenge, I decided to incorporate as many of those auxiliary functions as possible. Now came the 'gritty' bit, of deciding size, powerplant, projected weight, structural strength, materials, engine/radio access, contra-prop, wing sections, what bits to have 'working', etc; etc.

WING-FOLD

But hold on a minute I thought, one of the biggest problems was going to be transporting the thing around! One of the things you first notice about the Gannet is the cranked mid-wing and such layouts make weak structures if the wing is a 'bolt-on' removable type! Anyway, I was

7 & 8: The triple-cockpit upper fuselage panel is made removable for access to the radio equipment bay. 9: Main undercarriage leg and wheel well. There is no rake-forward/rake-back 'double angle' geometry to contend with in arranging undercarriage retraction. 10: The retracting noseleg unit instalation. Note also the simulated contra-rotation propellers, the dummy component being the rear pair of blades, set in the 'feathered' position, often operated in that state on the full size aircraft for cruise economy while on patrol.

definitely planning on a working bomb bay.

Plug-in outer wing panels were considered (and this option is shown on the plan) but since this was going to be a display model, folding wings as per full-size (or close to it), would certainly add some interest and would produce a compact enough arrangement for transport.

Size was selected at 1/8th scale, giving a span of 81" and wing area of about 7.5 sq ft, which would easily provide enough 'lift' for up to a 15lb projected weight, (actual finished weight with all functions working is 13lb 12 ozs dry).

POWERPLANT?

The108 size two-stroke I had seemed ideal to overcome surface drag, anticipated all-up weight and the induced drag of the freewheeling dummy contra-prop which I planned to fit behind the active drive propeller. My feeling was that a 'stripped-down' version to a weight of about 10.5 to 11 lbs with no contraprop blades fltted, would fly quite happily on a good 90/95.

Materials are conventional - just balsa and ply, with some aluminium plate and tube for special areas. Structural strength is achieved by joining the wing inside the fuselage and bonding the whole together as an integral unit. Engine fitting/access is from the front, through a removable 'chin piece' in the nose-ring, with a hatch cut into the left side for fitting a 'dustbin' type silencer covered with litho-plate.

Radio, servos, switches and batteries, are all accessed either through the weapons bay doors, or the removable full length cockpit decking (details on the plan).

CONTRA ROTATING PROPELLERS?

The 'contra-prop' power configuration of the full size was one of the major 'put-offs' mentioned earlier, raising its own particular challenge. In the past, I have seen several solutions to this problem described in magazines, mostly requiring very involved 'ring-gearing' or 'planet wheels', not to mention a BA in micro engineering! I wanted something simple and reliable, which would provide the required effect and the eventual free-wheeling (rear) unit applied works well and is not too difficult to make. The only component I had to have made, by an engineering friend, was the prop extension driver. It is quite a simple job for someone with lathe experience, but first you need a lathe!

The airfoils used were generated from my own experience and are very close to scale. Wing wash-out applied is 'aerodynamic' (as opposed to a physical twist), through a compound section changing from a semi-symmetrical root to an almost symmetrical tip.

THE WORKING BITS?

Well, as the saying goes ... 'in for a penny...!' I had already decided to fit working wing flaps, retracting undercarriage and operating weapons bay doors, so it was only a small step to include retracting radome, arrester hook and torpedo drop. The only question now, was how to operate all these ten functions without re-equipping with one of those up-market, expensive R/C systems (which I did not have)!

My answer was to use two sets of radio (which I did have), so I used a six channel set for the main four functions, plus flaps and undercarriage, plus an old five channel set for the remainder! The use of two separate R/C systems this dictated the enlistment of a co-pilot to operate all those auxiliary functions, but these days of course, you can get all of that from a single system - you just have toß remember which transmitter lever, toggle or knob operates what!!!

CONSTRUCTION

The plans are comprehensively drawn, with notes and sectional details, and should be quite easy to follow for a reasonably experienced scale builder. For that reason, there are no step-by-step instructions.

The structure is traditional balsa/ply and the model can be built with all, some, or none of the working options, but I would suggest you make that decision before building starts. A general outline of construction is as follows:-

TAILPLANE, ELEVATORS, FIN AND RUDDER

These are all balsa construction, built on a basic core frame, doubled each side with strip and then sanded to section and covered with 1/16" sheet. Fin and rudder construction is a repeat of the same process.

FUSELAGE

This is not as difficult as it may look at first glance. A basic box with angled sides is constructed first from the primary formers and 1/4" sides. When all spacers, doubler strips and cross-sheeting is fitted, the sides are 'laminated' with an outer skin of 1/8" balsa, which in turn is sanded away top and bottom to curve the sides towards the characteristic egg shape as shown. The lower formers are then added, nose leg ply plates fitted and formers planked over. The radar dome, arrester hook pivot and bomb doors should be built-in at this stage if you require them.

Next job is to fix the tailplane on the two laminated 1/2" sheet fillets, along with the fin assembly and 'fixed' top formers. The removable 'cockpit' decking/canopy shell can be built in situ, using two 1/8" strips taped to the top edge of the fuselage sides as a base for the formers.

Sheeting and shoulder fairings are then added to complete the assembly. Cockpit canopy bubbles will need to be vac-moulded, or achieved by cannibalizing standard available mouldings to fit, while windscreen and 'inter-glazing' are cut from acetate sheet.

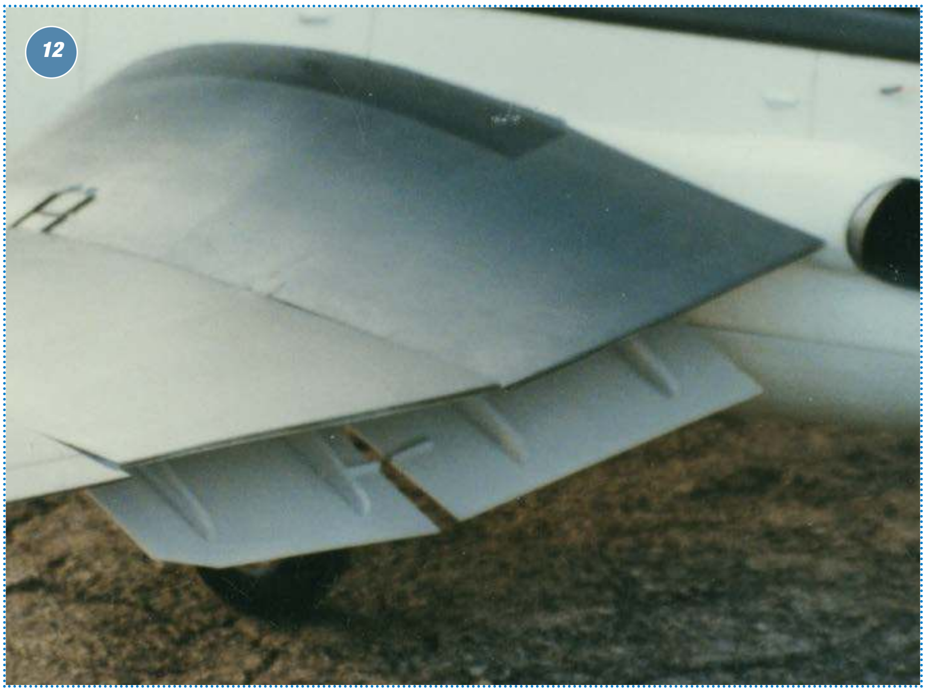
WING

The main spar is a laminate of ply/balsa/ply and carries the aluminium hinge plates and pivot bolts. Make the main and rear spar to the drawing on the plan, including the angled meeting faces and hinge plates (leave the outer section in one piece if wings are to be plug-in), disassemble and use in the normal way with the rib-set to build the wing panels.

Cut away the ribs where necessary to

11

12



13

11: The dummy search radars scanner, made extendable on the prototype model as seen here.

12: The 'split' type flaps in the extended position. Extreme extended position induces a marked pitch-up.

13: The 'weapons bay' on the fuselage underside, with twin dummy torpedoes in place.

14 & 15: **The triple cockpit upper fuselage panel is made removable for access to the radio equipment bay.**

rejoin the hinge plates within the open structure. Run extension leads, fit servos undercarriage and sheet with 1/16″ balsa. Flaps (if used) are best fitted before the top sheeting goes on.

When complete, the wing halves are 'socketed' into the fuselage sides and joined with the aluminium plates (you will need to sand away the openings to the required angle!), then a bead of epoxy mixed with microballoons is applied around the inside joints between the fuselage and wing to bond the whole together.

SPECIAL FEATURES

Arrester hook (co-pilot elevator stick: springs removed or flap control): is made from aluminium tube flattened and bent to shape, with a bolt (4 BA or similar) bonded in to make it removable for transport. It operates off a simple pivot block anchored to the rear end and is strong enough to be functional, driven through a flexible length of Bowden cable to allow movement on grounding.

Radar radome: (co-pilot/throttle stick) is made of balsa sheet wrapped around circular formers with 1/2″ sheet capping and is operated through a large pivoted bellcrank lever with a ratio of about 3-to-1. Lateral and vertical guides keep it in place and lined-up when operated.

Weapons bay doors (co-pilot/retract switch): are built in situ, then released and separated. The operating servo is mounted on a ply plate at the front end and uses extended output arms and rigid wire links (piano-wire or bike spokes) to 1/16″ ply or aluminium horns bonded into doors. The hinges are 'L' shape wire, bonded into the doors, located and pivoting in short lengths of cable-outer, bonded to the fuselage sides (four each side, the end ones are raised-off for alignment).

It is very important to make sure that all of the hinge points line-up fore and aft, or the doors will bind. The pivot pins all point backwards and the doors are fitted (or removed) by locating pins and sockets, the end sliding rearwards.

Torpedo release (co-pilot/rudder stick: left drops one; right drops the other): Torpedos (two fitted) are made from plastic foam cladding sold at DIY stores for lagging water pipes - 22mm size (not 15 mm as shown on plan), making them 'low-impact' and thus safe for use at displays. The release mechanism is a simple 'doorbolt' system, operated from extended servo arms. They are retained

This low level rear view further illustrates the double wing-fold which quite a scale modelling achievement in itself. It's manual of course (let's not get too complicated!!!). Note also the arrester hook that was made operatble on the prototype model and the dummy tail bumper.

by a single cable-tie around the body, with a natural stand-off loop for the bolt to pass through, located fore and aft in yoke shaped formers.

Dummy contra-prop unit: is shown in detail on the plan, but is basically a hollow cone, made from laminated balsa and ply, using Tufnol or Paxolin rings as bearings, front and back, running free-wheeling in a splayed aluminium tube. It is retained with sleeved pins and a few drops of oil will eliminate most of the friction. Blades of the contra prop assembly are made left handed from balsa, laminated each side of flattened aluminium tubes and set-in about 45 degrees opposite pitch!

FINISHING

The prototype was covered in Solartex (no longer available, but substitutes are avialable) and sprayed with cellulose primer and finishing colours (auto spray cans). Roundells (shown to the correct size on the plan) were made from discs of white vinyl, masked and sprayed (cellulose again), white lettering, and numbers (also shown), were cut from black vinyl. Panel lines were scored into the surfaces with a fine soldering iron, rivets were impressed with a homemade star-wheel, and the larger fasteners around the nose area were replicated with a heated brass tube.

CONTROL SURFACE MOVEMENTS

Initial surface movements should be as follows (measured at extremities):

RUDDER:	1-1/2" each way
AILERONS:	1" each way
ELEVATOR:	1-1/4" each way
FLAPS:	50 degrees max.

Use a high torque servo with extended arm and a forked push rod to each side of the elevator, or one servo per side. No BALLAST is needed to balance the model.

BATTERIES

I recommend 1400 mAh for the primary flying controls and a 700mAh pack for the auxiliary functions.

AIRBOURNE

Flying the Gannet is quite straightforward. Controls are smooth and positive. The long nose gives a 'soft' feel to the elevator, but on the whole, it is little different from any conventional low-winger. It has no nasty tendencies, but because of the large side area has a slight tendency to weathercock in windy conditions.

Stalling speed is very low and the flaps are not an essential consideration for the purpose of slowing the model down for a landing. Just remember though, that at about 25 degrees depressed, the flaps will give a marked nose-up attitude, which, surprisingly, is the reverse of what one might expect.

There is no discernible trim change when the bomb doors are open or radar dome deployed and the Gannet shows its best performance in light breeze or calm conditions.■

FAIREY GANNET

The Royal Navy's last fixed-wing submarine hunter

On patrol at low altitude, this Gannet AS.1 reveals its fully deployed 'dustbin' containing the submarine detection equipment. At a time when the nuclear-armed submarine was emerging as a primary Cold War weapon, the Gannet's task became vital.

The effectiveness of the submarine as an front line weapon of war dates back to the WW1 era when German U-Boats operating particularly in the north Atlantic, did much to disrupt sea surface supply to the United Kingdom, a menace that was developed even more effectively during WW2.

Effective countermeasures generally relied for detection by either surprising the Boats on the surface or by close proximity underwater identification fairly close to the surface Not until the closing stages of WW2 was there sufficiently promising scientific countermeasures in development that could be brought together and packaged into a specifically design aircraft that could roam the skies over wide expanses of open water.

Aircraft manufacturers have a habit of awarding names to their designs, in many cases from the animal world and in the case of military types, often intended to mirror the degree of agressiveness or belligerence of their natural world namesakes. Hence, Grumman 'Wildcat', Tiger and Tomcat; Bristol Bulldog; Mustang; Jaguar.

The Fairey Aviation Company had a long association with the Royal Navy's air arm, dating back to the pre-WW2 *Fairey Fox* biplane, followed in succession by the *Swordfish*, then the *Fulmar* fighter and the *Firefly*.

The Fairey Gannet's natural-world feathered namesake is a creature adapted to a very specialist technique for gathering its sustenance, being able to dive from height, deep into the water in pursuit of its prey. As such, the name well applies to the tasks required by the aircraft as an anti-submarine patrol type, which was designed in response to the 1945 Admiralty requirement GR.17/45.

Unsuccessful competitor to the Fairey Gannet was the Blackburn answer to the Admiralty's 1945 spec GR 17/45, their B-54/B-88 (aka YA-7, YA-8 and finally YB-1. Somewhat even less elegant Than the Fairey Gannet, it also used the Armstrong Siddeley Double Mamba contra-propeller turbine engine. With a more pronounced inverted gull wing configuration it needed only one outer panel fold on each wing.

The Fairey Aviation Company's response to the Royal Navy's invitation was, in its initial prototype stage the Fairey *Type Q* or *Fairey 17*, and ran in competition with the Blackburn Aircraft Company's *B-54 / B-88* which later, as prototype development progressed, received the designation *YA-7* and also *YB-1*.

CONTRA ROTATING TURBO-PROP POWER

Both Fairey and Blackburn design proposals envisaged a contra-rotating propeller configuration, Fairey first considering and then discounting the Rolls-Royce Tweed turboprop after that engine's development was discontinued. They then selected another turboprop engine based on the Armstrong Siddeley Mamba, the Double Mamba (or 'Twin Mamba') that was basically two Mambas mounted side by side and coupled through a common gearbox to contra-rotating propellers.

Blackburn first considered the Rolls Royce Griffon, already proven in contra rotating prop. configuration in the last variants of the Supermarine Spitfire, the Mks. 22 and 24, but then also settled on the Double Mamba engine which could be run with one half stopped to conserve fuel and thus extend endurance for cruise flight. The contra-rotating propellers meant that when only one half of the Mamba was running, there were no asymmetry of thrust problems encountered.

The Mamba engine could run on kerosene, 'wide-cut' turbine fuel or diesel fuel, allowing the Admiralty to eliminate or reduce the dangerous high-octane petroleum spirit required by piston engines from carrier operation.

It is worth mentioning here that Fairey Aviation had pre-WW2 experience of contra-prop engines with their *P.24 Monarch* engine which had twin, vertically arranged cylinder blocks driving contra-rotating propeller sets via separate shafts and gears. Tested in a Fairey Battle during 1939, it was considered as a power unit for the Hawker Tornado and an example was also supplied to USA during 1941/42 as a potential 3,000 h.p powerplant for the Republic P-47 Thunderbolt.

While the project was taken no further. The Fairey Battle test bed gave reliable service as a hack for some years and an example of the engine is now held on exhibition at the Fleet Air Arm Museum, Yeovilton.

At this point, for the purpose of this History, we'll now say goodbye to the Blackburn contender, for although development of the prototype continue until the mid=1950s, it was protracted enough for the Admiralty to lose interest during a period when the Fairey design made good progress.

The first prototype, the Fairey Q, the interim designated Fairey Type 17, showing the original two-seat crew configuration.

With 'everything down', a No.824 Squadron Gannet AS 1 about to 'take the wire' aboard HMS Ark Royal on October 1955, soon after the type entered front line service.

GO GANNET GO ...

The first prototype, bearing only superficial resemblance to the production Gannet, was flown for the first time on September 19th, 1949 by the company's chief test pilot Group Captain Slade, at Aldermaston, and was the first post-war British aircraft designed to combine the Search and Strike roles for carrier-borne anti-submarine operations.

The Fairey GR.17 was a two-seater aircraft with pilot and navigator in tandem cockpits, as was the second of

Line abreast formation of Gannet AS Mk.1 aircraft of No.703 Naval Air Squadron. This was a trials unit, the first to receive the type at Royal Naval Air Station Ford, Sussex. Intensive carrier operations including tropical and cold weather trials were conducted from April to December 1954.

ABOVE LEFT: Safely down, with the wire still hooked, a No.824 Squadron Gannet AS.1 aboard HMA Ark Royal in October 1955.
ABOVE RIGHT: A Fairey Gannet AS Mk.4. View of the underside shows the rocket on rail shung on the wing undersurfaces and also one of the difference of shape of the rear fuselage from the earlier AS Mk1 in that the fuselage, front and rear of the radome 'dustbin', is more markedly flattened.

the prototypes, VR 557, and similar in most respects to the first, was first flown on July 6th, 1950. Meanwhile, during the development of the design, numerous changes in requirements were made by the Admiralty in the light of improved armament, radar and operational techniques, which resulted in extensive modifications and provision for a third crew member in a cockpit just aft of the wing, in which the radar operator sat facing rearward.

Construction of a third prototype was commenced and whilst this was being built, the first prototype re-appeared with a wooden mock-up of the new rear canopy, with the retractable radome further aft, and the addition of the characteristic outboard auxiliary fins on the variable incidence tailplane.

The inboard section of the wing was of increased area, being swept forward from the inner fold line to the fuselage.

All this revision to specification, not untypical of British military aircraft development and procurement during the early/mid 1950s, required a considerable amount of development time and test flying, undertaken by these three prototypes, so that not until June 19th, 1950, did the first prototype perform a deck landing on H.M.S. Illustrious at sea.

On its first deck landing trials, this aircraft made 27 take-offs and landings in one day under varying conditions of take-off distance, ship speed, etc. During this

A pair of No.814 Squadron Gannet AS Mk.4s overfly HMS Eagle. Three Westland Wyverns and two Hawker Sea Hawks can be seen ranged on the Eagle's flight deck.

development period over 250 deck landings were made by the three prototypes, and hot and cold weather trials were satisfactorily completed in Malta and Canada respectively.

On March 14th, 1951, a substantial production order was placed by the Ministry of Supply, and in May, 1953, the first production machine, WN339, made its first flight piloted by Peter Twiss (later to gain fame for the first 1,000 mph-plus world speed record with the 'droop snoop' Fairey FD-2.

Seated above the powerplant, the pilot had an unrivalled field of vision, a contributory factor to the most excellent handling performance and close combat effectiveness. The navigator, seated behind the pilot also had excellent visibility, while the radar operator in the rear remained in somewhat 'splendid isolation'.

Access to the three crew positions was by means of a retractable ladder adjacent to the nosewheel door, and steps up the starboard side of the fuselage nose - thence along steps above the wing to the mid and rear positions.

The tricycle undercarriage, engineered by Fairey, was of long stroke type permitting a high rate of descent without the tendency to bounce - a vital requirement for deck landings. The

A Gannet AS Mk.4, with the rear element of the contra-prop unit fully feathered.

A Gannet AS Mk.4, rear sgowing the auxilliary fins applied to yje tailplane.

The Gannet AS 1 was quickly followed by the T.2 trainer with flying controls duplicated in the second cockpit. Later examples featured a periscope above and in front of the second cockpit, so that the occupant could have forward vision ahead during landing approach.

A Gannet T.2 on final approach during a land-based training sortie.

Hook down, wheels down, flaps down ... all down! A Gannet AS.1 reaches for the arrester wire as it passes over the rear round-down of a carrier deck.

nosewheel unit retracted ewarward under the front fuselage between inward folding double doors, which were closed to reduce drag, except when the undercarriage was moving. Mainwheels retracted inwards into the wing, the lower half of the wheel being unfaired when retracted.

A feature of the power-folding wing was that the height of the Gannet in 'folded' state was, at 13 ft. 9 in.. only 0.5 in. greater than with the wings extended. Wing control surfaces consisted of split, Fairy Youngman flaps and spring-tab actuated ailerons especially developed in wind tunnel and flight tests. Combined with the large rudder and tab-operated elevators, the control surfaces endowed the Gannet with exceptional handling qualities throughout the speed range.

DOWN TO THE SEA...

The first unit to be equipped with the Gannet AS.1 was no. 703X Flight which took delivery of their first aircraft on April 5th, 1954, to undertake intensive operational trials prior to the type being issued to anti submarine Squadrons of the Fleet Air Arm. Nine months later, on January 17th, 1955 No. 826 Squadron at Lee-on-Solent became the first to reform with Gannets, followed in February by No. 824 Squadron at Eglington. No. 826 Squadron later embarked in H.M.S.Eagle prior to her first Service Commission.

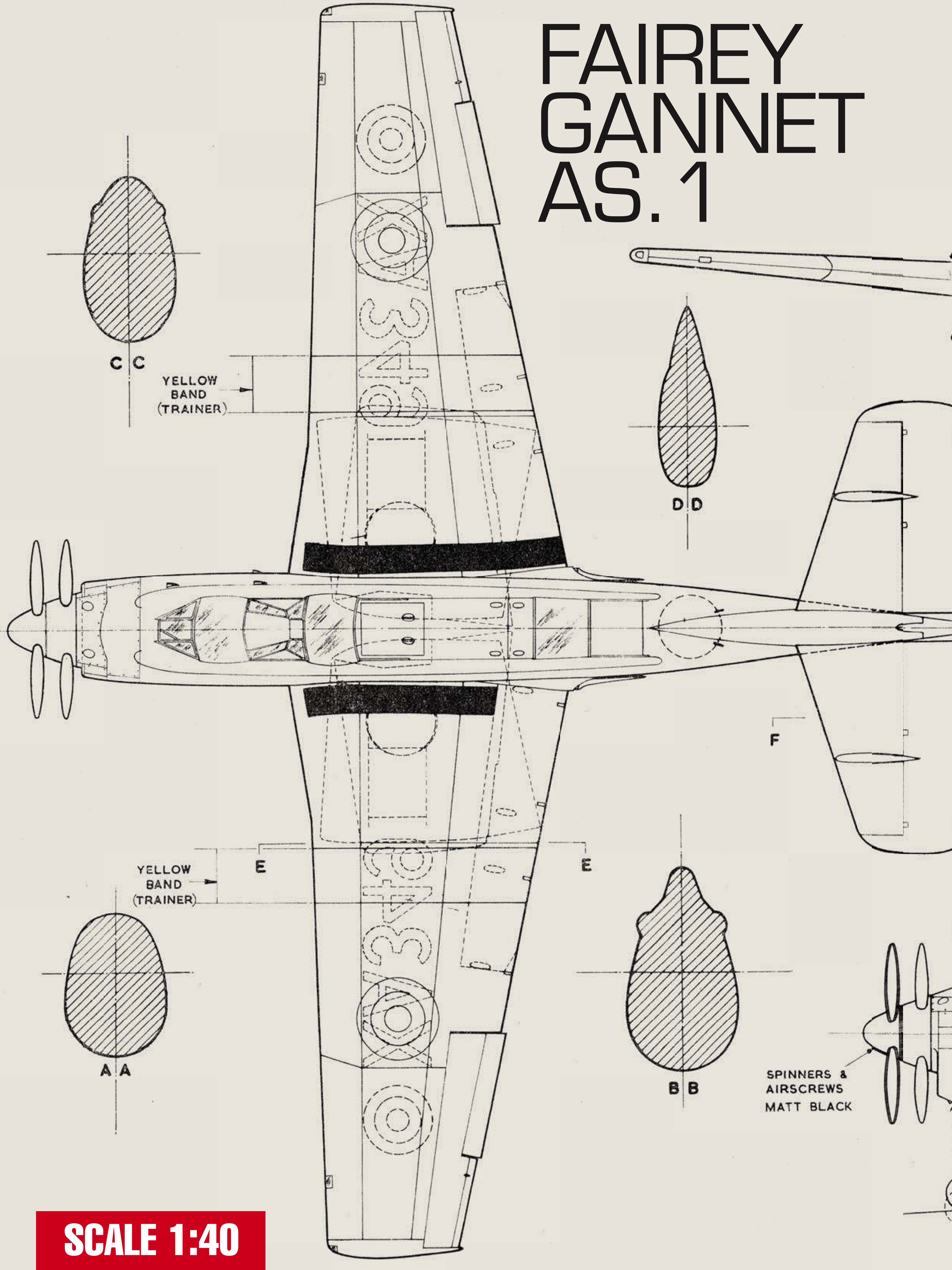
The Fairey Gannet AS.1 and the later AS.4 variant proved to be a highly effective fleet aircraft, serving on board fleet carriers during the 1950s and '60s in the anti-submarine role, until replaced in this task by Westland Whirlwind helicopters. Three other air arms also operated the Gannet, the West German Bundesmarine, Royal Australian Navy and Indonesia.

FURTHER DEVELOPMENT AND A NEW LOOK...

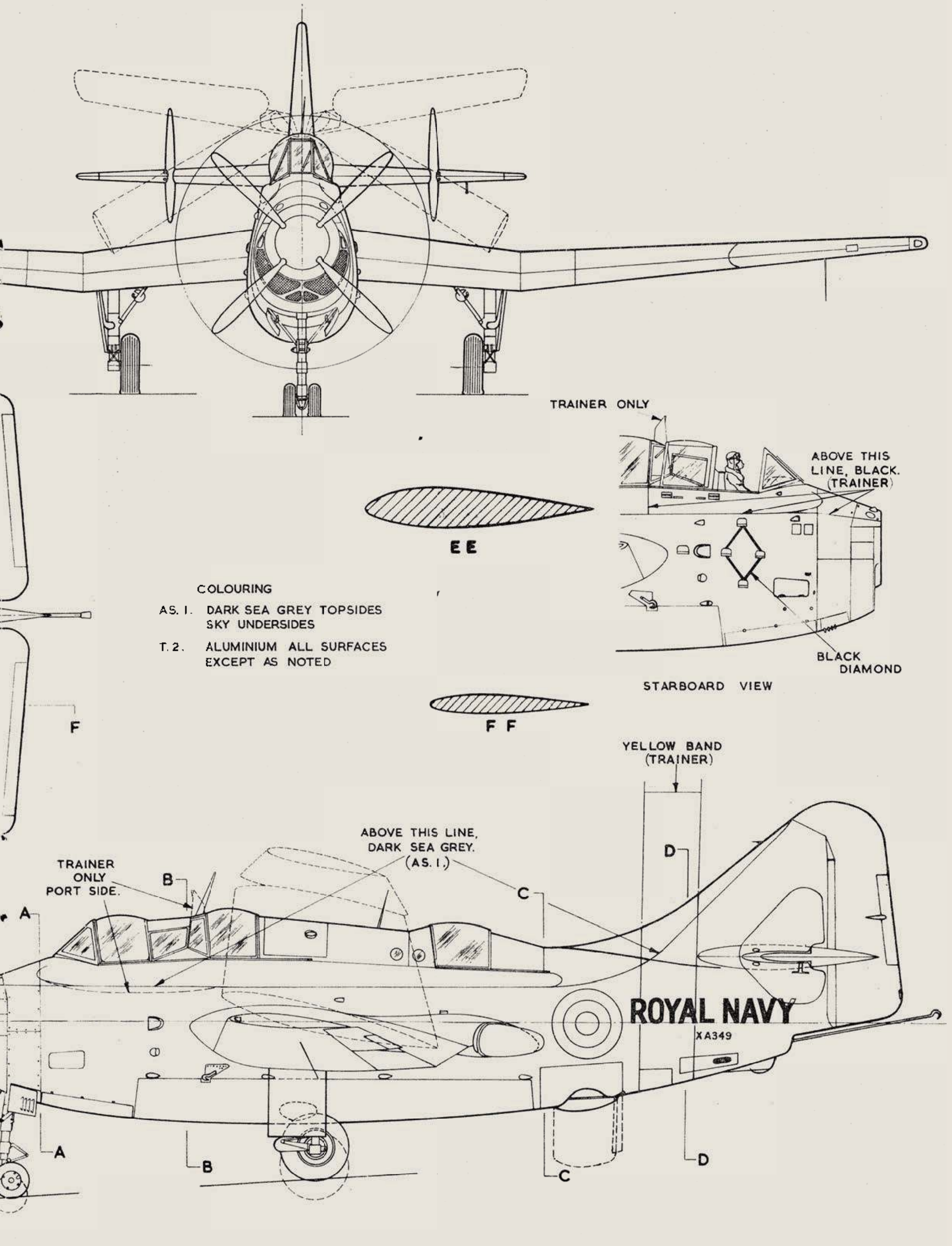
The AS.1/AS.4 Gannet was later developed into the AEW 3 type to provide the Royal Navy with a Fleet aircraft early warning capability. This type was devoid of the rear bubble cockpit canopies that were such a distinctive part of the shape of the early Gannet. The AEW 3 continued to serve operationally until the Royal Navy finally relinquished HMS Ark Royal, their last fixed wing aircraft carrier.

The loss of that vital cover was then demonstrated within two years, in the waters of the South Atlantic around the Falkland Islands. One wonders if the de-commissioning of Ark Royal was the vital signal that encouraged Argentina to invade that outpost of British interest in 1982. ■

FAIREY GANNET AS.1



SCALE 1:40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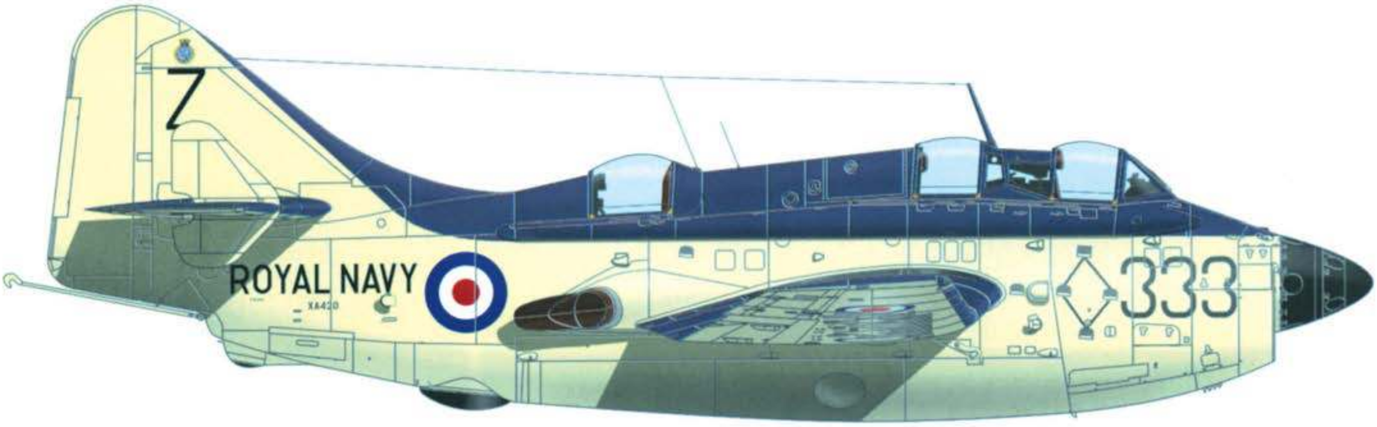
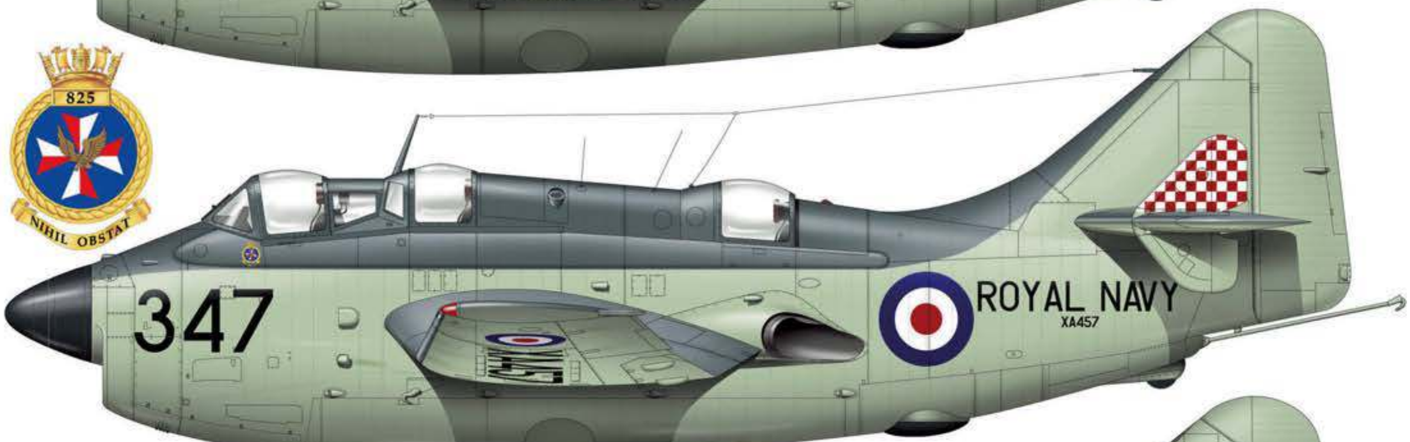


Fairey Gannet AS Mk.4
No.824 NAS, HMS Albion, 1957

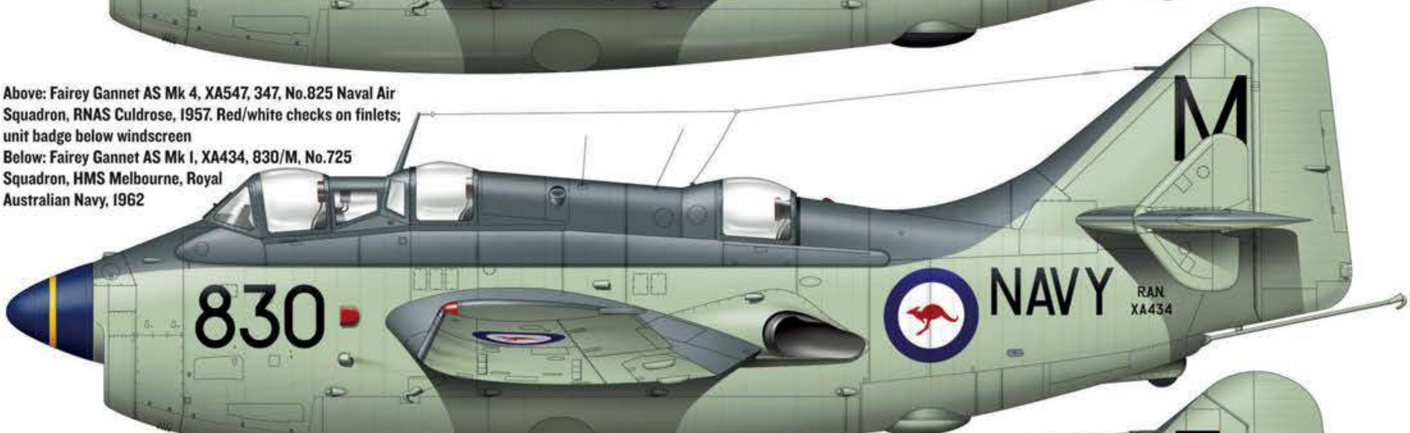
No.824 Squadron

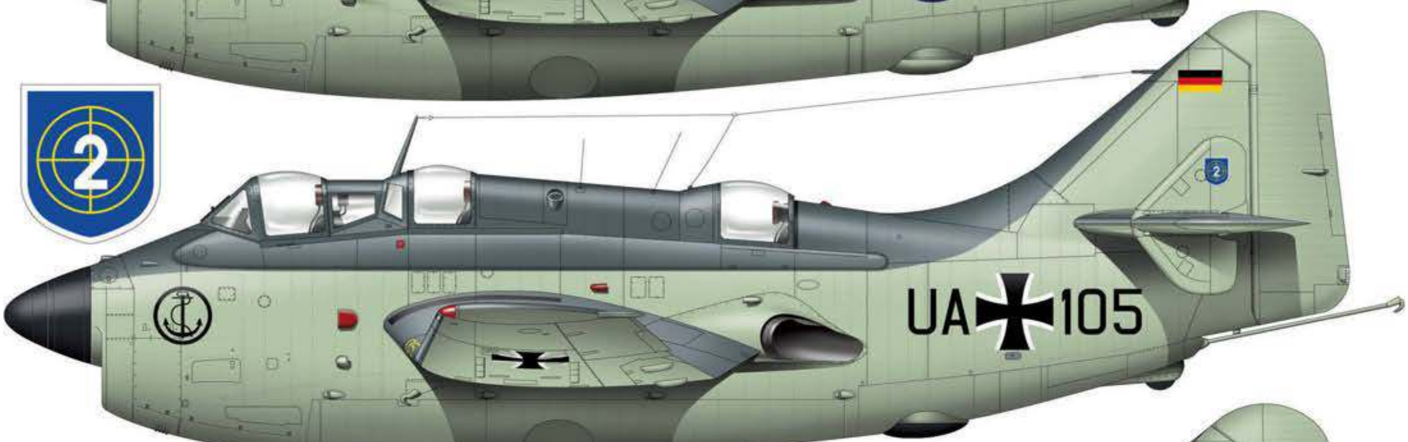
Fairey Gannet AS Mk I, WN450, 337/O, No.824 Naval Air Squadron, HMS Ark Royal, 1956. Extra Dark Sea Grey/Sky finish with black spinner and lettering; roundels in six positions. Serial repeated below wings, reading from leading edge below port and from trailing edge below starboard, reading from leading edge below port and from trailing edge below starboard; unit crest on fin



Above: Fairey Gannet AS Mk 4, XA547, 347, No.825 Naval Air Squadron, RNAS Culdrose, 1957. Red/white checks on finlets; unit badge below windscreen

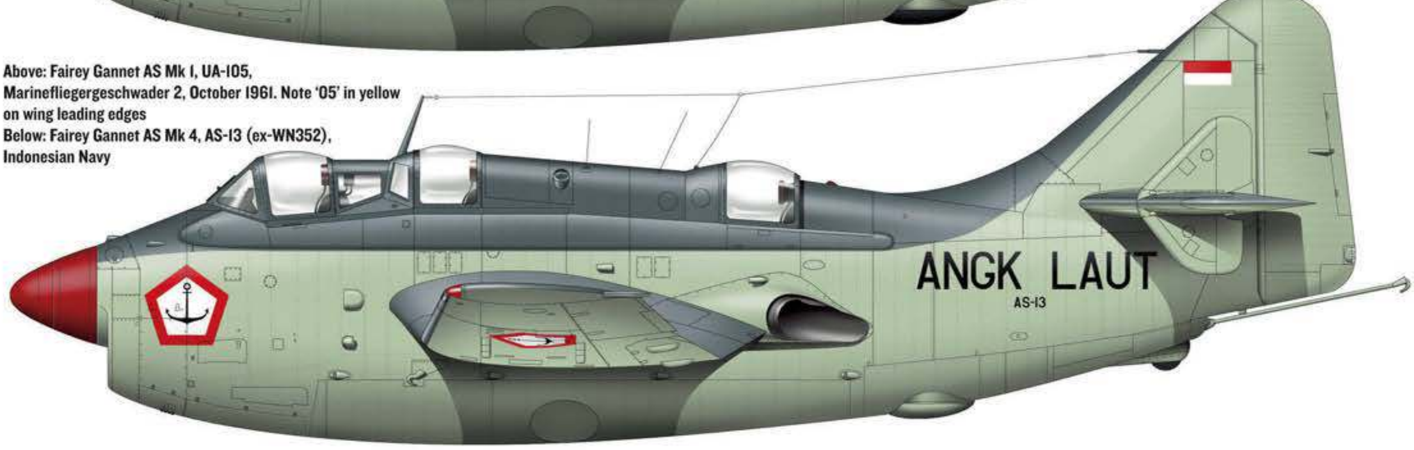
Below: Fairey Gannet AS Mk I, XA434, 830/M, No.725 Squadron, HMS Melbourne, Royal Australian Navy, 1962





Above: Fairey Gannet AS Mk I, UA-105, Marinefliegergeschwader 2, October 1961. Note '05' in yellow on wing leading edges

Below: Fairey Gannet AS Mk 4, AS-13 (ex-WN352), Indonesian Navy



IN DETAIL

FAIREY GANNET

Close-up detail of the preserved examples that can be viewed at the Midlands Air Museum (T.2), Coventry and IWM, Duxford (AS.4)

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3

1,2 & 3: Fully folded, the Fairey Gannet AS.4 on view at Imperial War Museum, Duxford is an excellently maintained and pristine example in full Royal Navy operational colour scheme. Physically little different to the AS.1 version

1

4: **Aileron underside on the wing of Midland Air Museum's Gannet T.2. 5: Aileron upper surface, also showing square raised blister inboard. 6: Wing outer panel underside, showing weapons rails. 7: Wing upper surface detail on T.2, showing wing walk pad. 8: Wing outer panel showing leading edge and wing trip lights. 9: Retracted flap panel. 10 & 11: Contra-rotating propeller unit is a prominent feature of the Gannet. 12: Bird or Basking Shark? The gaping front end of the Gannet that ducts airflow to the Double Mamba engine. 13: Further nose section detail. Note the periscope atop the cockpit (T.2 variant). 14: Nosewheel door detail. The main (rear) doors on 'working' Gannets actually closed after the leg was extended.**

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15: Radar operator's rear cockpit bubble. **16:** Detail of the two forward cockpits. Note the periscope (Gannet T.2) and the wing walk pads. **17:** All three cockpits, showing the distinctive bulged strake under the cockpit sills. **18:** The driving seat, pilot's position . **19:** View over the nose, showing the cockpit windscreen wiper. **20:** Another view of the two front cockpits, seen from the left side. **21 & 22:** The line of the bomb bay. Note also the folding step ladder. **23:** Massive hook under the wing leading edge engages the catapult-launch 'strop'. **24-28:** Views of the massive main undercarriage.

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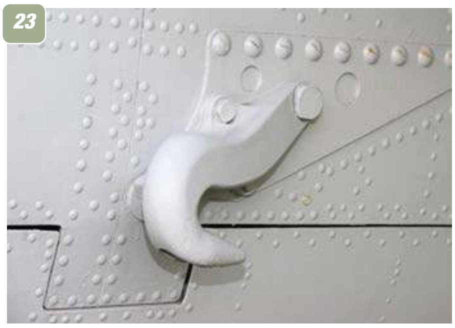

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29: The arrester hook looks quite spindly to stop an aircraft as big as the Gannet! **30:** Detail of the hook end. **31:** Detail of the rudder hinge-line: **32:** Anchor point for the arrester hook shaft and the tail bumper. **33 & 34:** Exhaust effluxes of the Armstrong Siddeley Double Mamba engine, just behind the wing trailing edges, left and right. **35:** Tailplane/elevator hinge line detail on Midland A.M.'s Gannet T.2 also reveals the auxilliary underside fin and rather mangled tailplane tip! **36:** Auxilliary fin on the tailplane upper surface. **37:** Side view of one for the nosewheels. **38:** Twin nosewheels, viewed from the rear.

39: The tall noseleg gives the Gannet a distict tail-down sit. **40:** A further view of the noseleg unit, viewed from the rear.

JUNKERS CORRUG SURFACE PANEL

PART 1: THE GERMAN JUNKERS COMPANY ADOPTED THEIR CORRUGATED ME INJECTING STRENGTH AND LIGHTNESS INTO AN AIRFRAME AS FAR BACK AS THE CONCEPT RIGHT UP- TO THE END OF WW2. BOB PARKER DEMONSTRATES THAT DISTINCTIVE FEATURE FOR SCALE MODELS USING CORRUGATED CARDB

Being asked to describe a method of covering a modell with corrugated cardboard (called c/c from this point onwards), to an audience as knowledge as the readers of *Flying Scale Models* is, to say the least, daunting. I can only assume that any modeller wanting to use this material is experienced in true scratch building and so, confine my suggestions to three Imainareas.

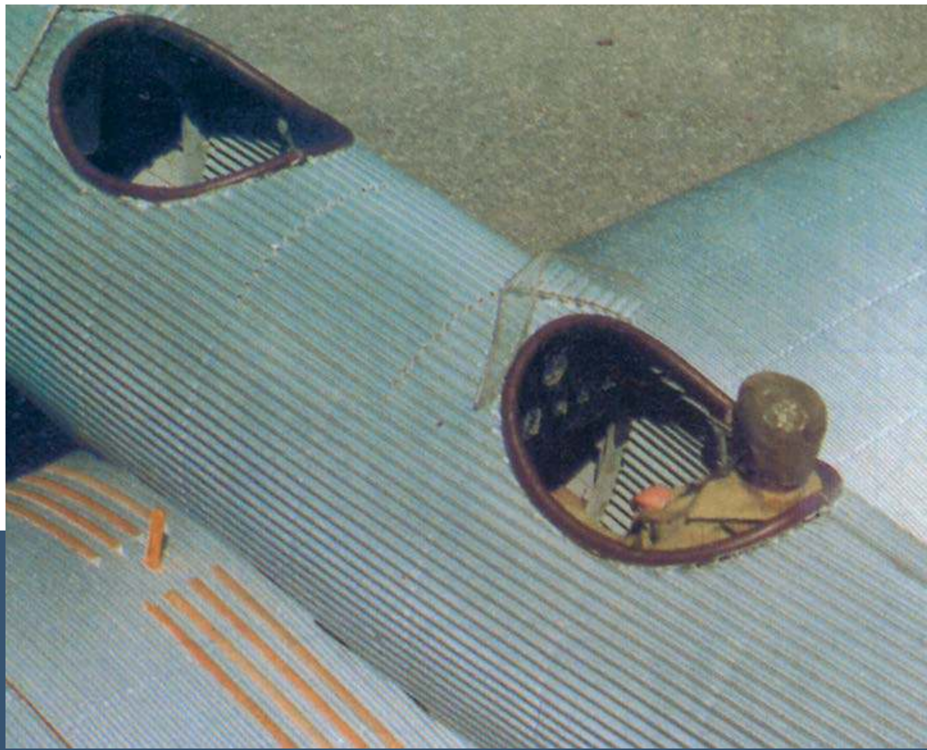
DESIGN OF THE AIRFRAME

As usual, the first step is to assemble as many photographs and drawings of the full size subject aircraft as possible and carefully study the construction methods used, panel lines, panel sizes etc. Prof. Junkers and his deslgn team were very clever, practical people, far ahead of their time. You will find that the wings are

The author's Junkers A.50 "Junior' of 1928, built to 1/5th scale spans 2 metres (78.75") and was original powered by a Saito 90 twin before conversion to O.S.90FS power. With a weight of 6 Kg. (13.2 lbs) it has excellent flying manners - almost stopped before the wing drops thanks to those wing corrugations that act as 'fences' so the author surmised.

GATED LLING

ETAL SKIN AS A MEANS OF 1915 - THEN RAN WITH S A WAY TO REPRODUCE BOARD



Detail of the corrugations on the fuselage, with marked out vertical panel lines.

really the only part of the airframe for which the metal was rolled to shape, while the fuselage and tailplane skins are easy to form.

Plan the structure to allow you to use panels, which reproduce the full size exactly, with plenty of adhesive area on the edges of these panels. When preparing airframe plans, remember to allow for the considerable thickness of the corrugations (in my case 2.5 mm). Also, make careful allowance for sealing the fuel tank area, locating fuel vents, drains and exhaust to minimise fuel on the outer surface. Any spilt fuel or oil will travel along the corrugations for the whole length of the aircraft and, as always, will find a way into the structure.

All leading edges are spruce or similar material, so that the c/c can be trimmed and crimped without fear of bruising or damaging the leading edge in the final stages. Leading edge sheeting should extend back well beyond the airfoil highpoint, to prevent a kink developing as the model (hopefully) ages. Only a light lower trailing edge is required to secure the lower surface.

TOOLS AND EQUIPMENT

Very sharp blades and a straight edge are absolute essentials, so best start with all new blades and be prepared to substitute regularly during the operation, so buy a large number of your favourite blade types and at the first sign of it not cutting like a surgeon's scalpel, put it to one side for normal model use. A surgeon's scalpel is actually one of the best tools you could choose.

When using c/c, every edge must be clean and crisp in line - you can't sand it to an edge later, in fact, you can't sand it at all, which is another basic point to take on board!

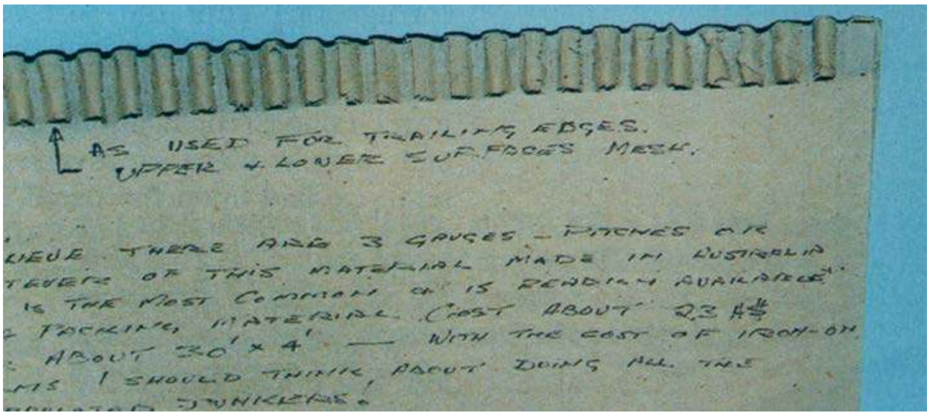
Your workbench should be covered with foam sheet and all tools, bottles etc. must be kept well away from the working surface. The only adhesive to use is contact cement with plenty of 'grab'. Don't allow any adhesive to touch the outer surface because it is highly likely you will be painting the aircraft silver and any variation in texture, which will occur if the glue gets onto the outer surface, will show through the final spray finish. For the same reason, do not use cyano anywhere, as it will soak through the c/c and blemish and harden the outer surface.

For a final paint finish, I used excellent Butyrate aircraft silver directly onto the bare cardboard. I didn't use a primer or sealer, as I could not think of a way to sand it. The result was an excellent scale-like finish. I think the secret is to have a very fast drying paint that does not give the cardboard time to absorb the paint, to swell and roughen texture.

APPLICATION

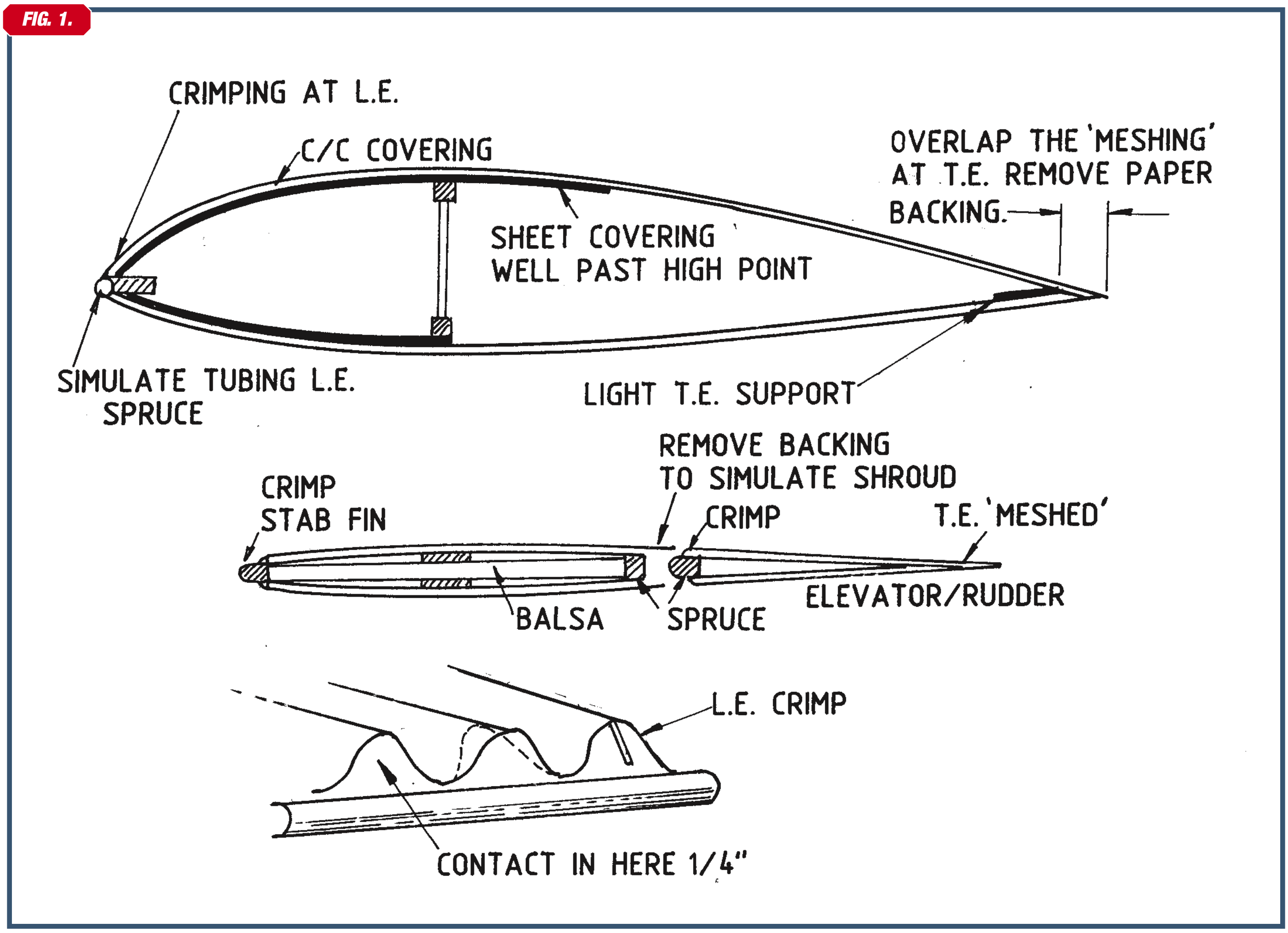
A very important step here is to have on hand some scrap pieces of C/C that can be meshed into the grooves of the panel being installed, i.e. smooth side up, to spread the load as you press the panel into place. In applying the c/c to the airframe, the corrugations must be absolutely in line with the root rib of the wings, tailplane, fin, fuselage datum line etc.

In the case of the fuselage, touch the material at the centre line and work out from there. For wing panels, tailplane, elevators etc., start at the leading edge and work back to the trailing edge. At all trailing edge areas, very carefully remove the backing from the corrugations an appropriate amount (approx 3/4"/20mm.)



Detail of the preparation of the corrugated sheet ready for application. Here, backing sheet has been peeled off at the trailing edge.

FIG. 1.



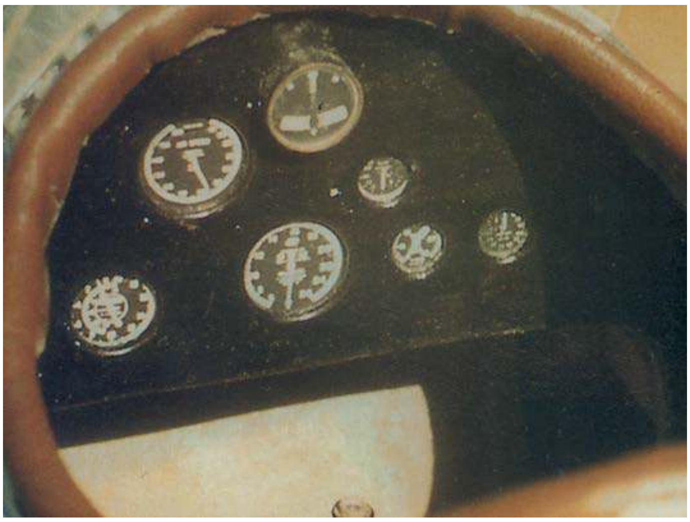
to enable the upper and lower surfaces to mesh. Apply the lower surface first and trim the trailing edge accurately. After the upper surface is secured, it will overhang this line and is then trimmed back to the lower edge.

For rudder, elevator and ailerons, the first side applied is the accurately finished shape - the second side applied is trimmed back to the first.

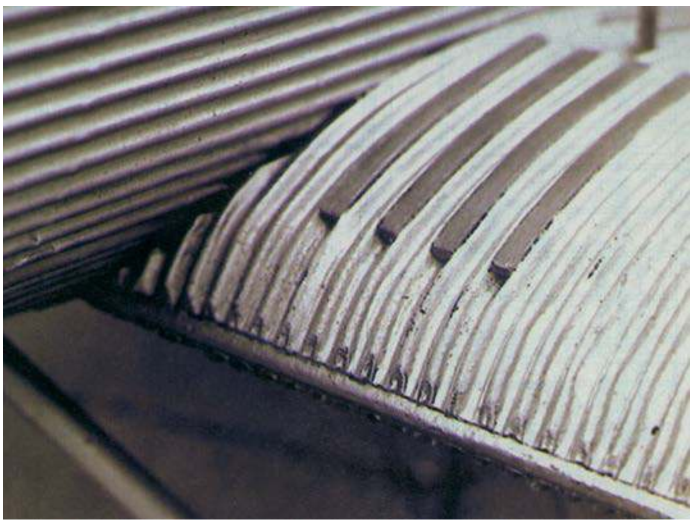
For a wing that tapers in chord and thickness, I found it impossible to cover the top surface with one piece of material, but managed it with two pieces (the full size aircraft uses 12 panels). To join panels, apply the first, then remove the backing on one-and-a-half corrugations on the adjoining panel and contact this overlap to the first (using the reversed scrap material to rub it down in place).

To obtain the curvature to the upper wing panels, I placed the wing panel on the bench and then, using indoor model technique, I sprayed a fine mist of water about 2" (50mm.) above the panel, letting it settle on the corrugations until the surface was just damp. I then laid the panel over a piece of chrome towel railing (corrugations up) and, with a piece of reversed scrap c/c laid upon the panel, I proceed to roll back and forth gently, coaxing a curve into the damp cardboard.

When satisfied that it will follow the upper rib profile with only slight pressure, align it with the root rib and the under



Cockpit detail on the author's model.



Detail of the wing leading edge crimping as referenced in the test; also reveals three years of grime, wear and tear. The finish proved to be durable!

Join line of corrugated sheet along the top of the fuselage centre line. Underside is similar.

Detail of corrugation edge crimping, here at the engine firewall.

surface corrugations and contact it to the frame, working from leading edge to the trailing edge.

When all is covered, you have an aircraft with hundreds of little air scoops on all the leading edges. To fix this in a scale-like manner, it is a matter of inserting contact cement into each and every opening, which I did with a piece of fine wire. After this is done and with the contact cement dry, push gently down at an angle with the end of a steel rule about 1/16" (1.5mm) from the edge of the panel. The corrugations will collapse inward and contact themselves in a most scale like manner at the rate of about five at a time. Naturally, you will need to practice this on scrap material before doing it on the model).

When all this is done, a careful going over with little touches of white glue will seal any remaining gaps.

PAINT FINISH

Suddenly you are now ready to paint - no sanding, no priming etc., just wipe over with a tack cloth and spray the final finish, taking care to keep the spray at right angles to the surface to ensure that the spray paint gets right into the corrugations without creating a build-up paint which might otherwise 'puddle' and thus attack the surface.

MAKING YOUR MARK

As for lettering on this bumpy material, I cut a stencil in drawing paper and taped it in position. Then, with a sharp 6B pencil, I carefully outlined the letters, taking care to keep my eyeline vertical to the surface. Then, with my trusty sable brushes, I filled the letters in exactly to the lines drawn.

Don't make adjustments as you proceed - its like instrument flying - what you feel is right will surely be wrong.

SUMMARY

The material is prone to puncture damage, but once on the model, can be handled as easily as any fabric covered model and boy is it rigid!

Repairs to punctures can be carried out by removing the backing paper from a scrap piece of c/c and applying with white glue. Just remember that sharp blades are essential. Use contact cement only (my Junkers A-50 required approximately 250 mm Spruce leading edges. Very fast drying paint is essential - at least for the first coat.

Plan ahead - don't try to force the material into position, it should almost fall into place. Protect the surface at all times until painted.

FINALLY - FLYING

I read somewhere that Prof. Junkers calculated that the corrugations increased drag by approx. 20% I think he was right. From my experience, I feel that you could quite easily underpower a model with this covering. My Junkers A-50, built to 1/5th scale, weighted 8.8 lbs (4Kg), spans 78.5" (2m.) and is powered with an O.S. 90 FS driving a 14" x 7" prop. It is definitely not overpowered.

With engine off, I am always short on approaches, even though it is a very clean design. I feel a smooth skinned version would fly easily with a .60 FS. I also feel that the corrugations on the wing act as 'fences' because, with no washout built in, it is VERY loathe to drop a wing. I only hope that these few hints and tips will give a modeller somewhere the incentive to build "that" model which is always being put off to another day. ■

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

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