Radio Control Models & Electronics

85p

1982/83

PLANS HANDBOOK 4

PLANS HANDBOOK 4

Radio Controlled Aircraft

CONTENTS

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The right model for the job

Choosing a plan from a range as extensive as that of M.A.P. can be somewhat bewildering for the newcomer to R/C modelling. Some simple guidelines can help to ensure that firstly the model type is suitable for the level of building experience of the individual and secondly that the flying characteristics of the completed model will allow a comparative newcomer to the sport to achieve success.

It is assumed that the reader is a relative newcomer to either building from plans and/or flying R/C model aircraft. Most modellers who have successfully constructed one or two kits should have no difficulty using the experience so gained to understand our plans and translate the details into the reality of a first class flying model. All of the plans in our range are for well tried and tested models, many of them flown by their designers and others with success in National and International competitions; e.g. ARROW, RC/1385, by Wolfgang Matt, winner of the 1979 World Aerobatic Championships or the twin engined B.N. ISLANDER RC/1255 of Roy Norris, the 1972 British Nationals Class 2 Scale winner.

However, the beginner to R/C flying would do well to put aside any thoughts of models such as these until he has gained considerable skill and experience in both building and flying. If this is to be a first venture into R/C modelling, please, please choose a model which has been designed with the beginner in mind. A suitable first model should incorporate at the very least the following features:

(a) high wing, i.e. wing on top of the cabin, layout;
(b) generous dihedral – for stability;
(c) rubber band assembly;
(d) non-enclosed engine, for ease of adjustment and operation;
(e) reasonable size – to carry a payload of R/C equipment easily;
(f) rudder, elevator and motor control.

There are experienced modellers that recommend the novice to attempt his R/C flight training with a comparatively high powered model, relying on the use of the Buddy Box facility – a feature of many modern proportional outfits, to prevent the crash which would otherwise be an almost certain outcome of the 'fast high powered' trainer regime. All very well for those in well organised clubs where suitable tuition is readily available but for the less fortunate a more sedate model will allow the novice to progress at his own pace after a minimum number of lessons.

A quick look at the Sports Model and Trainer Sections of this handbook will illustrate the model type required. How about HOTPOT or TYRO MAJOR perhaps a TAURI, something with more "character" like OLD BILL. Beware of the description 'fast and aerobatic' – leave this one until next time!

Similar considerations to the above should be borne in mind when selecting a first scale model. *Never, please, a Scale Model first.* Even the simplest of scale models tends to be more difficult to construct and fly than the purpose designed trainer. The temptation to add detail and colour is irresistible to the scale enthusiast, the more of which is added the heavier the model becomes and the more difficult it is likely to be to fly. A simple prototype, without too much detail, soundly constructed is the best approach. Look at Eric Fearnley's AERONCA GRASSHOPPER MA/281, or Pete Holland's CESSNA 172 or if W.W.1 types are your preference the FOKKER EINDECKER RC/1124 of E. Huber could be your model.

By building a model from one of M.A.P's extensive range you will embark on a new experience in model building. Control of quality, materials selected and ultimately the finished weight of the model and, by using one of our highly detailed Aeromodeller Scale Drawings, the scale details of your model are in your hands. Choose any of our range and you have chosen a proven design.

STAR PLAN GRADING

x A simple design with sufficient detail and explanation for the complete beginner.

x x Slightly more advanced, for the average modeller or beginners with some modelling experience in other fields.

x x x For modellers of some experience, or those who have built one or two similar models or are prepared to read up constructional technique.

x x x x For the expert able to interpret drawings (e.g., 3-view drawings) and decide his own constructional methods; also used for designs where workshop equipment is called for.

BUILDING FROM PLANS

By David Boddington

WITH such a wide range of kits available, why should modellers be bothered to build their models from plans? After all, the kits save you the bother of having to cut out many of the parts, and the nuisance of having to find and buy all the materials required for the model.

Not all modellers build from plans for the same reasons. For some it is the satisfaction of contributing the maximum amount of personal involvement to the project, and the preparation of the components, far from being a chore, is an integral part of the enjoyment. Were there no satisfaction from the building aspect of the hobby we should all be flying 'ready-to-fly' models. Despite the large numbers of kits available the model trade can never hope to cover every type of R/C model, manufacturing economics will ensure that this situation continues. Cost is another factor that persuades modellers to build from plans. For the first exercise you may find that the cost saving is marginal compared with a kit project — it may result in no saving at all. As you build up stocks of materials, the number of new items you have to purchase decreases, and the overall savings increase.

Choose your model

Desirable as many of the models undoubtedly are, will they be the ideal model for *you*? The models featured in the handbook represent the full range of modelling skill standards, from the simplest to the highly complex models. Take note of the descriptive notes accompanying the plans, and try not to get completely out of your depth. By all means aim for an increasing degree of difficulty (constructionally and flying) but take one step at a time. If you have only built one training model there is no point in trying to jump to, say, David Vaughan's contest winning scale P-51 'Mustang'. Almost certainly you will never finish the project and, even if you do complete the construction, the flying will end in disaster if *you* attempt to fly it.

Presumably you will have a good idea of the type of model you wish to build, i.e. glider, powered sports, scale, pylon racer, etc., before you make the final selection through studying the handbook. Consider your local flying field conditions, transport limitations and building facilities before making the final decision. A slope soarer, for instance, will not be a good investment if you can only get to a suitable site two or three times a year but, a dual purpose thermal/slope soarer will give you the best of both worlds.

Power in hand

Unless you are proposing to buy a new engine for a powered model, you will be looking for a plan to suit an engine that you already own. Many of the plans will quote a maximum engine capacity that should be suitable for the model — and some of the ranges quoted may seem to be stretched beyond plausibility. Remember that engines of the same capacity may vary enormously in their power outputs; '40' size engines of different makes, ages and design can range in output from 0.5bhp to getting on for 1.5bhp from some of the latest 'hot' engines. So how do we decide on the engine suitability for R/C models? Treat the minimum sizes quoted as being suitable for the more powerful Schneurle ported engines and/or for builders of light models — you will only find whether you are a 'light' builder after a few attempts, although we can all become builders of light airframes with a little care.

For sports, 'cooking' engines, choose the mid engine size range quoted and you are unlikely to be very far wide of the mark. Leave the most powerful engine sizes to the experts, or those who have a particular affinity for over-powered bombs. Too much power can get you into trouble — but need not do so if used cautiously — underpowered models are always a liability. The most dangerous period of any flight is when the model is near to the ground and, if the aircraft is semi-permanently in this state through lack of power, it is only a matter of time before the two combine in the most inconvenient ways.

All in order

Plans will include only the basic information dealing with construction and this is augmented at the time of its introduction by a description of the building and flying of the model in the feature article in the magazine. Back issues of the magazine may be available from MAP, if you do not have that copy, alternatively it is possible to obtain photocopies of the article from Plans Service, provided *you* can identify the magazine and the month of publication. (Photostats available price 50p post free if ordered with plan or +30p postage if ordered separately.)

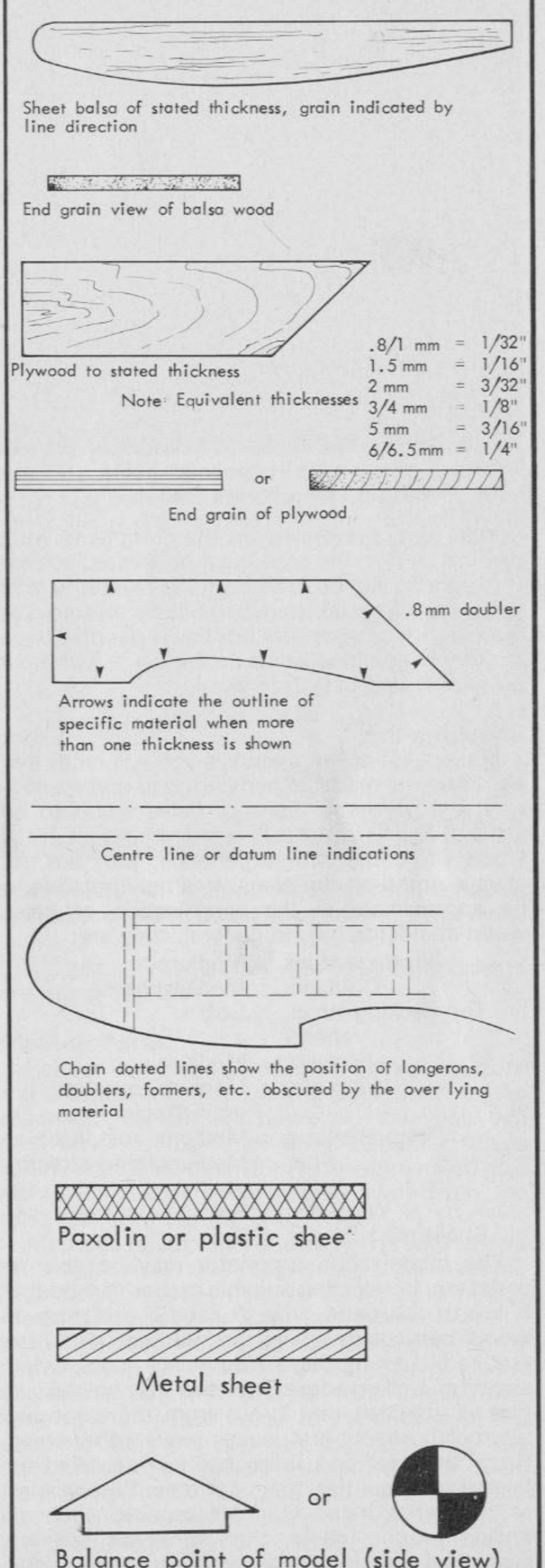
Special delivery

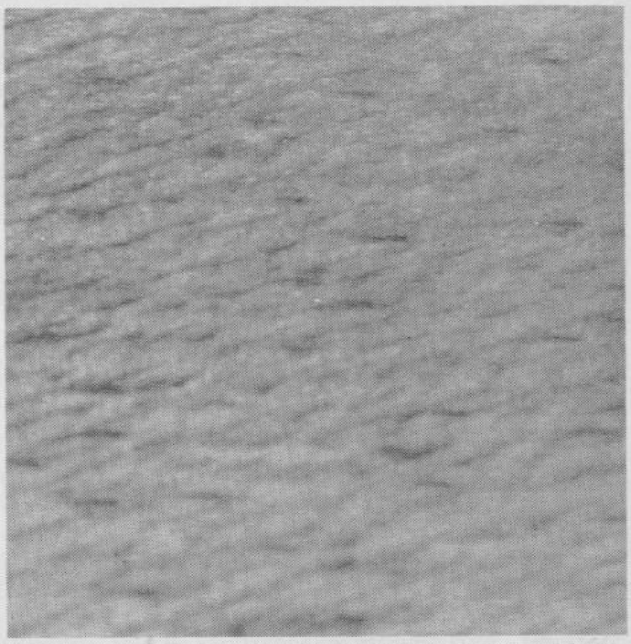
It is important to understand the nature of plans. The majority are produced by a dyeline process, the master tracing is fed into the machine with a light-sensitive paper under the tracing. Strong lights in the printing machine bleach out all of the emulsion on the printing paper *except* at the position of the lines, words, etc., and the paper then proceeds through a developing section — usually ammonia, hence the smell of the drawings! Printing by this method has the advantage of flexibility in being able to print single copies to specific orders but there are some disadvantages. Dyeline prints are not light stable and if they are subjected to strong sunlight for long periods (we're talking about weeks) they will fade, eventually leaving you with a plain sheet of paper.

Study the plan until you are certain that you understand *all* parts of the construction and the sequence of building components. Cross referring between elevations, plan views and sections should be sufficient to clarify most aspects but the designer may have some specific recommendations to make regarding methods and procedures. There are drawing conventions to illustrate materials and positions and these are shown in Fig. 1; there may be slight variations according to the style of the draughtsman or to make a form of construction more obvious. It is at this stage that the modeller is often tempted to 'improve' some of the methods of construction. Before you are tempted to modify the method shown, please bear in mind that the designer has taken the trouble to develop the model and prove it. Any changes are more likely to result in a less efficient design and *not* the opposite.

Planning the installation of the R/C equipment and linkages is a very definite pre-requesite to building — it will save aggravation and time wasting at a later stage. Most plans will give an indication of R/C equipment deployment, i.e. servos, receiver and batteries, but these must be tailored to suit your own R/C gear; draw on the plan the servo positions, bearers, linkages (whether pushrods, tube and cable or closed-loop systems) battery pack size, receiver and switch — the latter should be clear of the exhaust outlet. The same applies to the engine and fuel tank to be used. Some of the older plans may show redundant forms of R/C equipment, i.e. single channel gear and these must be ignored and installations re-planned. You may think that the drawings should indicate modern equipment but think of the task involved in updating hundreds of drawings every few years to incorporate the latest fashions of R/C design! Areas of particular concern with pre-planning are the fuel tank bay (keep it separate from the battery or radio compartments if possible) the battery area (may need lining with foam *during* construction) and the pushrod linkages (will it be possible to install them *after* the fuselage is complete). Occasionally, a plan will only show one wing half in order to keep the overall size of the print to manageable dimensions. The opposite wing panel may be shown in a chain

Fig. 1. Model plan conventions





Above, left: straight grained balsa and above right: quarter grain, characteristic 'fleck' to the surface distinguishes this cut.

dotted form overdrawn on the completed wing half but, if not, the plan must be treated so that the drawing can be seen from the reverse side of the paper. Special 'transparentisers' are sold at drawing office suppliers but liquid paraffin (sure to get you going) will also do the job — just rub it on with a wad of cotton wool.

Shopping list

Make a list of the materials you will require to complete the model remembering to make a note of the grades and types of balsa wood to be used. Judging the quality and grades of balsa wood will come with experience, they are not always noted on the plans. It is only possible to be approximate in the specification of balsa wood standards but, in general, they are:

Fuselage sides	:	Medium
Doublers	:	Medium hard
Top decking (thick sheet)	:	Soft
Formers	:	Medium
Wing ribs	:	Medium, quarter grain stock
Wing sheeting	:	Medium, soft flexible
Spar	:	Medium/hard straight grain
Wing tips	:	Soft
Sheet tail surfaces	:	Soft

The model shop proprietor may be able to assist you in selecting suitable grades of wood; it is worth the extra time in careful selection of wood, particularly where the 'matched pairs' are required, i.e. fuselage side wing spars, wing sheeting, trailing edges, etc. You may be lucky in finding sheeting that is cut from the same log (matching sheets are usually *every other* sheet (from the pile) and these can be identified by having near identical grain patterns. Purchase all of the other items you will require, such as engine mount (check the crankcase spacing first), fuel tank (to fit the available space), nose leg (correct height from former to wheel axle), spinner, canopy, hardwood, piano wire, horns, clevises, saddles — and so on. Making a comprehensive list of materials may be a little time-consuming initially — it will save many return trips to the model shop or, if you are miles from civilization, frustrating waits for mail order deliveries.

Make your own kit

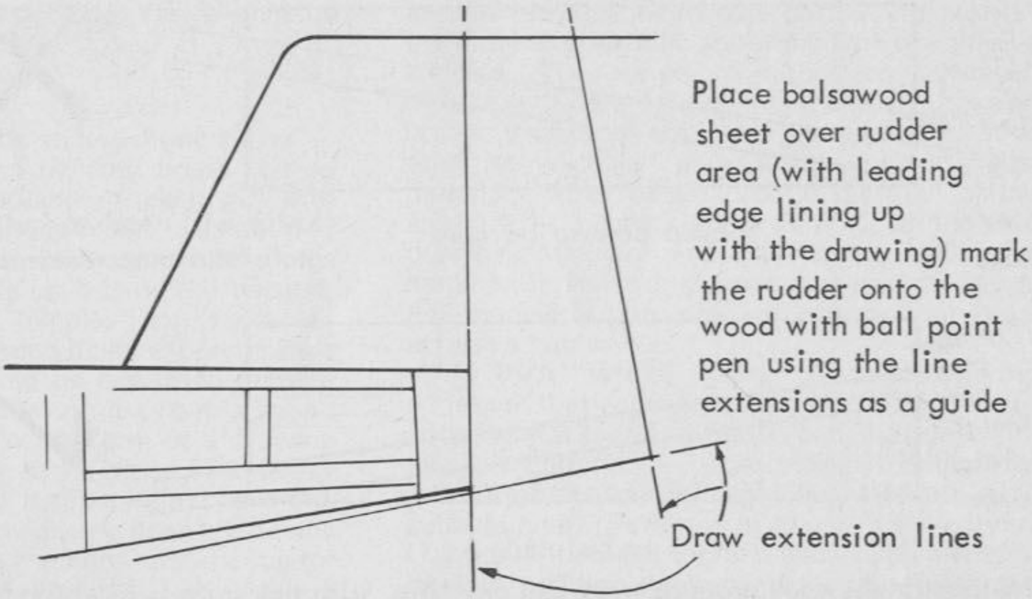
Producing all of the parts of the model before commencing construction is another time saver so start by cutting out all of the wood parts. First, we must transfer the shapes of the parts from the drawing to the material, there are a number of ways of achieving this.

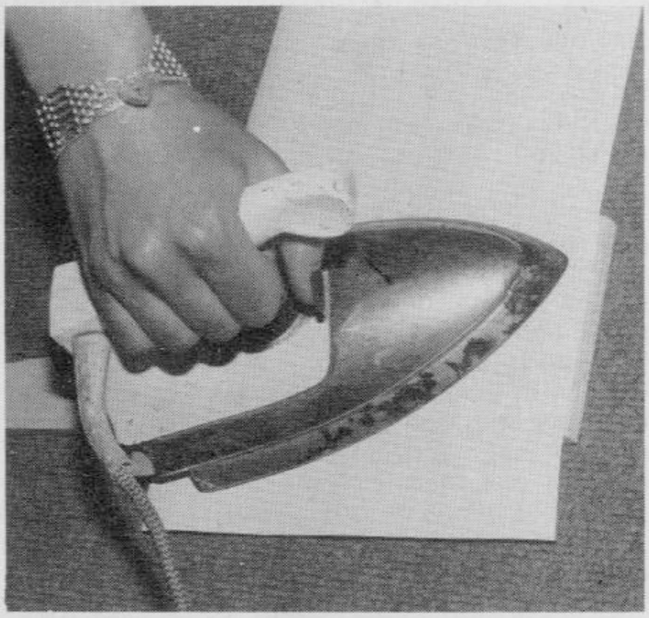
1. Carbon Paper (the pencil variety — typewriter carbon paper is useless). You will need a number of sheets if you are using this method for large areas such as fuselage sides. Free-hand copying with a pencil is not very satisfactory as the pencil tends to follow the grain of the balsa wood underneath rather than the line drawn on the plan. Use straight edges and French curves to guide the pencil point accurately and tape down the wood and the drawing to prevent any movement during the transferring.

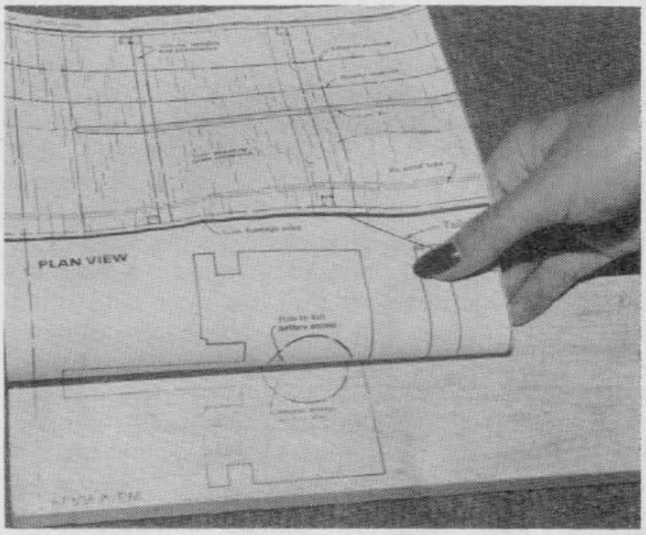
2. Tracing. Tracing the parts from the plan, with tracing paper or film, and then transferring to the material by the carbon paper method is laborious and can lead to inaccuracies. It should only be used if you feel it necessary to keep the plan in pristine condition.

3. Pinning. With the material positioned under the plan, the outline is pricked through with a pin or needle, these marks in the material can be joined by ball-point pen or, if you are very confident, used as guides for direct cutting. With any of the 'blind' systems of marking the wood must be carefully positioned under the drawing to ensure that you keep within the sheet areas and that the grain direction is correct. For a long straight line, i.e. fuselage top edge, it is tempting to use the natural edge of a sheet of balsa wood. Accurate lining up of the edge under the drawing

Fig. 2. Transferring shapes from plan to wood







Left and above: Transferring former shapes from Xerox copy to balsa sheet using a hot iron.

is difficult *and* many sheet balsa wood edges are not truly straight. Small 'windows' can be cut in the drawing to aid lining-up, but do of course permanently scar the plan.

4. Photocopies. Simple models, with plenty of straight edges and no complete shapes, ease the problems of drawing the shapes onto wood, and very simple shapes can be drawn by direct measurement or by positioning the material *over* the plan (see Fig. 2). Our greatest difficulties will come with intricate formers, ribs, etc., to be found in scale models. Copying these by hand is long-winded and by far the quickest way of transferring these to wood — balsa wood or plywood — is by using photocopies of the relevant plan portions. Most town libraries have photocopying machines for the use of the public, and there are many commercial organisations offering the same service, so it should be feasible for the majority of modellers to obtain these copies. Place the photocopy face down on the material and press hard with a domestic iron at a high temperature. The ink from the copy will be melted and transferred to the wood — see photo sequence. There may be a very slight increase in size as a result of the photocopying process but, this is insignificant unless very large components are being copied.

Making Parts

Former and rib patterns can be cut direct from the drawing and glued (using *Cow Gum*) to the materials; remember, however, that you will then have no record of these parts for future reference. Note: *Cow Gum* is recommended as it allows the paper to be peeled away from the materials after cutting is complete.

Methods of cutting the wood parts will depend on the thickness and toughness of the material. Thin balsa wood — up to $\frac{3}{16}$ in. in soft and medium grades — can be tackled with a modelling knife (more usually a surgical knife) and a sharp 'V' pointed blade. Straight lines should be cut with the aid of a metal ruler, keeping the unused wood to the outside of the rule so that any slip will not cut into the component. You should also aim to cut away from the grain of the wood and not into it. See Fig. 3. Wide curves can be cut freehand using a steady cut with gentle pressure — do not try to cut through the wood in one go, make a number of cuts. Small radius curves are best negotiated

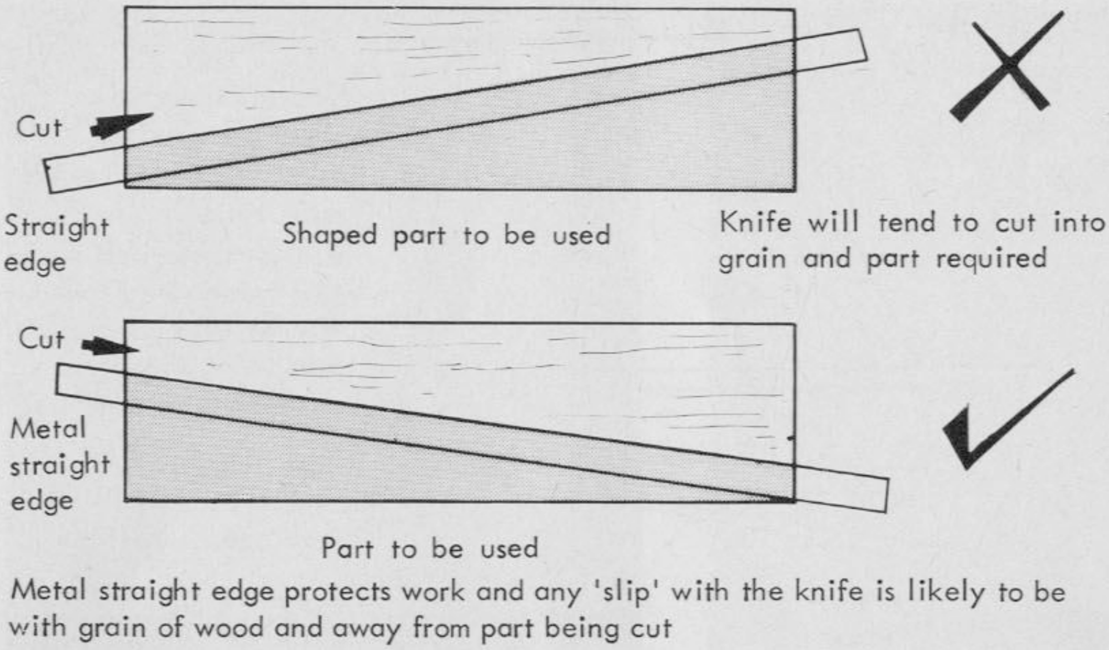


Fig. 3. Using a straight edge

by a series of 'jobs' with the knife, gradually working around the outline. Thicker balsa wood sheet, and plywood of 1.5mm thickness ($\frac{1}{16}$ in.) and above, are best cut with a fretsaw. Powered fretsaws (such as the *Dremel*) make cutting less of a chore but not necessarily more accurate. The humble hand fretsaw is quite capable of supplying accurately cut parts *providing* it is handled correctly. See Fig. 4. Three essentials to remember are the need for a solid cutting table, maintaining a vertical position with the fretsaw and moving the material to the saw, i.e. the relative position of the saw blade is maintained and the material is fed to it — as for a powered version. Keep the saw moving up and down at a regular rhythm, there is usually a tendency to slow down or stop as you approach a tight curve. Strip wood up to $\frac{3}{16}$ in. square can be cut with a sharp knife but larger sizes should be tackled with a razor saw. Part cutting of strip and rotating through all four sides should ensure a square cut — if the first and last cuts don't coincide on the meeting edge, the cut will not be square.

Bending pianowire requires the use of a vice and wood blocks to obtain accurate corners and straight lengths between the bends. Mark the pianowire at the bend position with a Chinagraph pencil and protect the marks with sellotape. Cut the wire to length (superior wire cutters should cope with pianowire up to 16g), with a file or hacksaw and high speed blade. When bending symmetrical pianowire components, i.e. undercarriage legs, start from the centre and take the equivalent bends in turn. Check all of the parts — wood and metal — closely with the drawing and never be satisfied with anything that is incorrect. Inaccuracies at this stage will make life very difficult later on. The position and function of the majority of parts will be quite obvious but there will be some components (similar wing

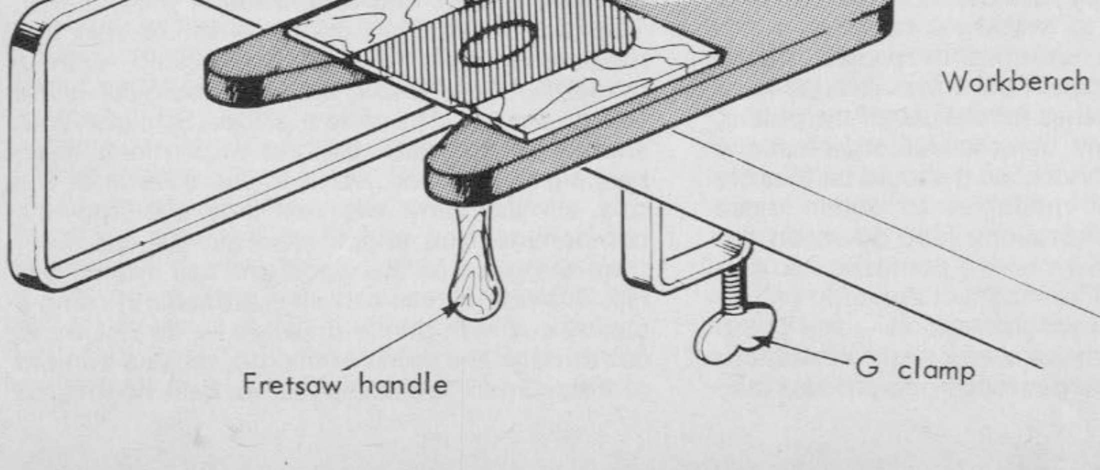


Fig. 4. Hand fretsawing shapes

ribs, gussets, infill parts, etc.) that should be marked for easy reference.

Building boards

Building boards come in two basic types — good and bad! A good building board will be level, true, clean and capable of taking pins into its surface without having to resort to a hammer, or for the surface to be so 'loose' that the pins will not hold. Bad building boards are twisted, covered with glue 'pimples' or have an unsuitable surface. Warped building boards are a total menace and should be discarded immediately. For a true board you must have a sound base and this can be in the form of a drawing board, solid flush door panel, slab of marble or blockboard screwed to a substantial base. The old-fashioned softwood drawing boards have the advantage of providing the right consistency for accepting pins and, if you can pick one up cheaply, they are ideal.

Other substructures must be covered with another surface material and the best material is 'K' quality hardboard (as used for pin-boards in schools and offices). Insulation board is insufficiently dense for our purposes. Glue the board to the base with a contact adhesive to obtain a complete bond and level surface.

Almost ready to go! Tape down the plan and protect it with thin clear polythene sheet or rub all of the joint positions with a candle to prevent the glue sticking to the drawing. Avoid cutting the plan into small section unless this is unavoidable.

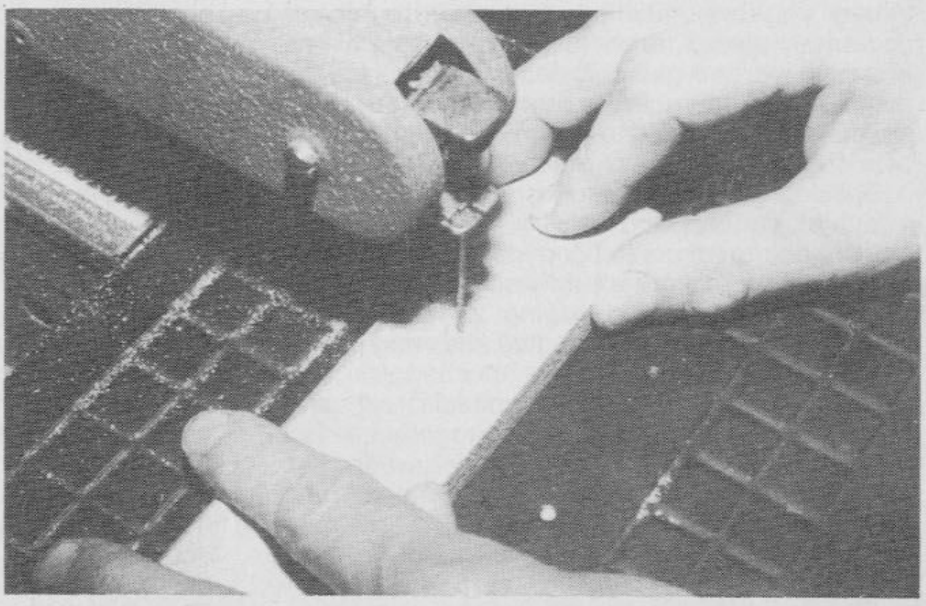
Drawings have to be folded for despatch (available rolled to callers) but the worst of the creases may be removed by ironing. It is worth providing yourself with a separate cutting board for shaping components. A piece of 'K' quality hardboard, a PVC flooring tile or a piece of soft wood will do fine. Best of all is a 'clicking-board' — as used in the leather trade — where the cutting surface is composed of timber, normally hickory, with end on grain. This allows the knife point to enter the surface easily but, the grain closes again as soon as the blade is removed.

Articles accompanying plans will frequently instruct the builder to glue part 'K' to part 'Y' without being specific about the type of adhesive to use. The range of adhesives available, including those produced for industrial purposes, is vast and there are glues formulated to stick together virtually any similar or dissimilar materials. They haven't found quite all of the answers — plastics such as PVC and Teflon present difficulties and no adhesive will bond metal joints as strongly as soldering or brazing. For modelling purposes we employ four basic adhesive types:

(A) **PVA white glue.** A woodworking adhesive that is satisfactory for 95% of our construction needs. Choose one that does not dry too 'rubbery' — and makes it difficult to sand. Borden and Evostik 'Resin W' are both suitable types. PVA glue is relatively slow drying (1-2 hours for initial set) and allows you plenty of time to position such items as wing sheeting before the glue begins to dry. You will need a little more patience in allowing the structures to thoroughly set before continuing with the assembly and you should organise your work programme accordingly, i.e. working on more than one assembly at a time.

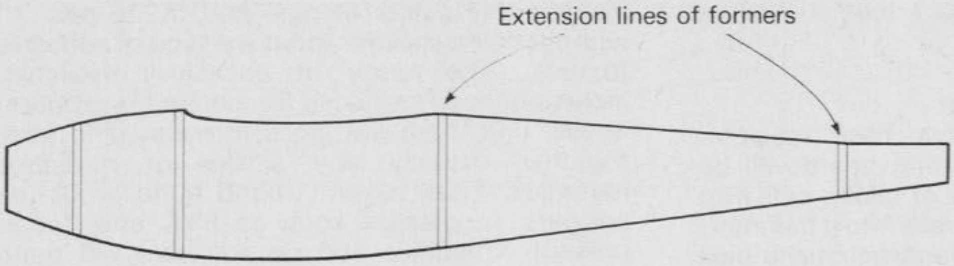
(B) **Epoxy glue.** The two main types of epoxy are the quickset (5 minute epoxy) and the 24 hours variety. Epoxy adhesives are excellent for wood/metal/plastic joints and for hardwood/plywood joints in areas where fuel may be in evidence, i.e. engine bearers to front bulkhead. Slow setting epoxy will give the strongest joint, particularly on wood, where the adhesive has a chance to penetrate the fibres of the wood, and the rapid setting epoxy should *only* be used for emergency operations and repairs.

(C) **Contact adhesives.** Used principally for fixing large doublers where PVA is unsuitable (lack of air to allow the glue to set) or where epoxy will add too much weight (the two part mix relies on a chemical reaction for setting and there is no solvent to evaporate). Both surfaces to be joined must be coated with a *thin,* consistent layer of contact adhesive and allowed to touch dry. Once the surfaces contact each other an immediate bond is made and it is



Right: Dremel Moto-Shop power fretsaw is a versatile tool, can be used with flex shaft and disc sanding attachments.

Fig. 5.



Place fuselage side over plan and mark position of formers using extension lines as guides

Fig. 6.

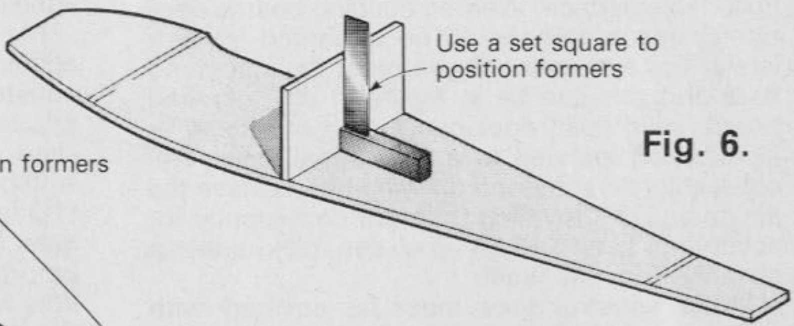
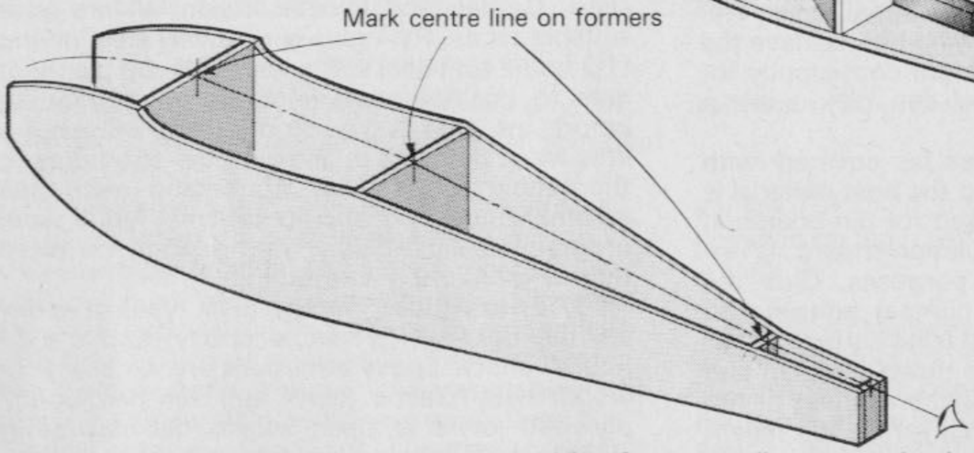
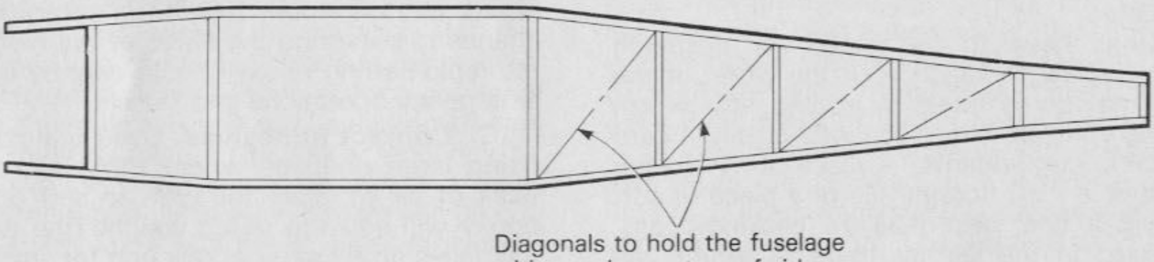


Fig. 7.



View from rear, all centre marks should be in line

Fig. 8.



imperative to be accurate with the mating of the surfaces. To assist in the accurate positioning of the doubler, slide a piece of tracing (or grease-proof) paper between the two dried surfaces. When you are satisfied that the doubler is accurately placed, draw the tracing paper away, pressing the two glued surfaces together as the paper is withdrawn. Press down all contact glued areas very thoroughly to ensure a complete bond over the whole of the surfaces.

Specialised contact adhesives are used for attaching veneers and balsa wood to expanded polystyrene foam cores (Copydex is satisfactory) as the standard contact adhesives will dissolve the foam. Balsa wood edging to foam panels may be glued with the PVA glue and wing panels joined with epoxy adhesives.

(D) **Cyanoacrylate.** This 'miracle' adhesive — well known for sticking fingers together — is a remarkable addition to the modeller's adhesive armoury. Early examples were only of the 'instant' type but, latterly, slightly slower setting varieties have become available, i.e. 90 seconds setting time. These retarded setting types are more suitable for the majority of our purposes as they do allow you to blink or sneeze before irrevocable bonding takes place. Were it not for the cost factor, cyanoacrylate adhesives could be recommended for almost all of the construction of a model — it is clean, quick, strong and results in a lightweight joint. At £8.00 plus for a 2 oz. bottle it begins to rival some exotic perfumes for cost per ounce, and therefore is normally restricted to areas where it is most essential. There are many areas where cyanoacrylate can be useful. It can be employed as 'liquid pinning', and for instance, temporary positioning of pianowire assemblies before soldering. Gluing hinges into position (moulded nylon or other types) is another obvious application of cyanoacrylate adhesives — the slower setting variety gives you sufficient time to apply the adhesive and position a number of hinges before the set takes place. One area where cyanoacrylates are less than ideal is with the fixing of clear plastic canopies. The adhesive does not make a good bond with the canopy material and there is a risk of internal 'blooming' as the set takes place — contact adhesive followed by an epoxy fillet will give better results.

Fuselages. Most fuselage designs commence with a basic box construction, even if this is eventually rounded off by the addition of formers and sheet or block balsa wood. Part of the fuselage sides viewed from the plan view are also normally parallel and that will allow us to glue two or three formers to the sides to act as a basis for the complete construction. Whether the fuselage sides are constructed from strip, or sheet with doublers, the positioning of the formers (bulkheads) must be accurate. It may be necessary to extend the lines of the formers on the plan so that marking of the sides can be achieved (see Fig. 5). Pin down one side to the board and glue the formers, within the parallel area, to that side. Use a small set square to ensure that the formers are truly square with the sides and re-check as the glue dries as the adhesive may tend to pull the formers out of true (Fig. 6). It must be emphasised that accurate cutting of components and exact fits are of the highest importance. Adhesives are for bonding two close fitting surfaces and the strongest joints will result from a *minimum* use of glue and not maximum. Although some adhesives (epoxies or cyanoacrylates with the addition of baking soda) do have gap filling properties they will inevitably produce a weaker and heavier joint.

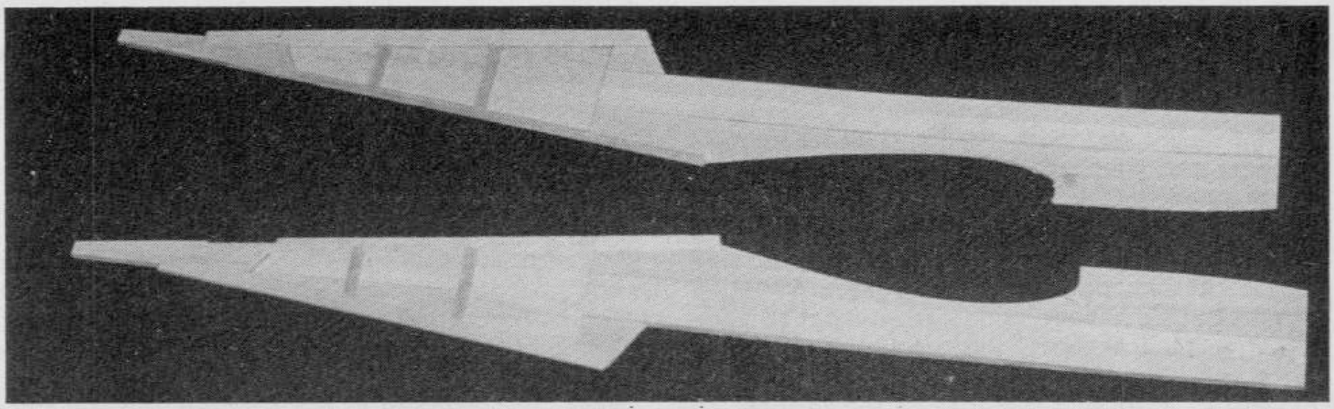
With the formers securely fixed to one fuselage side the opposite side can be glued in position. Again, check that the formers are square and, if there is a flat portion of the fuselage top or bottom (i.e. wing seating area) pin the assembly to the board to hold the construction in place. Pin the formers at regular intervals to prevent the formers becoming detached from the sides. With a sound, accurate, centre construction of the fuselage, it is unlikely that the remainder of the assembly will be out of true. Unlikely, but not impossible as twists and unequal bends can be introduced when the front and rear portions of the fuselage are brought together. Good selection of wood will reduce the chances of having different curvatures to the fuselage sides and a good check can be made by marking a vertical centre line on each former. Viewing from the ends of the fuselage should see all of the centre lines in a straight line (see Fig. 7). Should you have problems in getting the sides to curve equally you may have to resort to fitting temporary diagonals between formers and/or crosspieces to assist in the bending (see Fig. 8). When the top and bottom sheeting has been added to the fuselage, the need for the diagonals disappears, for open structure assemblies it may be advisable to retain the diagonals.

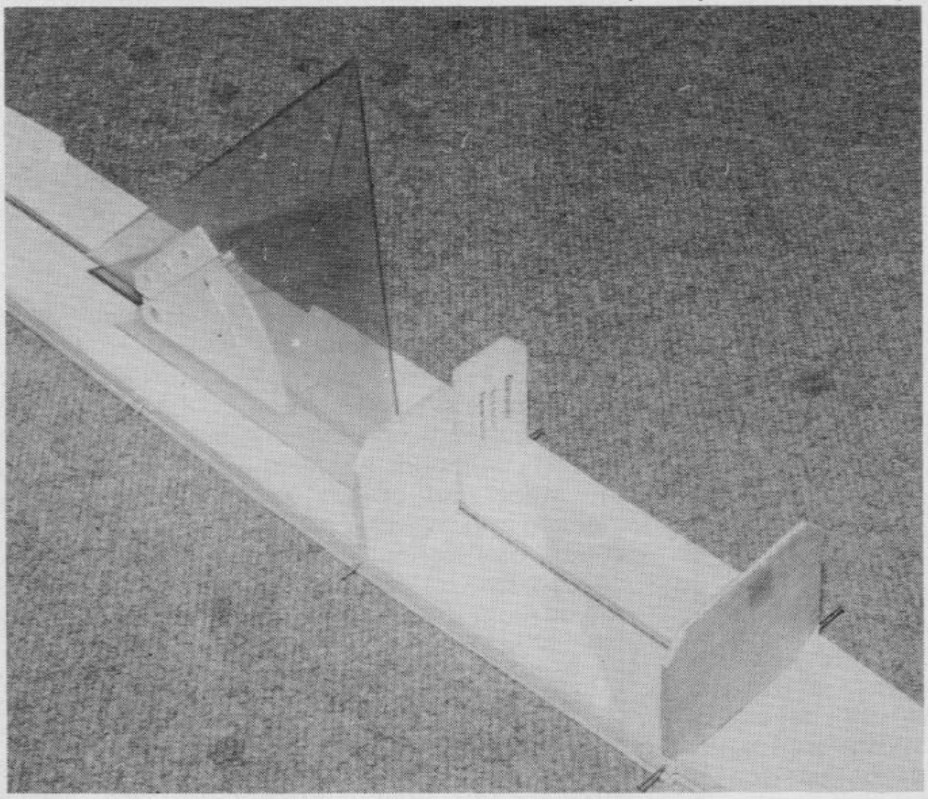
Try to think ahead during the building sequences of the fuselage and avoid fitting parts that will require further attention at a later stage, i.e. bulkheads should have holes drilled in them for throttle linkage tubes, fuel tubes, battery access, switch fixings, etc. Servo bearer rails should be pre-drilled for servo fixing screws and positioned at the exact centres to suit the servos used. Similarly, the engine bearers have holes pre-drilled for the engine or engine plate. Any inaccessible areas, i.e. internal fuel tank, likely to be contaminated with fuel must be doped and fuel proofed (or coated with epoxy or polyester resin) before they are finally covered in. Build in the control cable tubes or pushrods if it is impossible to fit these at a later stage.

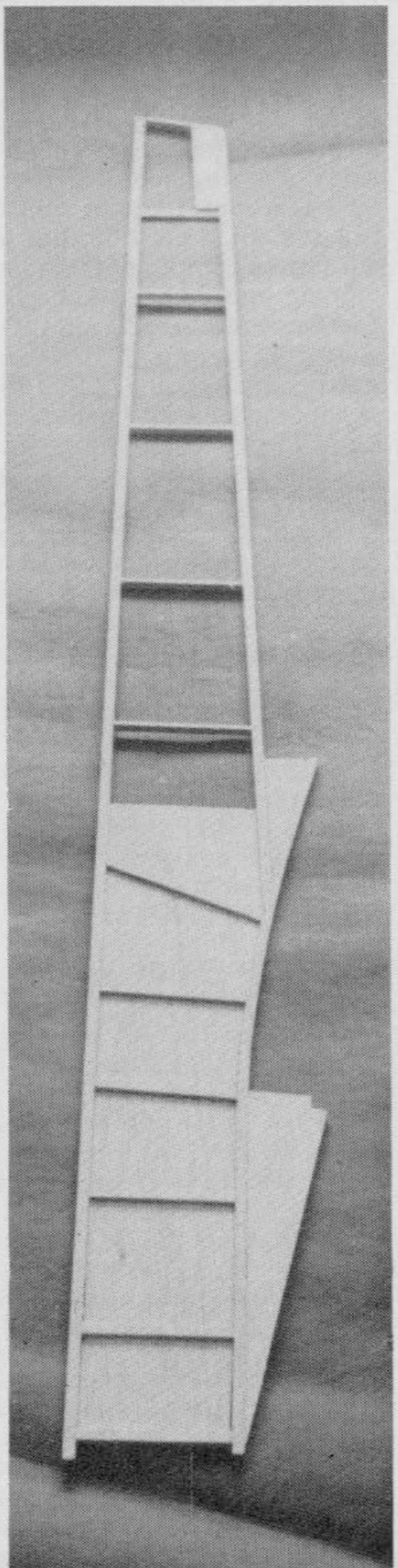
Naturally, there are many forms of fuselage construction, some use a central switch (horizontal or vertical) with half formers added. The same principles of keeping the formers square and the centre lines straight apply and exact construction of the fuselage will make the fitting of the wings and tail surfaces, and obtaining the correct rigging angles, much easier at the later stages. Make a trial fit of the wings, tail surfaces, engine and/or engine mount, undercarriage assemblies, wing dowels, fuel tank, servos and linkages before finishing the fuselage although these items should not be permanently fixed until the fuselage has been covered.

Wings. If an out-of-true fuselage is a nuisance, twisted (warped) wings are a total disaster. Trimming out a model with warped wings, by adjusting ailerons or the rudder, will only be effective for one given speed of the aircraft. Variations of speed will immediately put the model out of trim again. Warps can be induced into the wing panels at the stage of construction or during the covering stage. There is little excuse for allowing warps to occur during the building phase, these will only happen if you have a faulty building surface or by 'force-fitting' components. Wood is not an inert material and it is likely to 'move' and twist when subjected to changes of temperature and humidity. A straight strip of wood purchased from the shop may be anything but straight after it has been in the workshop for a few months. To attempt to use a piece of wood in this state is to build into the structure an unequal force which is constantly striving to become stabilised by moving some other part of the structure. Correcting bends and twists can be effected, in the case of balsa wood, by steaming the strip over a kettle spout, pinning the strip down and leaving it to dry. Harder woods, i.e. spruce or bamboo, may not respond so readily to this technique and soaking in an ammonia/water solution (strength 25-30%) will de-mature the wood sufficiently to straighten out the offending part. When the timber dries it will regain its strength. Inaccurate cutting of spar slots, requiring the spars to be 'eased' into position will also induce undesirable stresses, correct the spar slot before fitting the spar.

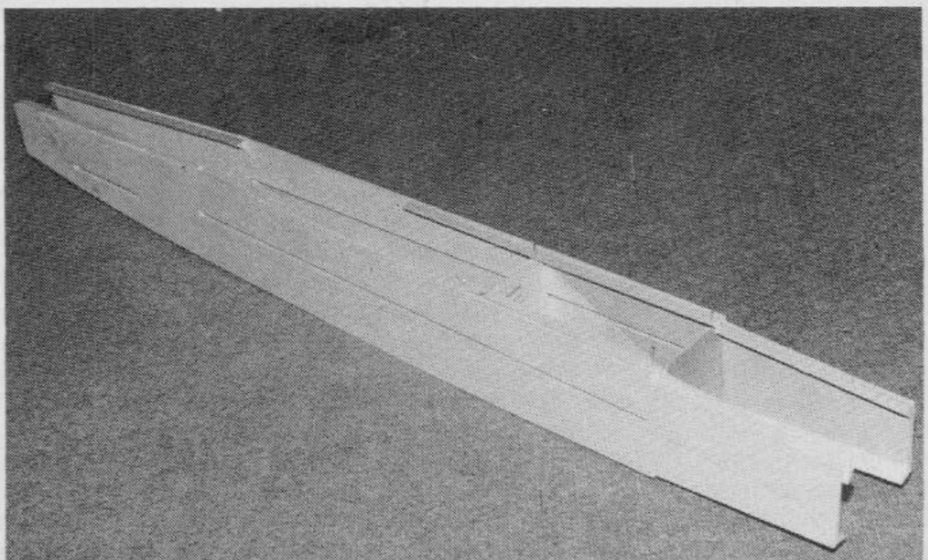
Cutting wing ribs can be a tedious undertaking when every rib is of a different size. Some wings are designed with equal wing rib spacing to allow the ribs to be formed by the 'sandwich' method as shown in Fig. 9. Note that the root rib is placed on the *outside* of the root rib template, the more common practice of putting it inside will result in an undersize root rib when the ends are trimmed. The 'sandwich' method is quite suitable for wings with a gently tapered







Top: Slabside fuselage, basic sheet balsa is reinforced locally to take stresses and prevent splitting. Above: Set formers square to sides carefully. Below: Two sides glued on to formers. Right: longeron and spacer construction with sheet balsa doublers at front.



planform; highly tapered wings call for individual cutting of ribs or the use of polystyrene foam spacers between the ribs of the 'sandwich' to lesson the angles of the leading and trailing vertical edges of the ribs. None of these problems are encountered with parallel chord wings where all of the ribs have the same outline.

Flat bottom wings, with a straight line underside profile for the majority of wing chord, are the easiest to construct as they can be built directly on to the building board. Trainers and sports models frequently incorporate this type of wing section, not because it is aerodynamically the ideal section but because it is likely to be constructed more accurately than a symmetrical or semi-symmetrical type. Wings featuring a curved underside profile will require more care during the construction to obtgain a true framework. Spars, trailing and leading edges, must be propped-up with packing pieces of precisely the correct height and the difficulties are compounded if wash-out (less wing incidence at the tip) is also to be incorporated. Ideally, the packing should extend the full length of the wing panel to support the components throughout. Individual packing pieces, spaced at regular intervals, will suffice if you position them carefully and ensure that these, and the components are firmly secured to the building board (Fig. 10). Aim to assemble as many of the components of the wings as possible, whilst it is pinned to the board. Obviously, it will not be feasible to add the lower surface sheeting, but all of the top sheeting, capping strips, vertical webbing, etc., should be included to obtain the maximum wing structure rigidity before removing it from the board. Leave the assembled wing on the board for a period of at least twelve hours before removing it to allow the glue to dry out and achieve full strength (Fig. 11).

Ailerons may have been designed as separate units or to be cut out from the wing panel after completion. Where separate inset ailerons are shown it is still sensible to construct these at the same time as the wings as this will give a check on the continuity of the wing section at this point. Do not forget to allow for the provision of aileron crank supports, holes for pushrods or aileron linkage tubes and the housing and support for the tubing. Trying to cut, drill or burn holes in wing ribs *after* construction is a frustrating experience. Remember, also to angle the root rib to suit the dihedral of the wing; make a template to 'offer-up' against the root rib so that you can check the angle over the full chord. Gluing the components of a wing together does not present many problems, but there are a couple of tips worth remembering. When gluing the top spars and leading edge in position, mark the rib positions first on to the strip and apply the glue to the strip. To attempt to place the glue onto the rib slot will almost certainly result in the glue spreading *only* onto the bottom edge of the slot. Fixing the leading edge sheeting should be commenced from the main spar and the sheeting bent forward over the front of the ribs to the leading edge (unless the sheet/leading edge has

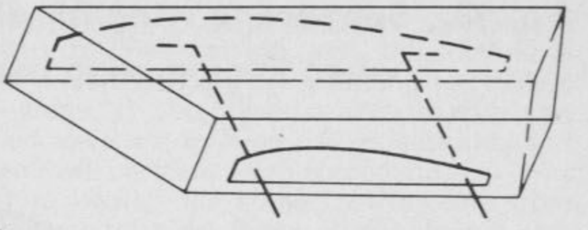
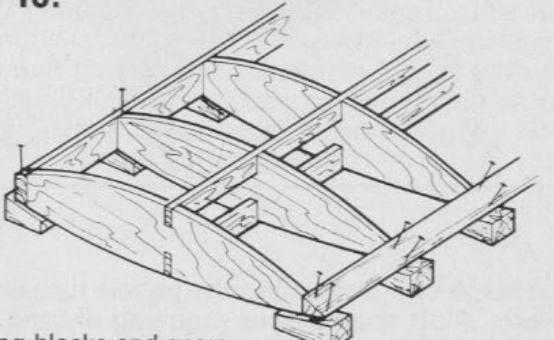


Fig. 9 Rib Sandwich contains three extra rib blanks held together between ply template during shaping with two 16 swg bicycle spokes bent over at one end. Discard three largest ribs after final shaping.

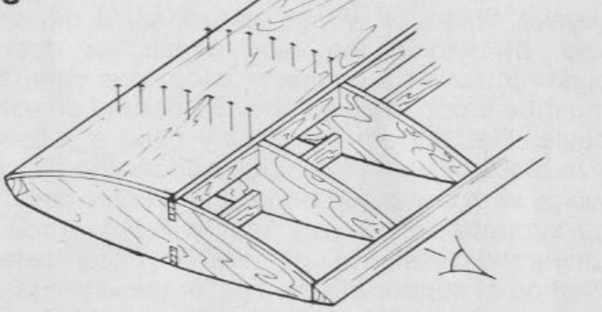
Fig. 10.



Packing blocks and spars,
L.E. & T.E. must be firmly pinned in position.

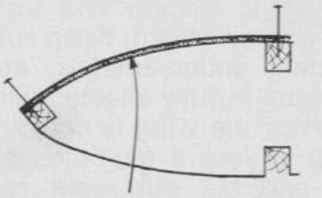
Use of packing blocks for symmetrical and semi-symmetrical sectioned wings.

Fig. 11.



Sighting along the rib, from the trailing edge, will assist in positioning the pins through the leading edge sheet into the ribs.

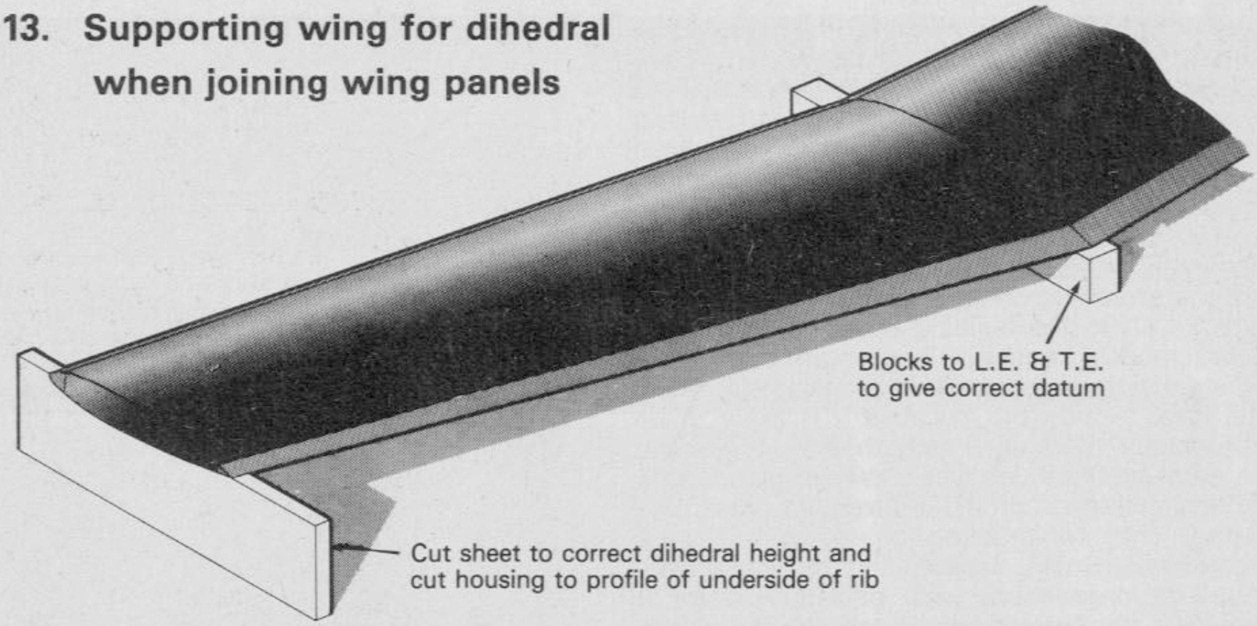
Fig. 12.



Avoid leaving gaps between sheeting and rib — use plenty of pins.

a butt joint in which case the process is reversed.) Spraying the outside of the sheeting will assist with the bending and plenty of pins must be pushed into the ribs to make certain that the sheeting contacts the ribs at all points. As you are pinning 'blind' into relatively thin ribs it will help if you sight the line of the ribs from low down at the trailing edge (see Fig. 12). Sheeting to the underside surfaces is added after the wing assembly is removed from the board but it may be necessary to add dihedral braces before this is undertaken. Dihedral braces are either built in at

Fig. 13. Supporting wing for dihedral when joining wing panels



the stage of constructing the panels (usually full depth, short span braces requiring divided ribs) or added at the wing joining stage, in the form of part depth braces fitted into slots cut into the ribs. Study the plan diligently, to ascertain the method employed or you may find that the fixing of the dihedral braces will require hacking away at the sheeting and ribs if the critical stage is passed. Nearly all wings feature some dihedral and, on joining the wing panels, or during construction of a complete wing, one wing tip must be propped up to give the desired dihedral angle. Flat bottom wings only need a suitable size block of wood positioned under the tip rib; wings with combined underside profiles have to be supported in a way that will not produce unwanted wash-out or wash-in. The safest method of supporting the tip, for these wings, is to cut a piece of sheet to the correct depth with the lower tip profile cut out to give full support over the chord (see Fig. 13). Obviously, the centre section of the wing must also be accurately supported with the leading and trailing edge datums at the correct height. Keep cut-outs (for servos, retracting undercarriages, etc.) to an absolute minimum in fully sheeted wings. Most of the strength of the wing is contained in the sheet covering (unless a multitude of spars is incorporated) and cut out areas represent a weakening of the basic structure.

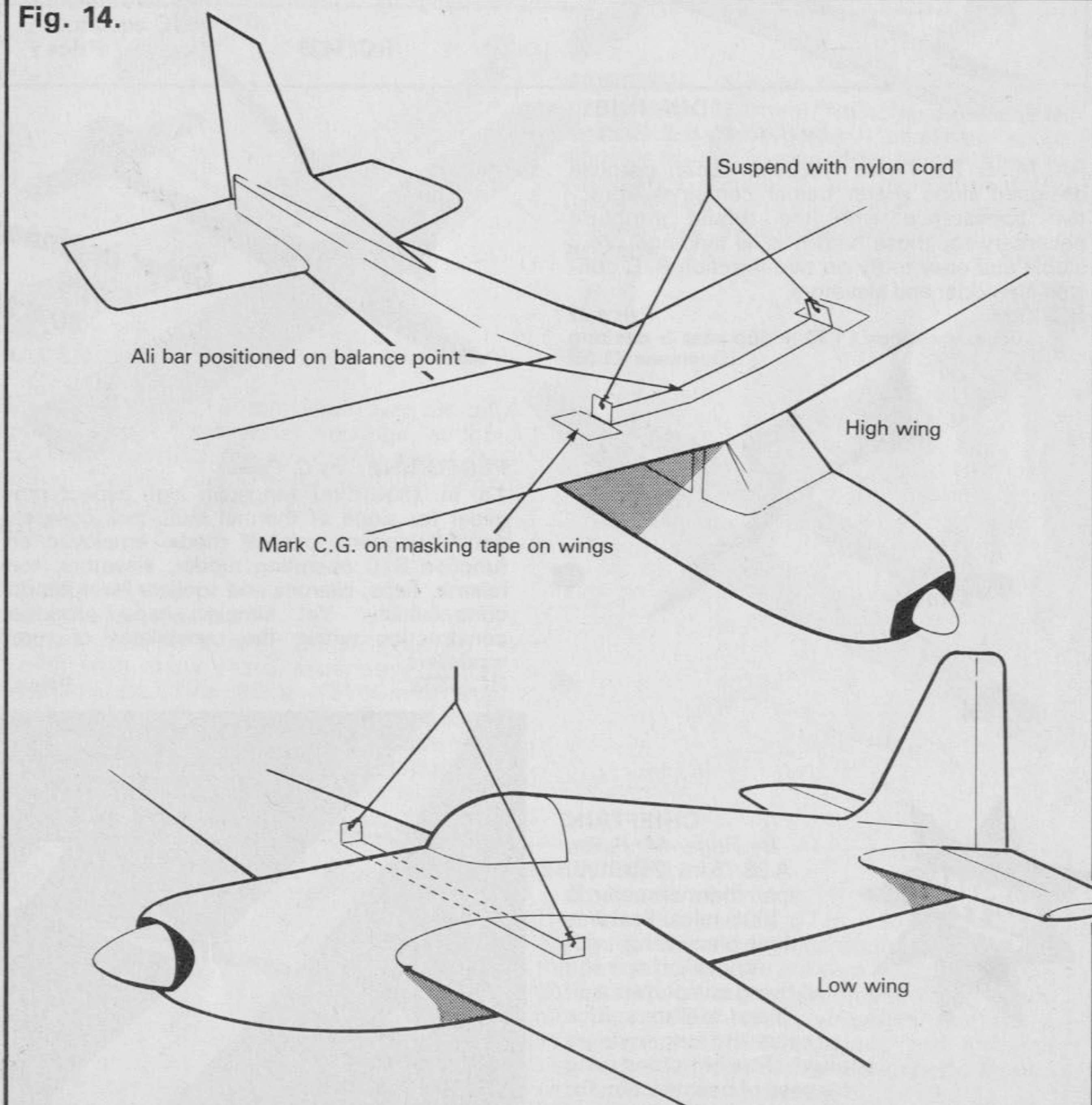
Veneered foam wings are a possible alternative to the built-up versions normally shown on plans. For many of the designs, this is quite acceptable, but it should be borne in mind that, as a general rule, they will be heavier than their equivalent constructed from balsa wood. For light construction wings, and large models, it is suggested that the built-up construction is retained as a substantially heavier wing may adversely affect the flying characteristics of the model. Other designs, where a fairly 'beefy' structure is employed, alternative foam wings should be constructed as lightly as possible, using balsa wood covering and light grades of balsa wood for the edgings and tips. Very few models, when completed, suffer from being nose heavy and the reverse is more often the case — particularly with scale designs where we do not have the full-size consideration of a heavy powerplant at the nose. To avoid the aggravation of having to instal a non-productive piece of ballast at the front end of the fuselage we must keep a close watch on the weight of the tailplane, elevators and fin and rudder. Small and medium sized models frequently specify that on tail surfaces a light grade of wood is to be used. Unfortunately, the use of softwood in this area leads to damage to leading edges and tips if you have to fly from a rough grass field. Edging the tail surfaces, especially the tailplane, with a small section (typically $\frac{1}{8}$ in. sq.) spruce tip will help to prevent minor damage being caused by thistles, gorse or coarse grass. When sanded down to the aerofoil section of the tail surfaces the weight increase is minimal. Alternatively, the edges of the balsa wood can be treated by applying cyanoacrylate before covering, this will toughen the fibres of the balsa wood and make it more 'ding' proof.

When should hinges be fitted? There is no definitive answer to this question, it will depend on the type used and the finish of the model. Thin strip nylar hinges can be fitted at the very final stages if the hinge strips are only to be glued (cyanoacrylate or 24 hour epoxy) in place — only suitable for smaller and slow flying models. Leaf hinged and barbed hinges require a little more preparation and the slots and recesses should be cut before covering is commenced. Where the hinges are to be pegged (with cocktail sticks or toothpicks) for additional security, the stage of final fixing becomes critical otherwise the 'raw edges' of the pegs will show on the finished surface. Models that are to be fully painted should have the hinges fitted after covering and doping but, before filling and painting. With iron-on coverings there is no easy answer — if you cover first, the pegs will show and if you fit the control surfaces first, it makes it very difficult to cover satisfactorily. In these instances it is preferable to use a hinge that does not require pegging, i.e. the barbed types or leaf hinges with holes or projections to improve adhesion.

Constructing and completing a model 'from scratch' is undoubtedly a satisfying experience, the more effort that is put into the product, the greater are the rewards in this respect. Not all modellers enjoy the construction process to the same degree and some prefer the flying challenges to the virtual exclusion of building. Modellers of the 'old school' may decry this attitude as "not being modelling" but what they really mean is that it isn't the type of modelling they are used to. In one respect, however, they may be right; the non-builder does not have the ultimate contentment (some might say smugness) of knowing that the model has been created with his own hands. Whether it is due to economic factors, or a reaction against the ready-to-fly, drive, eat, etc., etc., the good news is that more modellers are returning to building from plans. If you haven't already tried this method, give it a try, you will probably enjoy it and you will certainly learn something.

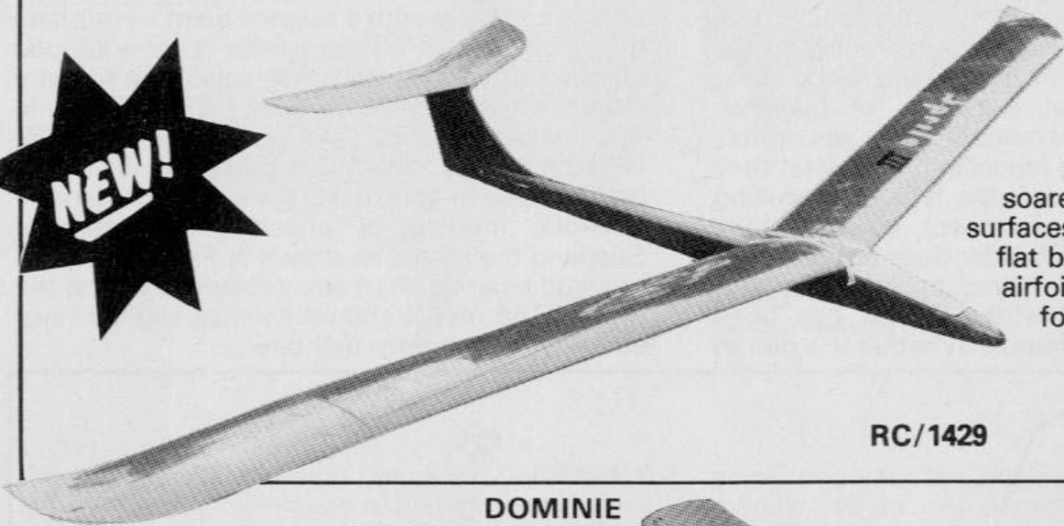
Before leaving the subject of building from plans, one last plea! Every model aircraft plan comes complete with a balance point — or a safe range limit — *use it.* Where there is some latitude allowed in the balance point, select the forward point for initial flights and work back *gradually* to the rearward position as you become familiar with the flying of the mosel. Balancing the model holding your fingers under the wings is not a very scientific method of checking the balance. Suspend the model as shown in Fig. 14 with the required balance point accurately marked on the wings. The model should balance slightly nose down with an *empty* fuel tank.

Fig. 14.



GLIDERS

NEW!



SUPER SPRITE

By D. Chinery

An innovative 100S Class thermal soarer with swept flying surfaces and fully sheeted, flat bottom wing section airfoil. Three piece wing for ease of transport. 99 in. span model uses two function R/C equipment.

RC/1429 **x x** **Price F**

DOMINIE

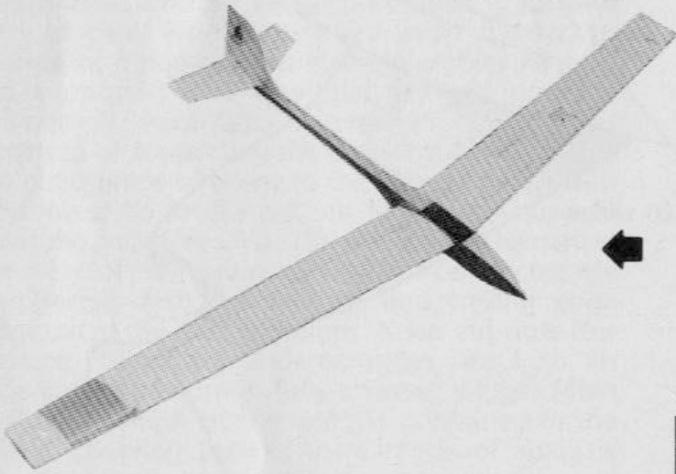
by R. C. M. & E. Staff

R.C.M. & E's 74 in. (1880 mm) span purpose designed slope soarer trainer combines attractive appearance with the robust structure necessary for those hard hillside landings. Very stable and easy to fly on two function R/C controlling rudder and elevators.

RC/1339 **Price H**

Cockpit canopy £1.50 + 95p post & packing (Overseas £1.95)

Great beginner's slope soarer!



PEREGRINE *by C. Pullen*

120 in. (3048 mm) wingspan high aspect ratio glider for slope or thermal multi-task competition. Designer's original model employed six function R/C operating rudder, elevators, tow release, flaps, ailerons and spoilers for optimum controllability. Yet simple shape produces construction within the capabilities of most modellers.

RC/1333 **Price I**

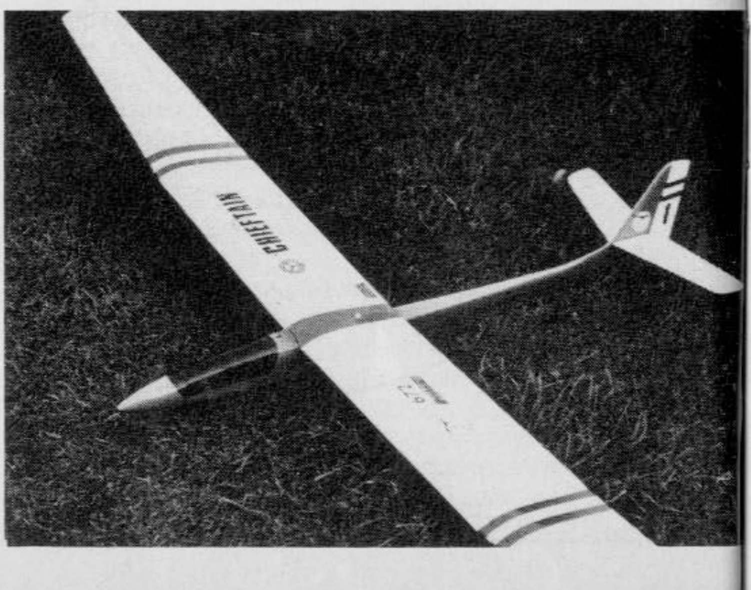
NEW!

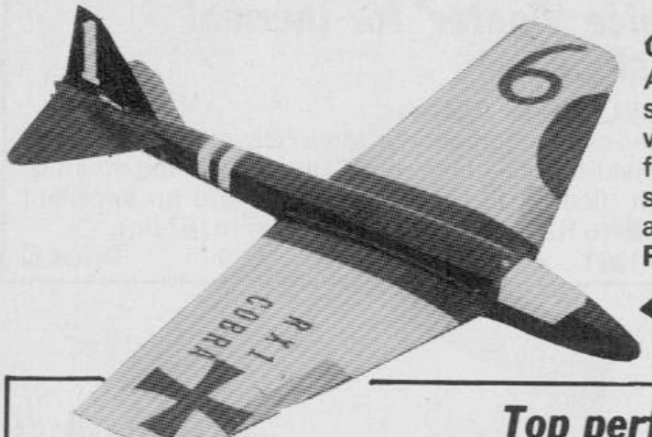
CHIEFTAIN

By Roger M. Pullen

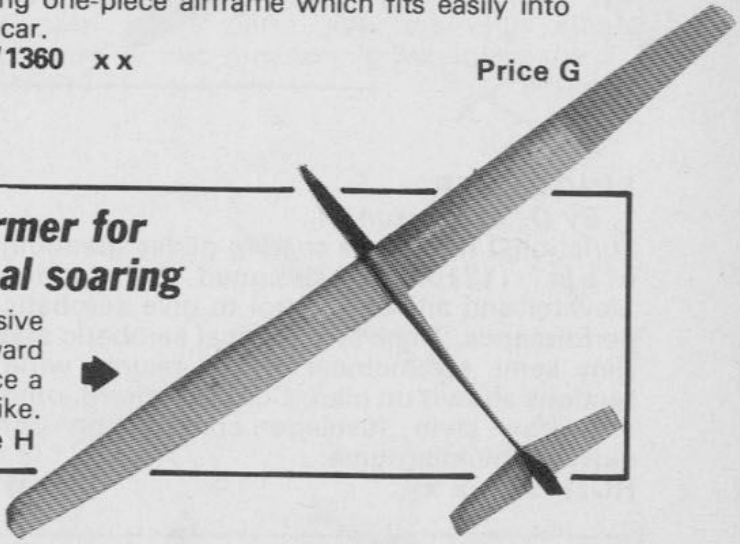
A 98.75 in. (2508 mm) span thermal soarer to 100S rules. Features three piece wing, with knock-off tips and all-flying swept back tailplane. Utilises spruce spars and longerons for strength. Flat-bottomed wing for ease of construction for 2 function R/C equipment.

RC/1434 **x x** **Price I**



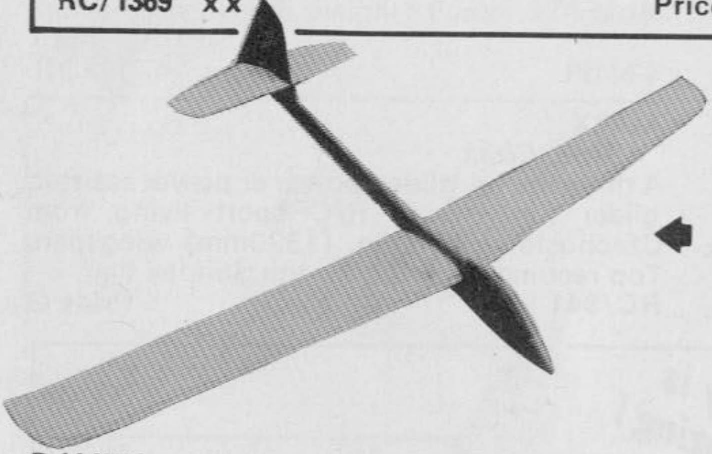


COBRA *by Richard Liddard*
A handy size, 41 in. (1041 mm) span aerobatic slope soaring glider. Despite small dimensions, wing has ample wing area to support 2 or 3 function radio. Compact dimensions permit strong one-piece airframe which fits easily into any car.
RC/1360 x x **Price G**



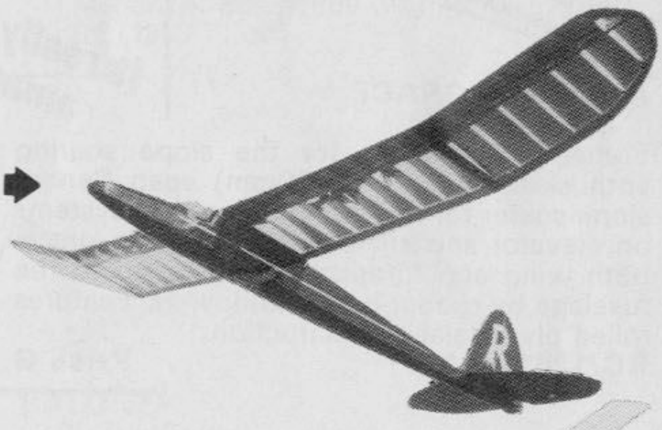
Top performer for thermal soaring

BLUE BEAST *by Al Wisher*
141 in. span open class Thermal Soarer with impressive list of contest successes to its credit. Straightforward construction and attractive lines combine to produce a model with appeal for the sport and contest flier alike.
RC/1369 x x **Price H**

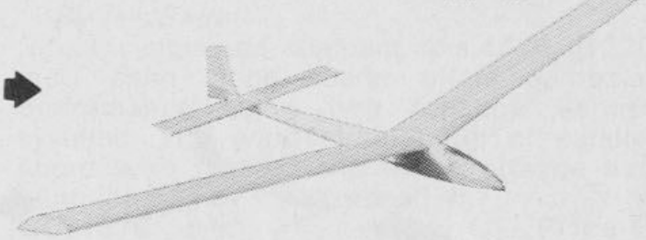


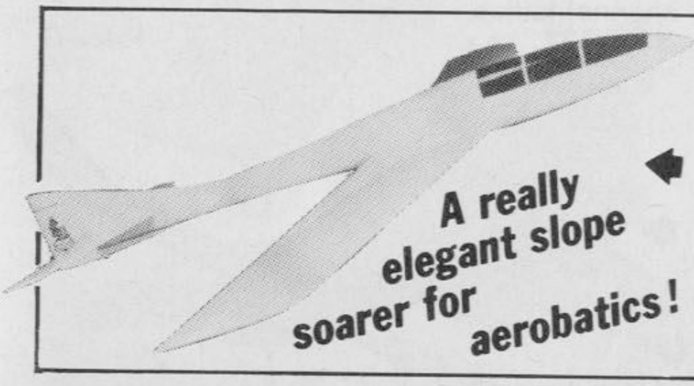
ANGELINA *by Keith Thomas*
109 in. span (2770 mm). No compromises as far as looks go with Angelina — an elegant sports slope or thermal soaring glider whose attractive appearance is sure to turn more than a few heads. A sleek, up to the minute, fuselage shape is achieved with sheet balsa and planking.
RC/1370 x x **Price I**

RAVEN
By Jack Headley
A simple 84 in. (2135mm) span two function control soarer for thermal or slope, suitable as a first model for the newcomer to the R/C hobby. Design offers good stability, strong construction and ease of repair.
RC/1303 x x **Price H**



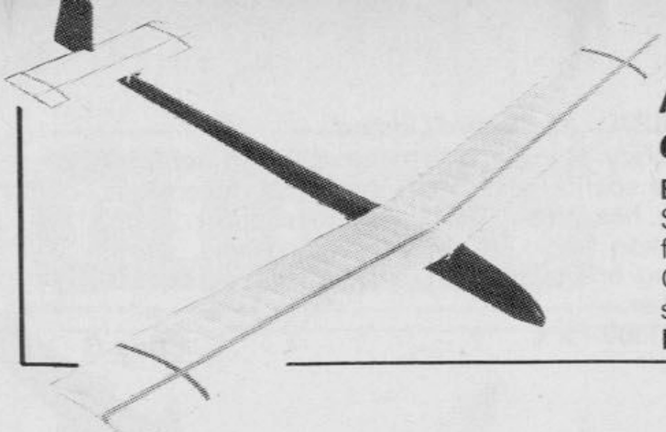
TOURMALINE
By Trevor Faulkner
Elegant, modern looking glider designed by a man with many years' experience of free-flight gliders. This 85 in. (2160mm) span slope or thermal soaring glider performs well in minimum lift conditions, and will take either single channel or two function proportional R/C. A builder's model.
RC/1167 x x **Price E**





A really elegant slope soarer for aerobatics!

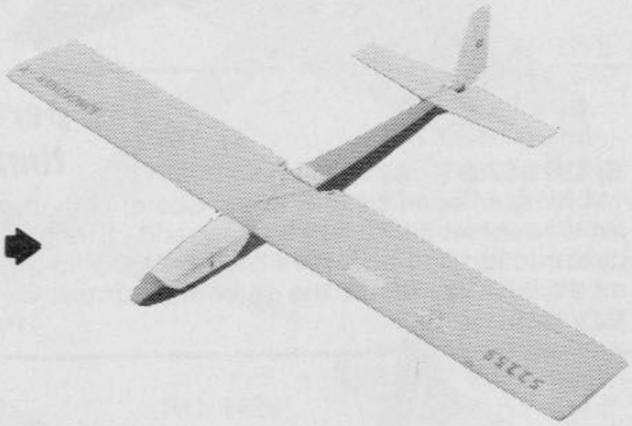
SEYCHELLE
By Sean Bannister
Here's a really sleek 67 in. (1700mm) span aerobatic slope soarer carefully designed for top performance. We are sure no slope soaring enthusiast will fail to appreciate the graceful racy lines of this model which features a compromise in design layout and airframe size to achieve good aerobatic performance with light lift flight capability.
RC/1300 x x x **Price H**

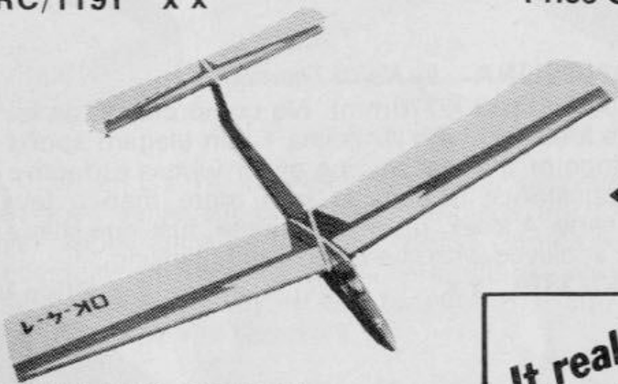


A nice 'floater' for thermal or slope

EXCELSUS *by B. Miller*
Super-simple 2 channel rudder/elevator just fine for flat field tow-line launch or light wind slope soaring. Great 'floater' for light wind days and an excellent starter to R/C gliding. Span 1.700mm (67 in.).
RC/1391 x **Price C**

KINGFISHER
By D. Williamson
Functional R/C slope soaring glider spanning $51\frac{1}{2}$ in. (1310mm), designed for rudder, elevator and aileron control to give aerobatic performance. Thick symmetrical aerobatic and slim semi symmetrical pylon racing wing sections shown on plan. Constant chord wing and box style fuselage construction for quickest building time.
RC/1191 x x **Price G**

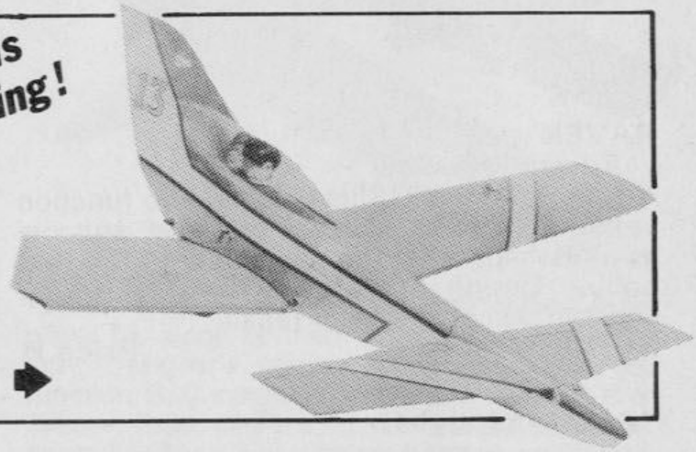


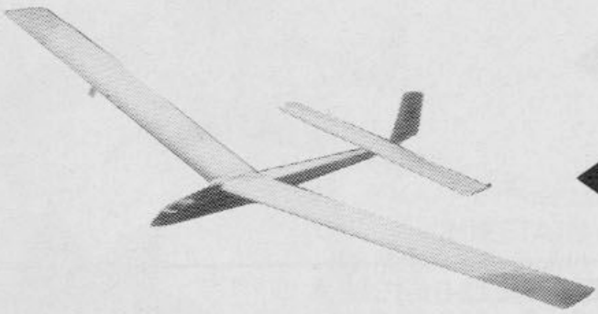


MINX
By R. Cizek
A three in one, glider, power or power assisted glider for F/F or R/C sport flying from Czechoslovakia. 52 in. (1320mm) wingspan. Top recommendation for the Sunday flier.
RC/941 x x **Price G**

It really is amazing!

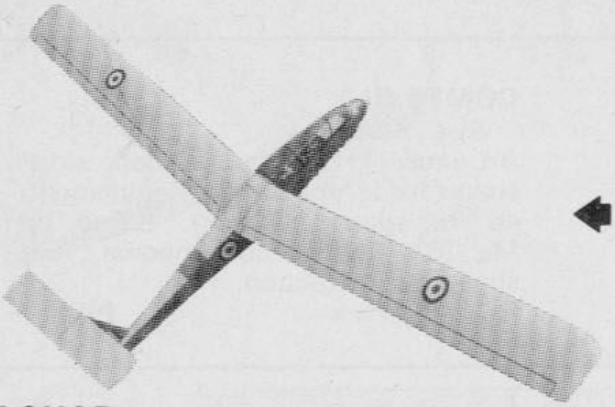
AMAZING GRACE
By D. Marquis
Something different for the slope soaring enthusiast, a 65 in. (1650mm) span Canard slope soarer for two function control systems on elevator and ailerons. Wing is one-piece, both wing and foreplane are secured to the fuselage by rubber bands to dowels. Features rolled ply fuselage construction.
RC/1261 x x x **Price G**



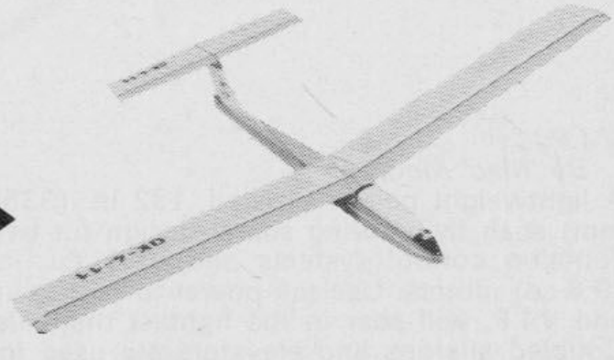


TURQUOISE
By Trevor Faulkner
A simple to build lightweight sailplane for slope or thermal work. Will suit rudder only or rudder/elevator control systems. Employs 96 in. (2440mm) span Jedelsky wing structure for fastest possible construction – ideal glider workhorse – suits single or multi channel radios.
RC/1222 x x **Price G**

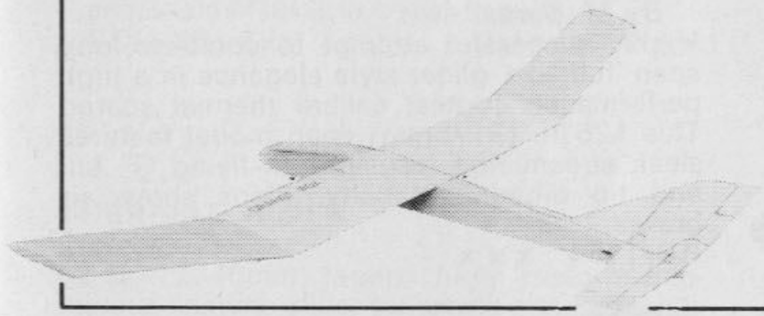
IMP
By T. King
48 in. (1220mm) span 'small field' R/C glider for single channel radio equipment. Can be used for tow-line work, high-start bungee launch or even slope soaring in calm conditions.
RC/1093 x **Price F**



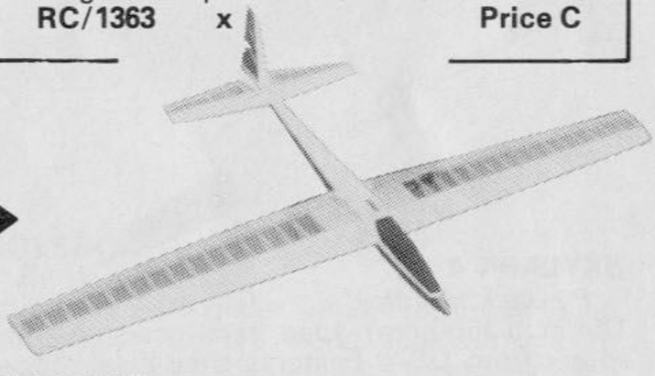
SLINGSBY T-53
By Jack Headley
68 in. (1730mm) span near scale model of full size two place glider trainer with unusual swept forward wing configuration and 'T' tail. Simple sheet balsa structure. For single channel or two function lightweight multi.
RC/1171 x x **Price D**



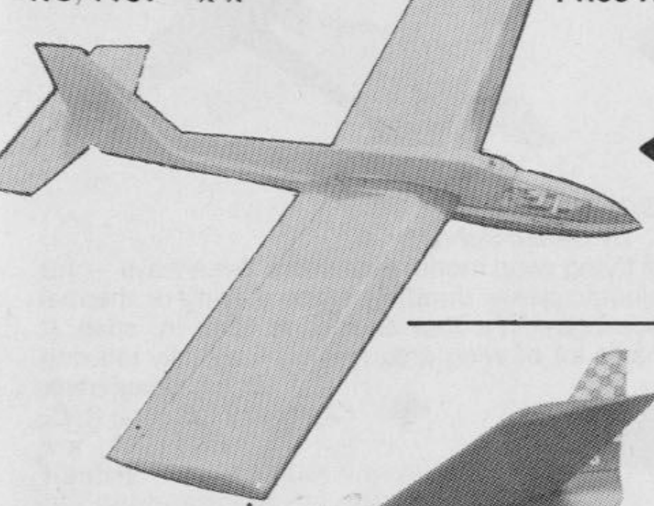
JAGUAR
By R. Cizek
Attractive 'T'-tailed glider of 61½ in. (1560 mm) wingspan designed for rudder only control and to be used as either a slope soarer or thermal soarer. Ideal dual-purpose machine which gains its strength from good design rather than excess weight! Eppler 374 airfoil used.
RC/1117 x x **Price F**



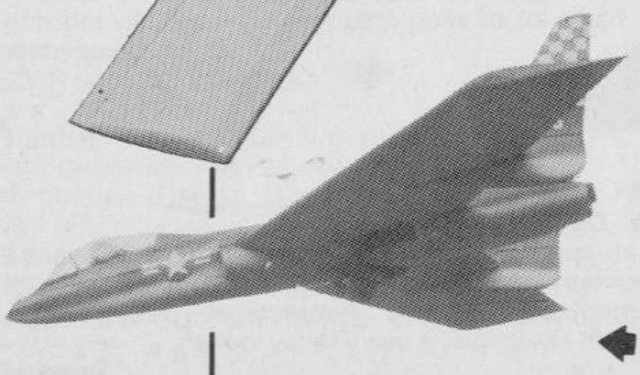
ORANGE BOX
By C. Smalley
Simple 2 channel rudder/elevator slope soarer, ideal as an introduction to slope soaring flight. Features economical yet strong construction which is essential for the beginner. Extremely popular when first introduced through AEROMODELLER Magazine. Span 1800 (71 in.).
RC/1363 x **Price C**



OMEGA
By C. Chapman
Sleek and fast looking fully aerobatic slope soarer with a really elegant appearance. Plan features both symmetrical and semi-symmetrical airfoil sections. Model offers excellent light wind performance if built light. Span 72 in. (1830mm).
RC/1197 x x **Price H**

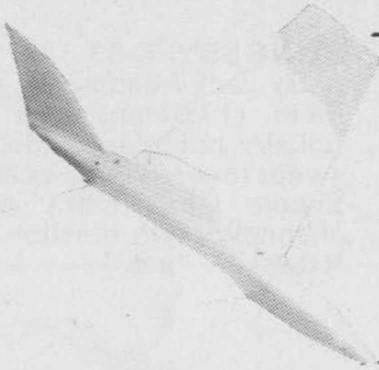


BALONEY
By Ian Barrett
Smart, simple and compact, this 48 in. (1220 mm) span slope soarer offers aerobatic performance using two function control systems. The wing structure is of parallel chord with tapered ailerons. Prototype had wing loading of 10 oz. per sq. ft.
RC/1270 x x **Price G**

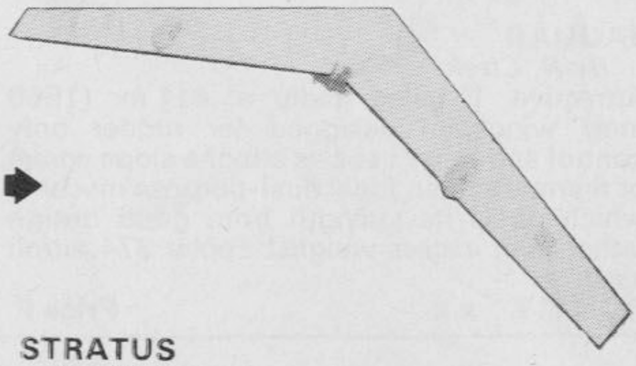


Here's something different!!

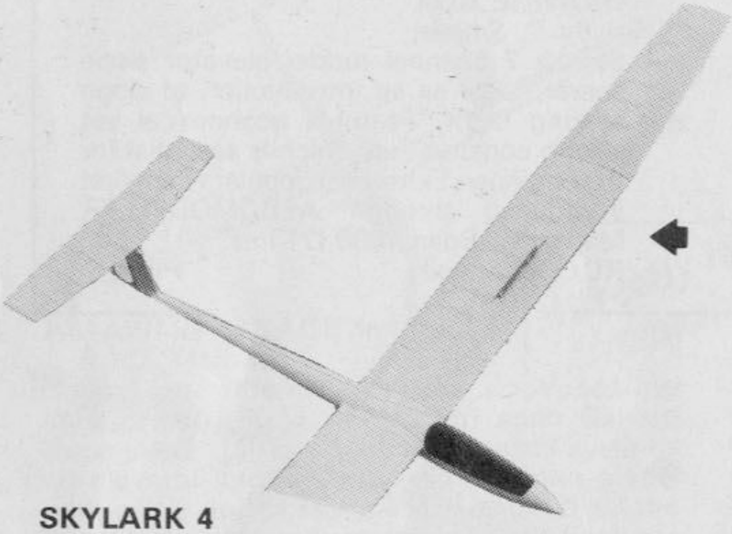
CUTLASS
By John Crump
A spectacular 57 in. (1450mm) span slope soaring replica of the Chance Vought fighter. Wing and fins are removable for ease of transportation. A fine aerobatic model, with good slow flying characteristics. Construction technique includes carved foam fuselage for economy's sake. Sure to create interest wherever seen.
RC/1247 x x x **Price J**



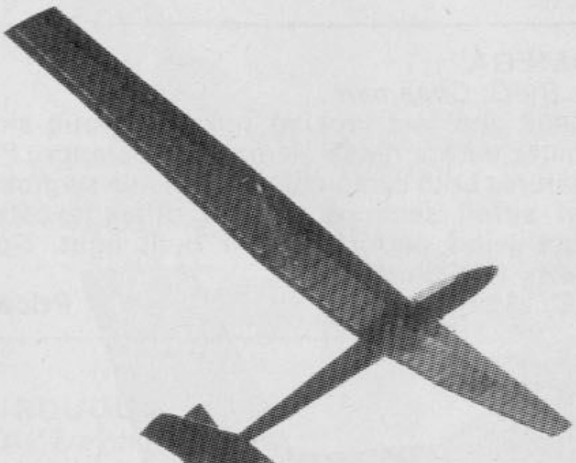
COMET III
By C. Moss
An unusual, fast and aerobatic slope soarer for 2 function R/C equipment. 46 in. span (1170mm). Based on Me 163 'Komet' conventional, fully sheeted construction.
RC/1407 x x **Price F**



V.I.P.
By 'Mac' McCrae
A lightweight power assisted 132 in. (3350 mm) span flying wing soarer design for two function control systems and ·051 cu. in. (0·8 cc) motors. Use the power to take it up and V.I.P. will soar in the lightest thermals. Coupled ailerons and elevators are used for control.
RC/1289 x x x **Price G**

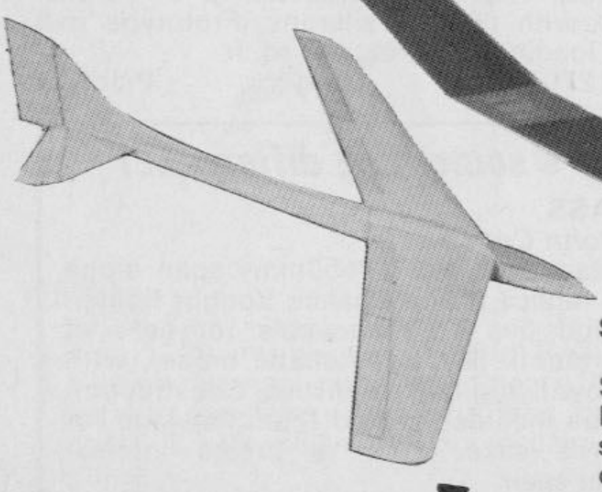


STRATUS
By M. Garnet
Highly successful attempt to combine long span 'full size' glider style elegance in a high performance contest calibre thermal soarer. This 125 in. (3175mm) span model features sleek streamlined fuselage, all-flying 'T' tail and tip dihedral stability. Plans show air brakes.
RC/1154 x x x **Price I**

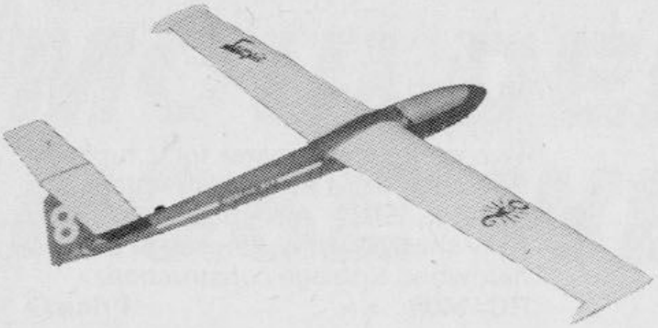


SKYLARK 4
By Jack Headley
144 in. (3660mm) span semi-scale thermal soarer from USA. Features simplified shape, yet still retains much of the elegance of the original Slingsby Skylark design. Model is quite aerobatic and slope soars well in very light winds.
RC/1141 x x **Price H**

GOONEYBIRD
By Gerald Johnson
A flying wing model that works three ways — for electric power duration, slope soaring or thermal soaring — it's your choice. At 99½ in. span, it has a lot of wing area making it a really relaxing flying experience.
Suits 2/3 function R/C.
RC/1376 x x
Price I



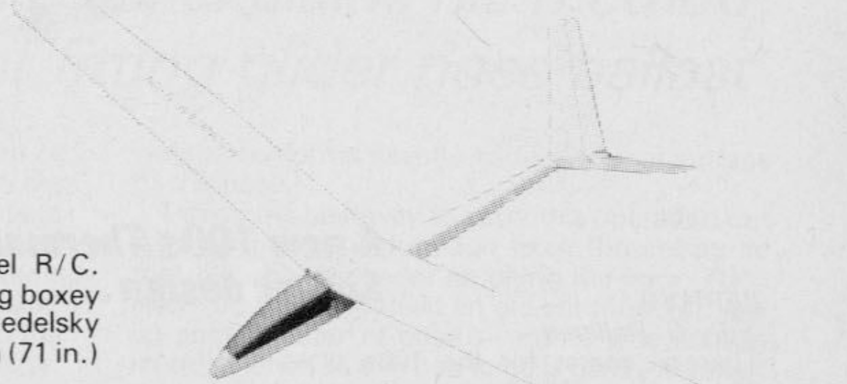
SIMOON
By E. W. Dilley
Sleek 58 in. span sweptwing slope soarer for 2-3 function R/C equipment, but always with ailerons. Plan features semi-symmetrical and fully symmetrical wing section options. From any angle, a really racey looker.
RC/1377 x x **Price H**



SCORPIO
By D. Marquis

Functional yet attractive aerobatic slope soarer, which features rolled plywood sheet fuselage construction for speed and simplicity together with great strength. Model features all-flying tailplane configuration and 'T' tail layout. Span 72 in. (1830mm).

RC/1150 x x **Price H**



MOONBEAM 7
By J. Kay

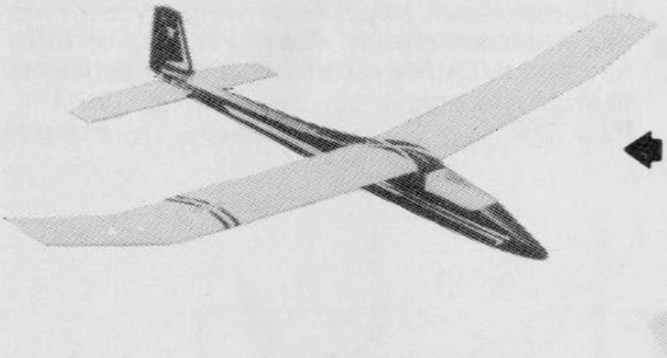
Pretty, V-tail slope soarer to 2 channel R/C. Model features all-sheet airframe including boxey sand-to-shape fuselage and all-sheet Jedelsky style wing. Plan shows choice of 1800mm (71 in.) and 2400mm (94½ in.) span version.

RC/1398 x x **Price F**

THERMAL RIDER
By G. Dallimer

92 in. (2340mm) span, high performance thermal soaring glider for single channel R/C. Ideal for this class of glider flying which is rapidly becoming popular.

RC/1053 x x **Price F**



BOLERO
By W. I. Barrett

Attractive R/C glider which forms an ideal introduction to R/C slope, thermal or even power assisted soaring. For power assisted soaring a 1 – 1·5 cc engine is recommended. Designed for 2 function R/C. 72 in. (1830mm) span.

RC/1215 x x **Price G**

PIRANHA
By P. Flook

Shapely, swept, taper wing glider for multi-task slope soaring or aerobatics. Design features sheet and block fuselage, semi-symmetrical section wing and 'flapperon' control linkage for aileron-cum-flap system. Plan shows 2210mm (87 in.) multi task and 1855mm (73 in.) span aerobatic wings. 4 channel R/C required.

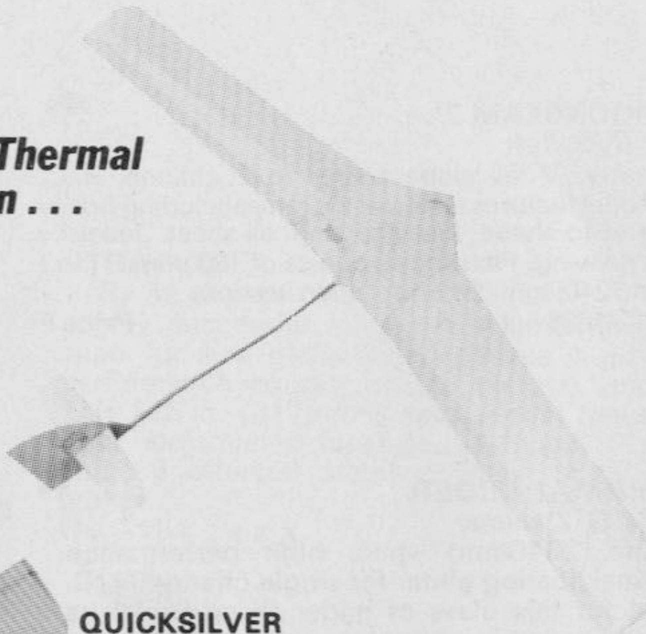
RC/1314 x x x **Price G**

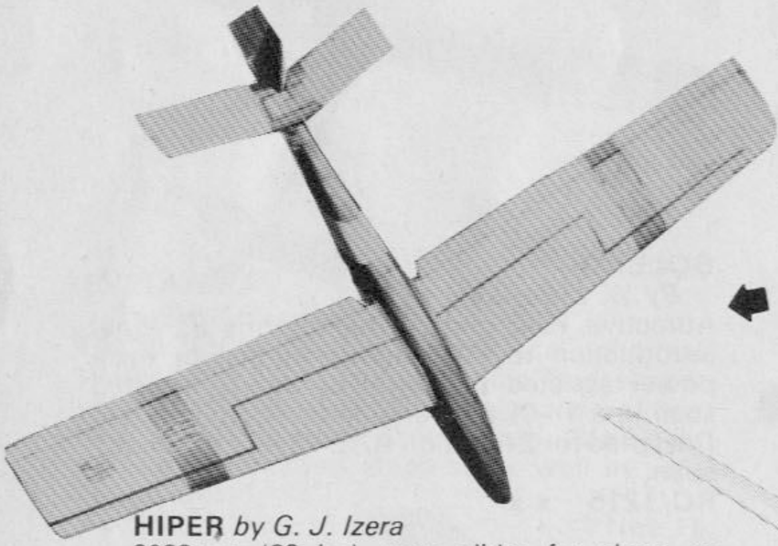
Try 2 metre Thermal Soaring!

ALGEBRA 2M
By S. Bannister
Two metre class soarer for 2 function R/C equipment controlling rudder and elevator, 78¾ in. span (2000mm). Fully sheeted balsa wings with ply and hardwood fuselage construction.
RC/1406 x x **Price G**

A new 100s Thermal Soarer design . . .

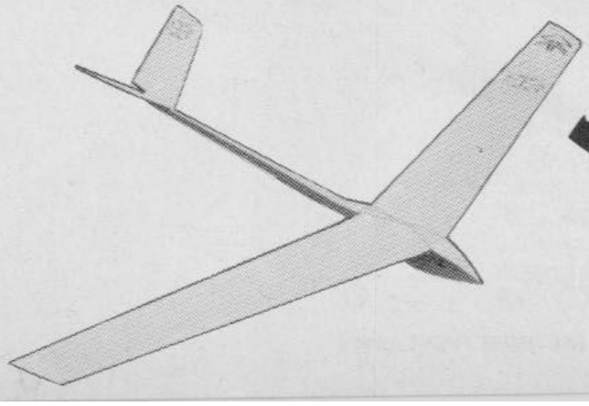
ZEPHYR
By G. Dallimer
Thermal soarer for the 100s class 99½ in. (2530mm) function 'minimum' aeroplane of unconventional appearance but conventional construction for 2 function R/C equipment.
RC/1393 x x x **Price G**





QUICKSILVER
by David Hardaker
A top aerobatic slope soarer design from R/C aerobatic champion, Dave Hardaker. Straightforward construction and attractive 62 in. (1570mm) span swept back wing layout make this a winner on any slope. For two or three function R/C (not recommended for beginners to slope soaring).
R/C 1352 **Price H**

HIPER *by G. J. Izera*
2083mm (82 in.) span glider for slope or thermal soaring, using 2 channel R/C. Construction is a little unorthodox using a full span foam core wing in which the core is sanded to shape from foam block. Model features all-flying tailplane.
RC/1386 x x x **Price K**



ALGEBRA
By Sean Bannister
A 96 in. (2440mm) span swept wing sailplane with 'V' tail. Features 1/32 in. (0·8mm) plywood fuselage construction and fully skinned wing. The wing section is modified Eppler 387, and the model has proved competitive for thermal soaring. Special V-tail control linkage shown on plan.
RC/1244 x x x **Price H**

MOULDED NOSE WEIGHTS

MARTIN TUCK explains his method of fitting glider nose ballast

HAVE you ever been faced with the problem of having to put a certain amount of weight into the nose of a thermal soarer with a glassfibre fuselage, and finding there is not enough room to get it in? Well, I suppose the obvious answer is to pour the lead in, while it is in its molten state. This then poses the problem of how to stop the lead burning a hole in the nose of the fuselage, letting the molten lead pour out onto objects which happen to fall in the way; e.g. feet.

Many people have come across this problem before, and have solved it by immersing the nose of the glider in water to dissipate the heat. This however can also be extremely dangerous because of the risk of the molten lead falling into the water, causing a 'blow-back' which could cause serious disfigurement. In fact any method which uses water, can be extremely dangerous.

Not wishing to harm the fuselage, I decided to try and keep the molten lead well away from it, so a new method had to be thought up.

I had 'toyed' around with the idea of making some form of mould which could be of the same shape as the nose of the glider, but finding that the mould would have to be concave I gave the idea up (too much like hard work!).

I have, then, come up with an extremely simple idea which guarantees that the lead weight conforms exactly to the internal surface of the nose.

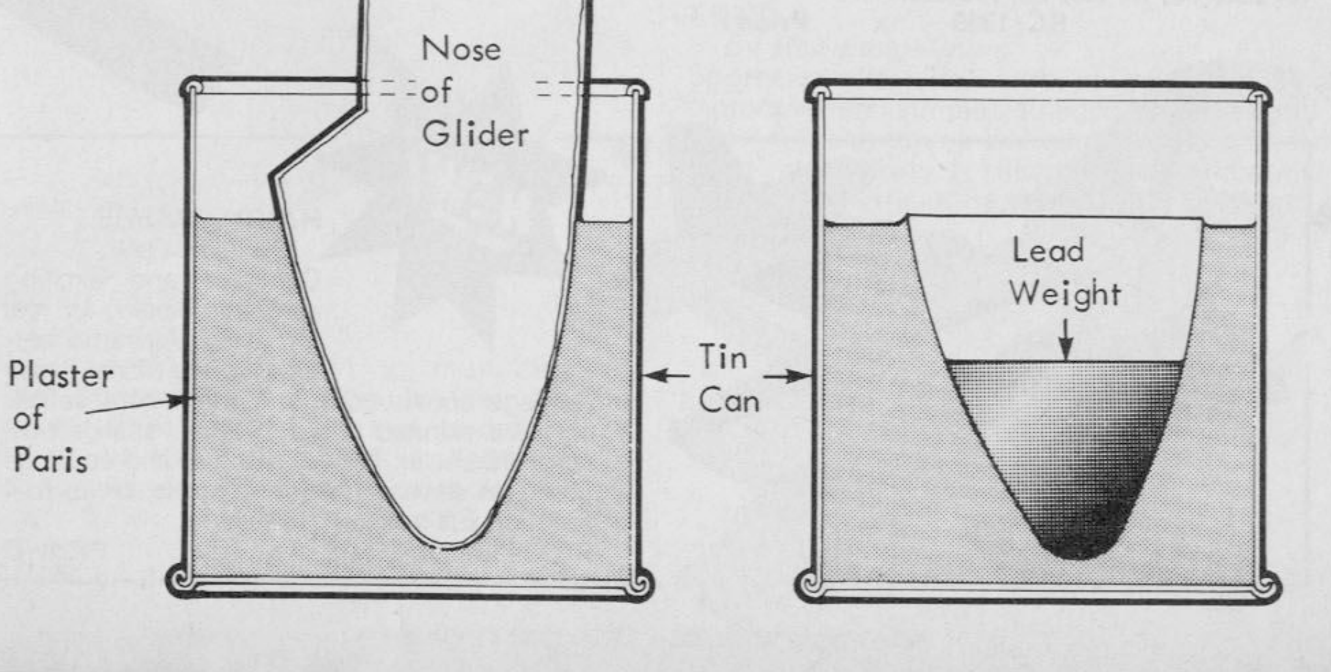
I think the best way to carry this operation out is to suspend the fuselage from the ceiling so that the nose is almost touching the floor. Then in an old tin can (I used an old cat food tin), mix up some plaster of paris — into a nice creamy mixture. Then all one has to do is gently immerse the nose of the fuselage into the plaster — don't worry, you'll get it out again — and then wait.

Plaster of paris sets in about an hour, depending on the mix, but give it a bit longer just to make sure. Once set a good sharp tap or two and the plaster cast should fall out. There's usually a little bit of water inthe cavity, so leave it *overnight* to dry thoroughly.

All that remains to do is to melt some lead in an old tin can and pour into the plaster mould, making sure that you are well protected against any possible splashes of molten lead, especially eyes.

When the lead has reached its solidifying point and gone hard, another sharp tap, and it's ready for use. Simply drop the lead into the nose of the glider and 'voila' a perfect fit — the amount of lead needed in the smallest possible space.

Do check that the nose is one with a steadily increasing curve, as there is nothing worse than finding you cannot get it out of the mould again.

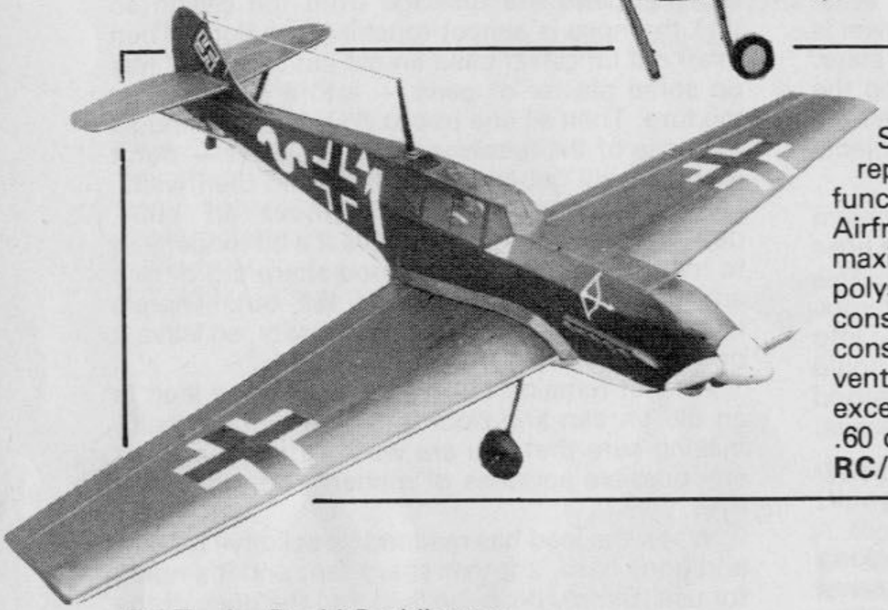


MULTI FUNCTION SPORTS MODELS & TRAINERS

HAWK *by D. Crawford*

Highly realistic semi-scale sports aerobatic model of the Hawker Siddley Hawk advanced jet trainer aircraft sized for .40 cu. in . (6.5 cc) motors and four function R/C systems. Elegant machine which captures all the essence of the R.A.F's latest jet trainer. Wing span 57 in. (1448 mm).

RC/1358 **Price H**



MESSERSCHMITT Bf 109E NEW!

By Obi Mapua

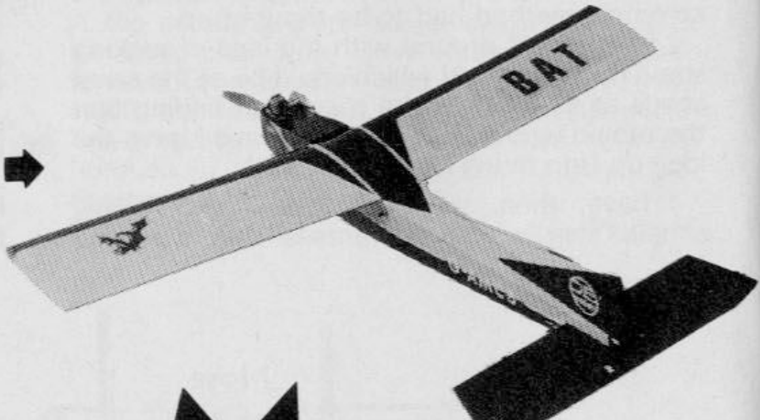
Scale-like simplified replica for four/five function R/C systems. Airframe construction makes maximum use of expanded polystyrene foam and cardboard construction techniques to minimise construction costs, yet provides a conventional sport-scale aerobatic model of excellent strength. 65 in. span model suits .60 cu. in. (10 cc) motors.

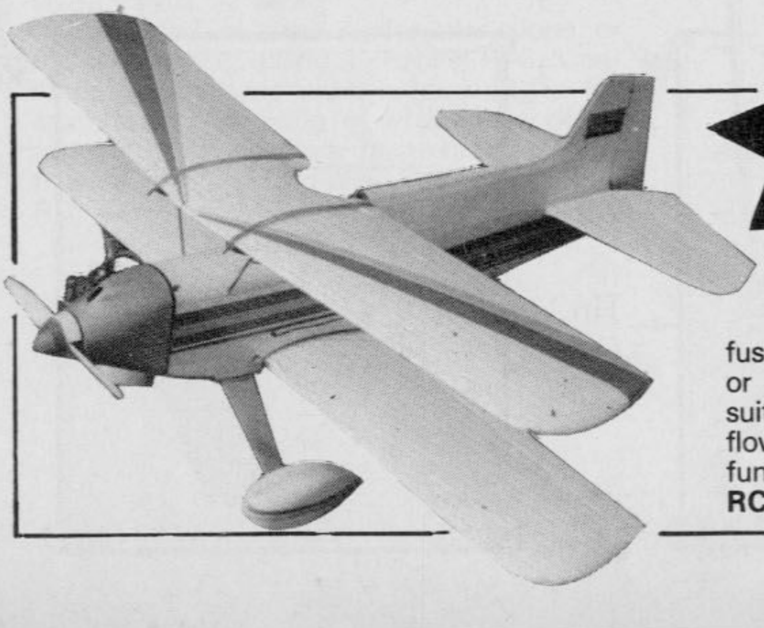
RC/1421 **x x x** **Price K**

BAT *by David Boddington*

A purpose designed Basic Aircraft Trainer (BAT) in two versions, one for rudder/elevator/motor controls, the other for advanced training employing strip ailerons and thus requiring additional control function. Speedy construction and repairability. Span 49 in. (1245mm), for 0.20 cu. in. (3.5 cc) motors.

RC/1349 **x** **Price I**





NEW!

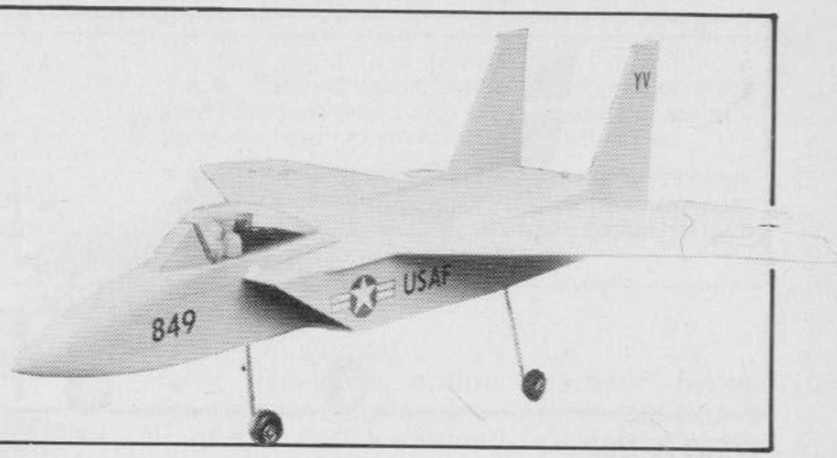
HAIRY GNOME

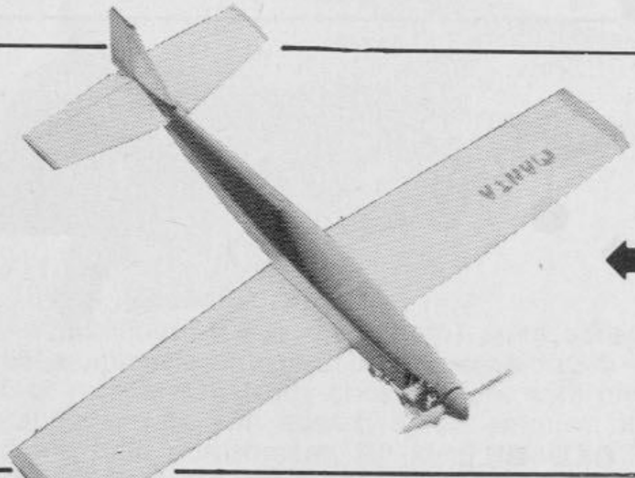
By Brian Park

Compact and exciting aerobatic biplane for real fun flying. Airframe features conventional balsa fuselage construction and foam core/veneer or balsa skinned wing. 29½ in. span model suits .15 cu. in. (2.5 cc) motors and could be flown on elevator/aileron controls, or up to 4 function full house R/C system.

RC/1418 **x x** **Price D**

F-15 EAGLE
By A. Weis
Semi-scale all-sheet balsa model of the famous U.S. fighter aircraft. Simple construction, for .25 cu. in. (4.2 cc) motors and 3 function R/C equipment (ailerons, no rudder). Span 40½ in. (1030mm). Model features rear mounted pusher motor which makes use of commercially available propellers. Looks great in the air.
RC/1412 x x **Price H**

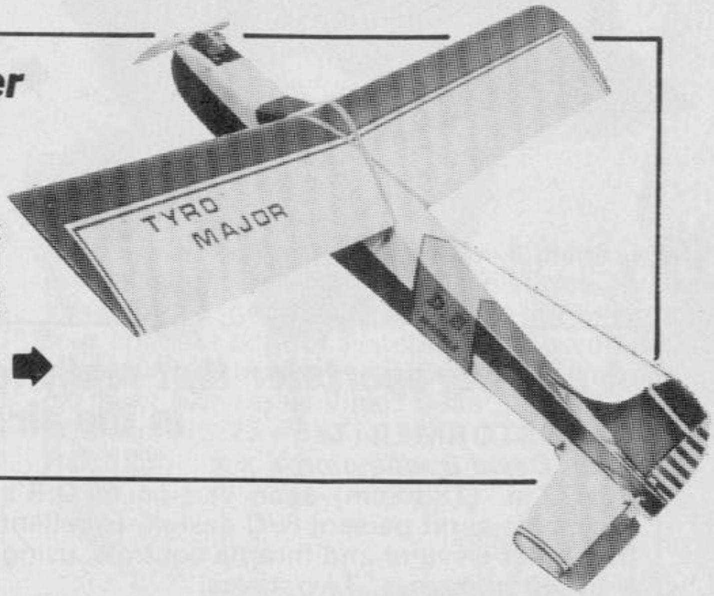


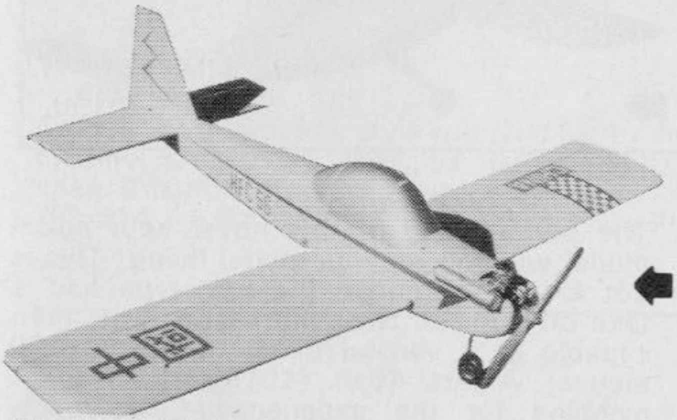


MANTA
By Pat Ingrouille
Here's a zippy 49¾ in. (1264mm) span aerobatic model for ·40 cu. in. (6·5 cc) motors and four function control systems. A clean and simple design, the straight lines of the airframe aid the speed of construction.
RC/1302 x x **Price H**

The ideal trainer

TYRO MAJOR
By D. Boddington
Purpose designed R/C trainer ideal as a first attempt at R/C flying using multi channel R/C on rudder, elevator, and throttle controls – generally agreed as the best approach for beginners nowadays. Model employs simple, all wood, conventional style structure. Span 54 in. (1370mm), for 3·5 – 5 cc motors.
RC/1176 x **Price H**

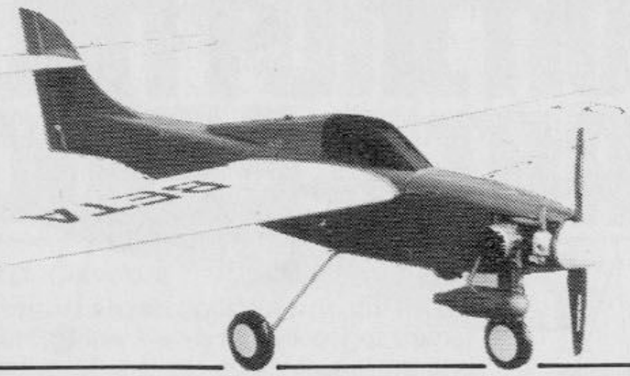




EKKO
By Hoh Fang-Chuin
Sporty, smaller-size aerobatic model for 6 cc motors offers simple, straight-forward construction techniques including constant chord wing layout, inset ailerons and functional trike undercarriage. Spans 50½ in. (1280mm).
RC/1198 x x **Price G**

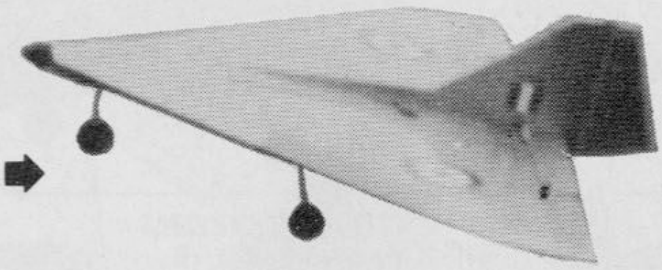
SUPER TAURI
By Ed Kazmirski
The perfect introduction to multi-channel radio control, by a top multi flier. Simple construction, docile flying and moderate size are its best features. Ideal equipment is a 3·5 cc engine and three function radio control. Span 57 in. (1450mm). For 3·5 – 6·5 cc motors.
RC/857 x x **Price F**

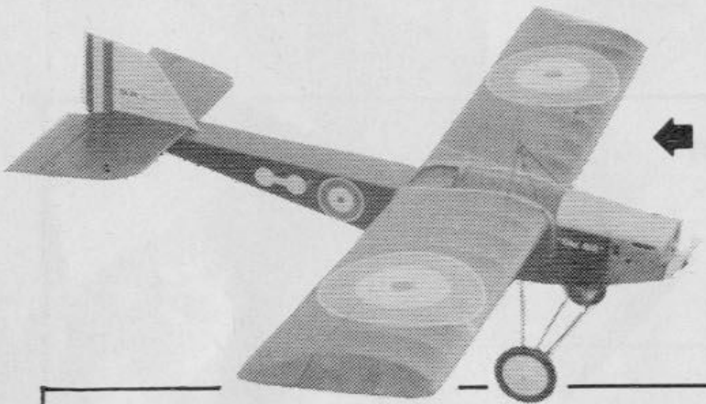
For aerobatic training



BETA *by W. Burkinshaw*
An attractive aerobatic trainer for .40 cu. in. (6.5 cc) motors. 52 in. span (1320mm). Simple, practical construction produces a robust vice-free model with good low-speed handling characteristics. Needs 4 function R/C equipment. A fine intro to the art of aerobatic flying.
RC/1390 x x **Price H**

DELTA 362
By Peter Russell
A 40½ in. (1029mm) span, compact one-piece model in classic delta layout with a good all round aerobatic performance. Takes 2 – 4 channel radio systems, very fast with 5 cc motor fitted. A popular design for the 19 – 29 cu. in. (3·5 – 5 cc) motor range and a fascinating performer.
RC/1224 x x x **Price H**





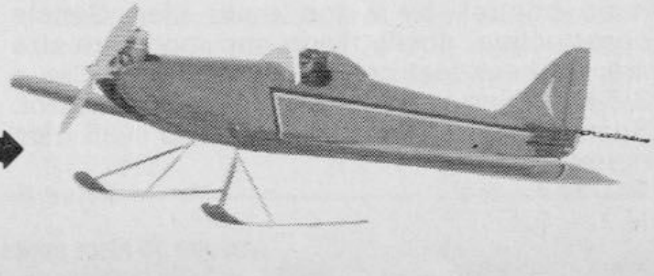
OLD BILL
By D. Boddington
A 56 in. (1420mm) span 'old timer' styled R/C sport model with shoulder wing and simple structure, designed to give typical W.W.1 appearance. Steady docile performance makes this a pleasant 'Sunday flier' with 3 – 4 function proportional radio for ·29 – ·40 cu. in. motors (5 – 6·5 cc).
RC/1090 x x x **Price H**

A nice big sportster that really looks good in the air!

BARNSTORMER 72
By David Boddington
Big 72 in. (1830mm) span version of D.B's adaptable sport parasol R/C design. Excellent for rudder elevator and throttle controls, using 6·5 – 10 cc engines. Two sheets.
RC/1118 x x x **Price K**

LIGHTNIN'
By T. F. McLaughlin
The performance of this novel twin boom model will enliven your model flying! This is not for the beginner, the prototype had a take-off run of two yards and was then capable of a vertical climb to 300 ft. (100 metres). A fast, 40 in. (1016mm) span fun machine for the experienced R/C pilot, designed for ·35 – ·40 cu. in. (6 – 6·6 cc) motors and four function control systems.
RC/1279 x x x **Price H**

RED ARROW
By David Boddington
Sporty looking low wing model for 2·5 – 5 cc motors. Spans only 44 in. (1120mm) and is compact, an ideal Sunday flier. Model features full house control, using strip ailerons and stunts well. Has semi-symmetrical airfoil.
RC/1128 x **Price G**



STAR PLAN GRADING

x A simple design with sufficient detail and explanation for the complete beginner.

x x Slightly more advanced, for the average modeller or beginners with some modelling experience in other fields.

x x x For modellers of some experience, or those who have built one or two similar models or are prepared to read up constructional technique.

x x x x For the expert able to interpret drawings (e.g., 3-view drawings) and decide his own constructional methods; also used for designs where workshop equipment is called for.

Here's a great biplane!

RODEO

By P. R. Firman

Pretty free-lance design aerobatic biplane with attractive appearance which captures the air of the radial engined, exposed cylinder bipes of the 20s and 30s. Offers excellent stunt performance for the sport flier who likes biplanes. Span 52⅜ in. (1330mm) for 6·5 – 10 cc motors. Two sheets.

RC/1208 x x **Price K**

FLI-BI

By M. Garland

An attractive 40½ in. (1029mm) span aerobatic biplane with a good performance on 3·5 – 5 cc motors. Of sturdy construction, with ply cabane struts will absorb a fair amount of flying field punishment. An ideal small field model. Requires four function radio for rudder, elevator, ailerons and throttle controls.

RC/1216 x x x **Price G**

BALDOCK BIPE

By Colin Hardwick

A 36 in. (914mm) span mini size biplane with a maxi size performance. Features fully sheeted construction. Suitable for lightweight four channel control systems. Fully aerobatic, a real fun machine that will go into the average car boot fully assembled. Suits ·19 – 29 cu. in. motors (3·25 – 5 cc).

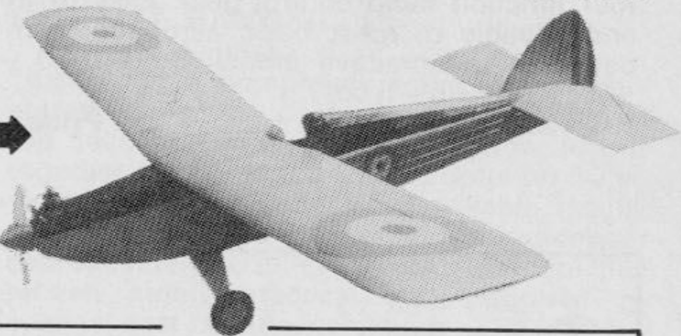
RC/1235 x x x **Price H**

WIFURSKIN

By J. Bowmer

Semi-scale interceptor style sportster for 4 – 6 channel R/C and 2·5 – 5 cc, 55 in. (1400mm) span. Smooth, attractive appearance.

RC/914 x x x **Price F**



Try this R/C water plane for a real change

DONALD

By F. Plessier

A novel floatplane design for 3 channel radio control. Model can R.O.W. with ease. Fully detailed plan including float details. Span is 56 in. (1420mm), for 3·5 – 5·6 cc (·19 – ·35 cu. in.) motors.

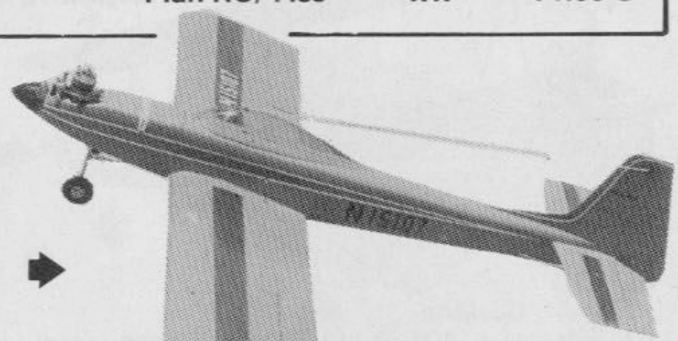
RC/1080 x x x **Price H**

SOLAR WIND

By Chris Clayton

Simple semi-scale low wing design for club aerobatics and sport flying. Basic slab side fuselage and uncomplicated wing construction permits speedy construction. 50 in. span model suits .40 cu. in. (6.5 cc) motors on four function R/C systems.

Plan RC/1435 x x Price G

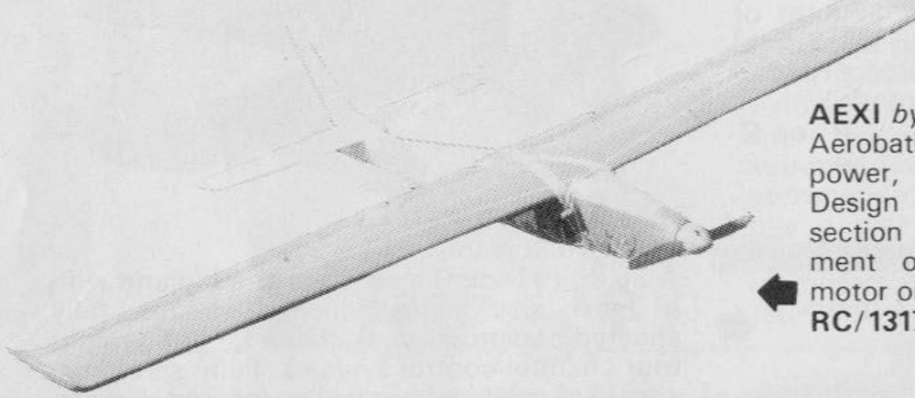


FLEA-FLI

By P. Kraft

Two-thirds size, 39 in. (990mm) span version of Phil Kraft's World Championship winning model. Capable of the full aerobatic schedule using a ·19 cu. in. glow engine (3·5 cc) and great fun to fly with miniature proportional R/C equipment.

RC/987 x x Price D



AEXI *by G. Johnson*

Aerobatic model specially for electric power, using '15' size electric motor. Design features semi-symmetrical wing section and uses 3 channel R/C equipment operating elevator, aileron and motor on/off switch.

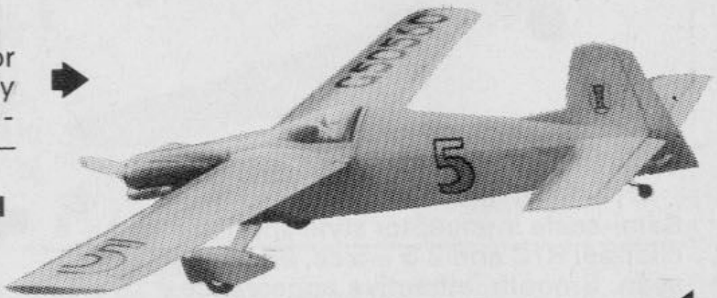
RC/1317 x x Price G

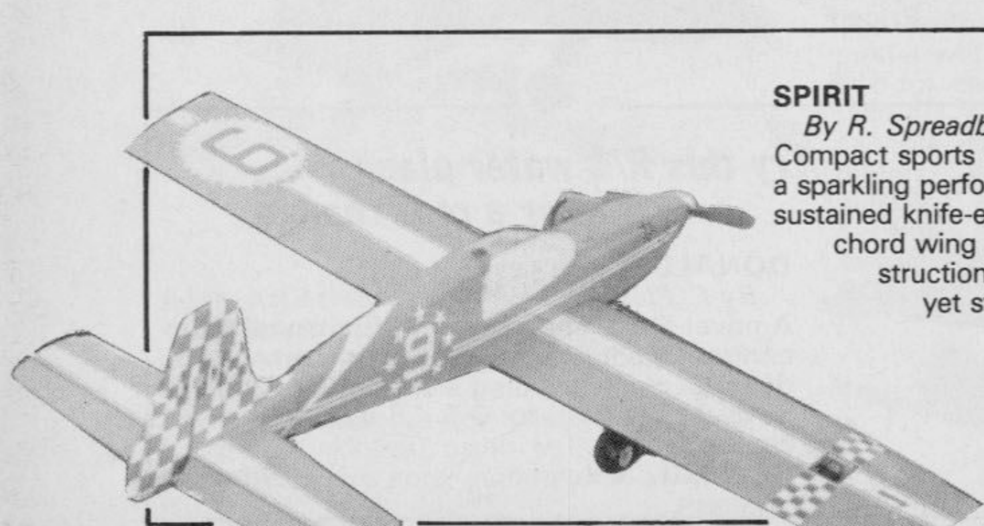
BOOTLACE

By Ian Peacock

52½ in. (1333mm) span sportster for three or four function radio control gear. Easy to fly and capable of most basic aerobatic manoeuvres. An attractive model. Suits 0·20 – ·30 cu. in. (3·5 – 5 cc).

RC/1227 x x Price I





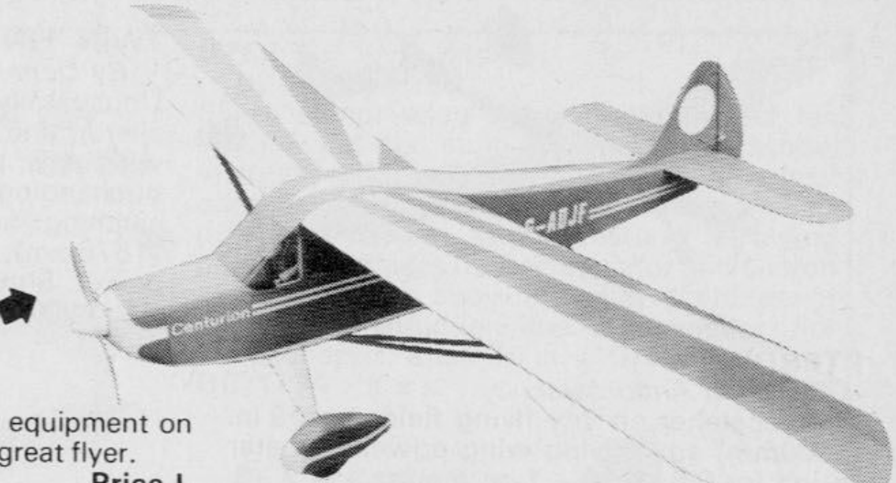
SPIRIT

By R. Spreadbury

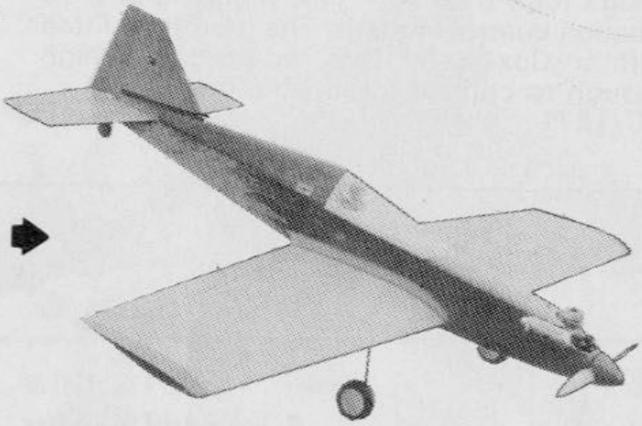
Compact sports aerobatic design with a sparkling performance which includes sustained knife-edge flight. Constant chord wing simplifies airframe construction which is uncomplicated, yet sturdy. 40½ in. span design takes up to four function R/C equipment yet can be fun flown using only elevator and aileron control functions. Suit .20—.25 motors.

RC/1436 x x Price D

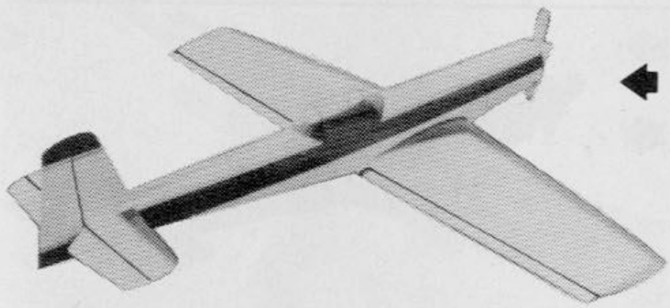
Big, graceful sportster



CENTURION *by D. Boddington*
A majestic 100 in. span (2540mm) sports model for .60 to .90 cu. in. (10 to 15 cc). Conventional structure with plug-in wing panels and functional struts. For 3 function R/C equipment on rudder, elevator and throttle. A really great flyer.
RC/1399 x x **Price L**



PHILIBUSTER
By Phil Greeno
A 42 in. (1067mm) span one piece sports aerobatic model for lightweight four channel control systems. Model has fully symmetrical wing section and is designed for fast construction. Highly manoeuvrable, offering a sparkling performance with a 3·5 cc motor. Features one-piece airframe with large radio/tank bay hatch for excellent internal accessibility.
RC/1214 x x x **Price G**



AKROBAT
By E. Herbert
Slimmed down semi-scale version of famous Zlinn Akrobat machine spanning 62 in. (1575 mm). Both conventional construction and foam core type wings shown on the plan. Fuselage structure also fairly simple. Foam wing cores, glass fibre cowl and cockpit canopy available from designer. Motors 6·5 – 10 cc.
RC/1181 x x **Price I**

BELL JET RANGER
By Dave Nieman
This is not a completely scratch-built helicopter, rather the designer, one of Britain's top helicopter modellers, shows how to put together a really practical helicopter for 10 cc motors using commercially available mechanics and glass fibre fuselage. Rotor diameter approximately 60 in. (1524mm). Machine has proven highly practical and designed to achieve best in serviceability.
RC/1286 x x x x **Price I**

DOUBLET
By D. Tapsfield
Nice looking, practical and proven free-lance twin engine design for two 3·5 cc motors. Model spans 62 in. (1575mm) and offers a good aerobatic performance. Also has safe flight characteristics on only one engine.
RC/1193 x x **Price K**

Ideal first twin. Give it a try.

TWIN FIN

By Dennis Thumpston

Unusual style, freelance aerobatic model for aileron and elevator control, offers modellers with only two function multi R/C gear an outstanding stunt performance and eye-catching appearance. Model spans 66 in. (1675mm), yet is quite small, for 2·5 – 3·5 cc power. Should be built light.

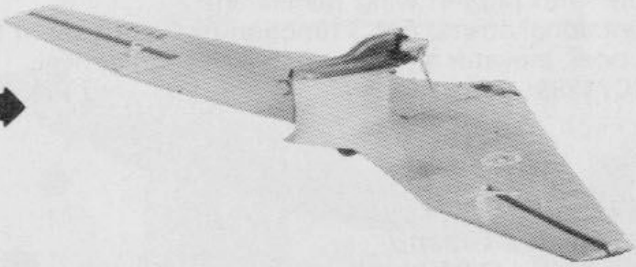
RC/1126 x **Price H**

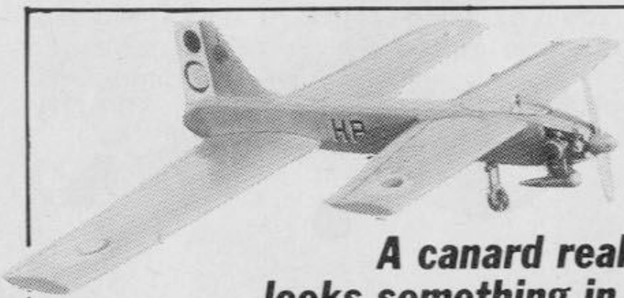
PTEROWAY

By Geoff Andriesson

An eyecatcher on any flying field – a 59 in. (1500mm) span flying wing powered soarer design for 0·8 cu. in – 1 cc motors and 2 –3 function control systems. The prototype fitted with a Cox Baby Bee would climb high enough to contact reasonable thermals.

RC/1271 x x **Price H**





G-MAN

By John Ogier

If you are tired of conventional R/C models why not try putting the cart before the horse for a change with this fully aerobatic 8–10 cc powered 63½ in. (1613mm) span canard. Excellent flight characteristics.

RC/1282 x x x **Price K**

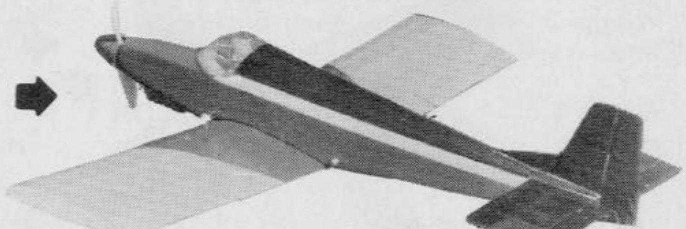
A canard really looks something in the air!

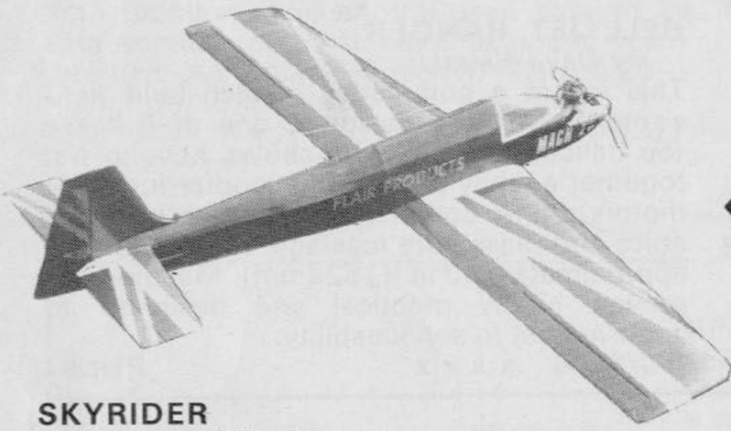
PINTO

By Alex Hutchinson

Simple low wing sports aerobatic model for tail dragger undercarriage. 50 in. span model suits 4-6 cc motors (.25–35 cu. in.) and four function R/C equipment. Just the job for Sunday knock-about flying, and in a handy size too.

RC/1362 x x **Price G**





MACH 20

By K. Hart

Lively sports aerobatic low wing model of 42 in. (1067 mm) wing span designed for .20 cu. in (3.5 cc) motors. Condenses all the characteristics of those big .60 size aerobatic models into a very handy size package which will take up to four function R/C systems.

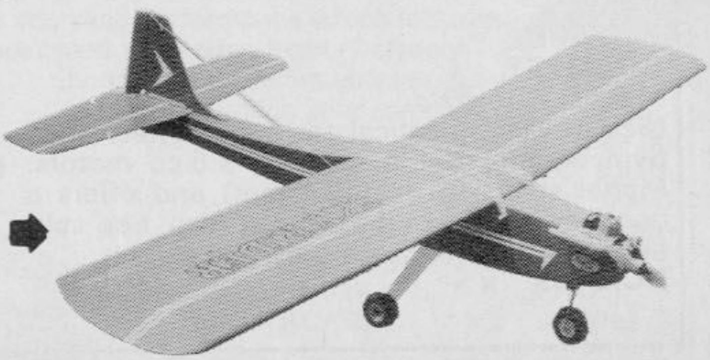
RC/1381 x x **Price H**

SKYRIDER

By D. Boddington

58 in. (1473mm) span shoulder wing, trike undercarriage, follow-on trainer from David Boddington's Tyro Major designed specifically to introduce embryo R/C pilots to the art of aerobatic flying. Performs practically all stunt manoeuvres and is ideal for its task with uncomplicated construction techniques and sturdy structure. For full-house R/C systems and 6 – 10 cc motors.

RC/1200 x **Price H**



Try a ducted fan model

EPEE

By M. Norman

Sleek, swept wing fighter style ducted fan type model for multi channel R/C. Model features rolled and formed thin ply sheet construction for the fuselage and has knock-off wing panels. Model features all-flying tailplane and uses rudder, elevator and aileron controls. Plans show detailed sketches of fuselage construction and the impellor. For 6·5 cc motors. Span 40 in. (1016mm).

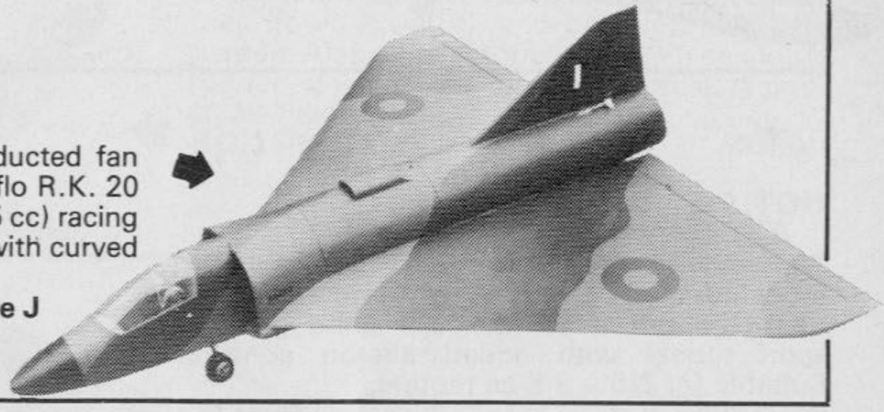
RC/1174 x x x Price I

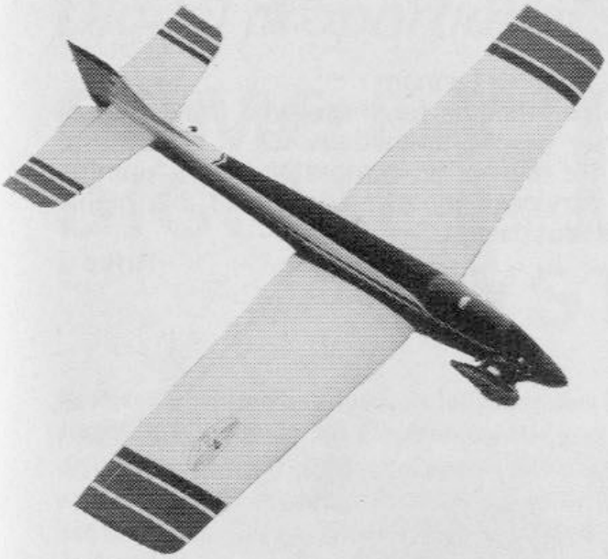
DELTA 1000

By G. Dennett

An exciting 46 in. span (1170mm) ducted fan model designed for the Midwest Axi-flo R.K. 20 fan unit and .20 — .21 cu. in. (3.2 — 3.5 cc) racing motors. Fuselage has rolled ply duct with curved balsa sheet outer skin.

RC/1400 xxx Price J





MINI ATLAS

By Dave Parker

51 in. (1295mm) span miniature of Wolfgang Matt's top aerobatic model, designed for ·40 cu. in. (6·5 cc) motors and four function control systems. Retains the full FAI Aerobatic Schedule capability of the World Championship winning original Atlas.

RC/1315 x x x Price H

BOXER *by C. Pinchbeck & W. Burkinshaw*

Try the possibilities of cardboard and expanded polystyrene foam construction with this 50 in. span (1270mm) sportster for .19 cu. in. (3.5 cc) and 3 channel radio. Airframe uses various grades of cardboard, foam plus some balsa and hardboard.

RC/1318 x x Price F

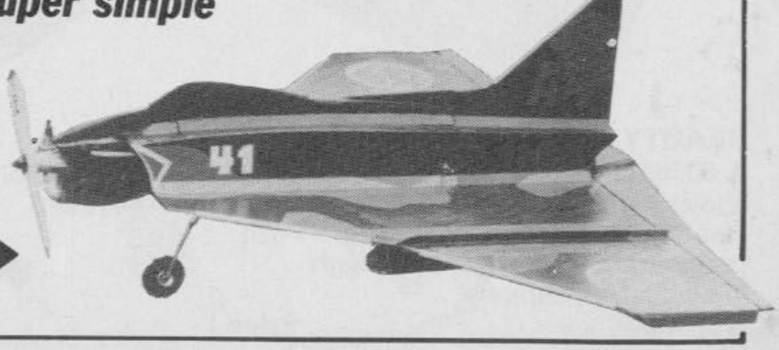
Cardboard Special!

Super simple

DRAKEN *by B. Garstad*

A quick-to-build 33 in. (838 mm) span all sheet balsa delta for 0.20 cu. in. (3.5 cc) motors and three function R/C systems. Builds fast into a rugged sporting semi-scale version of the famous Swedish Air Force fighter.

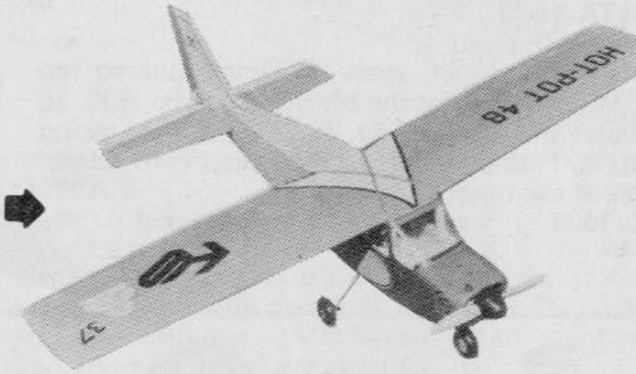
RC/1355 x Price F



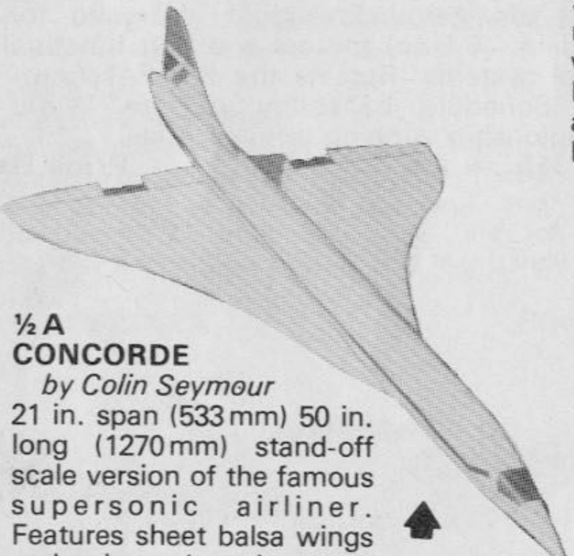
NEW!

JETTA
By Mike Delacole
Compact, competition quality aerobatic design to give the big .60 size models a run for their money! 55 in. span design for .40 cu. in. (6.5 cc motors) features slightly swept flying surfaces, plus plenty of fuselage side area and low placed rudder for yaw without roll. 4 function R/C systems.
RC/1412 x x x Price G

HOT POT 54
By C. M. Milford
A sturdy 54 in. (1370mm) span stable training model for the beginner using elevator-rudder-motor control. Also makes a good general sport model with added aileron control. Suitable for 2·5 – 3·5 cc motors.
RC/1288 x x Price H

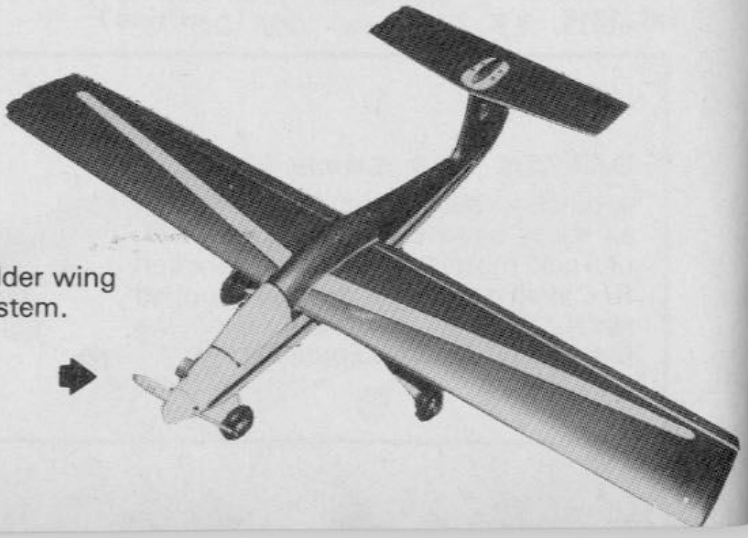


MARIONETTE *by Mike Larlham*
Sporty, open cockpit biplane for those who like an air of realism about their aerobatic models. 62 in. (1575 mm) wingspan model for .60 cu. in. motors and four function R/C. Functional serviceability is a keynote of this highly aerobatic knock-about design.
RC/1337 Price J



½ A CONCORDE
by Colin Seymour
21 in. span (533 mm) 50 in. long (1270 mm) stand-off scale version of the famous supersonic airliner. Features sheet balsa wings and sheeted polystyrene foam fuselage to produce a robust two function (aileron and elevator) model designed for a high performance .049 cu. in. (0.8 cc) motor, rear mounted.
RC/1335 Price H

BEAUTY *by M. & J. Niman*
A 60 in. (1524 mm) span 6.5 cc (·40 cu. in.) shoulder wing sports aerobatic model for four function control system. Heafty tricycle undercarriage and T-tail configuration contribute to a high individual appearance.
RC/1350 x x x Price I



STOL

By P. Russell

Surprising amount of interest in designer's experiments with 'short take-off and landing' models, reported in RCM & E magazine led to introduction of this specialist 48 in. (1220 mm) span design. Uses ultra lightweight construction techniques and also employs fixed leading edge slots together with simple trailing edge flaps to achieved desired performance. Designer has many times successfully flown it out of, and back into, his back garden. Also quite aerobatic. For 3·5 cc motors rudder, elevator and throttle controls. A good small-field model.

RC/1190 x x **Price I**

Build your own Digital proportional system

RCM&E DIGITAL FM SYSTEM

With 35MHz Circuit Conversions

Designed by Terry Platt, specially for publication in *Radio Control Models & Electronics,* this new digital proportional radio control system features up-to-the-minute *frequency modulation* circuitry and takes advantage of the most modern circuit design and components available from the electronics industry.

The circuit has been specifically engineered for home constructors and can be completely tuned and set up for operation without recourse to test equipment more complicated than a good quality multi-range test meter. 20 page instruction manual provides all constructional information for both transmitter and receiver, and goes on to show how the transmitter/receiver combo may be used with practically any modern commercially available servo. All components, printed circuit boards, transmitter/receiver cases, control sticks and other hardware are available commercially. Instruction manual comes complete with "RCM&E FM" decorative transmitter sticker.

RC/1000 **Price D**

MAKING FOAM CORE WINGS . . . By Bill Burkinshaw

CUT from expanded polystyrene foam and covered with hardwood veneer or similar materials these wings have brought a degree of speedy and accurate construction to many a modeller hitherto unknown. Well proven over the years by weekend flier and contest pilot alike, 'styro-foam' wings (and other air-frame components) are now fully accepted by most of us.

Their advantages are obvious but the finer details surrounding their manufacture may not be, and therefore it is hoped that this article may shed a little light on the subject for those who may have been somewhat sceptical about making their own foam core wings.

What then is styro-foam?

Expanded polystyrene foam is composed of small beads of polystyrene that have been expanded by heating in a closed mould to form a multiple-bead, closed cell mass through which air cannot pass. It is light and fairly resistant to compressive loads. For our application it rarely has sufficient strength without some sort of reinforcement — more of this later. Styro-foam is easy to work with but requires one or two different techniques from those most commonly used with balsa wood.

Polystyrene foam comes in many densities ranging from ¾lb./cu. ft. to 20lb./cu. ft. For most modelling uses a foam of about 1 lb./cu. ft. is ideal. Many model shops now stock foam in a variety of sizes. Other sources are builders' merchants where foam block and sheet are stocked for use in the insulation of buildings — check this source carefully, however, some insulation foam has a coarse grain which cuts poorly.

Styro-foam has the unfortunate property of being easily attacked by virtually all petroleum based solvents and adhesives. Only a few of the readily available glues and cleaners are suitable and if in doubt, try some on a piece of scrap foam first! Most wing coverings are stuck on with latex based contact adhesives as will be discussed later. White glues (PVA) do not affect foam but they rely on evaporation to dry — but since air cannot pass through foam (nor in some cases the covering material either) it will take for ever (if ever!) to dry. Avoid all petroleum-based adhesives — balsa cement, clear dope, glass fibre resin, Evostick contact, etc. Wing panel joining or odd repair work is best carried out with 5 min. epoxy.

Foam is a fire hazard. Being light, burning foam rises in convection currents from the heat to settle, in flaming blobs, elsewhere to start a miriad of smaller fires. So — do not try to burn the offcuts and rubbish!

Surface skinning materials

Surface skin materials fall roughly in to three groups:

1) Balsa wood
2) Hardwood veneers
3) Paper or card

Balsa is widely used in the USA. A basic necessity when using balsa is edge to edge jointing to produce sheets of adequate width, but beyond this there are no hidden snags. Hardwood veneer is by far the most popular material in UK. Currently .025 in. thick obechi veneer is used for all but a small percentage of wing covering although other hardwood veneers such as walnut, oak, and sapele are also used. The more exotic furniture veneers may often be heavier than obechi but equally, as they are often thinner, the overall balance is retained. The prime advantage with obechi is its low cost and ready availability. Suppliers such as MFA and others market obechi veneer through the model shops in the more popular sizes.

Paper and card offer a cheap substitute for other forms of core skinning, although paper does not have the intrinsic strength of wood, and card whilst often strong enough is sometimes very heavy. Heavyweight brown paper has been successfully used on small light models, and the 'white art card' with one side finished glossy is quite adequate for the larger models. For all the materials the covering technique is the same.

The other material used widely in foam wing construction is glassfibre. Most wings are reinforced at the centre join line or dihedral break with woven glass cloth and resin although ordinary gauze bandage and white glue is just as effective. Glass resin is hard, however, and care needs to be exercised when rubbing it smooth.

Tools and equipment

With only one exception, traditional modelling tools can be used throughout. The exception is a 'hot-wire foam cutter'. Whilst it is quite acceptable to cut foam with a sharp knife or saw it is far easier to cut (or rather melt) it with a hot wire, usually Nichrome although piano wire has

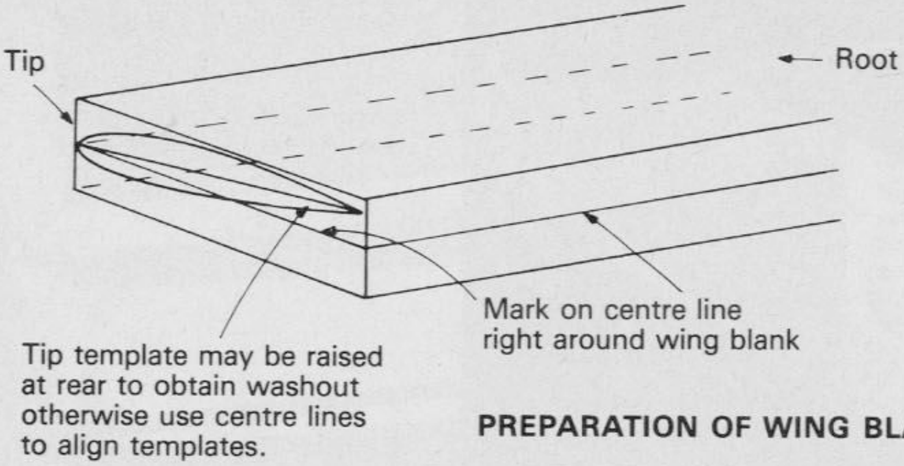
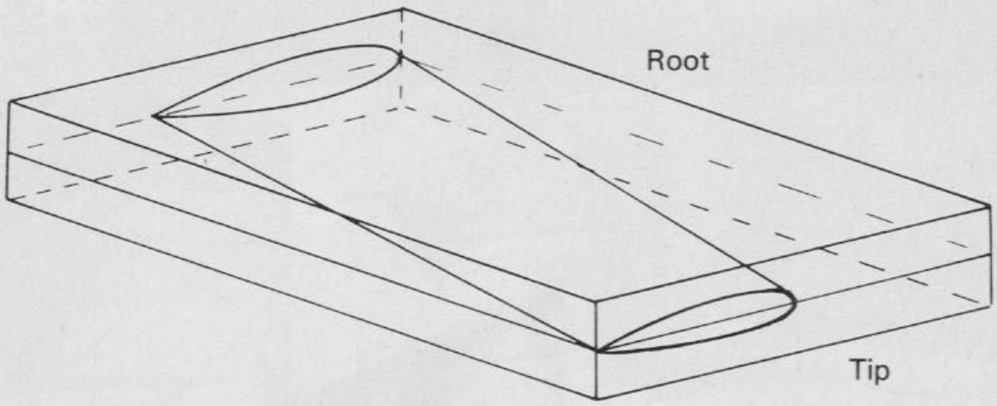


Fig. 1

PREPARATION OF WING BLANK

Fig. 2



Swept wing layout. Accurate blank preparation is important.

Note the ease with which a progressively changing wing section can be incorporated during foam cutting.

been used successfully, the principle being somewhat like a cheese cutter.

The theory is to pass an electrical current along the wire which causes it to heat. Black heat is sufficient to melt foam (and to melt nylon shirts and jumpers and burn fingers), the exact heat can be found by experiment. To cut foam accurately, the wire must be kept taut and therefore a cutting 'bow' is used. Either the traditional 'Robin Hood' bow or the 'Archemedian' bow are suitable, and it is not difficult to construct one's own. Commercially obtained bows are perhaps the most suitable for the modeller just starting to cut foam, and units like the MFA cutter are available from your dealer. This unit is powered from a transformer but others can be operated from a 12 volt car battery. *In no circumstances must the cutting wire be connected directly to the mains.*

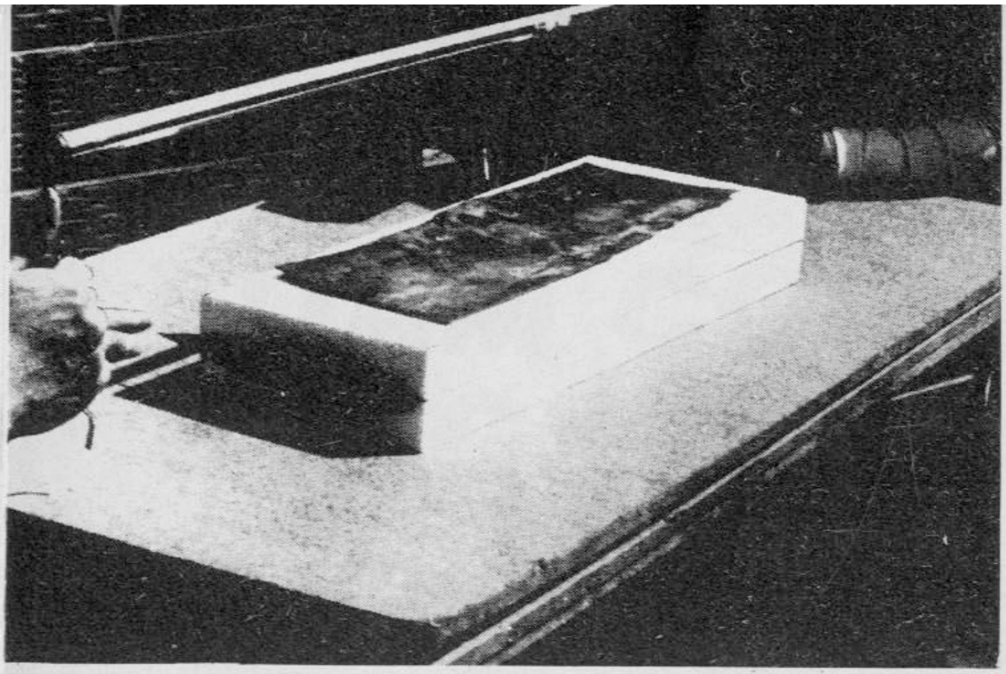
To cut foam accurately whether into basic block size or into wing sections requires the use of templates. Almost any easy to work, handy, craft material can be used for templates but clearly one should avoid metal for at the point of contact between the hot wire and the template, local cooling of the wire takes place as the template acts as a heat sink. For most general use $\frac{1}{16}$ in. or $\frac{1}{8}$ in. plywood is most suitable. To cut large sheets or blocks into wing size pieces straight edged templates are needed. For a parallel chord wing two identical templates are cut taking care to ensure that they really *are* identical. Drill holes through both templates and bolt them together with 6BA nuts and bolts. Cut and sand as a pair to ensure perfect uniformity. Before separating mark onto both the templates guide numbers which enable the operators to stay in step with each other when cutting and thereby avoid any lag.

Templates should be smooth on the edges to avoid the hot wire snagging or jumping. Scrap materials left from DIY jobs — ply, blockboard, hardboard, etc., can be made into suitable jigs for cutting dihedral angle, wing tip angles, etc.

Cutting cores

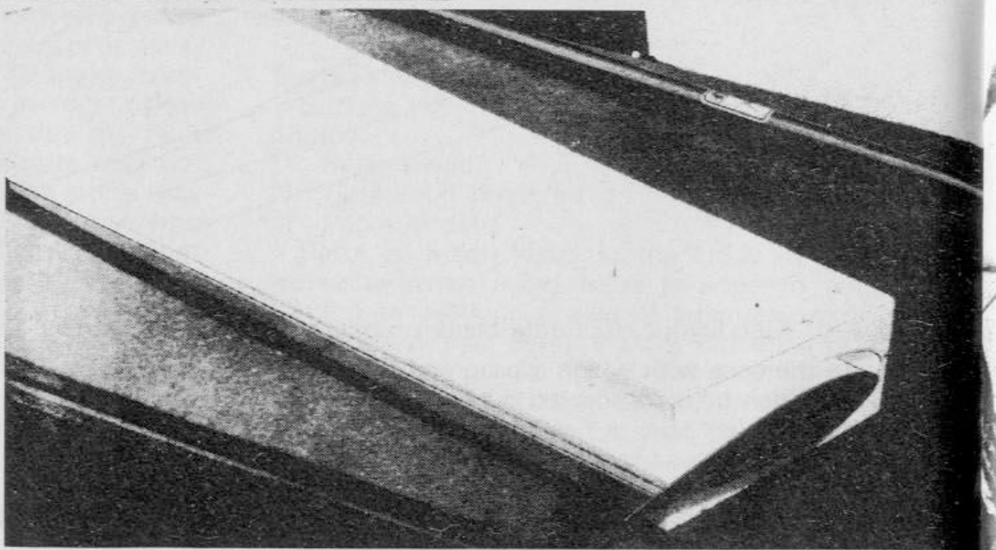
Absolute squareness of the master block of foam is essential to achieve an accurate set of cores. It is likely that one face and at least one edge will be square, and from these it should be possible to square up the rest of the slab. A felt-tip pen, set square and 3 ft. straight edge are all that are needed. Once the slab has been prepared, mark the centre line of the wing around the entire periphery of the block. If any washout is required now is the time to mark it in. Carefully pin the templates onto the ends of the block. I find $\frac{1}{8}$ in. dia. masonry nails ideal for this job. Check that templates are exactly in the correct place. At this stage you need the help of a friend.

The numerals previously marked on the template provide a guide to enable both partners to stay in line. One of you should be the 'caller'



Left: Cutting the foam core with M.F.A. cutter.

Below: The cut core partially removed from the block, note numbered guide marks on template.



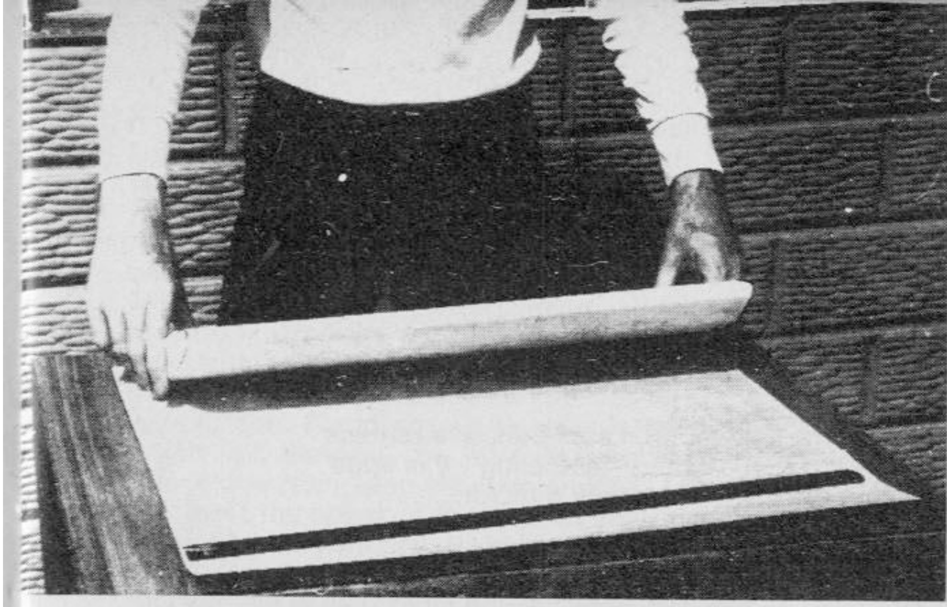
and one the 'follower'. The 'caller' will call out each numbered station as the wire passes it and the 'followers' job is to keep exact pace.

With the bow-wire at the correct temperature (tried on scrap foam first) both operators lower the wire onto the exposed end of the template and at the command "Enter foam — NOW" both will proceed to move the hot wire gently and steadily around the template until the cut is completed. Do not pull or force the wire but allow it to move at its own speed. This is particularly important around the leading edge where any excess tension (which causes the cutting wire to drag at its centre) will almost certainly produce a bowed leading edge to the core. Switch off the bow, hang it up and remove cut core from the block. Examine core for surface finish and sight along the leading and trailing edges for squareness. If satisfied, replace the core into the block for safe keeping.

Tapered wings are made in much the same way except that the wing root and tip templates differ in size. The only point to watch for here is that *both* templates should have the *same* numbering system, the numbers on the smaller template being closer together in proportion to the relative chords of root and tip. Quite obviously the tip operator should move more slowly than the root operator so that the hot wire is always along the mean of the wing.

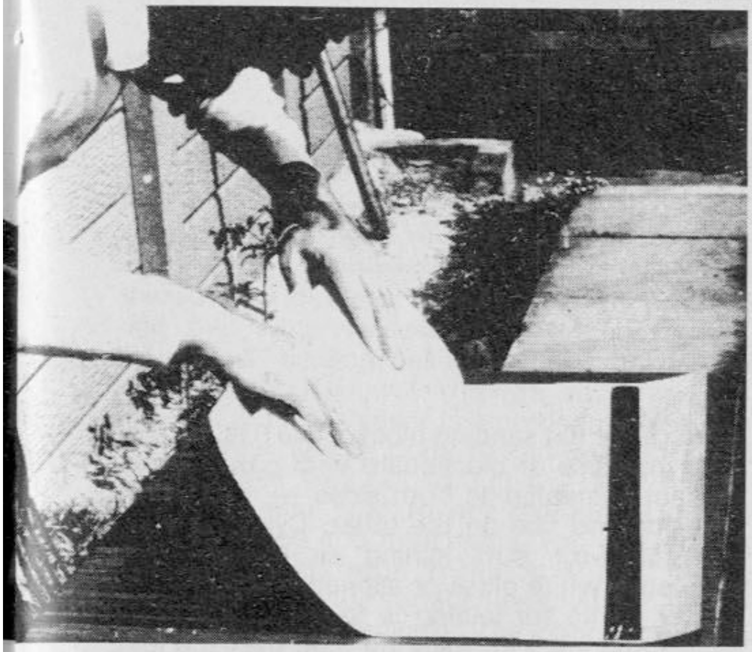
Swept wings can also be cut in this manner (as shown in Fig. 2) but here attention to initial squareness of the block is even more important. Thin wings or those having a more pointed section to the leading edge are best 'squared off' in the same way as the trailing edge and fitted with a balsa leading edge. This allows for top and bottom surfaces to be veneered separately as it becomes increasingly difficult to veneer as the radius of the leading edge decreases. Obviously a hot wire cutter can only cut simple curves but as many airframe components have a constant taper (i.e. top and bottom cowl blocks, turtle decks, etc.) these can be cut in the same manner as described using suitable templates at each end.

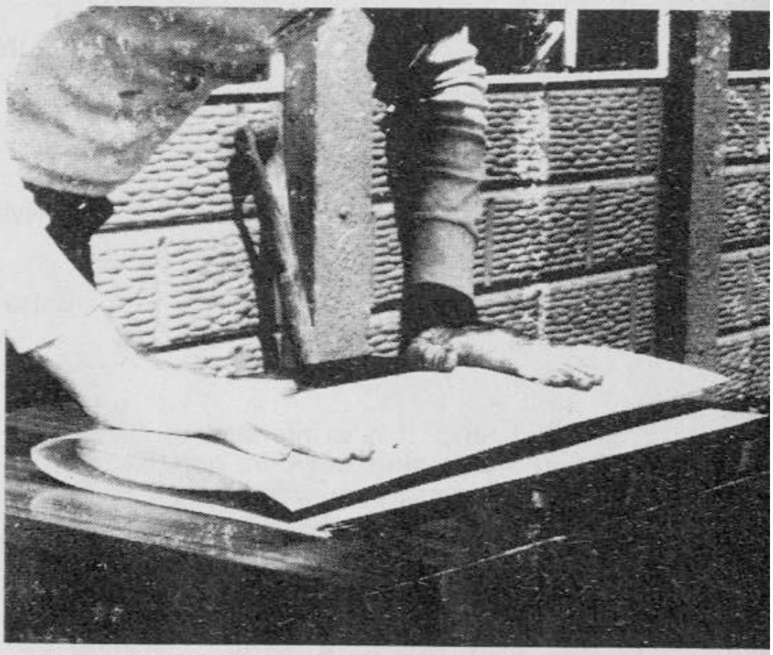
Multi-panelled wings such as those with poly-hedral or gull wings (i.e. Stuka) require each panel to be cut separately. Obviously this demands a greater number of templates but the method is the same. There are two basic tech-niques for the fitting of such components as dihedral braces, undercarriage blocks and so on. Some prefer to cut into the covered wing and some to cut and fit before covering. Personally I prefer the latter approach and cut the required slot with a specially made wire cutter. A small length of wire such as that shown in the photographs requires less current to heat it and some form of variable resistance is needed to



Left: First step in covering the core with hardboard veneer, note that veneer is cut oversize. Grain of veneer should run parallel with L.E. of wing to ensure even stress on upper and lower surfaces.

Below left: Care must be taken when using a contact adhesive to prevent 'accidental' contact of core and veneer, here a steel rule is used to prevent curling back of veneer. A sheet of brown paper, as described in 'Veneering' can be used to prevent premature adhesion. Below: Final stage of covering core, using a rocking motion to ensure even adhesion of the veneer.





control it. The conventional type of slide rheostat is the most suitable. Those using a car battery for a power source may tap off either 8, 6, or 4 volts. These simple cutting jigs are worth the small amount of time spent on them as the resulting slot is so accurate. Practice on scrap foam first and adjust the cutter size until a good fit is made. Similar jigs can be used to channel out the core to receive nylon 'snakes' for aileron control. An alternative approach is to use copper wire bent to section and mounted in the chuck of a Weller soldering gun. Quite complex sections can be cut this way with ease. Ailerons, if fitted, require a little thought. Strip ailerons are most easily fitted with the rear of the wing finished in a false trailing edge. Torque rods are fitted and the trailing edge (centre section and/or tip) and aileron added from T.E. stock or similar.

Inset ailerons also require a small false T.E. as shown, the veneer then covering top and bottom of the balsa. After veneering the aileron can be cut away with a fret or coping saw and faced with balsa.

Veneering

Having produced a pair of cores with such additions as are required fitted in place, these can be returned to their blocks and tip cut to the required dihedral. A simple box jig (adjustable to suit angle) can be used to achieve dihedral angles and with little adaptation angled tips can be obtained in the same way. When completely satisfied with the cores one can proceed to veneering.

Cut the veneer slightly oversize for the wing with the grain running evenly spanwise (on a tapered wing arrange the grain to be straight along the leading edge — this ensures an even skin stress on upper and lower surfaces). Clean off any dust and specks from both the veneer and the core and spread on an even, thin coat of adhesive. Special styro-foam adhesives are marketed by such suppliers as MFA and should be readily available from your local model shop. Failing this, Copydex (also a latex based adhesive) may be purchased from most good hardware stores. Latex adhesives may be thinned slightly with water and the addition of a little food colouring is a good idea as Copydex is white. Spreading white adhesive onto the veneer is not too difficult but trying to achieve an even coverage on white foam is difficult. Colouring makes it so much easier to spot the areas that one has missed or the areas with too much adhesive.

Latex adhesives are contact glues and must be left to touch dry before bringing the two surfaces together. Absolute adhesion occurs on contact and it is virtually impossible to separate the surfaces if alignment is not correct — so get it

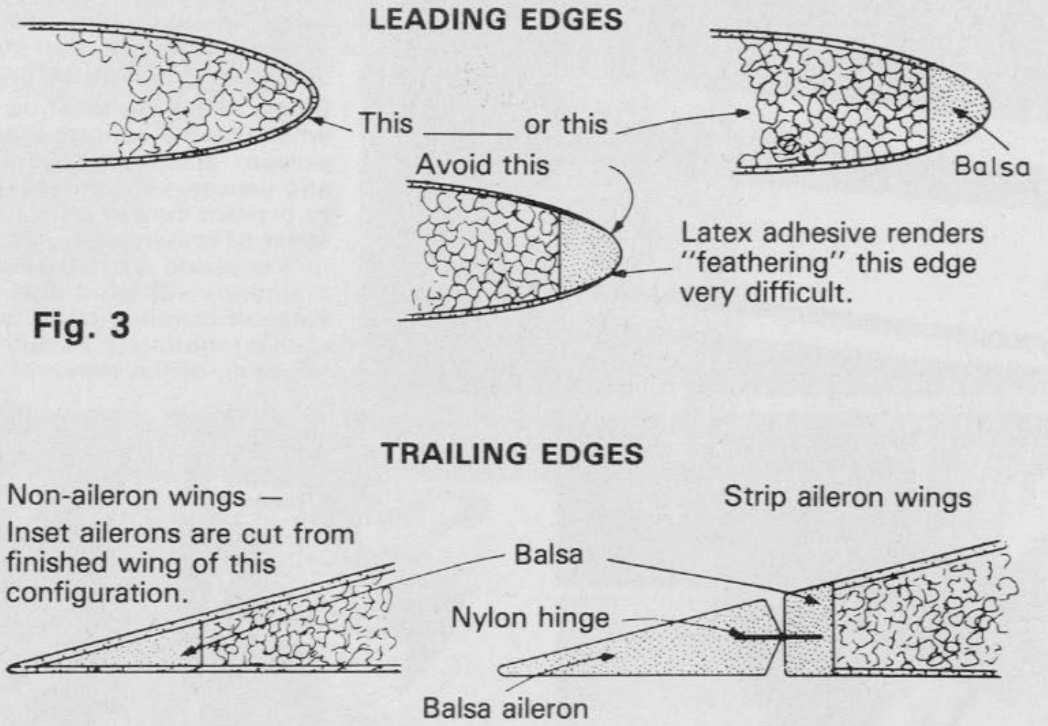


Fig. 3

right first time. If it is intended to cover right around the leeding edge in one piece, it is advisable to wet the outside face of the veneer with water. This may be done with a spray or simply sponged on. Damp veneer will curl around the radius of the L.E. much more easily than dry. For wings with a false L.E., top and bottom skins are separate and the wing curvature is rarely enough to necessitate the use of water.

When the adhesive is completely dry carefully align foam core with the T.E. of the veneer and lay gently in place with a rocking action from back to front of the wing. Continue this rocking action moving further and further around the front of the wing until the T.E. on the other side is reached. A sheet of thick brown paper inserted between core and covering can be used to prevent remature adhesion. The paper may be withdrawn inch by inch as the rocking action continues to ensure even adhesion. Surplus veneer may be trimmed from around the edges with a sharp knife, pair of scissors or razor saw.

When covering with brown paper or thin cardboard, the procedure is exactly the same. Balsa wood, however, presents an additional problem. To cover right around a 10 in. chord for instance may need balsa 24 in. wide. The required six sheets of 4 in. wide balsa need carefully matching for even grain and density and should be butt joined *before* covering the core. This is not unduly difficult but it is a bit time consuming. Butt joins should be done with 'sandable' glue and any ridge or other imperfections sanded smooth *before* covering. The flat work top mentioned earlier is essential, as is a large flat sanding block. I use 9 in. by 9 in. by 1 in. piece of blockboard with garnet paper contact cemented to both sides — medium on one side and fine on the other. Cyanoacrylates are good for butt joining as also are the 'sandable' white glues or aliphatics such as SIG BOND. A tip for joining is to butt up the two sheets and lay 1 in. masking tape over the join, pressed down firmly. Turn sheets over and bend back along tape 'hinge'. Run fillet of white glue along 'hinge' and return sheets to the flat, smoothing away surplus glue. Several sheets may be 'hinged' together at one time as white glue has a reasonably long handling time. Be sure to weight down the finished sheets to achieve a flat result.

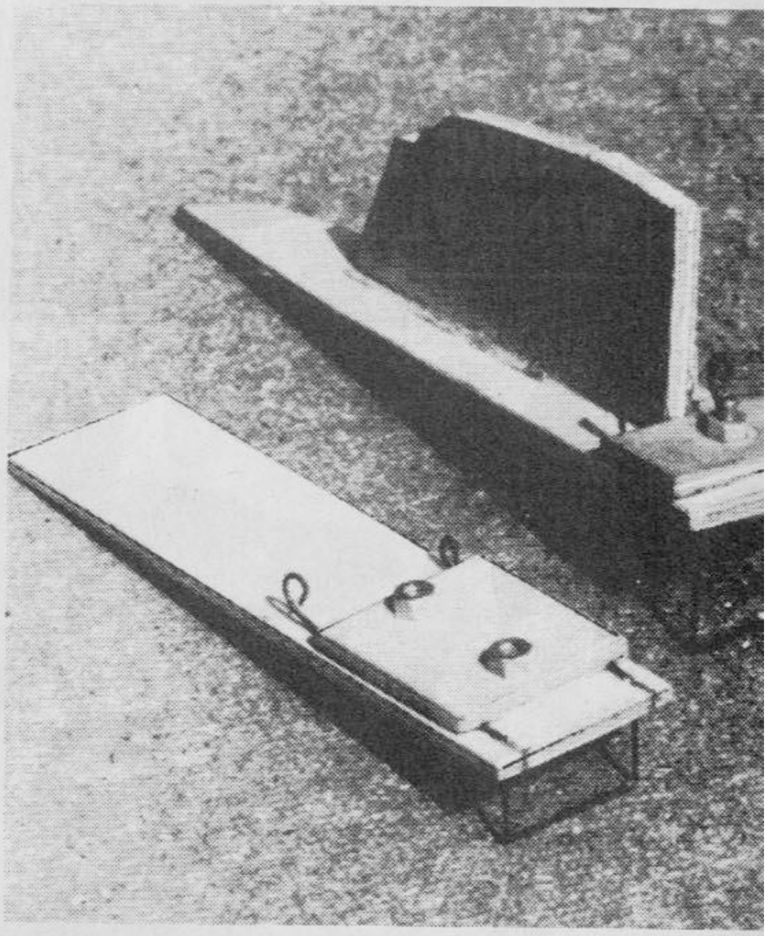
One other covering material worthy of mention is MIRRALYTE. This is a product distributed to the model shops by MFA and is an ultra-thin plywood of approximately .015 in. thickness. More usually associated with fuselage doublers and other similar reinforcement jobs MIRRALYTE makes an ideal foam covering medium. Unlike obechi veneer the surface of Mirralyte ply is very close grained making for an excellent surface finish that requires much less preparation than other woods before painting. It is also less porous — an important point if a paint finish is used. Being thinner than veneer it forms round the leading edge curves more easily, and although heavier than obechi size for size, its thinness results in a similar finished weight.

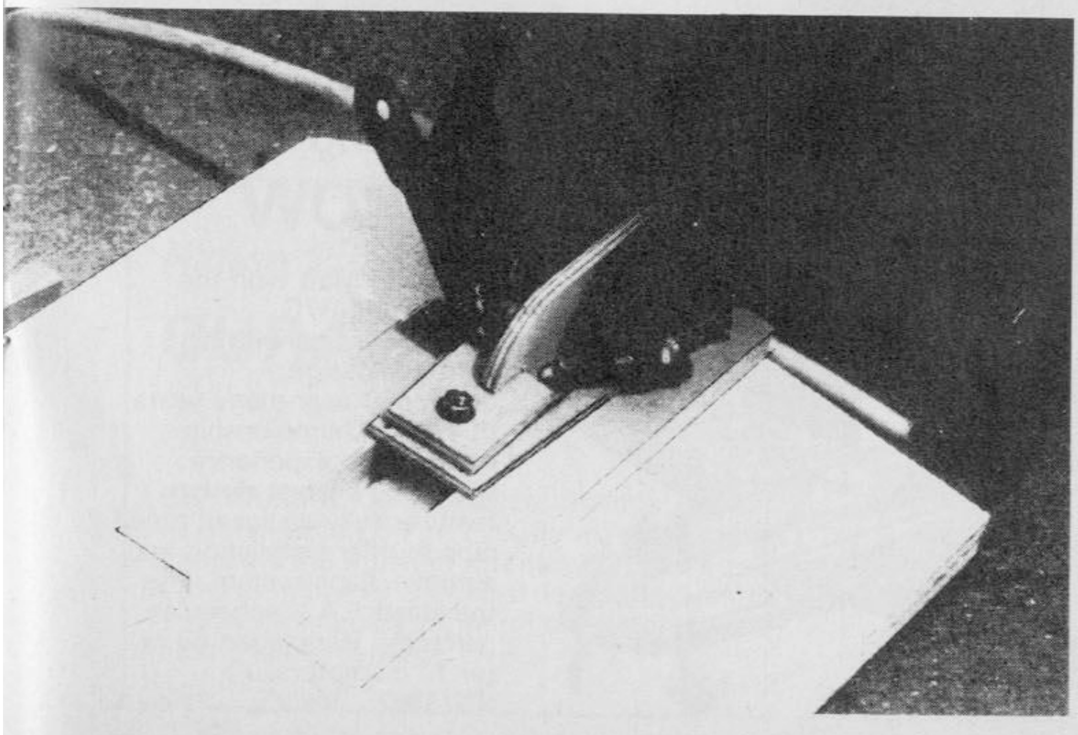
When the veneered cores are smooth enough and the various balsa parts have been added, i.e. wing tips and false L.E. and T.E. where applicable, the left and right hand panels may be joined. Often this involves the fitting of a dihedral brace and where possible five minute epoxy is recommended. When this has set, additional surface reinforcement is often specified. This usually takes the form of 2 in. or 3 in. wide woven glass tape covered with resin. Smaller models having a lighter loading have employed ordinary cotton gauze bandage covered with white glue or even balsa cement. Whichever method is used the tape must sit evenly about the centre of the join and the resin or adhesive must be thoroughly rubbed into the weave of the woven tape. Avoid any air bubbles in the resin which will weaken the joint. It is normal to extend the resin span-wise for another 1 in. or 2 in. past the edges of the tape as final sanding of the tapered joint can, if one is not careful, cut into the veneer itself causing a local weak point. Any surface defects must now be filled (Pollyfilla is a good product here but use sparingly as it can add unwanted ounces to the finished weight).

Finishing

Sand smooth and apply the finish. If shrink film is used, this may be applied by the usual method with an iron and heat gun. For the more traditional approach of dope, tissue, sanding sealer, etc., care must be taken to ensure that there are no cracks or other defects in the veneer and that all veneer-to-balsa joints are good. Dope and sanding sealer dissolve foam, and dope will find its way through any crack left unfilled. Also as veneer is a porous material the first coat or two of dope should be un-thinned and brushed well out to achieve rapid drying. Allow the first coat to dry *thoroughly* before adding second and third coats. Too many coats too quickly will result in the outer coat drying first and sealing the surface thereby trapping the volatile solvents beneath. The only escape for these solvents becomes through the grain of the veneer to the foam with disastrous effects. Once the first couple of coats are thoroughly dry conventional finishing may continue.

Fine detail variation may be necessary on *your* particular model but it should all fall within this general description. Additional strengthening to take wing fixing bolts, cut-outs for servo boxes and retracts, flaps as well as ailerons, reinforcement for wing tanks, etc., on scale models can all be treated in a similar manner. Often small excavations in the foam core can be made with a *sharp* knife (blunt blades 'pull' the foam and remove vast lumps!) avoiding the need for a 'special' cutting wire.





Above: Simple home-made foam cutter used to cut grooves for under-carriage blocks.

Left: Cutting grooves for undercarriage blocks, full details for making and operating this useful tool are given in the 'Cutting Cores' section of the text.

COMPETITION AEROBATIC MODELS

MAGIC

By Hanno Prettner

The maestro's latest F.A.I. aerobatic design in 1981 Acapulco World Championships winning form. Model is the very latest in a long line of carefully developed competition aerobatic designs. The 62½ in. span Magic features fully enclosed tuned pipe muffler layout and clean aerodynamic refinement for maximum efficiency.

RC/1432 **xxxx** **Price K**

Glass fibre cowl and fuselage top deck shroud £5.95 + £1.95 p&p (U.K. only)

NEW!

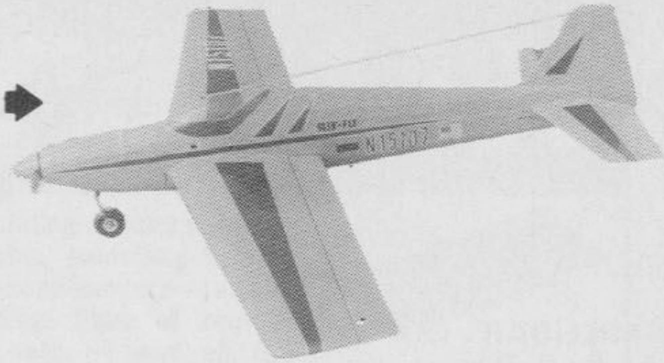
Wolfgang Matt's

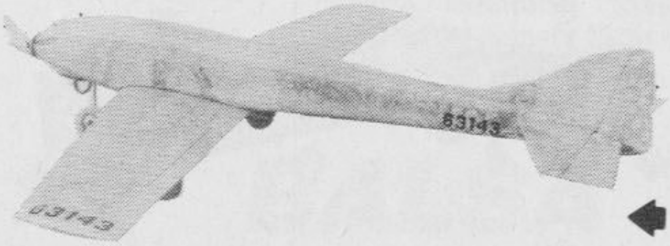
ARROW

Wolfgang Matt won the 1979 World R/C Championships with his ARROW design — developed over many years of World Championship competition experience. Wolfgang's latest design features fully enclosed tuned pipe muffler installation and airbrake/flaps system. Flys the latest F.A.I. schedule perfectly. Wing span 63 in. for 10 cc motors.

RC/1387 **xxxx** **Price K**

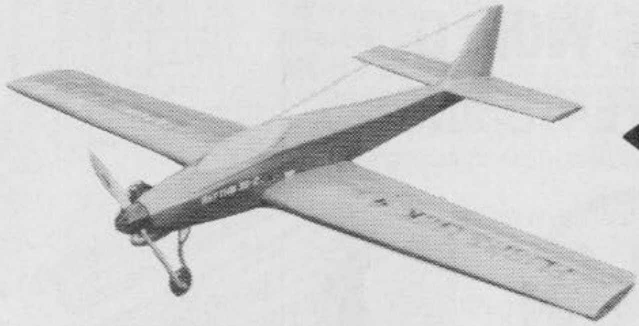
SLIK-FLI
By P. Kraft
Phil Kraft's 61½ in. (1562mm) span swept wing, multi aerobatic model which features coupled flaps and ailerons. For full house R/C and 10 cc engines only.
RC/1035 x x x **Price H**





ZIPPY
By Sean Bannister
A 42 in. (1070mm) span swept wing design for 2/5 function control systems. Zippy is fully aerobatic, capable of the full FAI schedule. Construction is quite conventional and straightforward. The model is fast with a ·20 cu. in. (3·5 cc) motor installed, but has good slow speed characteristics.
RC/1260 x x x **Price G**

TIGER TAIL
By Ron Chidgey
A top aerobatic R/C model for the FAI pattern by one of America's best known R/C aerobatic experts. Model was purposely designed to be functional first with aesthetic considerations second, but latter has also been achieved. Tiger Tail is capable of finest aerobatic performance as first place wins at 1971 and 1972 US Nationals prove. Foam wing structure and retracting undercarriage shown on plan. Wing span 64 in. (1626mm), for 10 cc motors.
RC/1185 x x **Price I**

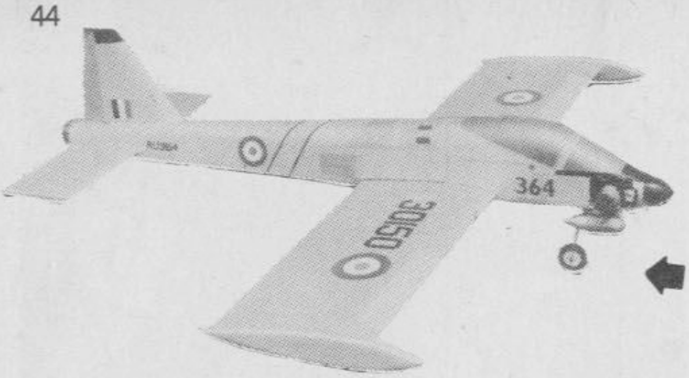


RHYTHM 35
By Clive Weller
Smaller size contest aerobatic model with modern style 'fish' shape deep fuselage shape. Model spans 54 in. (1372mm) and uses ·35 – ·40 cu. in. motors (6 – 6·5 cc). Has adequate room for full-house four function radio equipment which it will carry with ease.
RC/1170 x x **Price H**

Hanno Prettner's

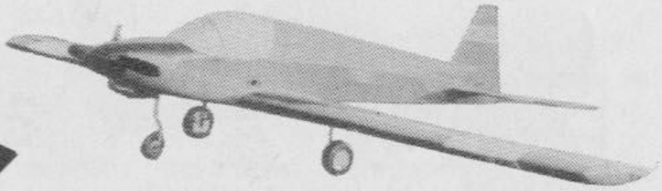
CURARE

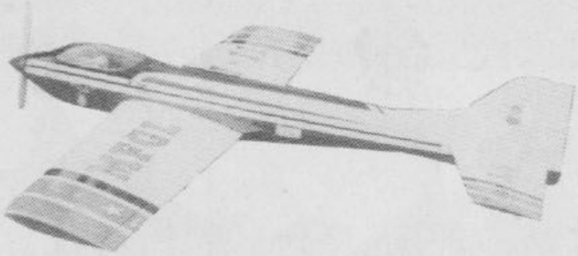
1977 World R/C Aerobatics champs winner; this outstanding 64 in. (1626mm) span model represents the finest in its category, developed from a long line of specialist aerobatic designs. Features in-vogue anhedral tail, flaps and retracting undercarriage.
RC/1323 x x x **Price K**



STRIKER
By P. Russell
Top line multi R/C aerobatic model with a really different appearance. Very practical design, includes details of operating flaps for use with fifth function. 59 in. (1500mm) span to suit 10 cc engines.
RC/984 x x x **Price I**

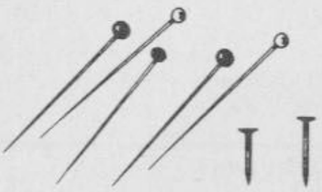
MILLIBAR
By D. Day
Based on a 9/10th scale reduction of Phil Kraft's Bar-Fli design, this 52 in. (1321 mm) span machine offers first class aerobatic performances on a ·40 cu. in. size motor (6·5 cc) and flies even on a ·29 cu. in. (5 cc).
RC/1098 x x **Price H**



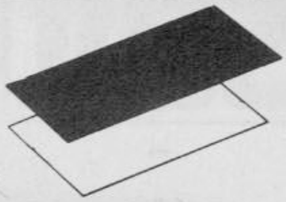


ATLAS
By Wolfgang Matt
1975 World R/C Aerobatic Champs. winning design, the Atlas has become a classic shape for R/C competition aerobatics, stemming from a long line of successful designs. Many other competition successes to its credit. 65 in. (1650mm) span model suits 10 cc motors and 4 – 5 function control systems.
RC/1283 x x x **Price K**

START WITH RIPMAX



Ripmax cover ALL your building requirements — starting from modelling pins, modelling knives, planes, sandpaper — even hand-sanders specially designed for model building. Plus, of course, balsa, hardwoods, tissue, etc. — and all the adhesives you are likely to need.



Graupner

BALSA

PREMIER GRADE BALSA, produced by GRAUPNER and specially selected and cut for Ripmax. You have probably admired the quality of balsa in Graupner kits. Now you can use the same SUPER Balsa for building your own models. Feel the smoothness of the finish! See how precisely each piece is machined! It looks good, feels good — and is good! Really superb quality and finish. RIPMAX-GRAUPNER PREMIUM GRADE BALSA is available in sheet sizes as listed on the right.

36 x
3 x 1/32
3 x 1/16
3 x 3/32
3 x 1/8
3 x 3/16
3 x ¼
3 x 3/8
3 x ½
36 x
4 x 1/32
4 x 1/16
4 x 3/32
4 x 1/8
4 x 3/16
4 x ¼
4 x 3/8
4 x ½

DEVCON

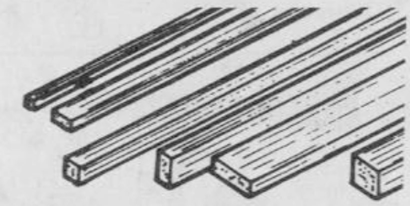
5-min EPOXY AT A REALLY LOW PRICE

GIANT SIZE (9 ounce) Twin-Pack of epoxy resin and hardener for only **£3.95**. That's REAL value-for-money.

EPOXY is the most popular choice for model building — for strong, durable joints in ALL materials (including foam plastic and metals). Far better than balsa cement or PVA! Gap-filling and non-contracting too. Epoxy used to be expensive — but not any longer. This Twin-Pack should last through several models!

IF YOU ARE IN A HURRY . . . .

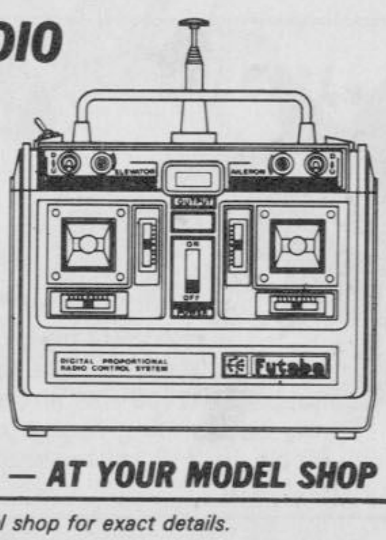
'GRIP' — the new 'cyano' glue is the one to use. Sticks balsa, hardwoods, metals, etc. — virtually everything (except some plastics) in SECONDS. 'GRIP' is specially formulated for the RIGHT viscosity for modelling use. Non-staining, non-ridging, waterproof, heatproof, fuelproof. Above all 'GRIP' is REALLY ECONOMICAL to use. Available in 20 gram (0.7 oz.) plastic bottle. Porous or standard versions. **Price £2.10**



Hardwood for engine bearers? Yes — RIPMAX covers all your needs here. Nine different sizes from ¼" square to ½" x ¾" in specially selected *tough*, straight-grained hardwood. Also other essential materials like birch and ramin dowel; and top quality resin-bonded plywood (starting at 1/64" thickness). All top quality materials. In *modelling* sizes.

FINISH by fitting RIPMAX-FUTABA RADIO

The LARGEST range of Tx-Rx Combos and Servos — so you can choose exactly what you want — at prices you can afford. 2-channel to 7-channel coverage, including the very latest modular systems with 'pro' and 'expert' features. PERFORMANCE guaranteed. Superbly RELIABLE. From the world leaders in digital proportional radio control. Full servicing facilities available in the U.K.



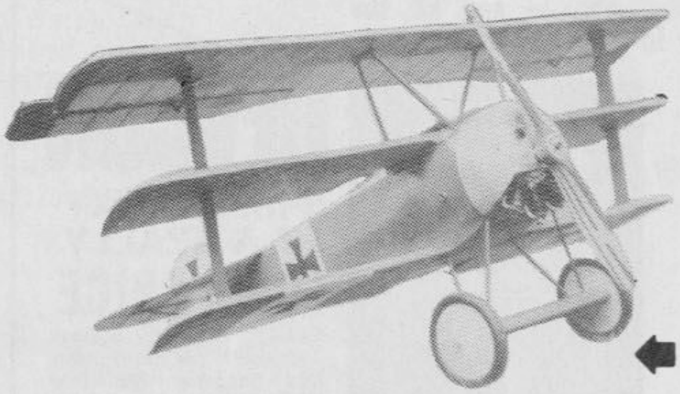
TOP QUALITY AT LOW PRICES

Your local Ripmax stockist can help you choose the outfit that best suits your needs—and pocket!

RIPMAX PRODUCTS — AT YOUR MODEL SHOP

Prices correct at time of going to press — check with your local model shop for exact details.

MULTI FUNCTION SCALE MODELS



FOKKER Dr. 1 TRIPLANE

By Tony Lunt

Without doubt the most impressive 'Class II' scale model with its dowel structure to simulate the fuselage tubes. Scale rib positions and leading edge sheeting and overall appearance which makes it look 'right'. Original flies at scale speed using a Merco 61. Cowling is a Woolworth's 8 in. (203mm) kettle with base removed! Easily transportable through its condensed span of 54 in. (1370 mm), this 1/5th scale model has operated off grass and runways, flown and won prizes in many contests and will be a long time favourite replica of the famous 'Red Baron's' fighter of W.W.1. 10 cc motors. Two sheets.

RC/1213 xxx **Price L**

World War I

SOPWITH CAMEL

By F. Meier-Patton

1/6th scale R/C model from Switzerland of this classic W.W.1 fighter. 'Full house' radio is essential in this model, which requires 8 – 10 cc motors. Span 56½ in. (1435mm). Two sheet plan. Two sheets.

RC/1099 xxx **Price J**

A.B.S. Cowl £2.25 + 95p p&p. (Overseas £1.95)

NEW!

AVRO 504K *by David Boddington*

Super 1/6th scale, 72 in. span replica of the classic R.A.F. training machine. Model reproduces much of the full size airframe structure, including rib spacing yet is supremely practical and a truly outstanding flyer with an air of magnificent realism. For four function R/C systems and .60 cu. in. (10 cc) motors. Two sheet plan.

RC/1420 **xxxx** **Price J**

SOPWITH PUP
By D. Boddington

53 in. (1346mm) span scale model of this old favourite, using 8 – 10 cc. engines and three or four function proportional R/C. Two sheets.

RC/990 x x x **Price J**

BRISTOL SCOUT TYPE D
By M. J. Fardell

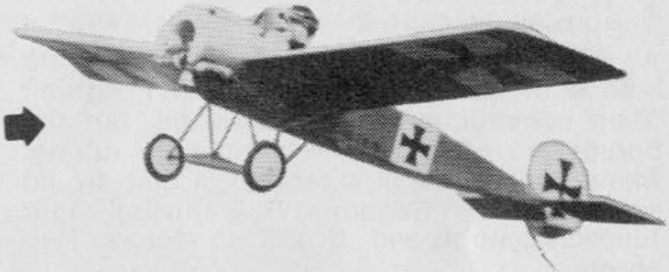
Small size Class 2 type scale model of early W.W.1 scout, popular as a modelling subject. Model uses scale wing rib spacing, but construction is not particularly complicated. 42½ in. (1080mm) span model suits 3·5 cc motors and is designed for three function multi equipment operating rudder, elevator and throttle controls.

RC/1201 x x **Price H**

FOKKER EINDEKKER
By E. Huber

Class 2 scale model of the famous Eindekker of W.W.1 spanning 68 in. (1730mm), this model features simple construction, yet still has scale wing rib spacing, and would make an ideal introduction to R/C scale flying. Motors 6–10 cc. Flies without ailerons. Two sheets.

RC/1124 x **Price K**



SOPWITH TABLOID
By David Boddington

50 in. (1270mm) span Class 2 scale model of the well known early W.W.1 scout and Schneider Trophy winner. Model is designed for rudder, elevator and throttle controls and 6 – 10 cc motors. A quite straightforward model to build.

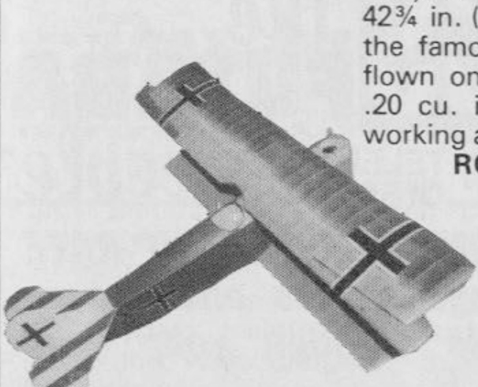
RC/1144 x x **Price I**

SPECIAL

FOKKER DVII
By David Boddington

42¾ in. (1085 mm) span sport scale model of the famous German WW1 fighter. Can be flown on 2-4 function R/C systems using .20 cu. in. (3.5 cc) motors. Plan shows working ailerons.

RC/1383 x x **Price E**



NIEUPORT 24
By David Boddington

Sport scale replica of French WW.1 scout, spans 41½ in. (1054 mm) and suits .20 cu. in. (3.5 cc) motors.

RC/1384 x x **Price E**

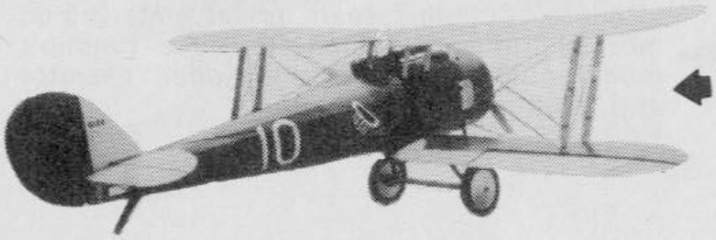
FOR KEY TO PRICE CODES — SEE INSIDE FRONT COVER

S.E.5a

By David Boddington

Conveniently sized 32½ in. (826mm) span scale model of the famous W.W.1 scout. Practical airframe structure makes this model a joy to construct. May be flown on 3 channel R/C, operating rudder/elevator/throttle. Suits .09 cu. in. (1.5 cc) motors and prototype has flown very successfully on a Mills 1.3 cc diesel.

RC/1415 x x **Price E**



NIEUPORT 28

By W. Antione

1/6th scale, 52 in. (1320mm) span model of a famous W.W.1 French scout. Model features faithful reproduction of full size airframe structure and is a proven flier. For 8 – 10 cc motors. Two sheets.

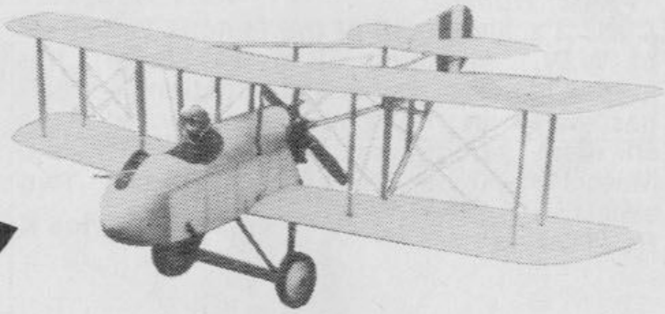
RC/1094 x x x **Price K**

D. H. 2

By Peter Neate

A 63½ in. (1613mm) span 3/16th scale replica of the famous early W.W.1 fighter. Main construction is of hardwood, but the booms are of thick wall aluminium tubing. Many how-to detail sketches on plan to aid scale fidelity. Requires 'full house' four function controls and ·61 (10 cc) motors. Two sheets.

RC/1245 x x x **Price L**



STAR PLAN GRADING

x A simple design with sufficient detail and explanation for the complete beginner.

x x Slightly more advanced, for the average modeller or beginners with some modelling experience in other fields.

x x x For modellers of some experience, or those who have built one or two similar models or are prepared to read up constructional technique.

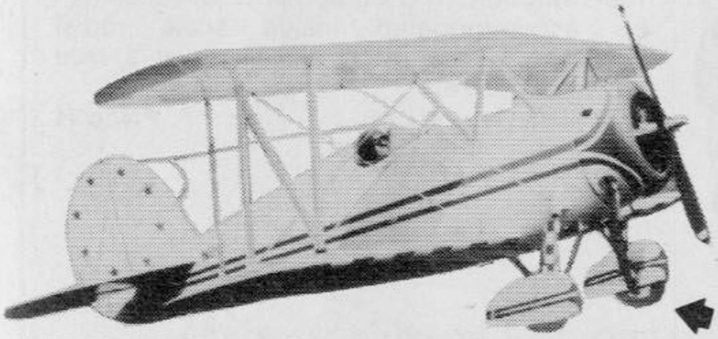
x x x x For the expert able to interpret drawings (e.g., 3-view drawings) and decide his own constructional methods; also used for designs where workshop equipment is called for.

Golden Age era . . .

☆ ***Revised edition plans***

D.H. 60 GYPSY MOTH *by Dr. M. Sun*
A 60 in. span (1525mm) scale model of the first of a long line of De Havilland 'Moths', famous for its long distance record flights. Wings fold in the scale manner for transport. For .40 — .60 cu. in. (6.6 to 10 cc) and 4 function R/C equipment. Plans are fully revised from original sheets, with simplified airframe construction.
RC/135 x x x **Price J**

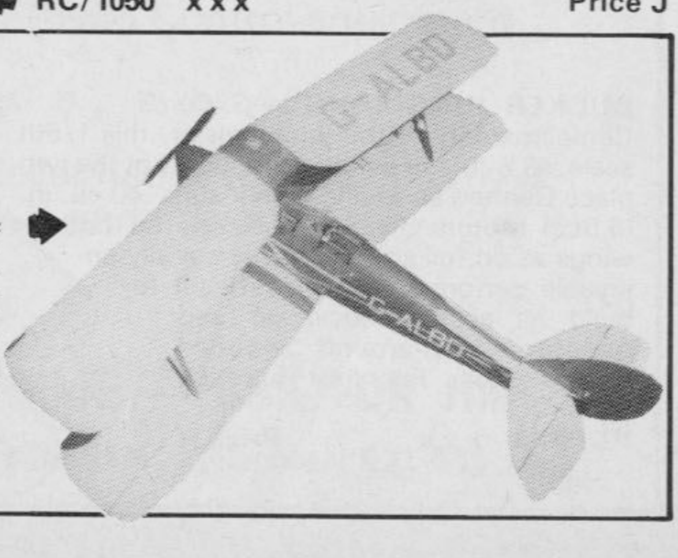
RWD-8
by Marek Klimczak
92 in. span (2340 mm) scale (1/5th full size) model of a simple Polish prototype with full size construction methods duplicated wherever possible. Four function R/C and ·60 size motors are essentials.
RC/1365 x x x x **Price L**



GREAT LAKES SPECIAL
By D. Stothers
Scale model of this all-time favourite aerobatic biplane. For multi R/C only, using 10 cc engines, 60 in. (1525mm) span. Really impressive in the air. Two sheets.
RC/1050 x x x **Price J**

The classic Tiggie!

D. H. TIGER MOTH
By H. J. Towner
53 in. (1346mm) span scale R/C model of most famous of all British biplanes . . . everyone's favourite. Two sheet, super detailed plan features faithful reproduction of full size structure including fuselage longerons and spacers, scale wing rib spacing, cockpit detail and scale propeller. Suits 5 — 8 cc motors.
RC/1131 x x x **Price I**

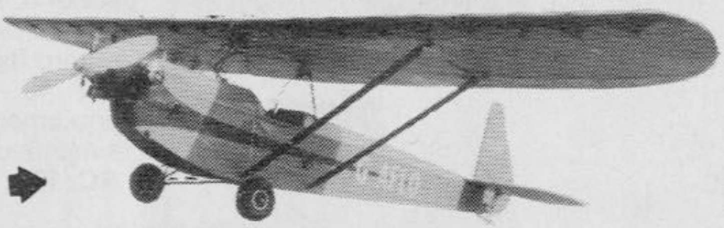


NEW!

A pair of LUTON MINORS in two sizes

LUTON MINOR *by Peter Miller*
Big 1/5th scale, 59 in. span replica of the 1930's ultra light machine, so popular as a modelling subject. Constant chord, zero dihedral one-piece wing and slab side fuselage make this an ideal first R/C scale model. A forgiving flier thanks to the thick wing section and ample wing area. Prototype used G-MARK flat twin motor, but any .40 cu. in. (6.5) motor will suit. For four function R/C systems (rudder, elevator, aileron, throttle).
RC/1430 **x x** **Price K**

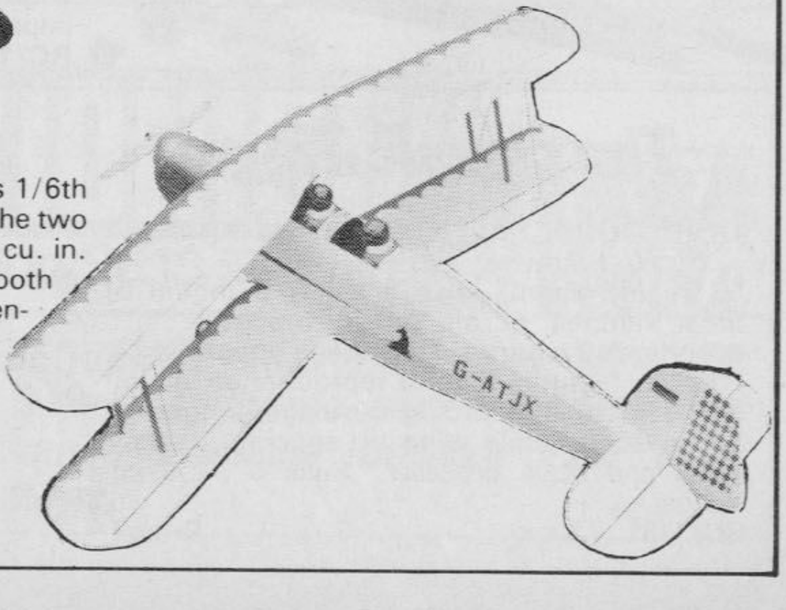
LUTON MINOR
By E. Fearnley
43 in. (1090mm) span scale model, designed for 3 function propo equipment but would accept lightweight 4 function gear as well. May also be flown with single channel, rudder only. 1·5 – 2·5 cc engines.
RC/1046 **x x** **Price E**



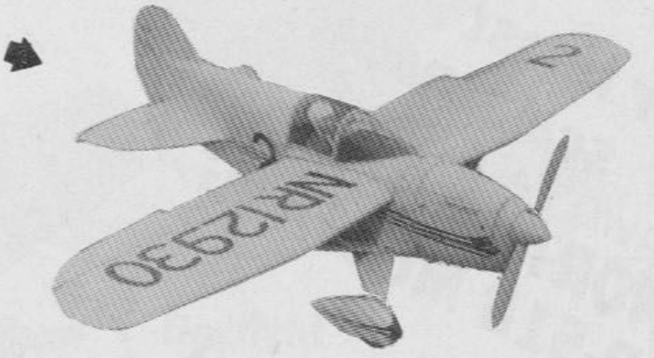
A brace of Bückers!

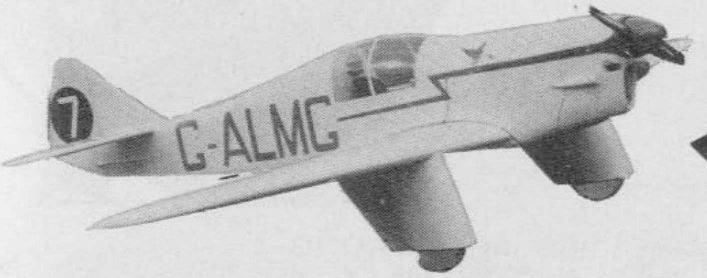
BUCKER JUNGMEISTER *by G. Curd*
A 1/6 scale sports model of the famous aerobatic biplane. 43 in. span (1090mm) for .35 – .40 cu. in. (6 to 6.6 cc) motors and four function R/C equipment. Silencer can be accommodated inside scale radial cowling. A nice flying aeroplane at a nice convenient size!
RC/1392 **x x x** **Price H**

BUCKER JUNGMANN *by G. Curds*
Complimentary to the Jungmeister, this 1/6th scale, 48½ in. (1332mm) span model of the two place German aerobatic trainer suits .40 cu. in. (6.5cc) motors. Features ailerons on both wings as on full size and gives a really enjoyable performance. Not difficult to build as scale models go and features wrap-around wooded engine cowl. For four function R/C.
RC/1413 **x x x** **Price H**



CHESTER JEEP
by Henry Haffke
52 in. span (1321 mm) scale model of the highly successful American 1930's "Golden Age" air racer designed and raced by Art Chester. Uncomplicated construction should be no problem for any modeller of reasonable experience and will repay the constructional effort with a fine flight performance on 3.5–6.5 cc (.20–.40 cu. in.) motors. For four function R/C systems.
RC/1361 xxx **Price I**





MILES HAWK SPEED SIX *by J. Grewcock*
49¾ in scale replica of the famous British air racer. Features simple construction including the elegant trousered undercarriage. Suits .40 size motors and full house four function radio. Moulded cockpit canopy and engine cowl available.
RC/1371 **Price I**
Cowl £1.95 **Canopy £1.25 plus £1.25 p&p. (Overseas £1.95)**

World War II aircraft

Our finest scale model!

DAVID VAUGHAN'S

NORTH AMERICAN P-51B MUSTANG

More than just a plan — there's so much information on this 3-sheet drawing that it's an R/C scale tuition course! Fantastically detailed 1/6th scale model for 10 cc motors. Spans 74 in. and is a magnificent flyer. Plans are well worth the investment.

RC/1378 x x x x Price N

VICKERS ARMSTRONG WELLINGTON Mk. X

By Eric Evans

The classic W.W.2 'Wimpy' bomber modelled to 1/12th scale for two 5 cc motors. Although by no means the simplest of scale models, the construction is fairly straightforward, there's just that much more of it. Span 86 in. (2185 mm) for 4 – 6 function control systems. Moulded engine cowls, cockpit canopy and turrets available commercially.

RC/1308 x x x x Price L

SUPERMARINE SEA OTTER

By Eric Fearnley

A 46 in. (1170mm) span stand-off scale model for .30 cu. in. (5 cc) motor and four function control systems. Not recommended for the newcomer to R/C but would make a good introduction to Class 2 scale for the experienced pilot.

RC/1281 x x x x Price K

Simple Spitfire!

SPITFIRE

by P. H. Ingrouille

For those who like scale appearance without the complication of scale model construction, here is a semi-scale version of the classic WWII Spitfire designed for ·40 cu. in. (6.5 cc) size motors and four function R/C equipment. The plan includes details of veneered foam cored wing construction in addition to the conventional built up balsa structure. Wingspan 56 in. (1422 mm).

RC/1342 Price H

GRUMMAN WILDCAT

By John Neate

Attractive 38½ in. (980mm) span stand-off scale sport model for ·15 – ·19 cu. in. (2·5 – 3·5 cc) motors and 2 – 3 function control systems. Model is designed for small grass field flying. No undercarriage details on plan. Fine flying performance.

RC/1312 x x **Price G**

Dogfight Double feature

SPITFIRE & MESSERSCHMITT 109E

By Ian Peacock

Simple sport scale models for 3–5 cc motors (.20 cu. in.) of aviation's most famous 'enemies'. Each features foam core wings and built-up fuselage construction. Spitfire span 40½ in., ME109 42½ in. Will fly using 2 function radio for elevator and aileron control – or up four function with lightweight radio.

Spitfire RC/1325 x x **Price E**

Messerschmitt ME109E RC/1326 **Price E**

***HAVE THE TWO* – Price H**

KAWASAKI Ki 61 TONY

By H. Bando

Superb multi channel 68 in. (1730mm) span scale Jap fighter for 8 – 10 cc motors. Two sheet plan.

RC/931 x x x **Price I**

Cockpit Canopy £2.50 + 95p p&p. (Overseas £1.95)

NEW!

DOUGLAS D.C. 3 DAKOTA

By Pavel Bosak

A 63 in. span scale model of the famous "Dak", "C-47", 'Skytrain', 'Gooneybird' – call it what you will, from the stable of a prolific and practical R/C scale modeller. Model suits two .20 cu. in. (1.5 cc) motors and minimum of four function R/C systems. Radio engine cowls fabricated from plastic bottles.

RC/1440 x x x

Price J

Post 1945 aviation . . .

Super performer

CITABRIA PRO

by Henry Haffke

56 in. span (1422 mm) scale replica of the American parasol wing aerobatic light aircraft with a performance to emulate the full size. Designed for 5 – 6.5 cc (.29 – .40 cu. in.) motors this conveniently sized scale model suits the low budget Sunday flier. For four function radio control systems.

RC/1353 x x x **Price I**

A.B.S. Cowl £2.75 + 95p p&p. (Overseas £1.95)

VICTA AIRTOURER 115

By G. Hahn

Super scale light plane for multi channel R/C 8 – 10 cc. 58 in. (1473mm) span.

RC/922 x x x **Price H**

SCOTTISH AVIATION BULLDOG

By Eric Evans

A 1/6th scale 65 in. (1650mm) span model of this very attractive RAF training aircraft model can fly all manoeuvres possible by the full size aircraft. Features flaps, and aerodynamic control balances. GRP engine cowling and canopy can be obtained commercially. For ·49 – ·61 cu. in. motors (8 – 10 cc).

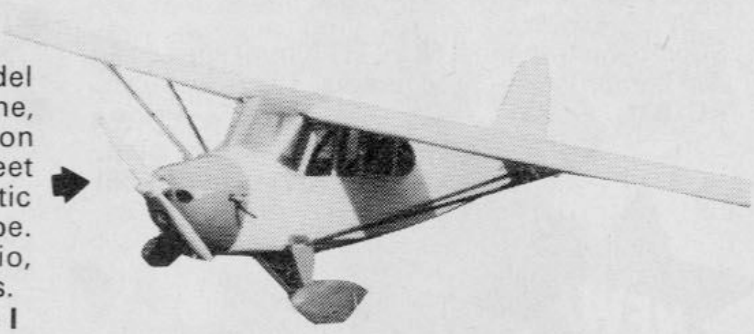
RC/1241 x x x x **Price J**

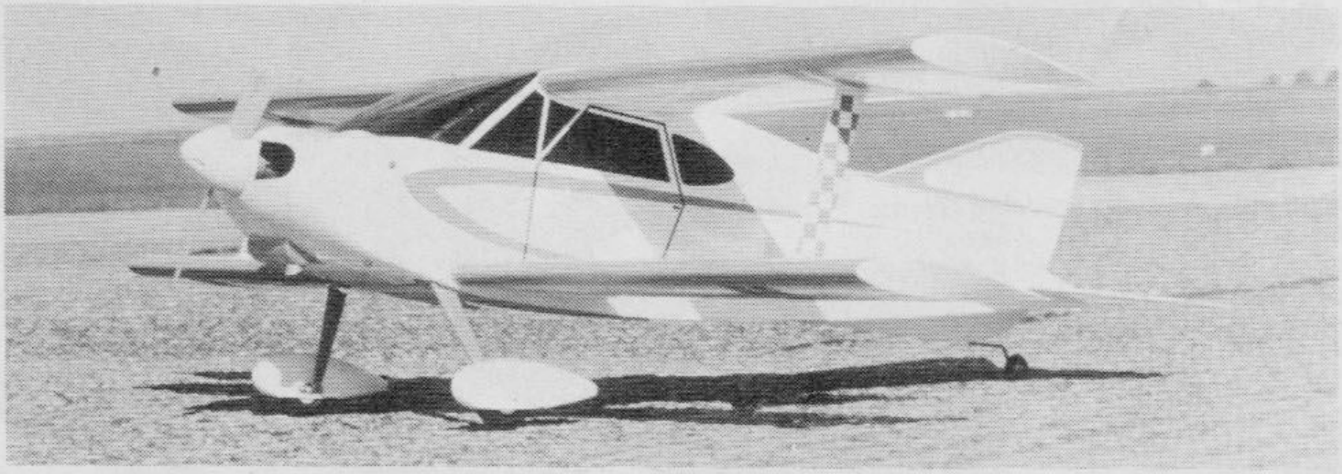
AERONCA CHAMPION

By Don Stothers

71 in. (1800mm) span Class 2 scale model of a favourite American high wing light plane, this model features quite simple construction as scale models go, including basic sheet fuselage sides. Has remarkable aerobatic performance far beyond full size prototype. For 6 – 8 cc motors, and full house radio, although it could be flown without ailerons.

RC/1132 x x **Price I**





SORREL SN7 HIPERBIPE *by David Boddington*

1/8th size sport-scale model of the attractive U.S. homebuilt biplane. 34 in. (864mm) span model suits .20 – .25 cu. in. (3.5 – 4 cc) motors and 4 channel R/C equipment. A nice flier, and aerobatic too.

RC/1414 x x **Price E**

CESSNA 172H

By Eric Fearnley

Delightful Class 2 type scale model of well-known modern light aircraft offering fairly simple construction and gentle flight characteristics satisfactory for the novice to scale R/C modelling. Wing span is 57in. (1450mm), for ·25 – ·40 cu. in. motors (4·5 – 6·5 cc). Four function R/C equipment required.

RC/1210 x x — **Price H**

Cockpit Canopy £2.25 + 95p p&p. (Overseas £1.95)

SPINKS AKROMASTER

By E. Herbert

1/5th scale, 72 in. (1830mm) span scale model of the famous and colourful one-of-a-kind aerobatic craft flown at the 1970 World Aerobatic Championships. Model too, features excellent aerobatic performance. For 10 cc motors. Two sheets.

RC/1107 x x x — **Price K**

BEDE BD5

By Flt. Lt. J. Carr

72 in. (1830mm) span semi-scale model of the sensational American experimental lightweight pusher aircraft. Relatively simple construction, though not a beginner's model. Correct balance is achieved without resorting to much noseweight and without use of an extension shaft for the ·40 cu. in. (6·5 cc) size motor. Two sheets.

RC/1254 x x x — **Price K**

MEYER LITTLE TOOT

By John Grewcock

51 in. (1295mm) span scale model of a really attractive full size home-built biplane suitable for use with 8 – 10 cc motors and four function control systems. The full size 'Toot' was designed and built by Texan George Meyer who, like so many home builders, was also a keen aeromodeller. Two sheets.

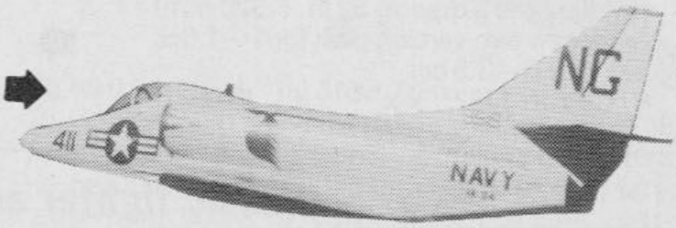
RC/1266 x x x — **Price K**

DOUGLAS A-4 SKYHAWK

By P. Scowan

This 46 in. (1170mm) span stand-off scale model of the American strike fighter for 10 cc motors and 4 – 5 function control systems uses carved foam polystyrene construction for fuselage and wings. Sparkling performance and a winner at the annual Class 2 scale event in New Zealand, home of the designer. Two sheets. Airscrew driven—not ducted fan.

RC/1295 x x x x — **Price L**



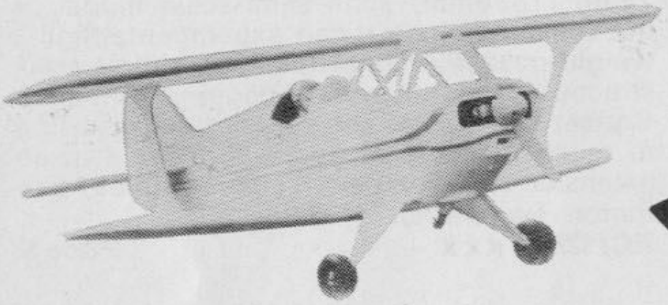
BRITTEN NORMAN ISLANDER

By R. Norris

This Class 2, 1/7th scale model was the winner of the 1972 British Nationals. It has a 84 in. (2140mm) wingspan and is designed for 4/6 function control systems. The model has a good performance using two ·30 cu. in. (5 cc) engines, and an exceptionally good single engine performance. Three sheet plan, very detailed for easy construction.

RC/1255 x x x x — **Price M**

QUICKIE
By R. Jennings
An exciting, out of the rut, sport model of the unorthodox tandem-wing U.S. homebuilt. For .40 cu. in. (6.6 cc) motors and 4 function R/C equipment. Wings may be foam cored or conventional structure 52½ in. span (1330mm).
RC/1409 x x x
Price G



PITTS LITTLE STINKER
By D. Tapsfield
A very pretty 52 in. (1320mm) span ¼ scale model biplane for four function control systems. Not 100% scale, but ideal for Class 2 competitions. Model is based on the full size 'Little Stinker' which was built by Curtis Pitts. For ·49 – ·61 cu. in. (10 cc) motors. Conventional built-up construction clearly shown on large 2 sheet plan.
RC/1258 x x x **Price K**

PIPER CUB *by J. Headley*
Specially commissioned by Aeromodeller magazine from America's top R/C sports designer Jack Headley, this quick build easy to fly little model ensures lots of flying. This realistic semi-scale model features sheet tail and fin, simple sheet box fuselage, which swallows R/C gear and flies like a dream. 52 in. (1320 mm) wingspan two version plan for 1—1.5cc F/F or 2.5—3.5cc.
R/C FSP/1357 x x **Price C**

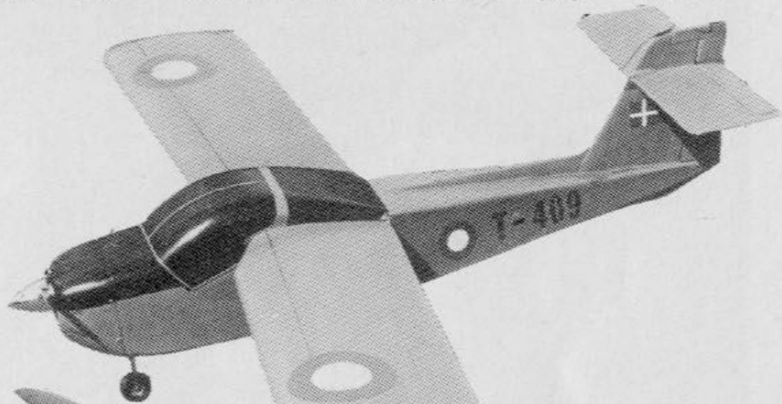
Classic fighter aircraft

HAWKER SEA FURY
By G. Dodwell
Class 2 R/C scale model of the Royal Navy's famous post-war fighter, known for its potent performance. The 56 in. (1420mm) span model captures all the air of the full size, much admired by scale modellers. Retracting undercarriage shown on plan. For 10 cc motors. Suits commercial cockpit canopy.
RC/1204 x x **Price K**

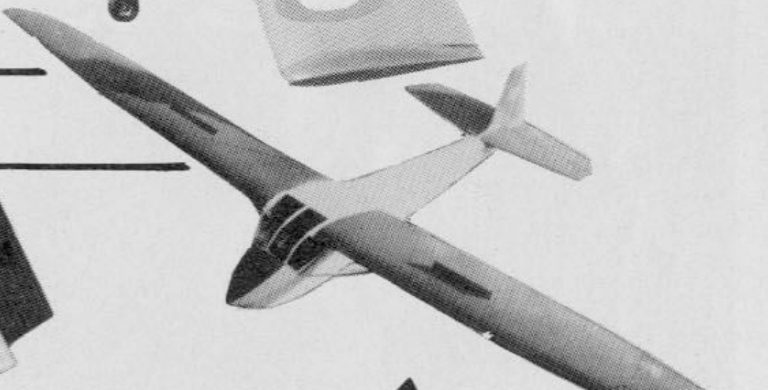
☆ ***Big 1/5th scale model***

BELLANCA CITABRIA *by J. Evans*
Simple sport-scale version of the aerobatic trainer to 1/5 scale (80 in. span) for .60 cu. in. (10 cc) motors and 4 or 5 function radio gear. Construction is straightforward but several areas require careful alignment. Plans show wing flaps.
RC/1402 x x x **Cowl for Citabria £3.85 plus £1.25 p&p.** **Price J**

SAAB SAFARI
By R. Milner-Smith
47 in. (1194mm) wing span sport-scale model of the Swedish primary training aircraft. Simple sheet box fuselage construction and sheet balsa skinned semi-symmetrical wings. Pleasantly aerobatic on a .20 cu. in. (3.5 cc motor and lightweight 4 channel R/C.
RC/1330 x x **Price G**



Scale gliders



The bigger they are— the better they fly

SLINGSBY T46 *by Mike Trew*
A fully detailed scale model by the Slingsby T46 glider trainer. Full size construction is duplicated in balsa, spruce and plywood to provide many absorbing hours of building for the enthusiast whose construction effort will be rewarded by many more hours of fine flying performance. A great flyer. Span 136 in. (3454 mm).
RC/1334 **Price L**

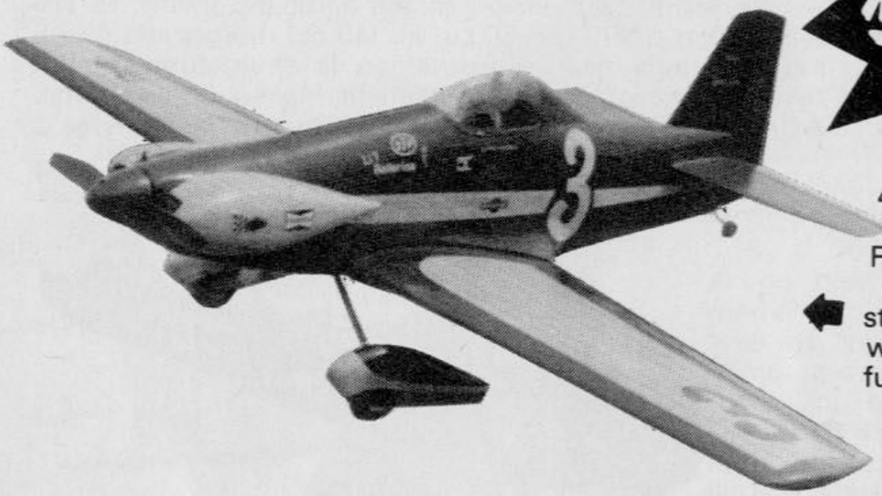
ASK-18 *by C. Charlesworth*
An accurate ¼ scale model of the German high performance sailplane spanning all of 157½ in. Despite size construction is conventional and surprisingly simple — just that much more of it! Wing constructed in 3 pieces and tailplane is fully detachable for transport. Air brakes shown on plan.
RC/1372 **Price M**

L-39 ALBATROS

By Pavel Bosak

58 in. span replica of the Czechoslovakian military jet trainer using rear mounted .60 cu. in. (10 cc) motor. Design offers all the aerobatic performance associated with this type of aircraft and long nose aids in balancing the rear mounted motor. For four function R/C systems.

RC/1424 xxx Price K



Le Vier COSMIC WIND

By Dave Skerychly

40 in. span sport scale model of the famous Cosmic Wind Goodyear/Formula 1 racer, designed with scale aerobatics in mind. Design features straightforward airframe construction with strip aileron wing and basic box fuselage construction. For .20 cu. in. (3.5 cc) motors and two-four function R/C systems with elevator and ailerons essential for 2 function operation.

RC/1425 xx Price F

KRAFT SUPER-FLI *Available September*

By J. Featherby

Big, accurate new quarter scale (2/9ths) replica of Phil Kraft's purpose designed one-off full size aerobatic design which took advantage of his experience in model R/C aerobatics. Sometimes referred to as a "Sorta low-wing Pitts", Super-Fli features thick wing section for constant speed aerobatics and offers an excellent layout for those R/C pilots interested in the "Aresti" free style aerobatic class now gaining popularity. 67 in. span model uses .60 cu. in. (10 cc) size motor and four function R/C equipment.

RC/1438 xxxx Price K

SIMPLE COMPONENT MOULDING

Detail is the icing on the cake for scale models

FREQUENTLY, it is only the addition of minor detail that is needed to transform a model aeroplane into a replica that captures exactly the atmosphere of the full-size. Little touches such as the pitot head, gun blisters, chutes for cartridge ejection and fuel filler caps come to mind, a look at an accurate three-view drawing of the prototype you are modelling will certainly suggest more. Traditionally, many of these items are carved from balsa, made up from odds and ends from the scrap-box, etc., then with the application of various fillers, primers and paint developed into the detailed item they are destined to represent. All too often, it is at this stage in building that an already weighty model can become overweight, for even though the original lightweight material appeared to weigh next to nothing, finishing and fixing puts the weight up dramatically.

Apart from weight considerations, if a part has to be duplicated several times, it can become a chore leading to the feeling that one has become a slave to the production line, rather than an aeromodeller. Some modern plastic moulding techniques can be used to great advantage in miniature, why not consider, having carved one gun blister, making a mould, then either push-moulding, vacuum-forming or GRP moulding the next five, six or seven? The techniques mentioned are certainly not high technology, but 'Cottage Industry' or for the enthusiastic and inventive modeller most definitely. Providing care is exercised, good results can be obtained quite simply.

Push moulding

An ideal method of producing blisters is from thermoplastic sheet, and of course, the obvious question is where does the thermoplastic come from? One can buy virgin material in the form of *Plasticard* from model shops specialising in railway and plastic kit modelling, or re-use secondhand material.

Bubble pack material is a possible source, quite large scraps are freqently found at the edge of the pack. It might even be that a portion of the bubble itself is just what is required. Some plastics have an 'elastic memory' after forming when they are re-heated they revert to the flat sheet that they started from. Some heatshrink films are made this way, the plastic sheet is heated, stretched in all directions, then allowed to cool whilst staying stretched. Re-heating causes it to shrink to its original dimension.

Try warming bubble pack materials, if it

Fig. 1

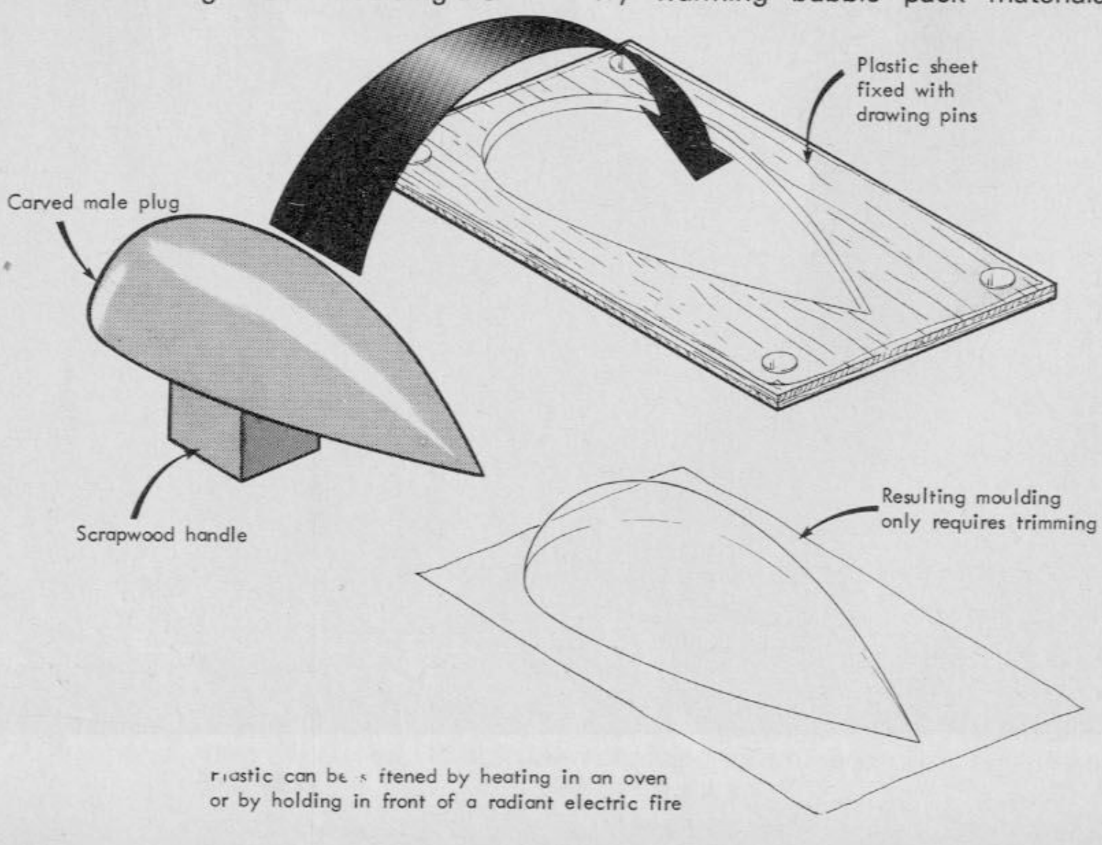
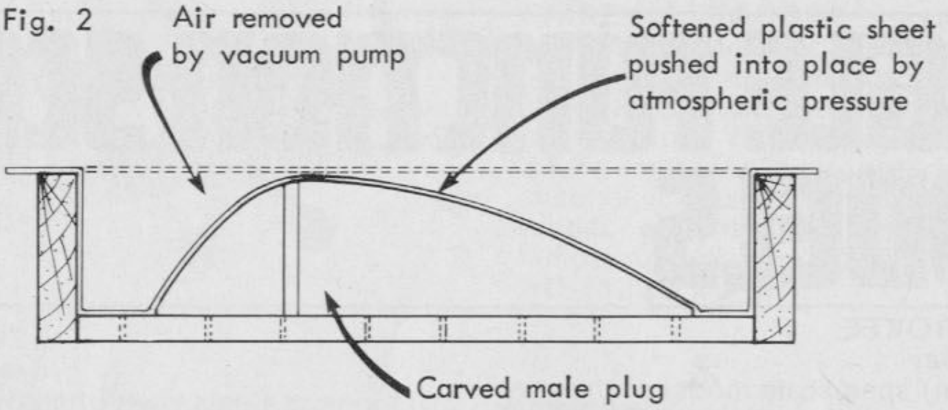


Fig. 2



flattens out, great! To use the material, firstly carve a male mould and a frame to carry the plastic sheet, see Fig. 1. To make a moulding, quite simply warm the plastic until it is soft, then press the male former into the plastic and into the shaped hole in the frame.

It may be necessary to warm the male plug for large mouldings, as local chilling of the plastic can occur where the plug contacts the sheet. Depth of moulding is governed by thickness of sheet plastic and cooling rate; in general terms it should be possible to form a cockpit canopy from .030 in. acetate sheet for quite a large model. Sheet thickness is important, as the shape of the moulding is produced by stretching the plastic sheet over the mould and the result is a thinning of the sheet. It may be possible to try again if first attempts fail, but repeated attempts with the same sheet of plastic are rarely possible. Do produce a good finish on the plug, otherwise wood grain patterns can be transferred to the plastic surface.

Vacuum-forming

Very similar to the above, but the heated plastic is pressed down over, or into, a mould by atmospheric pressure, after sucking out the air around the mould. Fig. 2. A domestic cylinder vacuum cleaner can provide enough 'suck' to produce a small canopy moulding and blisters, but frequently cannot remove the air from beneath the heated sheet quickly enough, causing the plastic to chill before the moulding is completed. Commercial machines overcome this problem by pushing the plug into the softened sheet before evacuation, and using air pressure to blow a bubble into the sheet before 'vaccing down'. It is quite possible for the enthusiast to produce a small machine for one-off production with little more than scrap wood and a few screws. Fig. 3.

GRP moulding

Much has been written about this technique, but possibilities for scale detailing are worth further exloration. A mould has to be made, usually over the top of an accurate replica of the part needing duplication. This is then used as a female mould to produce further mouldings. Try lightweight cloth and either 30 minute or even 5 minute epoxy for rapid turnround from a single mould, after all, strength is not usually a requisite, just rapid accurate duplication. Many plastics can be used for GRP mould work, so a vacuum or push-moulded shape could in turn be used for a mould.

Undercarriage wheel well doors can be produced by GRP mouldings very easily. Frequently, these doors need to be compound curved and if plastic sheet is tightly taped over the area, GRP can be laid up over the area. When this is fully cured, the whole sandwhich can be removed and the reverse side of the GRP used as a mould for producing the doors.

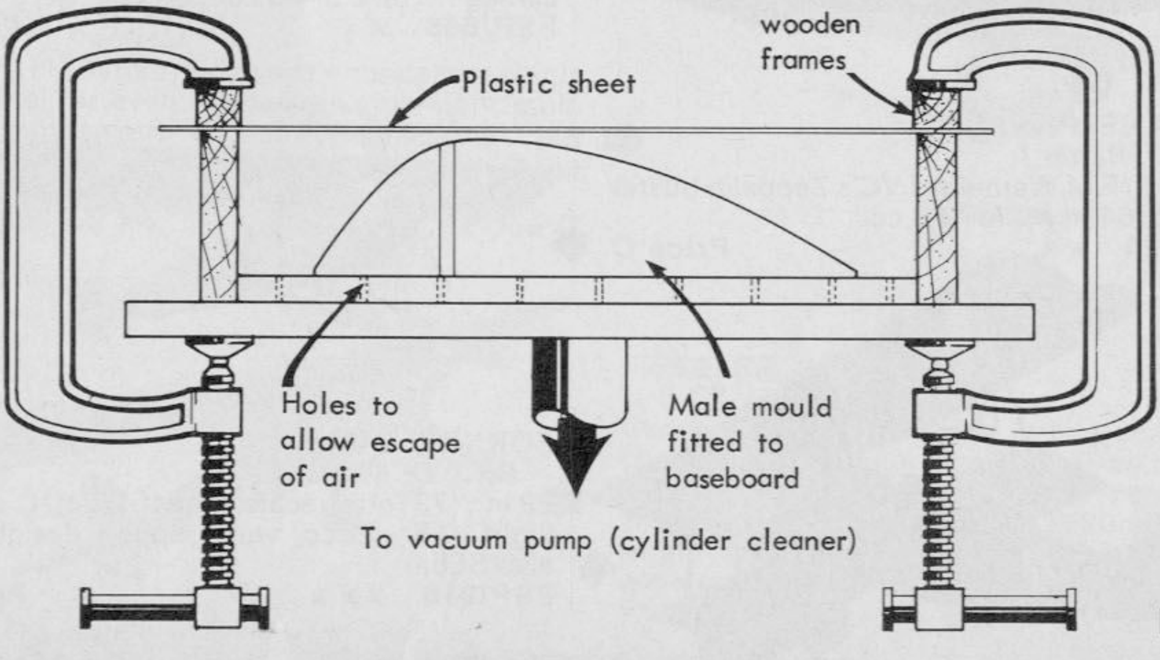


Fig. 3

SINGLE FUNCTION SCALE MODELS

PIPER CHEROKEE
By J. Headley

38 in. (965mm) span scale model of the very popular American light aeroplane, designed for single channel R/C and 0·49 cu in (0·8 cc) motors.

RC/1049 x x **Price D**

BEAGLE PUP 150
By J. Headley

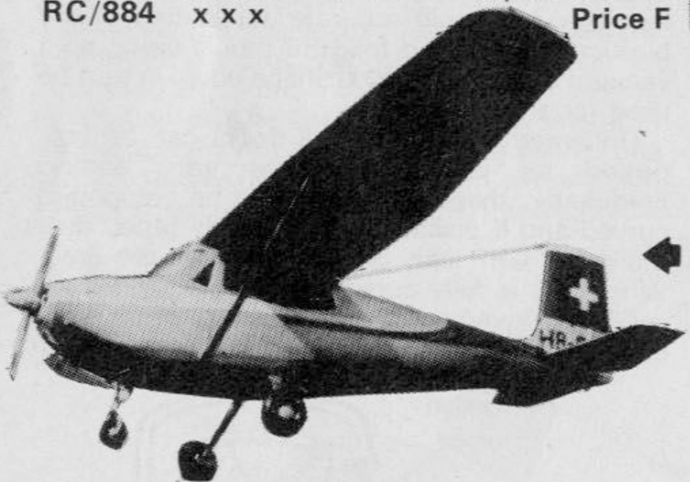
36 in. (914mm) span scale model for free flight or rudder only R/C. Construction is straightforward yet strong and light, resulting in an easy to fly, attractive airplane. For 0·8 cc engine.

RC/983 x x **Price B**

JUNKERS JU 87D
By F. Arigaya

A 41 in. (1040mm) near scale model for rudder only R/C and 1·5 – 2·5 cc engines. Scale deviations are shown. A top seller.

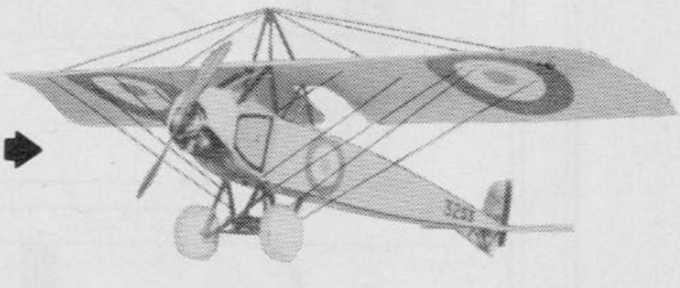
RC/884 x x x **Price F**



CESSNA 172
By W. P. Holland

This 72 in. (1830mm) 1/6th scale model of the popular American light plane is the answer to those who want an easy to build large model for radio conversion. Knock-off wings and shock absorbing trike undercarriage. For 2·5 – 5 cc motors.

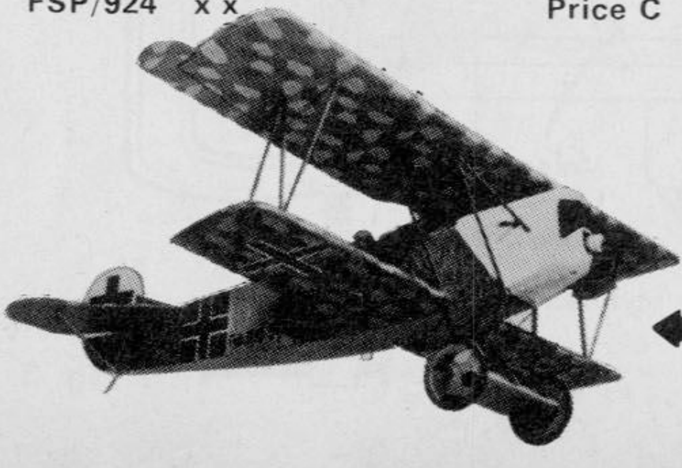
FSP/668 x x **Price G**



MORANE PARASOL
By D. Rattle

R/C or F/F of Warneford VC's Zeppelin buster 34 in. (864 mm), for 0·8 cc.

FSP/924 x x **Price C**



FOKKER DVII
By J. D. McHard

29 in. (737mm) scale model for R/C or free flight, 0·5 – 1 cc, very popular design. See also SE5a.

FSP/916 x x x **Price C**

FAIREY ALBACORE

By M. J. Fardell

50 in. (1270mm) span scale model of the full size machine designed as a successor to the more famous Fairey Swordfish. Suits 2·5 – 3·5 cc motors. Although designed for single channel, it could be converted to multi using rudder, elevator and throttle controls, but radio equipment would have to be light.

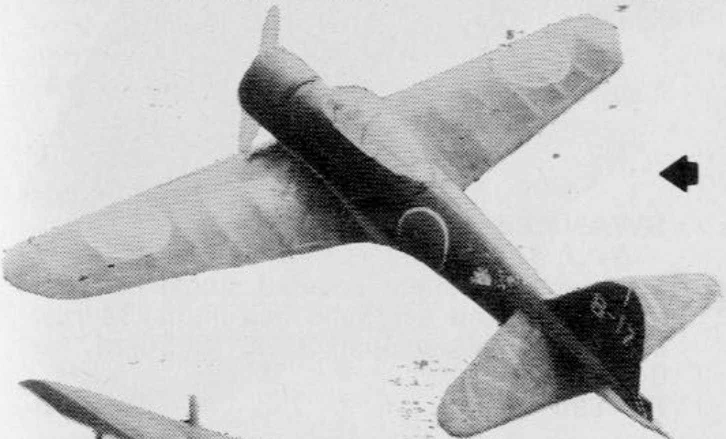
RC/1136 x x x **Price G**

CESSNA 172E

By F. Arigaya

A $46\frac{1}{2}$ in. (1180mm) span single channel R/C flying scale model for 1·5 – 2·5 cc engines. Rudder only or with flaps, ailerons, elevator, rudder, throttle and steerable nose wheel which can be flown free flight. A top seller.

FSP - RC/902 x x x **Price G**

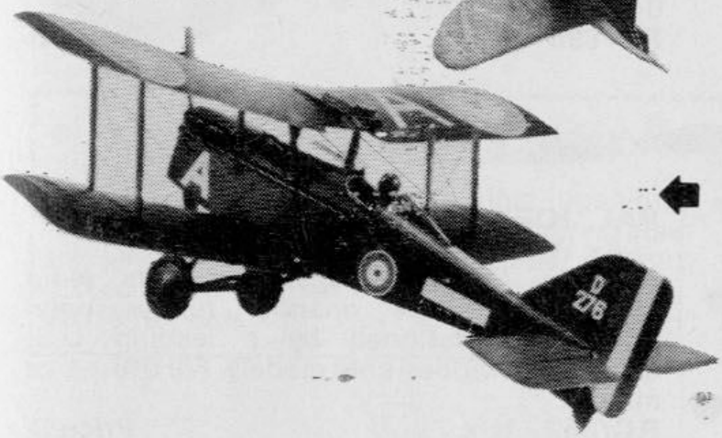


MITSUBISHI ZERO

By J. A. Fleming

Semi scale version of the famous Japanese fighter, originally designed for use with Galloping Ghost pulse proportional, but may also be flown with single channel or up to two functions of modern lightweight proportional R/C. 36 in. (914mm) span model using 1 – 1·5 cc engines.

RC/1165 x x **Price G**



S.E. 5a

By J. D. McHard

Mick Mannock's famous fighter in full detail on specially-printed plan with copious instructions, ten photo illustrations. Fine performer with tough construction. Span 27 in. (686mm). Suitable for single channel R/C. For 0·8 cc engines.

FSP/682 x x **Price E**

FOKKER D VIII

By P. Tranfield

47 in. (1194mm) span scale model for single channel, or even the latest lightweight multi R/C equipment. Not for the beginner, but suitable for those with previous flying experience. 2·5 cc engine.

RC/996 x x x **Price G**

FIESELER STORCH

By P. L. Whittaker

German observation plane in true scale with characteristic slats, flaps and stilty u/c. Stringer fuselage construction, detachable wing halves. Span $46\frac{1}{2}$ in. (1180mm). Full single channel R/C details. For 1–1·5 cc engines.

FSP/669 x x **Price F**

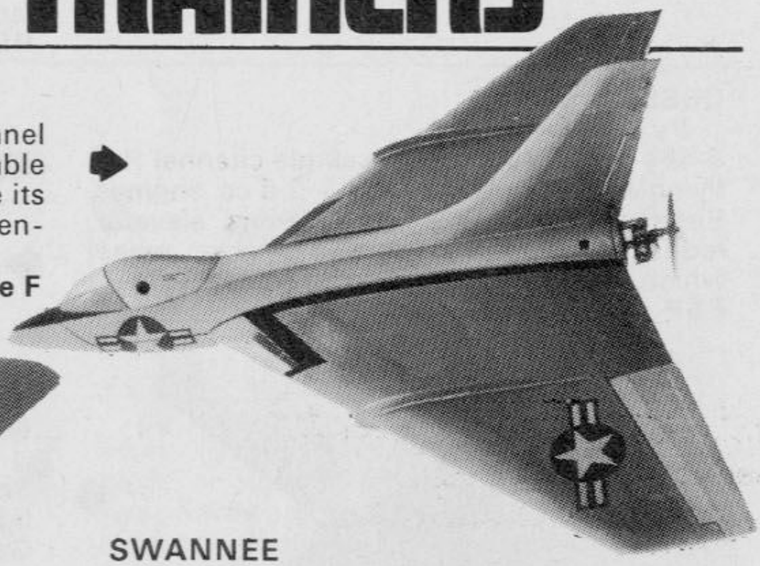
FOR KEY TO PRICE CODES — SEE INSIDE FRONT COVER

SINGLE FUNCTION SPORTS MODELS & TRAINERS

DELTA 707
By W. Biesterfeld

Something really unusual in single channel R/C, this 36 in. (914mm) Delta, also suitable for sport F/F, is very easy to build despite its attractive streamline shape. For pusher engines of 1·5 – 2·5 cc capacity.

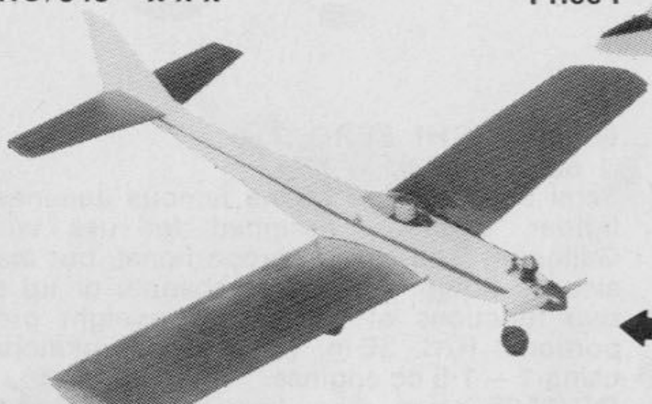
RC/649 x x x **Price F**



SWANNEE
By J. Bowmer

Low wing all sheet covered single channel model fast and aerobatic has multi 'Taurus' lines in miniature. Span 38 in. (965mm), for 0·8 cc engines.

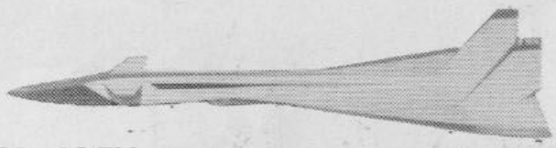
RC/898 x x **Price B**



P.1174
By J. Crampton

Supersonic transport layout canard, all sheet single channel radio flier, with coupled twin fins. Pushel 0·8 cc engine. Span 22 in. (560mm).

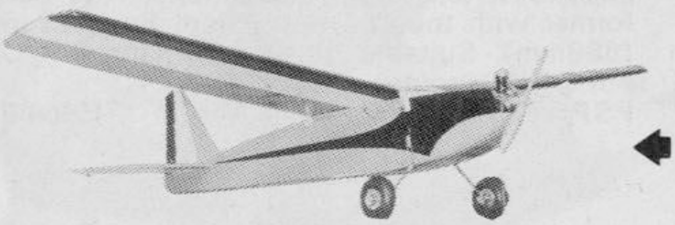
MA/394 x **Price D**



PAL JOEY
By W. Winter

A 42 in. (1067mm) span beginners' radio model for single channel rudder only. Specifically designed by a leading U.S. designer of rudder-only models. For 0·8 – 1 cc motors.

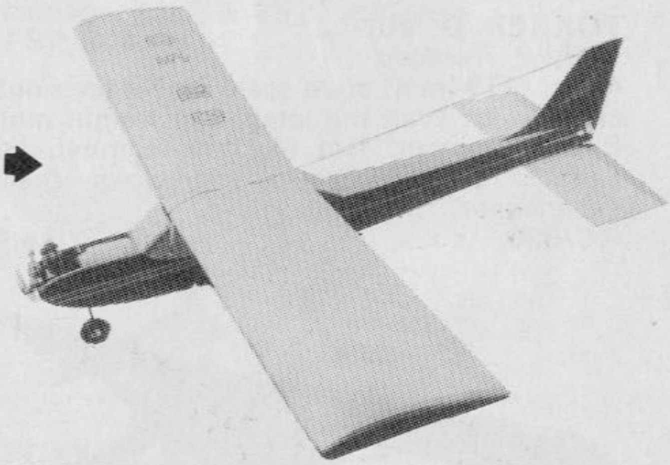
RC/852 x x **Price D**



CRAFTSMAN
By D. Boddington

A single channel 'all weather' sports trainer, also suitable for galloping ghost systems and lightweight proportional using 1·5 – 2·5 cc engines. 47½ in. (1206mm) span.

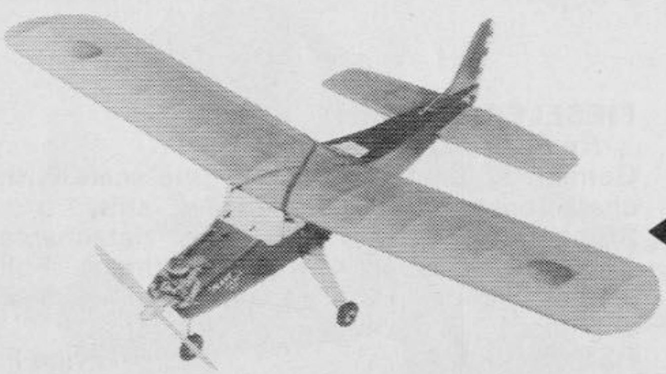
RC/993 x x **Price F**

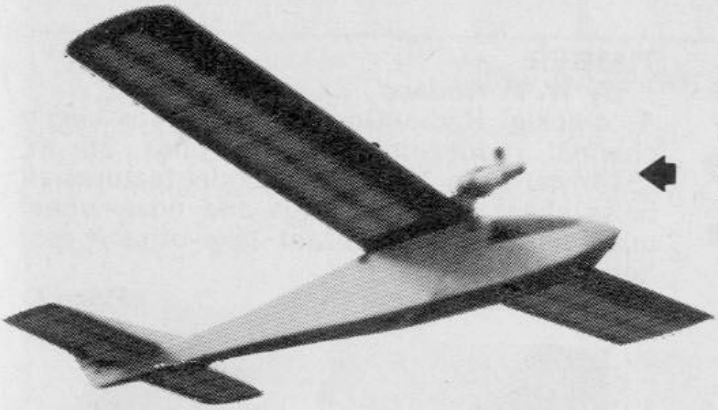


PLANE SIMPLE
By M. A. Garland

Easy to build and fly, this model is ideal for single channel systems, using 1 – 1·5 cc engines, 36 in. (914mm) span.

RC/986 x x **Price D**



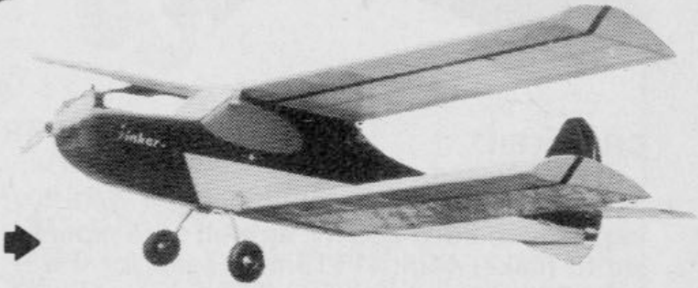


APPRENTICE

By D. Boddington

Ideal introduction to single channel flying, which can be flown with a power pod, or as a slope soarer if desired, 48 in. (1219mm) span for up to 0·8 cc engines.

RC/979 x x **Price B**

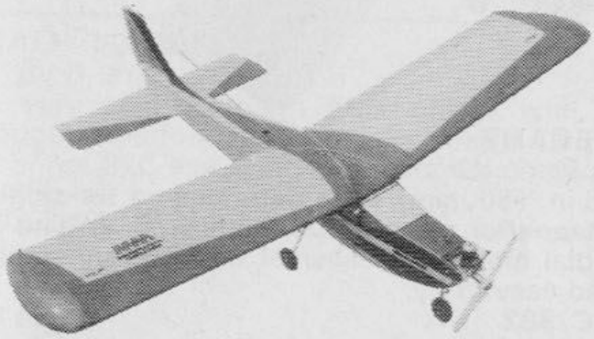


TINKER

By David Boddington

45 in. (1143mm) span sport biplane design which can be built to take either single channel or multi R/C gear for up to three functions, excluding ailerons. Basically designed for 1·5 – 2·5 cc motors, it will take up to 3·5 cc motors with multi R/C.

RC/1147 x x **Price E**



SCHOOLMASTER

By K. Willard

Produced in co-operation with Top Flite Models this 39 in. (991mm) span single channel model has an all sheet covered structure with motor, rudder and kick up elevator controls. For 0·8 – 1·5 cc motors.

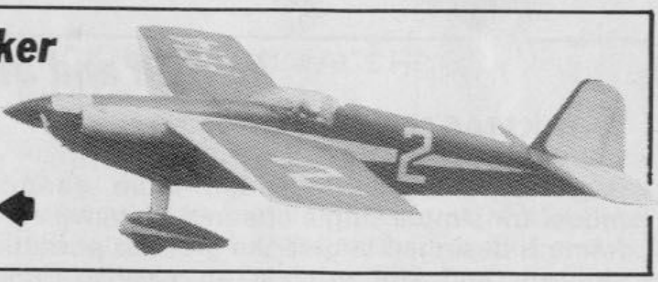
RC/875 x x **Price E**

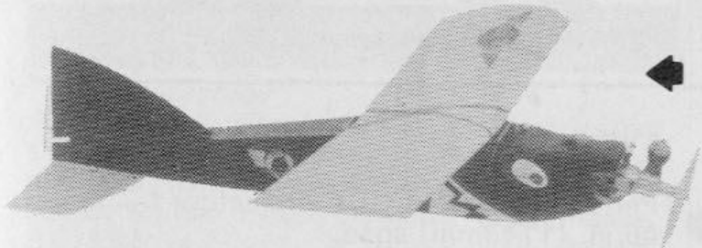
BLISTER ***Here's a racey looker***

By P. E. Norman

Designed by one of Britain's most ingenious modellers. Good looking, near unbreakable thrilling sports radio control model to suit 2·5 cc engines. Span 42½ in. (1080mm).

RC/815 x x x **Price H**





SHARKFACE

By E. Clutton

Rudder only 22 in. (560mm) span aerobatic model, simple construction, knock off engine mounting. Claimed to be almost indestructible. For 0·8 – 1·5 cc motors.

RC/887 x **Price B**

STAR PLAN GRADING

x A simple design with sufficient detail and explanation for the complete beginner.

x x Slightly more advanced, for the average modeller or beginners with some modelling experience in other fields.

x x x For modellers of some experience, or those who have built one or two similar models or are prepared to read up constructional technique.

x x x x For the expert able to interpret drawings (e.g., 3-view drawings) and decide his own constructional methods; also used for designs where workshop equipment is called for.

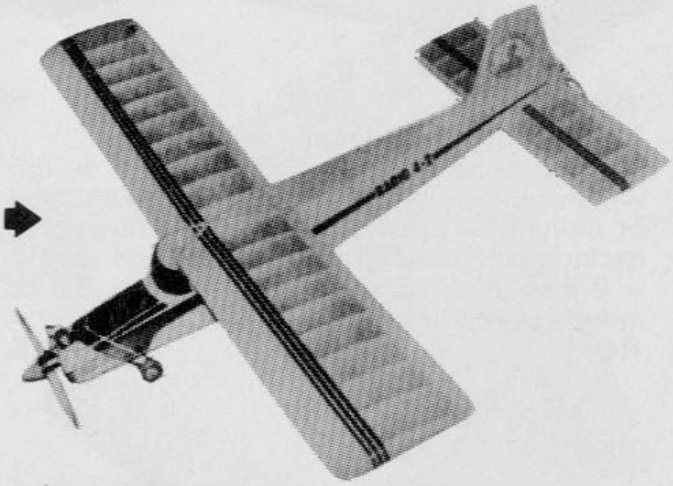
SMOKE TRAIL

By C. A. Foss

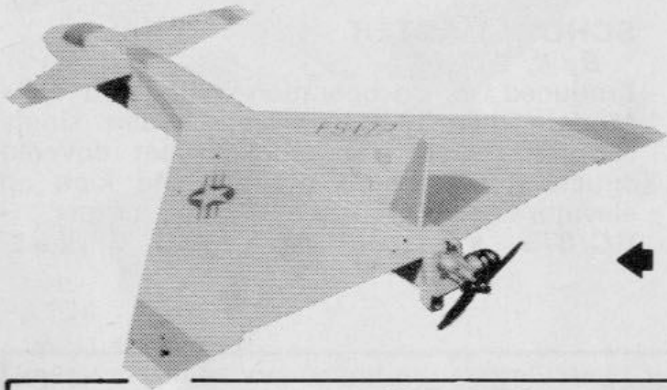
A 32 in. (813mm) span 'three-in-one' model for free flight, radio and ski equipped snow flying. Full instructions and ski details make this simple construction model ideal for the novice. Engines 0·5 – 0·8 cc.

RC/PET 864 x x **Price B**

TIMBER
By W. P. Holland
A 'quickie' Radio Control trainer for single channel rudder-only systems, this 36 in. (914mm) span 1 – 1·5 cc model features all balsa sheet covered wings and nose-wheel undercarriage for pleasant take-offs. A real 'toughie'.
RC/811 x **Price E**



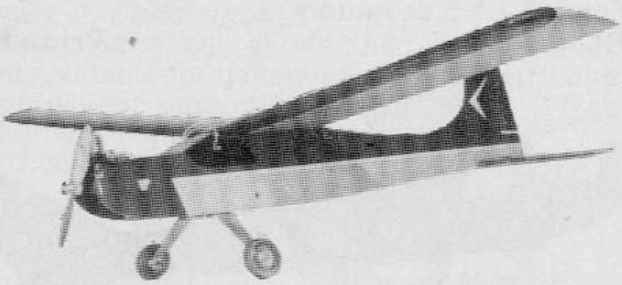
CRACKER
By V. Smeed
Ideal introduction to single channel R/C flying. Easy to build and fly, as well as inexpensive to make, 44in. (1118mm) span for 0·8 – 1·5 cc engines.
RC/1045 x x **Price C**



DECANT
By D. Walton
26 in. (660mm) span delta canard for single channel or pulse proportional R/C. Engine is radial mounted pusher of 0·8 cc. Very stable and easy to fly.
RC/982 x x **Price E**

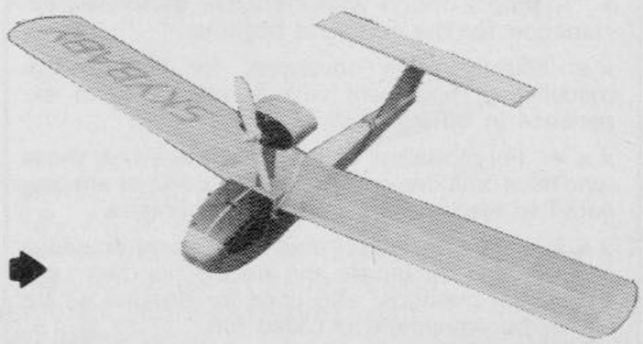
Rugged and attractive!

WORKMASTER
By R. G. Moulton
Beginner's semi-scale tough radio control model for simple single channel systems. Airframe is designed to give the greatest possible strength and still provide an easy-to-build model of light weight. Span $47\frac{3}{4}$ in. (1213mm) for 1 – 1·5 cc engines.
RC/821 x x **Price E**



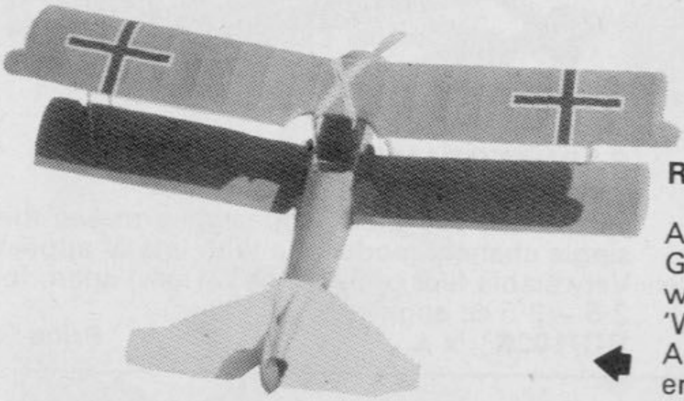
TYRO
By D. Boddington
Perfect rudder-only R/C project for 1 – 2·5cc, 45 in. (1143mm) span.
RC/920 x x **Price B**

SKYBABY
By D. Greenfield
A 39 in. (990mm) span power assisted glider for single channel control systems. May be built with over-wing power-pod installation for ·049 cu. in. (8 cc) motors.
RC/1239 x x **Price E**



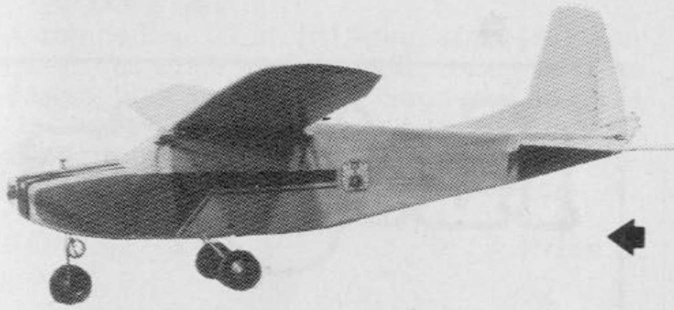
They hate each other!

WARRIOR
By D. Boddington
Semi-scale British W.W.1 fighter, for single channel R/C, 42 in. (1067mm) wingspan, this model has a very stable flight pattern. For 1·5 – 2·5 cc engines.
RC/948 x x **Price E**



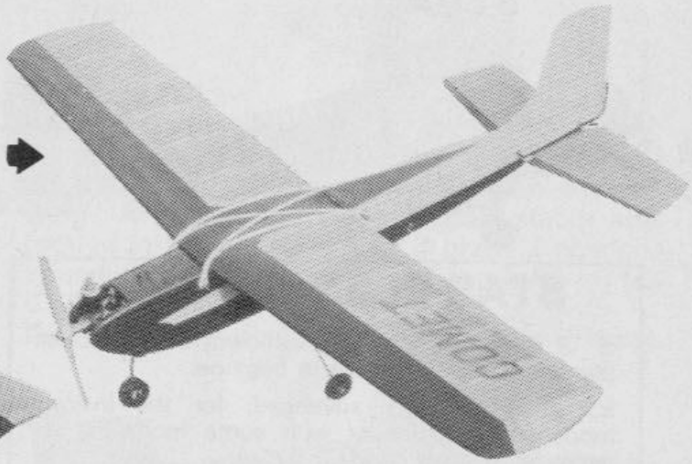
RED KNIGHT
By D. Boddington
A simple to build semi-scale model of a German W.W.1 fighter type of 42in. (1067mm wingspan, a perfect dogfight partner for 'Warrior'. For single channel R/C equipment. Another very stable model. For 1·5 – 2·5 cc engines.
RC/949 x x **Price E**

HALF TONE
By D. Platt
A very simple, tough little model with a sprightly performance for lightweight single channel R/C and 0·8 cc engines. Span 38 in. (965mm).
MA/357 x **Price D**



LOCKHEED-AERMACCHI SANTA MARIA
By Vic Smeed and D. Boddington
Single channel R/C semi-scale model of 35 in. (889mm) wingspan with all balsa fuselage. Plan features details of Mono Pack R/C equipment installation. For 0·8 – 1 cc motors.
RC/963 x **Price B**

MINI COMET
By Y. Machida
A delightfully simple 37½ in. (952mm) span single channel model for 0·8 cc motors upwards. Choice of wing structure gives sedate trainer or hot aerobatic performance.
RC/892 x **Price E**



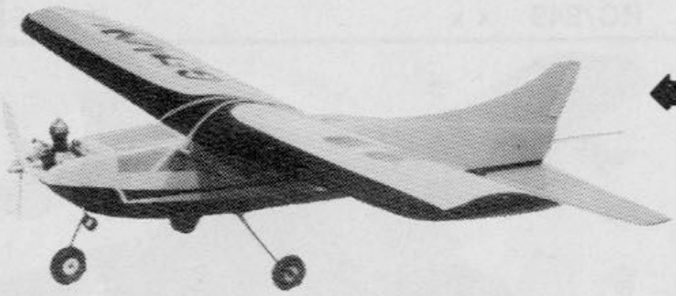
MINI-TYRO
By D. Boddington
Small size version of David Boddington's popular 'Tyro' trainer, for single channel rudder only control. 32 in. (813mm) span, for 0·5 – 1 cc motors.
RC/1065 x **Price B**

FOR KEY TO PRICE CODES — SEE INSIDE FRONT COVER

Your choice of sizes!

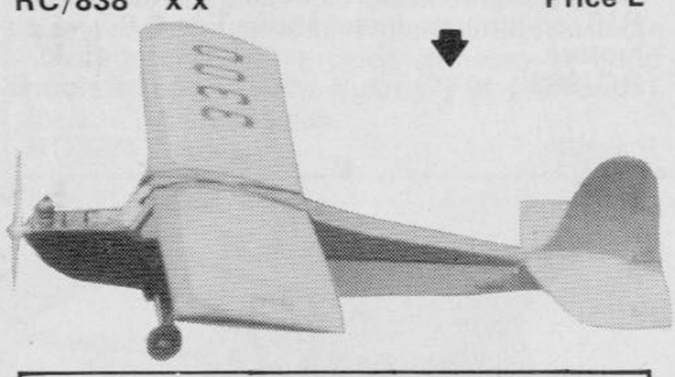
BARNSTORMER BABY
By David Boddington
Mini version of David Boddington's parasol winged Barnstormer design. Offers attractive lines and pleasant performance. Wing span 32 in. (813mm). For 0·8 – 1 cc motors.
RC/1106 x x **Price E**

BARNSTORMER
By D. Boddington
Out-of-the-rut 'oldie' appearance makes this single channel model one with lots of appeal. Very stable flier of 52 in. (1321mm) span, for 2·5 – 3·5 cc engines.
RC/1039 x x **Price G**



JUMPING GEMINI
By D. Tafler
A simple, fast, single channel model for 0·8 cc glow motors and miniature receivers. 28 in. (711mm) span. An R/C 'hot-rod'.
RC/839 x x **Price B**

LUMPERS
By G. L. Harber
The ideal introduction to R/C flying, a really tough single-channel model, prototype flight tested through hundreds of flights in rough country of East Africa. Designed for the 'Lone-hand' and widely praised since publication. 48 in. (1219mm) span. For 1·5 – 2·5cc motors.
RC/838 x x **Price E**



STAR PLAN GRADING

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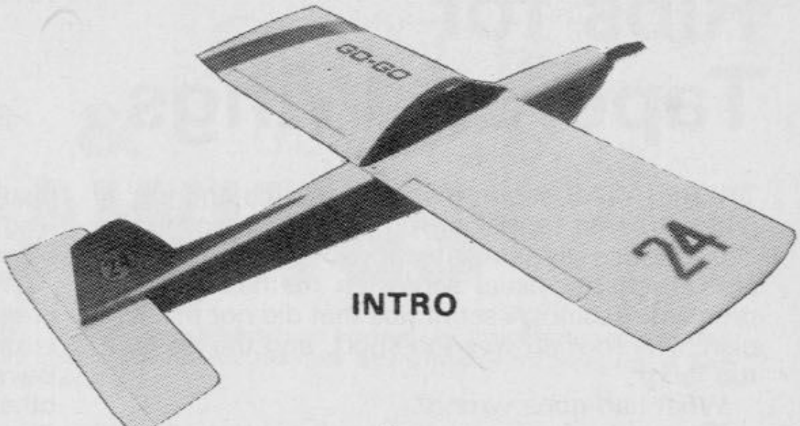
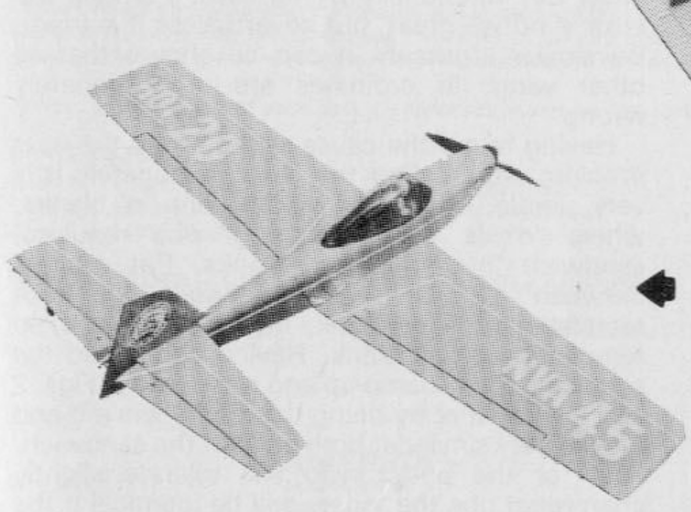
x x x For modellers of some experience, or those who have built one or two similar models or are prepared to read up constructional technique.

x x x x For the expert able to interpret drawings (e.g., 3-view drawings) and decide his own constructional methods; also used for designs where workshop equipment is called for.

PYLON RACERS



INTRO

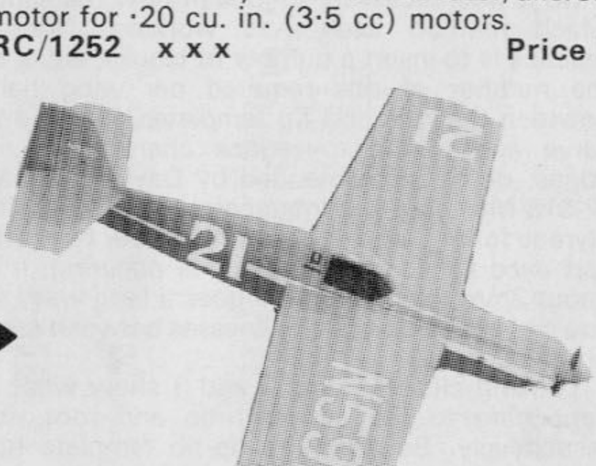


HOT 20 and INTRO

By David Boddington

Two models on one sheet, both designed primarily for the Club 20 Pylon racing class. Models have similar airframe structure. The 'Hot 20' is a low wing design with a 37 in. (940mm) wingspan, the 'Intro' is a shoulder wing model with a 38 in. (965mm) wingspan. Both models are also suitable for general sport flying, and each is designed to use 2/3 function control systems on elevator/aileron/motor for ·20 cu. in. (3·5 cc) motors.

RC/1252 x x x **Price H**



DICK OHM SPECIAL

By Dave Day

A competitive 32 in. (813mm) span ½A pylon racer, this scale model of the attractive racer design built in 1959 for Goodyear Formula One racing. Suits aileron and elevator control systems and may also be used as a fast aerobatic sportster for powerful ·049 cu. in. (0·8 cc) or 1 cc motors.

RC/1242 x x x **Price D**

ESTRELLITA

By R. Greenwood

A new formula F.A.I. R/C pylon racer with very attractive near scale lines, featuring semi-eliptical wing. A really hot racing model, stable and groovy in the air. A winner if given a chance. Four function radio required. Span is 50 in. for 6.5 cc motors.

RC/1068 x x x **Price G**

'OLE TIGER

By Eric Rhodes

45 in. span pylon racer to new F.A.I. racing specification of Bob Downey's famous full size racing machine. Excellent racing performance on a "hot" .40 cu. in. motor. Glass fibre wheel parts available from the designer.

RC/1113 x x x **Price G**

Ribs for Tapered Wings

Ron Barnes describes his method of getting the best results from the sandwich method

THERE I WAS creating my latest pride and joy, when it came to making up a set of wing ribs. So, produce ply templates for root and tip ribs, and adopt the usual sandwich method — no problem. Result? A set of ribs that did not fit the plan. The root rib was too short, and the tip rib too long!

What had gone wrong?

The method, of course, is well tried and had worked for me in the past albiet with a little sanding/trimming on assembly to get the best fit. This time, the ribs were so far out that the technique itself had to be questioned. After all, if the templates are correct what else is there to go wrong?

Questioning began with looking at the difference between the plan form of this latest wing, and those previously built. No doubt about it, a good straight taper — but what a taper, eleven inches at the root to 3½ inches at the tip, i.e. a difference of 7½ inches.

So it was necessary to look at how the sandwhich method itself was working. Normal practice is to insert a number of blanks, equal to the number of ribs required per wing half, between the root and tip templates, clamp and carve away. And to reduce chamfer on rib edges, do as recommended by David Vaughan (P-51B Mustang) and intersperse the blanks with styrene foam — Fig. 1 (I use the veneer type, the sort used for lining walls prior to papering. It is about 2mm thick and a roll goes a long way, so you can afford several thicknesses between each rib if you want).

Looking closely, Figs. 2 and 3 show what is happening to the apparent tip and root ribs respectively. Because the tip-rib template has finite thickness — usually about ⅛ in., it does not allow the actual wing rib blank next to it to be reduced to the correct length, and an error a-b results. This error is seen to be about the same as length a-c which is the difference between the adjacent ribs (about ⅓ in. in my case).

The root rib is not affected by template thickness, but fractionally by its own. Perhaps the error is not so great, but nevertheless it is there. By similar argument it can be shown that all other wing rib ordinates are proportionately wrong.

Having found the cause of the errors the next problem was to find the cure. Fortunately it is very simple. Instead of sandwiching 'n' blanks, where 'n' is the number of ribs required, sandwich 'n' minus two blanks. Put spacers between all blanks and between the root template and first blank, but not between tip template and last blank. Having concocted the sandwich thus, clamp up and carve away. Figs. 2 and 3 show that by doing this the tapers a-b and a-c are very similar at both ends of the sandwich. And for the purist who will tolerate slightly chamfered ribs the tapers will be identical if the tip template thickness is the same as the thickness of a rib blank plus spacer.

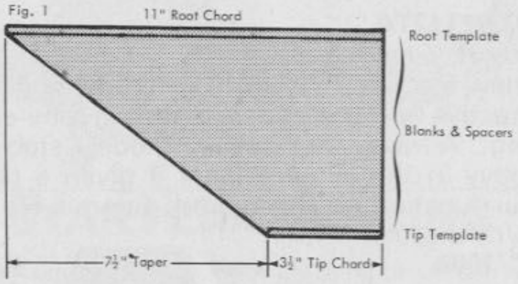
This method produces all ribs *between* root and tip to their correct profiles, whilst root and tip ribs themselves can be cut separately to the profiles of their actual templates (which you have made for the sandwhich anyway).

Well, there you have it, a set of ribs which are more nearly accurate than was possible beforehand.

Admittedly the problem was highlighted by the amount of taper on the wing in question, but the 'geometry' is true of any tapered wing, and accounts for why it has always been necessary, in the past, to trim here and there on assembly. By using the modified approach outlined above, this problem has been overcome. What is more, I was able to use the original set of U/S ribs — that is all except two — in the new sandwich to produce a good set.

I hope this method saves you the usual time spent 'fudging' — not to mention unnessary expenditure — get carving!

Fig. 1



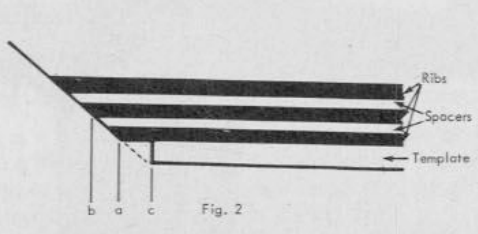


Fig. 2

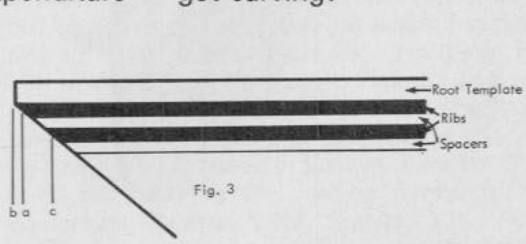


Fig. 3

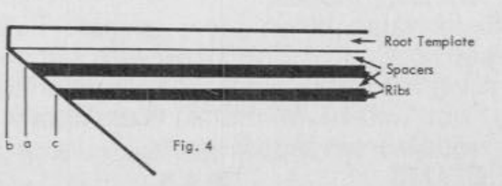


Fig. 4

Aero Modeller & SCALE MODELS
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2774	A & J	F4U-1 Corsair	B
2668	A & J	F8U-1 Crusader	B
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		Chester	
2726	A & N	Jeep Racer	C
		Consolidated	
2983	A & J	B24J Liberator	E
		Convair	
2653	J	YF-102 (prototype)	A
2226	A	F-102 Delta Dagger	A
2821	A	XFY-1	B
		Curtiss	
2671	A & F	Cleveland	C
2698	A & F	P6E Hawk FIIC Goshawk	C
2884	A & H	Kittyhawk I, III, IV	E
2739	A & F	JND4 Jenny	C
2755	J & U	Navy Racer CR1, 2, 3	C
2832	A & J	Sparrowhawk	C
		Douglas	
2783	N & A	DC-3 Dakota	E
2872	J & H	SBD-5 Dauntless	D
2856	A	D558 Skyrocket	A
2989	J & U	DB7/A20 Boston/Havoc	G
2876	A & O	Havoc (Turbinlite)	A
2445	A & J	F4D-1 Skyray	B
2649	A & J	Skyhawk	B
2777	A & F	World Cruiser	D
2778		World Cruiser Dimensions (comparison to above)	C
		Erco	
2446	A	Ercoupe 415G	A
		Folkerts	
2771	A & H	SK. 3 Jupiter	C
		General Dynamics	
2920	A & J & O	F-111E	E
		Granville	
2789	J & H	Gee-Bee R1	C
		Great Lakes	
2748	A & F	(Harold Krier's)	C
		Grumman	
2683	A & J	F9F-8 Cougar	B
2955	A	(Grumman) F-14 Tomcat	E
2706	A & F	Gulfhawk & F3F-2	C
2984	U	Guardian	D
		Meyer	
2701	A & F	Little Toot	B
		Loving Wayne	
2707	A & F	Love	B
		Lockheed	
2657	A & J	F-94 Starfire	B
2757	A & J	F-104 Starfighter	D
		Martin	
2949	O, J & F	B-26A & B Marauder	F
		McDonnell-Douglas	
2747	A & J	F4H Phantom (Proto)	C
2922	J, A & H	F4K & M Phantom	E
		Northrop	
2738	A & J	N.156 Freedom Fighter	C
		North American	
2647	A & J	Harvard	B
2766	H, A & J	P.51 B, C & D Mustang	F
2717	A & J	F-100D Super Sabre	C
2489	A & J	F-86E Sabre	B
		Pesco	
2745	J & F	(Roscoe Turner's)	C
		Piper	
2974	A & J	PA 28 Cherokee One Forty	B
2975	A & J	PA 28 Arrow	B
2976	A & J	PA 32 Cherokee Six	B
2998	H & J	Cub J3 & L4	D
		Pitts	
3016	S	S-1	H
2962	G & F	S2A Special	D
		Republic	
2793	J & H	P.47 Thunderbolt	C
2713	A & J	F.105B Thunderchief	B
2700	A & J	Thunderstreak	B
2822	J	Thunderjet	A
		Ryan	
2688	J & F	'Spirit of St. Louis'	B
		Travel-Air	
2935	J & U	Woolaroc	C
		AUSTRALIAN	
2841	A & J	Victa Airtourer 100	C
2878	J & H	Victa Airtourer 210	C
2951	A & H	Commonwealth AC, CA-1 Wirraway	C
		BELGIAN	
3001	A & J	Stampe SV4C	E
2721	F & J	Tipsy Nipper	B
2805	J	Tipsy Junior	A
		BRITISH	
		Airmark	
2905	G & F	Cassutt Racer	D
		Arrow	
2801	J	Active II	A
		A.N.E.C.	
2007	H	Missel Thrush IV	A
		Armstrong-Whitworth (AW)	
2736	N & J	AW 650 Argosy	D
2818	A & J	FK8 'Big Ack'	B
2780	A & J	FK10 Quadruplane	B
2651	A	Meteor NF. 14 (see Gloster)	A
2014	A & J	Siskin	B

Pack No.	Scale Code		Price Code
		Auster	
2018	A & J	Ambulance B.4	B
2016	A & J	Autocar J.5B Autocar	B
		Avro	
2781	N, J & A	Lancaster I & III	E
2758	E & J	Rota (Cierva 30)	D
2702	N & J	Shackleton MR. III	D
2759	J & N	Vulcan II	C
2967	H & J	504K	D
2023	A & K	707A	B
2744	O & A	748 Airliner	D
		Beagle	
2823	J	B206	A
2890	J & H	Pup 100 & 150	C
		Blackburn	
2743	A & J	Airedale	B
2842	J	Buccaneer Mk. I	A
2868	J & A	Buccaneer S Mk. 2	B
2806	J	Lincock III	A
2052	A	Monoplane 1912	A
2855	A	Shark 1, 2, 3	A
		Boulton Paul	
3014	H, A & J	Defiant	G
2689	A & J	Overstrand	C
2055	A & J	P.III	A
		Bristol	
2845	A	Bloodhound	A
2958	H & J	Beaufighter I-IV	G
2060	J	Brabazon	C
2709	N & O	Britannia 312	C
2718	A & F	Bulldog IIa	C
2692	A & F	F2B Fighter	C
2838	J	Monoplane M1B, C & D	B
2792	A & J	Scout D	B
2809	J	173 Belvedere	A
2117	A & J	171 Mk. 4 Sycamore	B
		Chilton	
2119	F & J	D.W.1a (Trainer)	B
		Currie	
2788	A & H	Currie Wot	C
		Dart	
2124	F	Kitten II	A
2125	J & F	Pup	B
		De Haviland	
2833	F & J	D.H.2 Fighter	D
2735	A & F	D.H.4	D
2765	A & J	D.H.5	B
2970	F & J	D.H.9	C
2852	A & J	D.H.9A	B
2791	J & F	D.H.34	C
2708	A & F	D.H.60 Moth	C
2959	A & H	D.H.71 Tiger Moth	C
2144	F	D.H.75A Hawk Moth	B
2681	A & B	D.H.82A Tiger Moth	D
2954	J & F	D.H.85 Leopard Moth	C
2930	P & J	D.H.87A Hornet Moth	D
2149	J & H	D.H.88 Comet (Racer)	D
2690	A	D.H.89A Rapide	A
2834	J	D.H.94 Moth Minor	A
2752	N & A	D.H. Comet 4B	D
2168	A & J	D.H.110	A
2680	J & A	D.H.112 Venom, Series	C
2163	A	D.H.115 Vampire	A
2861	J & A	D.H. Mosquito, II, IV, VI	F
2164	K	D.H. TK4	A
		Edgar Percival	
2696	A & J	E.P.9	B
		English Electric	
2171	A & J	Canberra 2	B
2704	J & A	Canberra 8 (I) 8	C
2785	J & A	Lightning Mk. 1a	B
2916	A & J	Lightning F'6 (B.A.C.)	D
2851	P	T.S.R.2	A
		Fairey (Britten-Norman)	
2914	J & F	Battle B Mk. 1	E
2656	A & J	Fairey F.D.2	B
2672	A	Fantome	A
2900	A & J	Firefly Mk. V	C
2763	H	Fox	C
2664	A & J	Gannet T1 & A.S.1	C
2971	F & J	Seafox	D
2795	J & F	Swordfish I & III	D
2859	A	111D	B
2937	A, J & N	Islander	C
		Felixstowe	
2980	A & J	F2A Flying Boat	D
		Gloster	
2798	J	Bamel	A
2960	A & J	Gamecock	D
2714	A & F	Gladiator	C
2214	A	Grebe I	A
2670	J & A	Javelin Mk. I	C
2220	A	Meteor VIII	A
2225	A	IVB Seaplane	A
2742	A & J	VI Racer	B
		Handley Page	
2882	J, N & A	Halifax	F
2677	J	Heyford	A
3000	J & N	Victor	J

Pack No.	Scale Code		Price Code
		Hawker	
2727	A & F	Fury (Biplane)	C
2729	A & F	Hart	D
2892	J, H & A	Harrier GR1 & T2	E
2731	J & A	Hurricane Mks. I-IV	C
2663	A & J	Hunter V	B
2241	A & J	P.1067 Hunter	B
2850	A	P.1127 (Kestrel)	A
2943	H, A & J	Hawker Tempest Mks. I-IV	H
2953	U & J	Tomtit	B
2808	J & H	Typhoon	H
2049	A & J	Woodcock	B
2250	A & J	N7/46 Sea Hawk	B
		Heston	
2804	A	Phoenix	B
2786	A & H	Fury I	B
2888	A & H	Fury II	B
		Luton	
2256	J & F	Minor	B
2247	J & F	Buzzard	B
		Martin Baker	
2889	J & H	MB5	C
		Miles	
2904	J & H	Hobby M13	C
2813	A	M.20	A
2063	A & J	M.21 Hawk Speed 6	B
2292	A & J	Sparrowjet	B
		Percival	
2894	J & H	Mew Gull E3H	C
2301	A	Mew Gull P.6	B
2991	H & J	Proctor Mk. IV	E
2300	A	P.56 Provost	A
2661	A & J	Jet Provost II	B
2986	J	P50 Prince	A
		Prestwick	
2302	A & J	Pioneer II	B
		Royal Aircraft Factory	
2978	F & J	BE2c	C
2716	A & F	B.E. 2e and 12a	C
2669	F	F.E.2b	B
2703	A & F	R.E.8	C
2694	A & F	S.E.5a	C
		Rollason	
2901	P & A	Condor	D
2925	G & F	Beta	E
		Saunders-Roe	
2831	A & J	S.R.53	C
2724	A & J	S.R.177	B
		Short	
2988	J & O	Singapore	E
2307	A & J	S.A.6 Sealand	C
2317	A	Seamew	B
		Slingsby	
2812	A & J	Sky	B
		Sopwith	
2320	A & J	Buffalo	B
2699	A & J	Camel	B
2754	A & J	Dolphin	B
2844	A & J	Pup	B
2686	A & J	Snipe	B
2751	A & J	Tabloid	C
2741	A & J	Triplane	B
2779	A & J	1½-Strutter	B
		Supermarine	
2335	A	Sparrow	A
2985	A & J	Spitfire prototype	D
2896	A, P & G	Spitfire Mk. 1	E
2740	J & H	Spitfire IX & XVI	D
2999	H & J	Spitfire XIV	I
3006	H & J	Spitfire 20 & 22	H
2807	A & J	Seagull	B
2764	J & H	S5	D
2331	A	S6B	A
2828	A & J	N.113	B
2356	A & J	Type 508	B
2357	A & J	Type 510	B
2359	A & J	Type 525	B
		Thruxton	
2966	F & J	Jackaroo	C
		Vickers	
2810	A & J	Gun Bus FB9	D
2360	J & N	Valiant	B
2730	N & J	Vanguard	D
2879	1/192 & O	VC10 (R.A.F.)	D
2722	A & J	Vimy	C
2358	J & N	Viscount 700 & 800	C
2725	A & J	Stranraer	C
2659	A & J	Walrus	B
		Westland	
2873	J & H	Lysander	D
2854	A	Wessex Trimotor	A
2684	A & J	Whirlwind (Helicopter)	B
2848	A	Widgeon II & III	A
2398	A	Wyvern TF, Mk IV	A
		Gliders	
2662	N	R.A.F. Training Gliders Cadet 1, 2, 3, Eton, Prefect and Sedburgh	B

Pack No.	Scale Code		Price Code
		General	
2909	J & N	Bessonneau Hangar	B

CANADIAN

Pack No.	Scale Code		Price Code
2633	A & J	Avro Canada CF 100B	B
2820	J	D.H.C. Beaver	A
2652	A & J	D.H.C. Otter	C

CZECHOSLOVAKIAN

Pack No.	Scale Code		Price Code
2902	A	Avia BH33	B
2839	A & J	Super Aero 45	B
2923	A & H	Broucek	D

DANISH

Pack No.	Scale Code		Price Code
2637	A	KZ111 Lark	A

DUTCH

Pack No.	Scale Code		Price Code
		Fokker	
2662	A & J	D.23	B
2802	A & J	F.III	B
2875	A	V.VII A	B
2636	A & J	F.VII A	B

FRENCH

Pack No.	Scale Code		Price Code
2797	A	Antoinette Monoplane	A
2794	U & J	Bernard V2	C
2903	A & F	Breguet XIV	C
2760	O & A	Breguet XLX	D
2814	A & J	Bleriot XI Monoplane	A
2782	J & H	Caudron CR460	C
2924	J & H	Caudron CR714	D
2693	A & J	Dassault Mystere Series	C
2750	A & J	Dassault Mirage III	C
2799	J	Deperdussin Racer	A
2648	F & J	Druine Turbi	B
2655	F & J	Druine Turbulent	B
2811	A	Dewoitine D510	A
3005	A & D	Fournier RF-4	D
2950	E & J	Fournier RF.5	D
2646	F & J	Jodel Bebe	B
2899	A & H	Jodel D117	C
2886	A & H	Jurca Sirocco	B
2885	A & H	Jurca Tempete	B
2665	A & J	Leduc 021	B
2769	J & H	Mignet Flying Flea	C
2853	A	Morane Saulnier B	A
2685	A & J	Morane Saulnier L	B
2947	A	Morane Saulnier N	A
2908	J & H	Morane Saulnier 35EP	C
2864	A & J	Maurice Farman Shorthorn	C
2711	A & J	Hanriot HD 1	B
2728	A & J	Nieuport 17c	B
2776	A & J	Nieuport 28	B
2695	A & J	Nord Griffon	B
2897	A & H	Piel Emeraude CP30	C
2911	A & F	Potez 25	C
2720	A & J	SE 5003 Baroudeur	C
2679	H	Spad XIII	B
2817	A & J	Spad Berlina	A
2645	A & J	Sud-Ouest Vautour	C
2915	J & F	Sepecat Jaguar Variants	E
2948	A	Voisin 1909	B

GERMAN

Pack No.	Scale Code		Price Code
2994	A & J	Albatros BI	C
2995	A & J	Albatros BII & BIIa	C
2996	A & J	Albatros BIII	C
2997	A & J	Albatros CI	C
3003	A & J	Albatros CV/16	C
3004	A & J	Albatros CV/17	C
3007	A & J	Albatros CVII	C
3011	A & J	Albatros CIX	C
3012	A & J	Albatros CX	C
2746	A & J	Albatros DII	C
2676	H only	Albatros DIII & DVa	D
2944	H, A & J	Albatros DV & DVa	F
2705	A & J	Albatros CIII	B
2815	A	Arado Ar68G	A
2933	A, J & H	Arado Ar234 'Blitz'	E
2816	A	Brandenburg Sea Monoplane	B
2712	A & F	Bucker Bu 133 Jungmeister	C
2956	E, J & F	Bucker Bu 131 Jungmann	C
2919	J & F	D.F.W. CV	D
2917	O	Dornier Do X	C
2895	A & J	Dornier Do 17Z	C
2749	A & J	Dornier Do 28	B
2969	H & J	Dornier Do 335	J
2756	A & J	Etrich Taube	C
2865	A & J	Fieseler-Storch	B
2883	A & F	Focke-Wulf FW44 Stieglitz	C
2869	J & F	Focke-Wulf Fw Stosser	C
2761	A & H	Focke-Wulf Fw190, A5, A8	D
2993	H & J	Focke-Wulf Fw190, A5-A9 (Bentley)	N
2691	A & J	Fokker DVII	B
2667	A & J	Fokker DVIII	B
2678	J & F	Fokker DR1 Triplane	B
2849	A	Fokker EII & EIII	A
2977	J & F	Gotha G-IV, GV	E
2773	A & J	Halberstadt CL-II	B
2737	A & J	Hannover CL-111a	B
2846	A & J	Hansa Brandenburg C1	B
2961	A & J	Hansa Brandenburg D-1	D
2929	J & H	Heinkel He 51, A-1, B-1	D
2819	J & F	Heinkel He 162	D
2926	O, J & F	Heinkel He 111	E
2880	F & J	Junkers D1	C
2979	F & J	Junkers Ju 86D	D
2687	J & A	Junkers Ju 87 D & G	C
2968	F & J	Junkers Ju 188	D
2563	A & J	Klemm L24/1A	B
2941	H, A & J	L.V.G. CVI	E
2790	A, J & H	Messerschmitt Bf 109e	D
2945	H & J	Messerschmitt Bf 109f	D
2881	A & J	Messerschmitt Bf 110c & G	D
2907	A & H	Messerschmitt Me 163	D
2891	A & J	Messerschmitt Me 262	C
2898	A & J	Messerschmitt Me 410	C
2860	A & H	Moeller Stomo 3	C
2697	A & J	Pfalz Dr. I	C
2787	A & J	Pfalz D-III	C
2874	F & J	Pfalz DXII	D
2829	J	Phonix C.1	A
2952	H & J	Roland DII	C
2719	A & J	Roland DVIb	B
2796	J	Roland CII Walfisch	A
2963	F & J	Rumpler CIV	D
2826	F & J	Siemens Schuckert DIV	B
2580	F & J	Zaunkonig	B
2972	1/192nd	P Type Zeppelin	B
2982	1/192nd	'R' Type Zeppelin	C

SWEDISH

Pack No.	Scale Code		Price Code
2858	A	Saab J29	A
2660	A & J	Saab 32A Lansen	B
2775	A & J	Saab 35 Draken	D

ITALIAN

Pack No.	Scale Code		Price Code
2674	A	Fiat CR42	A
2715	A & J	Fiat G91	B
2863	A & J	Macchi MB 326	B
2800	A	Macchi Castoldi MC 72	A
2847	J	Piaggio PC7	A
2936	A	Macchi C-202 A.S. 'Folgore' 1/30	D

JAPANESE

Pack No.	Scale Code		Price Code
2768	A & H	Mitsubishi A6MC Zero 52	D
2843	A & J	Kawasaki Ki 45 Nick 1	A

POLISH

Pack No.	Scale Code		Price Code
2733	A & H	PZL P11c	D
2946	J & F	PZL P-23A & B Karas	D
2910	1/20th & J	PZL Wilga 32, 35	D
2784	1/25th & J	PZL 101 Gawron	B
2862	A & H	PZL 104 Wilga	D
2871	A & H	RWD 8	C
2866	J & H	SZD 19 'Safir'	C
2927	J & H	Kania-3	D
2965	F & 1/84th	Lublin R.XVIB	C
2987	H	Morava L-200D	E
2964	A & H	TS – B Bles	D

RUSSIAN

Pack No.	Scale Code		Price Code
2912	A & F	Antonov An-2 Colt	D
2906	A & J	Ilyushin 11-2M3	C
2957	A & J	Ilyushin 1L10	B
2921	J & H	Lavochkin LA-5FN & LA7	D
2644	A & J	MIG-15	B
2827	A & J	MIG-21 (Fishbed)	C
2893	A & H	Polikarpov Po-2	D
2767	F & J	Polikarpov 1-16 (Rata)	B
2877	A & J	Sukhol Su-7m	C
2825	O	Tupolev Tu-104	B
2928	J & H	Yak 9	D
2918	A & H	Yak 18PM-PS	D
3008	H & P	Yak 18	E

SPECIALS (ONE-OFFS)

Pack No.	Scale Code		Price Code
3009	F & G	Hirth Wagner Akrostar	H
3002	H & J	Coates Swalesong	E
2990	H & J	Sorrel Hiperbipe	D
2992	N & A	Gossemer Condor II	C
3010	A only	Gossamer Albatross	C
2762	A & J	Cosmic Wind and Long Midget	B
2931	G & F	Mace R-2 'Shark'	D
2932	G & A	Owl Racer	E
2734	U & J	Pearson-Williams Mr. Smoothie	C
2913	G & A	Spinks Akromaster	D
2887	A & J	Thomas Morse S-4C	B
2732	A & F	Wright Flyer	B
2934	P & F	Thorp T-18 Tiger	C
2935	J & U	Travel Air 'Woolaroc'	B
2938	A & G	AGEP Tailwind	D
2939	A & G	'Chuparosa' (Humming Bird)	D
2786	A & M	Isaacs Fury I	C
2888	A & M	Isaacs Fury II	C
2981	J & H	Isaacs Spitfire 1	D

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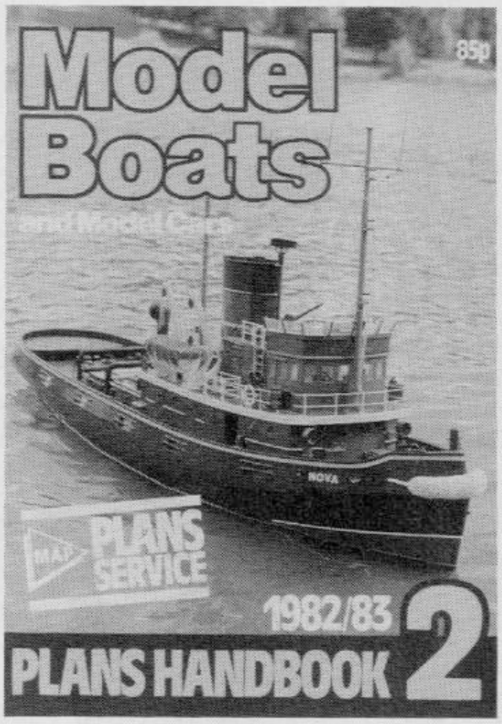

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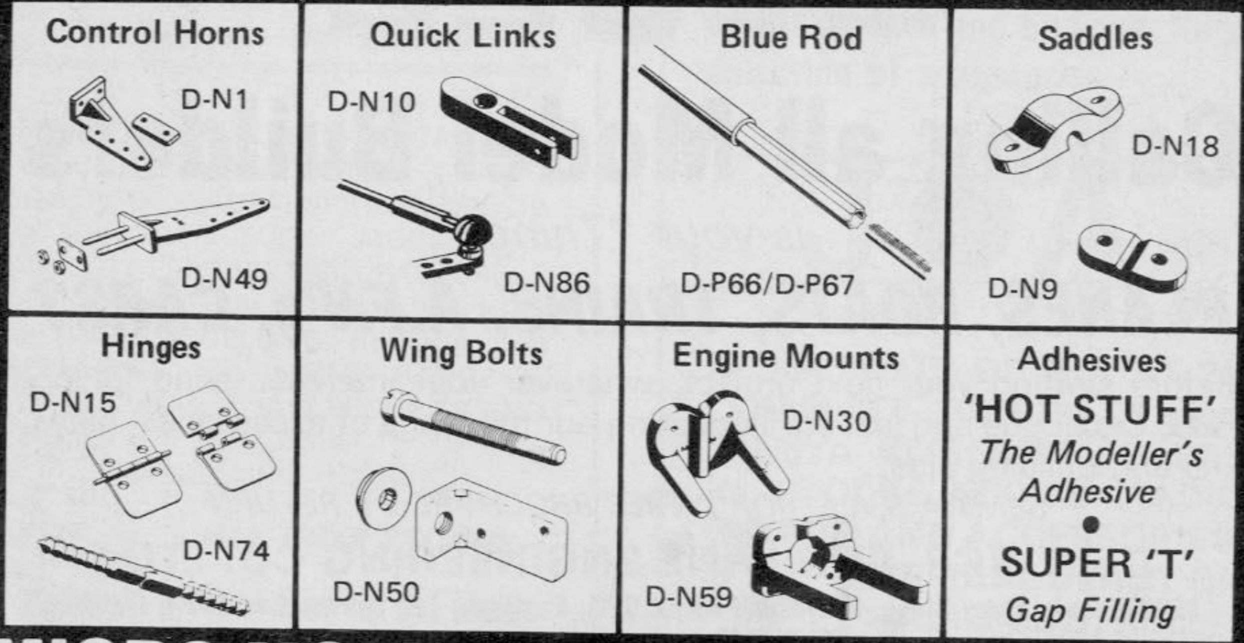

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For price coding and postage data, see inside front cover. **1982-83 (All previous lists superseded)**

INDEX AND PRICE CODING FOR PLANS HANDBOOK No. 4
RADIO CONTROL MODEL AIRCRAFT

Continued from page 83

Title	Code	Page No.	Price Code
Slingsby T-46	RC/1334	57	L
Slingsby T-53	RC/1171	21	D
Smoke Trail	RC/PET/864	65	B
Solar Wind	RC/1435	30	G
Sopwith Camel	RC/1099	46	J
Sopwith Pup	RC/990	47	J
Sopwith Tabloid	RC/1144	47	I
Sorrel Hiperbipe	RC/1414	54	E
Spinks Akromaster	RC/1107	55	K
Spirit	RC/1436	30	D
Spitfire (56 in.)	RC/1342	52	H
Spitfire (40½ in.)	RC/1325	53	E
Stol	RC/1190	35	I
Stratus	RC/1154	22	I
Striker	RC/984	44	I
Supermarine Sea Otter	RC/1281	52	K
Super Sprite	RC/1492	18	F
Super Tauri	RC/857	27	F
Swannee	RC/898	64	B
Thermal Rider	RC/1053	23	F
Tiger Tail	RC/1185	43	I
Timber	RC/811	66	E
Tinker	RC/1147	65	E
Tourmaline	RC/1167	19	E
Turquoise	RC/1222	20	G
Twin Fin	RC/1126	32	H
Tyro	RC/920	66	B
Tyro Major	RC/1176	27	H
Vickers Armstrong Wellington Mk. X	RC/1308	52	L
Victa Airtourer 115	RC/922	54	H
V.I.P.	RC/1289	22	G
Warrior	RC/948	67	E
Wilfurskin	RC/914	29	F
Workmaster	RC/821	66	E
Zephyr	RC/1393	24	G
Zippy	RC/1260	43	G

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