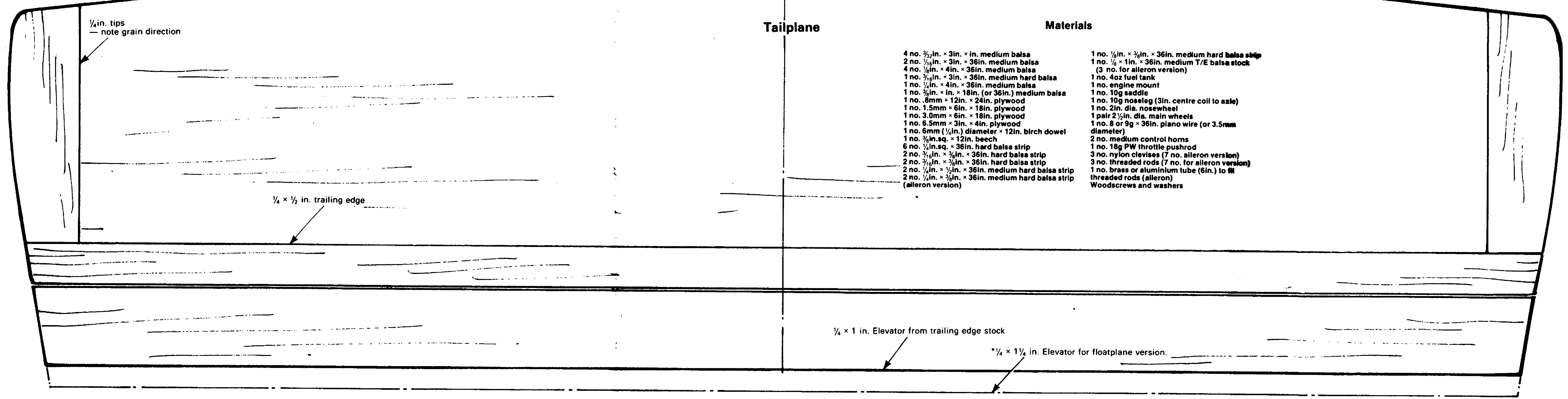
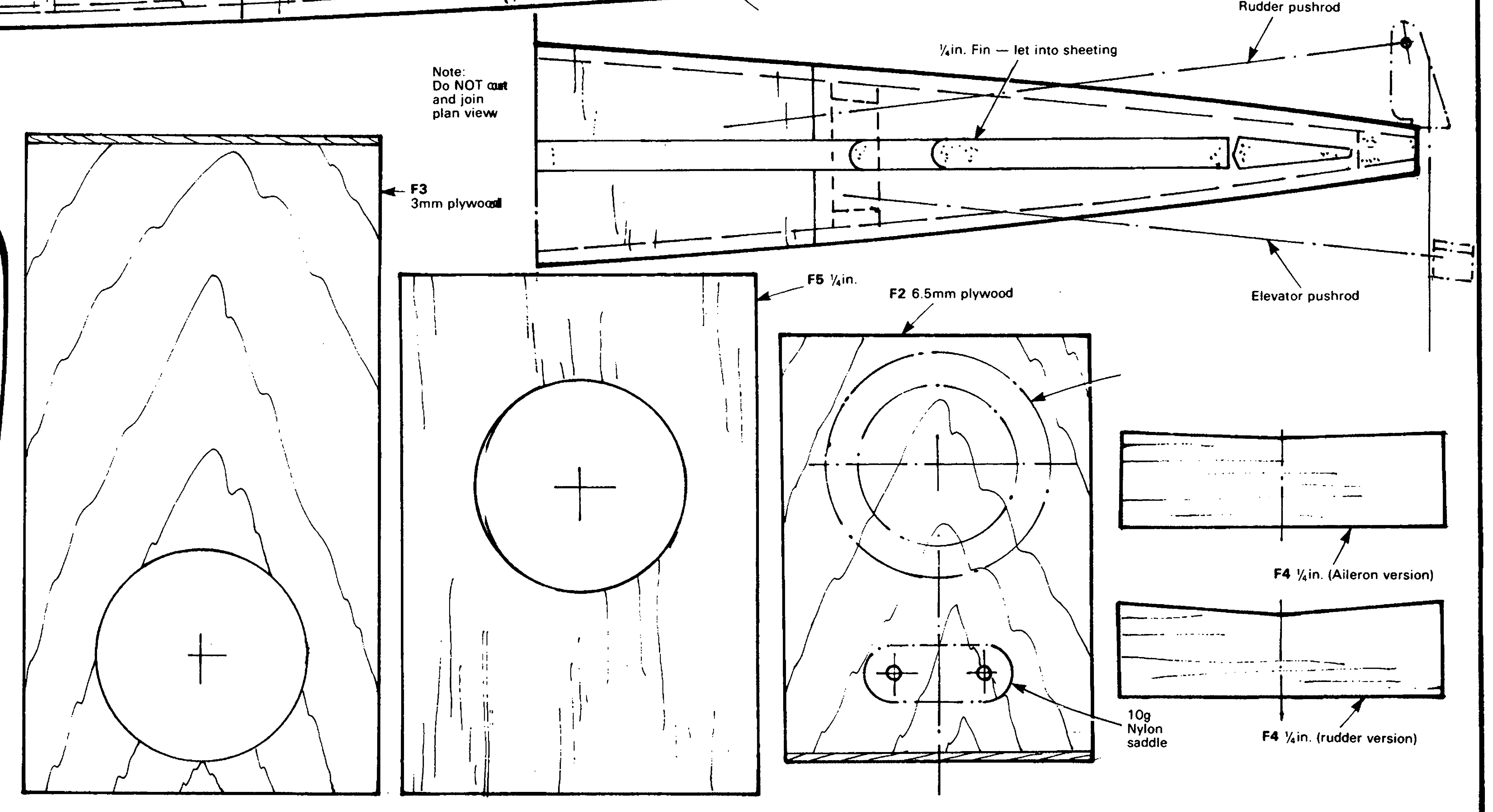

RM Flight Training Course
RM TRAINER
A 52inch wingspan Basic Trainer for 3-4 function R/C and .19-.29 cu. in. engines
BALANCE POINT
¼ × 1 in. Trailing edge stock
aileron servo
1/16in. × 3in. leading edge sheeting
Centre ribs only
¼in. sq. L.E.
¼in. sq. spars
1/16in. vertical grain webbing
D.B.1
D.B.2
1/16 × ½ in. trailing edge
TYPICAL WING SECTION
3/16 × 3/8 in. spar
¼in. Fin
¼in. Rudder
AILERON WING PART SECTION
¼ × 3/8 in. spar
¼ × 1 in. T.E. stock
'20' sized engine — see article.
½in triangular
F1
F2
F3
F4
F5
¼ × ½ in.
½ × 3/8 in.
¼in. dia. birch wing retaining dowels
1/8 × 3/8 in. trebler for wing seating to double arrows
1/8in. side top piece
Aileron horn pushrods
Aileron horn clevis
1/16in. sheeting
¼in. dia. dowel pushrods for rudder and elevator
Throttle pushrod
Engine mount
FUEL TANK BAY
1/8in. Tank bay floor
Paint on cabin windows
1/8 × 3/8 in.
1/8in. Fuselage sides
1/8 × 3/8 in. verticals
3/8in. sq. beech servo bearer
3mm plywood undercarriage leg retainer
0.8mm plywood doublers end here
3/16in. nose treblers to double arrows
10g nylon saddle
1/8in. treblers to double arrows
Note: See plan view for position of doublers and treblers
1¾in. dia spinner
3/32in. sheet
3mm plywood
1/8 × 3/8 in. spruce undercarriage stop
3 or 4 mm plywood
1.5mm plywood from F2 part F5
3/16in. balsa sheeting — grain across the fuselage
Rudder extension for float-plane
*Pianowire or heavy laystrate bracing
3/16in. dia. birch dowels for 2 wheel undercarriage
Alternative 2 wheel dural undercarriage
8/9 g nylon double saddles
8/9 g pianowire undercarriage legs
*10g Pianowire supports for floats
Note: Fuselage sides are cut from 1/8 × 4 × 36 in. balsa sheet and joined at the front of former F2 and for the top wing seating.
Note: Cut to the chain dotted line and join B-B to A-A
¼in. Fin to here
Rudder horn
Pushrod exit slot
Tailplane
Elevator horn
¼ × 1 in. T.E. stock elevator
*Horn for float rudders
*Sub fin for float plane or 2 wheel undercarriage version
10g sprung nose leg
2in. dia nose wheel
FUSELAGE SIDE VIEW
F1 ¼in.
2½in. dia. main wheels
All woods are balsa wood unless otherwise stated
*For float plane version only
Retain wheels with soldered washers
*Top of floats
WORTH £1

'RM TRAINER' - Free with July Issue 1984 of Radio Modeller



Materials

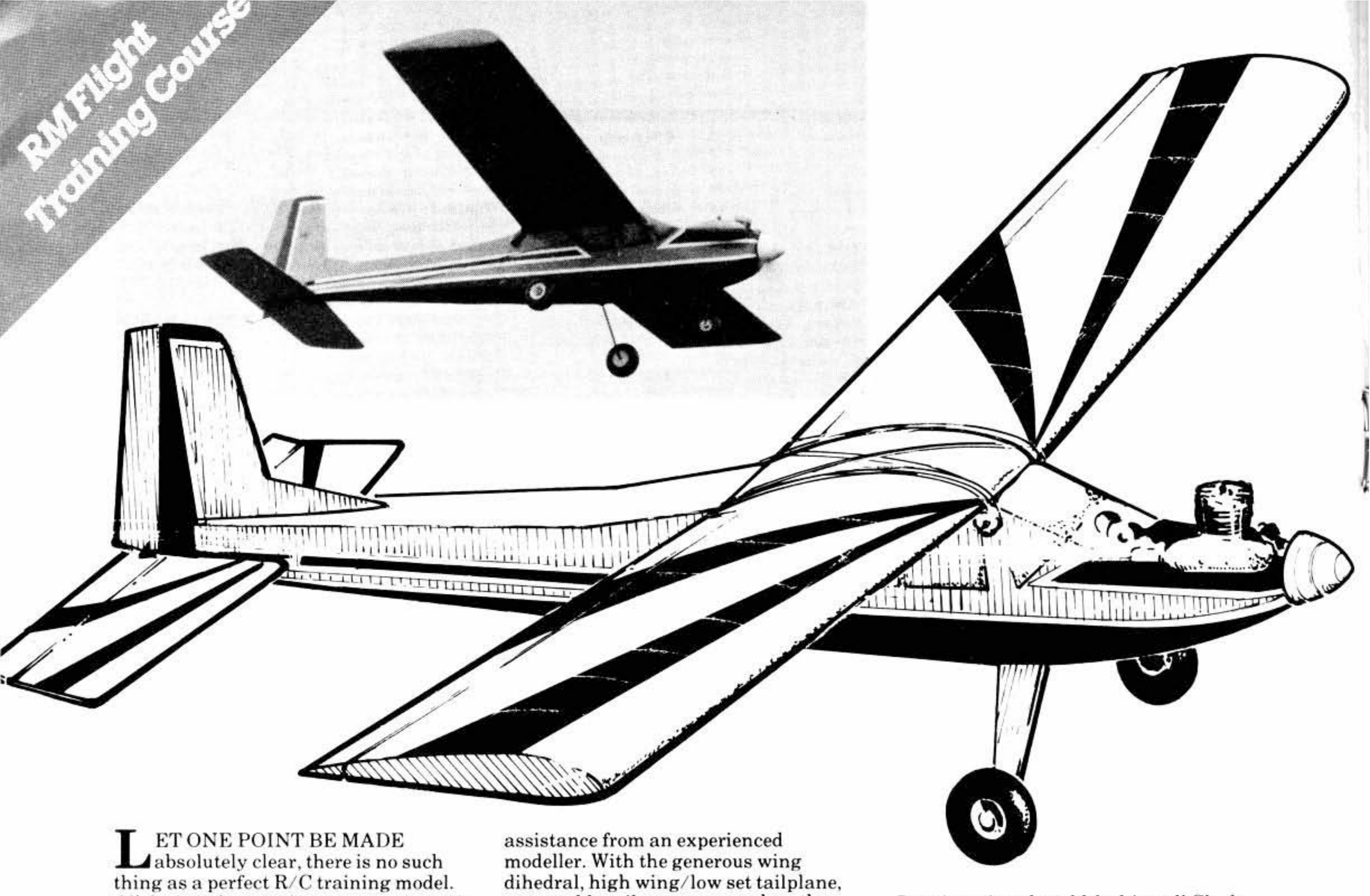
4 no. 3/32in. × 3in. × in. medium balsa
2 no. 1/16in. × 3in. × 36in. medium balsa
4 no. ⅛in. × 4in. × 36in. medium balsa
1 no. 3/16in. × 3in. × 36in. medium hard balsa
1 no. ¼in. × 4in. × 36in. medium balsa
1 no. ⅜in. × in. × 18in. (or 36in.) medium balsa
1 no. .8mm × 12in. × 24in. plywood
1 no. 1.5mm × 6in. × 18in. plywood
1 no. 3.0mm × 6in. × 18in. plywood
1 no. 6.5mm × 3in. × 4in. plywood
1 no. 6mm (¼in.) diameter × 12in. birch dowel
1 no. ⅜in.sq. × 12in. beech
6 no. ¼in.sq. × 36in. hard balsa strip
2 no. 3/16in. × ⅜in. × 36in. hard balsa strip
2 no. 3/16in. × ⅜in. × 36in. hard balsa strip
2 no. ¼in. × ½in. × 36in. medium hard balsa strip
2 no. ¼in. × ⅜in. × 36in. medium hard balsa strip (aileron version)
1 no. ⅛in. × ⅜in. × 36in. medium hard balsa strip
1 no. ⅛ × 1in. × 36in. medium T/E balsa stock (3 no. for aileron version)
1 no. 4oz fuel tank
1 no. engine mount
1 no. 10g saddle
1 no. 10g noseleg (3in. centre coil to axle)
1 no. 2in. dia. nosewheel
1 pair 2½in. dia. main wheels
1 no. 8 or 9g × 36in. piano wire (or 3.5mm diameter)
2 no. medium control horns
1 no. 18g PW throttle pushrod
3 no. nylon clevises (7 no. aileron version)
3 no. threaded rods (7 no. for aileron version)
1 no. brass or aluminium tube (6in.) to fit threaded rods (aileron)
Woodscrews and washers



1/16in. × 3in. sheeting
1/4in.sq. spars
1/8in. tip rib
3/8in. tip
Section through wingtip
.8mm plywood reinforcement for leading edge
1/8in. rib — angle for dihedral
1/8in. rib
1/8in. rib
1/4in.sq. leading edge
Note: port wing shown chain dotted
1/16in. × 3in. leading edge top sheeting
1/4in.sq. main spars top and bottom
1/16in. × 1/4in. webbing (grain vertical)
DB1
Position of servo for aileron wing version
1/16in. centre section top sheeting ends here
Torque rod bearing tube
Aileron crank for port wing
Note: all wing ribs are from 3/32in. sheet unless otherwise stated
Torque rod (spoke)
Port wing tip shown chain dotted
1/8in. on lower surface — aileron version only
Root rib template for rudder version
Dihedral braces — 3mm plywood
DB2 (rudder version)
DB2 (aileron)
DB1 (aileron)
DB1 (rudder)
2 1/2in. dihedral (rudder version)
1in. dihedral (aileron version)
3/8in. × 1 1/4in. wing tip
1/8in. root ribs
Note: angle root ribs to template
1/8in. tip rib
DB2
Aileron pushrods
Torque rod tube
Torque rod
Aileron crank
Starboard wing
Nylon clevis with one leg removed
Aileron version — shown dotted
1/16in. × 3/4in. trailing edge strip top and bottom
1/4in. × 1in. trailing edge stock aileron
1/4in. × 3/8in. trailing edge spar
Port wing
Root area shown dotted
1/4in. × 1in. trailing edge stock reinforcement
1/16in. × 1 1/2in. trailing edge strip top and bottom
Root rib template for aileron version
Wing centre line
.8mm plywood reinforcement for trailing edge
Aileron crank assembly
Chamfer aileron
RM Trainer
Free with August issue
of Radio Modeller

RM Flight Training Course
RM Trainer
Part Two — Wings and Floats
Free plan — worth £1.00
RM TRAINER
A 52in. 'RM Trainer' issued free with Radio Modeller August 1984
1/16in. sheet
3/32in. sheet sides
FL1
FL2
FL3
FL4
FL5 and 6
.8mm plywood
Float Formers
1/8in. balsawood except for FL12 — 3mm plywood
FL12
FL11
FL10
FL9
FL8
FL7
FL6A
FL6
Jig for float struts and bracing
Templates
15 15/16in. c/c legs
Template for float struts and bracing
Double saddle clamps
18g piano wire or heavyweight control line wire
1/4in. hardwood strips
16in.
Bind and solder
Fuselage width of front leg position
Line of fuselage at front leg
10g front leg
Mount with saddle clamps
Undercarriage leg for tricycle undercarriage
Position of 1/2in.sq. beech mounting block
Expanded polystyrene block
Templates to this line — extend below bottom edge of foam
Template for foam floats
3mm plywood end former for foam floats
9/10g piano wire undercarriage leg
10g piano wire front leg
10g pianowire rear leg to floats
Front leg
10g piano wire crosspieces for floats
Attachments for balsawood floats
Nylon or metal double saddle
1.5mm plywood
Former
3mm plywood
Attachments for foam floats
Nylon double saddle
Foam core veneered with 4mm plywood
1/2in.sq. beech
Balsawood block
A
Double saddle
Piano wire leg and crosspiece
1/2in.sq. × 1 1/2in. beech block
Foam core with .4mm plywood veneer
Attachments for foam floats
Double saddles
Bend and solder legs and crosspieces
Former FL3
Attachments for balsawood float
SIDE VIEW OF FLOATS
B
1.5mm plywood
Nylon or metal double saddle on 1.5mm plywood
3mm plywood crosspiece
Brass water rudder bell crank
16g brass tubing
FL5
1/8in. × 3/8in. spine
1/8in. sheet spine
Note: template for underside of foam floats follows this line
3mm plywood strake
16g piano wire rudder shaft
Brass rudder

RM Flight Training Course

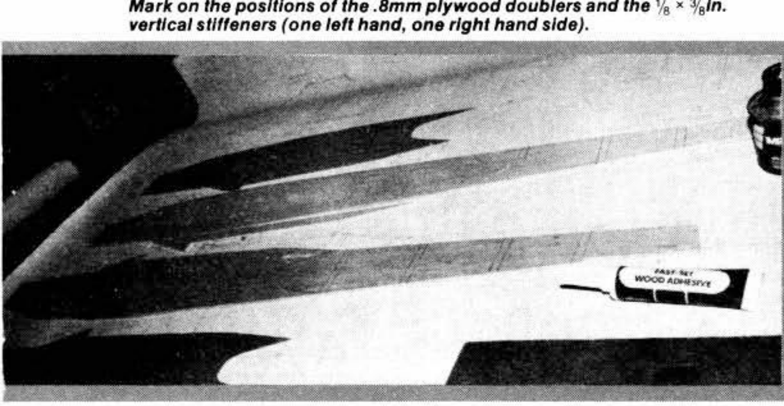


LET ONE POINT BE MADE absolutely clear, there is no such thing as a perfect R/C training model. All designs have to incorporate a certain degree of compromise to cater for a variety of learners: the lone hands, slow learners, those with natural aptitude, ones using a 'Buddy Box' system and those wanting a more advanced model for training.

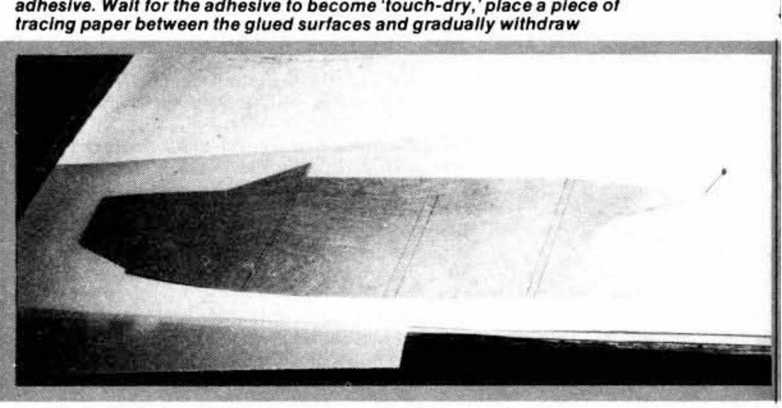
How does the *'RM Trainer'* fit into the compromise situation? To make it more suitable for the diverse requirements it has been designed with options, it is not one type of aeroplane only; you have a choice on the style to build. The non-aileron version (rudder, elevator and engine throttle control only) is intended for the beginner with limited supervision during flying training — or, if you are prepared for the occasional unscheduled arrival, for the individual determined to learn without any assistance from an experienced modeller. With the generous wing dihedral, high wing/low set tailplane, reasonable tail moment arm lengths and modest wing loading the model has good inherent stability qualities. However, it is more than a guided free flight model and is capable of handling windy conditions surprisingly well, although the raw beginner is not recommended to attempt to fly the rudder controlled version in adverse weather. The model is aerobatic to the extent of loops, stall turns, rolls (somewhat 'barrely') and it will hold inverted flight in gentle turns, but the main purpose is that of a basic trainer with forgiving qualities.

When ailerons are fitted a lower dihedral angle is incorporated, for better aileron response, the *'RM Trainer'* has less positive stability i.e. it has to be flown and corrected to a greater degree. Despite using the 'old fashioned' Clark Y style wing section (retained for ease of construction and proven characteristics) the model does not exhibit excessive pitch changes — climbing and diving — with the throttle setting changes. Learning to fly with an aileron equipped trainer means that you do *not* have to

Glue the $\frac{1}{8}$in. nose and wing seating parts to the main fuselage sides. Mark on the positions of the .8mm plywood doublers and the $\frac{1}{8} \times \frac{3}{8}$in. vertical stiffeners (one left hand, one right hand side).



The .8mm plywood doublers are glued to the fuselage sides with contact adhesive. Wait for the adhesive to become 'touch-dry,' place a piece of tracing paper between the glued surfaces and gradually withdraw



convert to the use of ailerons at a later stage, but it is advised that the learner has an instructor standing by during the pre-solo period. It does involve operating four control functions and this requires a degree of co-ordination that may take a little time to master.

Variations of the *'RM Trainer'* does not stop there, it can be built as a 'tail dragger' (with a two wheel undercarriage and tail skid) or with a tricycle undercarriage arrangement. Most modern trainers feature three wheel undercarriages, but this is as a result of fashion rather than from functional considerations. 'Trikes' are fine when you are operating from tarmac or short grass, they are less suitable for the rougher ground flying patches and, more apposite, they do not allow you to learn the finer points of take-off and landing. If you have to fly from a really long grass area, or overgrown 'weedy' flying sites, you can dispense with the undercarriage entirely — the model will have to be hand launched and an undercarriage will probably cause it to be turned over on landing.

You will also note, on the fuselage drawing, provision for fitting floats (construction is detailed in the second part). It is not suggested that you learn to fly with the model as a seaplane but it is a very suitable design to learn to fly from water. Although the model is called a 'trainer' we would like to think that it can be classified as a general sports model and we are convinced that it will give plenty of fun and satisfaction to the average club flyer. Later in the series some modifications will be described for increasing the fun aspects of flying — including, at a more seasonable time, the fitting of skis.

Having the free plans divided over two issues of *Radio Modeller* should give you adequate time to make a good job of the construction and the September issue will advise on the covering, finishing, radio installation and flying of the *'RM Trainer.'* This period will also allow you to obtain the necessary radio equipment, engine and the accessories you will need for flying. Have a little patience, build carefully and the results will give you a much better chance of success once you do get into the air.

Engine selection

Engines of similar capacity do not automatically give similar power outputs, some are designed for high speed and power, others are intended for sports use. The *'RM Trainer'* is designed for '20' class engines (3.2cc) but this statement needs to be substantiated. For the non-aileron version, built reasonably lightly, any of the sports '19' to '21' engines should be quite adequate, the aileron trainer would benefit from a little more power and the schneurle ported '21s' will certainly provide that. When fitted with floats — giving more drag and additional weight — a good '21' will still provide sufficient 'oomph,' but a '25' or '29' would give a reserve of power that can be useful at times.

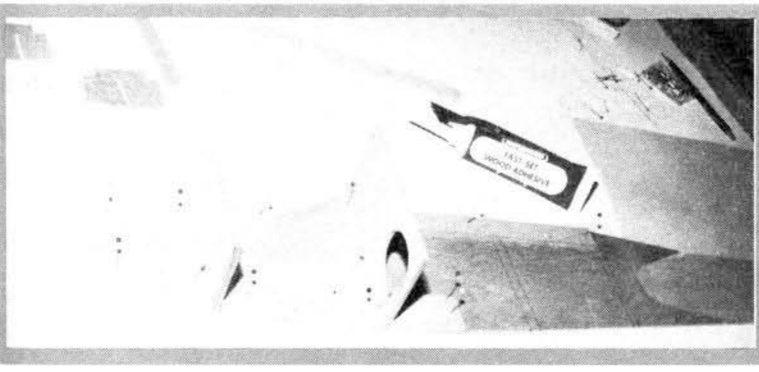
Any model that is overpowered can cause the learner to get into difficulties and the same is true of too little power. On balance, it is more prudent to err on the side of generous power; any excess can be reduced by fitting an over large propeller, by limiting the throttle opening or using a straight fuel (no nitro-methane content). Trying to increase the power output of an engine is more difficult and may involve fitting of a tuned pipe silencer (or Irvine Super Silencer) and using expensive high nitro content fuels. On page 51 there is a pictorial review of some of the suitable R/C engines for the trainer.

Wood selection

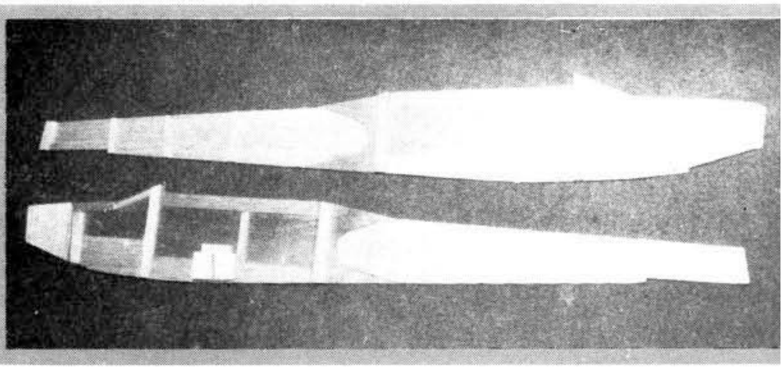
Trying to describe, in words, the characteristics and qualities of suitable balsawood for the various parts of the *'Trainer'* airframe is like trying to qualify the beauties of a woman's face — you know what is good when you see it, but it is difficult to verbalise on these attributes. For the total newcomer the best advice is to seek the assistance of an experienced model shop proprietor (regretfully, not all model shop salesmen

TRAINER

Basic training model with alternative three or four function control. Suitable for '20' size engines – larger for float plane version.



Use the formers (F1 to F5) to act as spacers for the positioning of the doublers and treblers. Remove the formers before the glue starts to set.



The completed fuselage sides with all the doublers and stiffeners etc. glued in position. Chamfer the stern posts slightly to mate accurately when the rear fuselage is joined.

are knowledgeable about R/C model goods). A list of materials is included on the pull-out plan. Some of the wood sizes quoted will be larger than required, due to the standard sizes of sheets produced, the surplus will be useful for future projects.

Reading and thinking

Human nature seems to decree that once a decision has been made it has to be acted upon immediately. Before you start to hack away at the wood and glue pieces together PLEASE take the trouble to inspect the drawings thoroughly — until you understand it completely — and read the building instructions. If you have only got around to reading this part as a result of coming up against an insoluble building problem . . . hard luck, read them now.

Cutting and forming

Once a project is commenced it is natural to want to proceed as fast as possible; the speed of building will be enhanced if all the parts are cut out or pre-formed before you make a start on the construction. You will also find the building more satisfying if you don't have to break off repeatedly to cut the next part to be assembled.

Adhesives

It is possible to build the *'RM Trainer'* using only two types of adhesive, PVA white glue and a contact adhesive. Both of these glues are readily available from your model shop or a hardware store. Modellers make great use of the modern cyanoacrylate adhesives, these so called 'miracle' glues have extremely short setting times and therefore appeal to those enthusiasts with an impatient nature. There is no doubt that they are effective adhesives (they are available as ten seconds and 30-60 second setting times) but they are also relatively expensive.

Construction

The airframe construction will only be true if the basic components are constructed on a flat building board. Before you glue any parts together, you must check that they fit accurately, this can be done by carrying out a 'dry fit' i.e. putting the components together without glue. Note that some of the parts must be marked onto the material before the drawing is cut and the fuselage sides joined for a full length view.

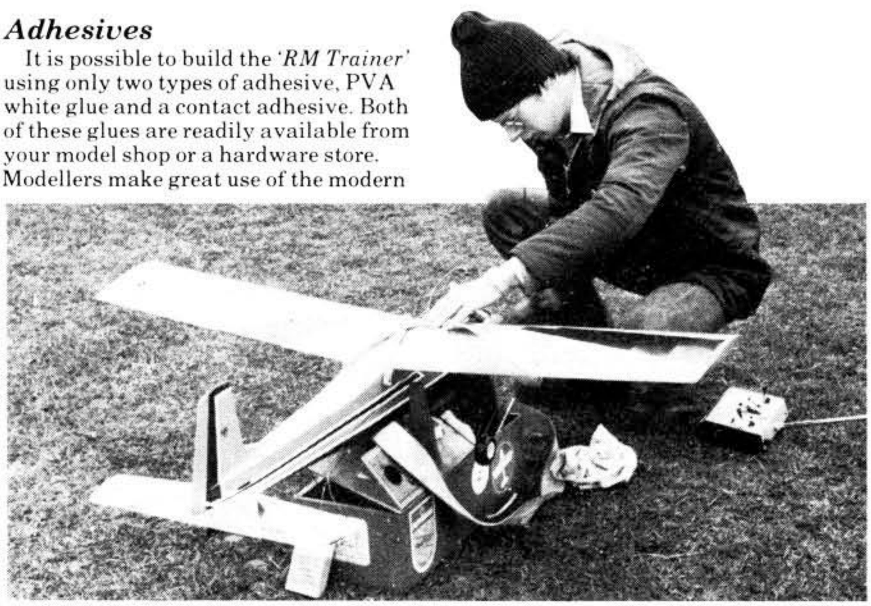
Fuselage

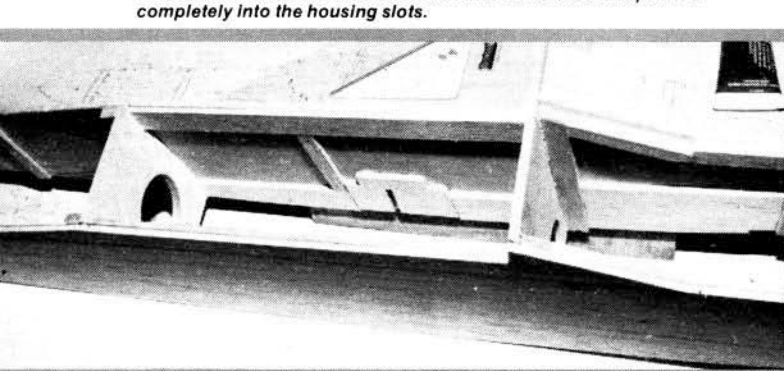
Before commencing the cutting-out of the fuselage sides and doublers you must check the mounting of the engine and the servos. Engines vary in their overall length and this may affect the position of the front former F1. Fit the engine into the nylon engine mount (it should sit as far back into the mount as the moulding will allow) and mark the position of the engine bolt holes onto the mount. Drill pilot holes into the engine mount and secure the engine with suitably sized self tapping screws (5/8in. long and a diameter to clear the holes in the engine mounting lugs). Offer the engine/mount up to the fuselage side view drawing and note whether the fuselage nose needs to be lengthened or shortened: mark any alterations on the drawing and cut the parts accordingly.

Check the dimension between the fuselage servo bearers to ensure that it is correct for the servos you intend to fit (if you have not purchased the radio equipment at this stage, cut the undercarriage doublers as shown, but do not cut the engine bearers). Holes must be drilled in plywood formers F2 and F3 to accept the throttle pushrod tube. A piece of 1/8in. diameter nylon tube — or a plastic tube from a spent ballpoint pen — is large enough. Draw on the plan (side and plan views) the route of the linkage from the engine servo to the throttle arm on the engine, measure the position of the holes onto the formers F1 and F2 and drill the holes.

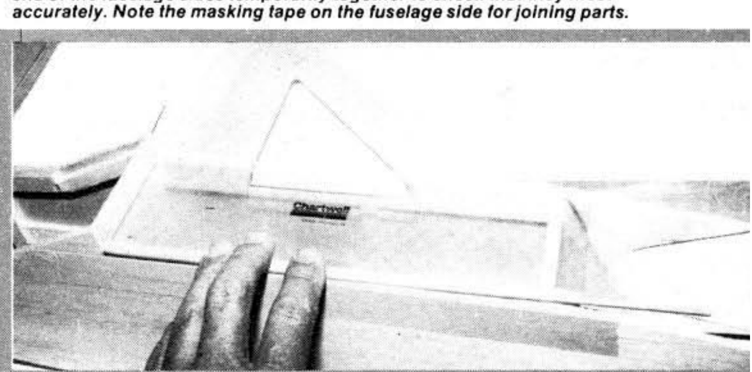
Because balsawood sheet is only commonly available in sizes up to 4in. × 36in. the 1/8in. fuselage sides are constructed from three pieces; the main piece from F2 to the rear stern post, the nose piece to F1 and the top wing support. It is important to select sheets of balsawood that are of equal weight and strength for the main fuselage sides, otherwise it may be difficult to obtain an equal curvature when the sides are joined at the rear end. Glue the 1/8in. nose piece and wing supports to the main fuselage side and leave to dry — holding the pieces together with masking tape will assist in this operation.

One of the most common mistakes in building a fuselage is to make up two left hand or two right hand sides. Doublers etc. (strengthening pieces and stiffeners) have to be glued to the insides of the fuselage and the fuselage sides must therefore be paired. Mark on the fuselage sides the positions of the .8mm plywood doublers. PVA white glue is *not* suitable for gluing large areas of balsawood and plywood sheet together — the water content of the adhesive

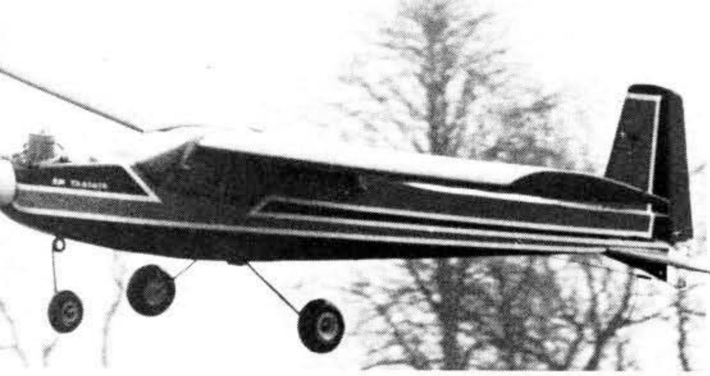




Formers F3 and F5 are first glued to the port fuselage side and then the starboard side is added. Make certain that the formers are pushed completely into the housing slots.



Check that the fuselage formers and sides are truly square. Pull the rear end of the fuselage sides temporarily together to check that they meet accurately. Note the masking tape on the fuselage side for joining parts.



tends to make the sheet curl. Contact adhesives, such as Evostik, are preferable for this situation, the two surfaces are given a thin surface of glue and allowed to become touch dry before the parts are joined. Once the two glued surfaces are contacted there is an immediate bond, so the positioning of the plywood onto the fuselage must be accurate. Holding a piece of greaseproof, or tracing, paper between the glued surfaces and gradually withdrawing it will help with the precise positioning — see photograph.

Mark on to the inside of the fuselage the positions of all doublers, treblers, and vertical stiffeners etc. This is done by placing the starboard fuselage side over the plan, and lining the vertical components with the marks shown on the outside of the fuselage side view. Marking the port side is less easy, it can be achieved by taking a tracing of the side view and reversing it, or carbon paper can be placed under the drawing (face side upwards) and the principal markings drawn to show on the reverse side of the drawing. When gluing the doublers etc. in position the formers (F1-F5) are used as a guide to positioning the doublers (see photos). The formers are not permanently glued in position at this time, they are removed as soon as the doublers are correctly glued to the sides. Pins are used to hold the doublers and uprights in their positions until the glue has dried. Note that the undercarriage doubler slots are not symmetrical on the left hand side and right hand sides — note also the angle of slope.

When the fuselage sides are set, hold them together (outside faces mating) and check that the outlines are identical. Use a sanding block to remove any small discrepancies. Slightly chamfer the ¼in. × ½in. stern posts, so that they will join accurately when the rear of the fuselage sides are brought together (see the plan view). Glue formers F3 and F5 in position on the port fuselage side, checking that the formers are securely in the slots and that they are at right angles to the side. Leave until the glue has set. Now the starboard side can be glued to formers F3 and F5, again checking for accurate positioning and the 'squareness' of the fuselage assembly. Pull together the rear of the fuselage sides temporarily to ensure that the stern posts meet accurately.

The assembly must again be left for the glue to set. Mark the position of the nylon engine onto the engine bulkhead (F2) and drill pilot holes for the engine mount retaining screw. Use ½in. RH woodscrews to fix the mount to the plywood bulkhead, the pianowire nose leg is retained by the engine mount and a nylon saddle clamp. Once the mount and noseleg have been fitted, they can be removed again — the noseleg will get in the way if it is left in position for the remainder of the construction.

Glue the sides of formers F1 and F2, insert between the doublers on the fuselage sides and slightly pull in the sides at the nose to retain the formers. Temporarily hold the formers in position by placing rubber bands around the nose, or sticking masking tape around the sides and F1. Apply glue to the inside edges of the ¼in. × ½in. stern posts and join the rear ends of the fuselage. At this point the fuselage should be viewed from above and below to check that the front formers are at 90° to the horizontal axis and that the curvature on the rear fuselage sides are equal. Minor adjustments can be made by pushing the fuselage gently into position and pinning strips of wood (say ⅛ × ⅜in.) diagonals to the edges of the fuselage sides, to hold the assembly true until the glue has dried.

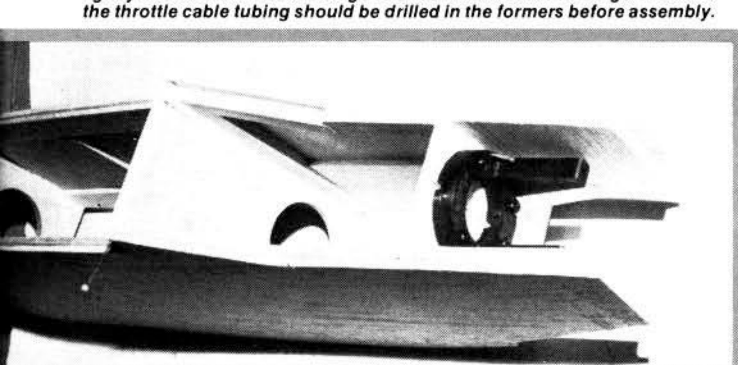
F4 is glued to the rear of former F3 and the 3mm plywood lower crosspieces are fitted — note that the undercarriage plate fits between the .8mm plywood side doublers and has slots cut in the ends to receive the pianowire legs. Glue the ⅛in. sheet fuel tank floor between formers F2 and F3, it sits on the ⅛in. fuselage doublers. The ³⁄₁₆in. × ⅜in. balsawood crosspieces are added to the rear end of the fuselage, and the ½in. triangular reinforcing strips to the rear of the nose former (F1). It will be necessary to slightly chamfer the triangular fillet to match the slope of the fuselage sides.

When the assembly has dried the 1.5mm plywood bottom can be glued to the fuselage, holes must be drilled for the fitting of the undercarriage legs. ¹⁄₁₆in. balsa sheeting to the top and bottom of the rear of the fuselage has the grain running across the fuselage, cut the widths accurately, or the edges may be damaged when sanding takes place. The ⅜in. sheet lower nose block is cut to the correct plan view, and a slot is cut (³⁄₁₆in. × ½in.) in the rear edge, so that the nose leg can be inserted after the fuselage is covered — it also allows waste fuel and oil to be drained away from the engine compartment. Fit the ³⁄₁₆in. sheet cabin front provisionally in position, it will be necessary to relieve the front of the sheet to allow the fuel tank to be inserted and removed for maintenance. If you already have the fuel tank (4oz round or oblong fuel tank) this can be check fitted at this stage and the ³⁄₁₆in. sheet permanently fixed.

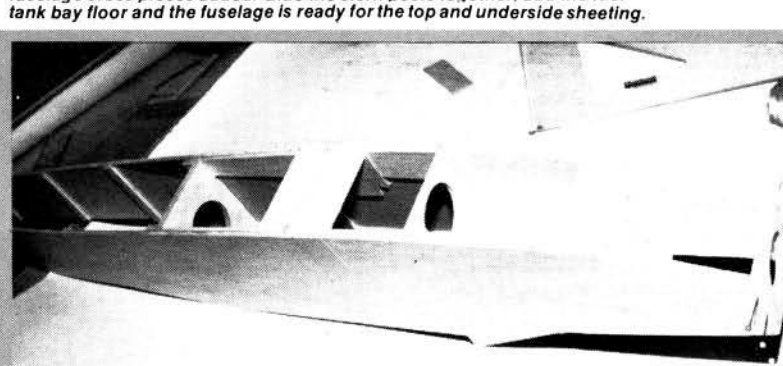
Glue the ¼in. × 1in. trailing edge stock front wing support to formers F3 and 4, it should be partially sawn through at the centre, so that it follows the dihedral angle. A short length of ³⁄₃₂in. × ¼in. spruce (or hard balsa) is glued to the top of former F5 to act as a wing positioner. That completes the basic construction of the fuselage, if the two wheel version is built, the nosewheel is obviously omitted, and an additional plywood plate is fitted to the underside in front of Former F3.

Next month, the wing and tailplane construction will be detailed, together with the general preparation of the model before covering.

Former F2 is added after formers F3 and F5 have set. The engine mount is lightly screwed to F2 at this stage to check the fit in the fuselage. Holes for the throttle cable tubing should be drilled in the formers before assembly.



The nose former, F1, can be positioned when F2 has set and the plywood fuselage cross pieces added. Glue the stern posts together, add the fuel tank bay floor and the fuselage is ready for the top and underside sheeting.



HAVING COMPLETED THE CONSTRUCTION of the *Trainer* fuselage — or were you waiting for the second part to appear before making a start — we can move onto the wing assembly. You may hear, or read, that flat-bottom wing sections are not ideal for training model due to the 'ballooning' tendencies of the model when an excess speed occurs. There is an element of truth in this opinion, but it is not a serious disadvantage — providing the model is not grossly overpowered. Out-weighing the limitations of using a Clark Y type wing section is the fact that the wings can be simply constructed over the building board, thus reducing the risk of ending up with a twisted pair of wings — subject to you also taking care at the covering stage. Of course, you could use veneered foam wings with a symmetrical or semi-symmetrical section, but it is all too easy to join these incorrectly and build in a permanent twist.

Wing construction

To convert a true and straight wing panel it is essential to have:

(a) a perfectly flat building board;

(b) parts that fit together accurately and do not have to be forced together;

(c) strip and sheet balsawood that is straight and of the correct grade, e.g. that the leading edge sheeting is not too hard and stiff, or it may be difficult to hold in position when it is being glued.

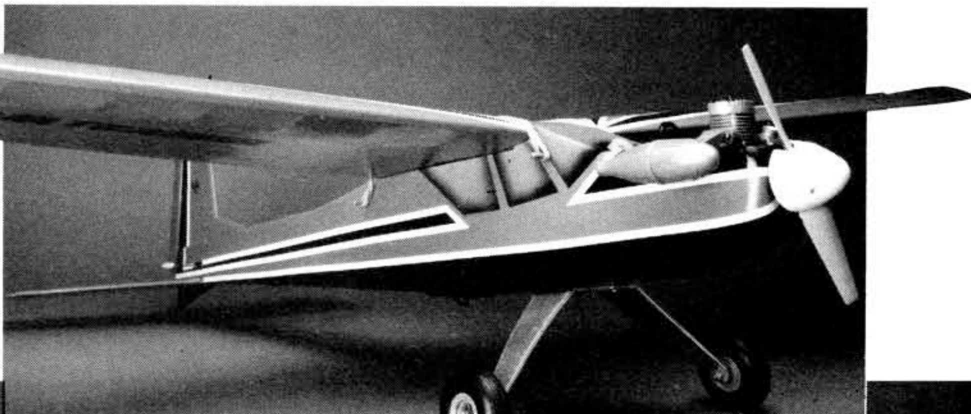
Start by protecting the drawing, either by covering it with thin clear plastic film, or by rubbing the areas of the joints with dry soap or a candle. Using a PVA white glue will give you ample time to position all of the components, particularly the 1/16in. leading edge. However, because it is slower drying than some of the modern 'miracle' adhesives, you must leave the structure pinned to the board until the glue has really hardened. To remove it too soon may lead to a warped wing panel.

Construction of the non-aileron wing

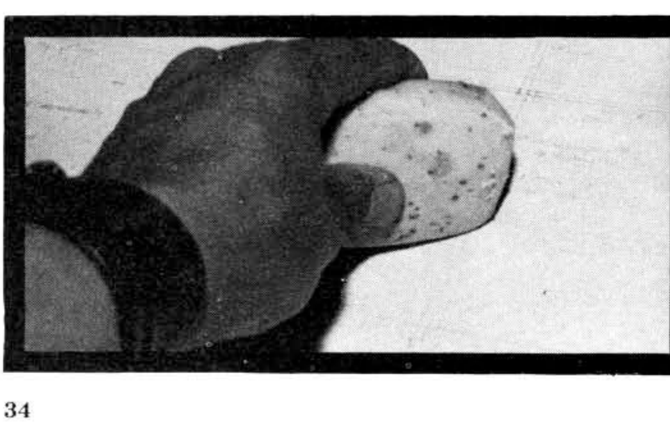
Pin into position over the plan, the 1/16in. × 1 1/2in. lower trailing edge strip (chamfer the rear top edges slightly — as shown on the wing section) the 3/16in. × 3/8in. rear span and the 1/4in. sq. main spar. Note that all of the spars, strips and sheet should be accurately trimmed to length before they are fixed in position — this will reduce the amount of sanding required at a later stage.

Cutting the wing ribs to shape can be carried out on an individual basis, using a plywood or plastic laminated sheet template as a guide, or by the 'sandwich' method. For the latter system it is necessary to cut two identical templates and drill three 3/32in. holes (middle and towards the ends). Balsawood blanks (8 no. 1/8in. and 12 no. 3/32in.) a little larger than the rib profile, are also drilled with the three holes in the same respective positions. A 'sandwich' is made with the templates at the outside surfaces and the blanks in between, the 'block' being held together with short lengths of threaded rod (about 6b.a.) and nuts at the ends to tighten the assembly. The block is then carved, with a razor plane, and sanded to the rib profile. Slots for the spars, leading edge and trailing edge strips are cut with the help of a razor saw or a small hacksaw, finishing off with a file. When the block is smoothly finished — always use a sanding block and not a loose piece of sandpaper — the ribs can be released from the block. Note that the centre section ribs, where there is sheeting on the top, are 1/16in. lower on the top rear surface.

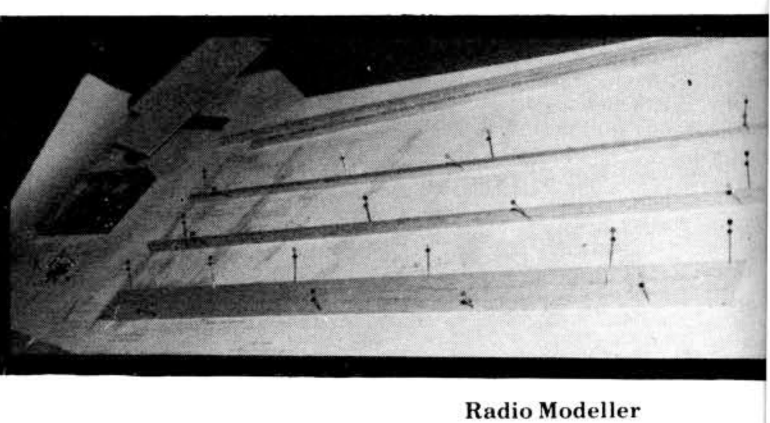
Commence gluing the ribs onto the main lower spars and trailing edge of



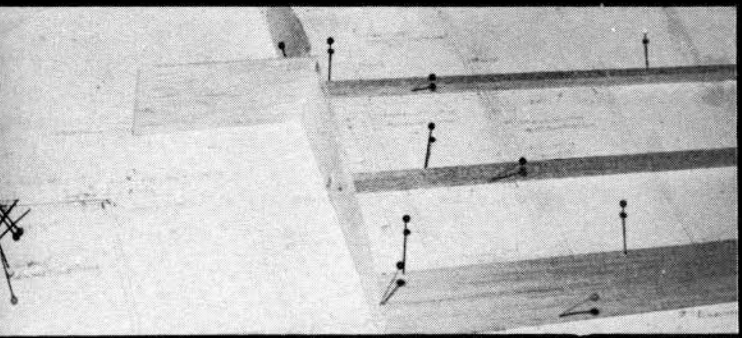
RM TRAINER Part



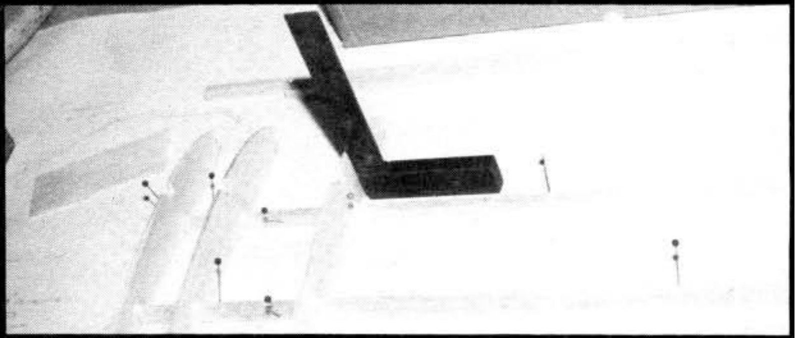
Rub the drawing with dry soap before commencing the building - or cover plan with clear film. The use of oatmeal soap is not imperative.



Pin down the trailing edge, rear spar and lower main spar. Cut to accurate lengths before fitting.



Angle root rib using the root rib template to obtain the correct inclination.



Glue the $\frac{1}{8}$in. root ribs in position - check for vertical with set square.

the wing panel. The root rib has to be sloped to allow for the dihedral (wing angle when viewed from the front) and is checked by placing the appropriate template against the rib — see plan and illustration. The remainder of the ribs are glued in position, checking that they are upright with a set-square. Wait for the glue to partially dry and then glue and pin the top trailing edge strip, together with the top main spar and $\frac{1}{4}$in. sq. leading edge. Fitting these components at this stage will allow for slight adjustments to the rib positions should this be necessary. The important point to remember is that the parts to be joined should be a snug fit — only a small amount of glue should be used — and no great force should be required to position them. Hold the parts together with pins until the glue has dried out.

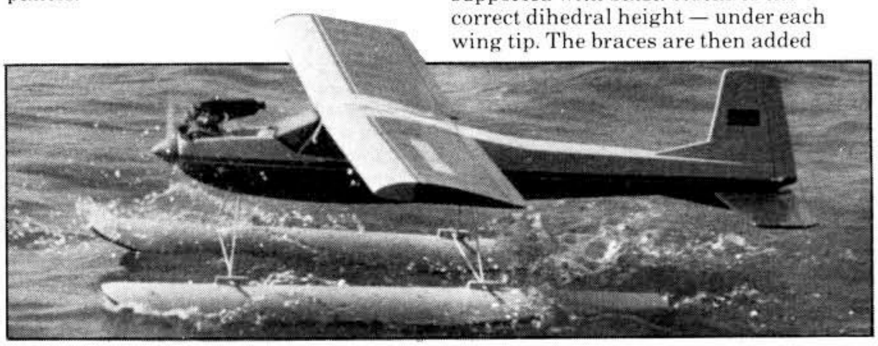
Fitting the $\frac{1}{16}$in. leading edge sheet can be carried out with the wing panel still pinned to the board or, after removing it. If the sheeting is reasonably soft and pliable (it should be medium grade) it will follow the contours of the ribs quite early and can be pinned to the leading edge without any problems. For slightly stiffer sheet it may be difficult to retain the glue joint on the leading edge (with pins alone) and clothes pegs, or masking tape will be used to secure the sheeting. It is easier to carry out this operation with the wing panel removed from the board (damping the top side of the sheet with water, from a wet sponge, will assist in forming the curvature).

Cut the $\frac{1}{16}$in. vertical webbing pieces from $\frac{1}{16}$in. × 3in. sheet — with the grain running vertically — and glue them to the spars and sides of the ribs. Fitting them to the wing spars helps to give greater rigidity to the wing panel with less chance of the wing bending. With the webbing set the leading edge strip and sheet can be planed and sanded to a rounded section — it is easier to do it before the two wing panels are joined. Glue the $\frac{3}{8}$in. soft wing tip blocks in position and, when dry, chamfer to the shape shown on the plan. The centre section $\frac{1}{16}$in. top sheeting can now be glued in position, note that the grain must be parallel to the spars so that it will follow the curvature of the ribs. Sand the wing panels to a smooth finish — using a sanding block. Be particularly careful when sanding the root wing ribs, there is a danger of rounding off the surface slightly and this will affect the joint of the two panels.

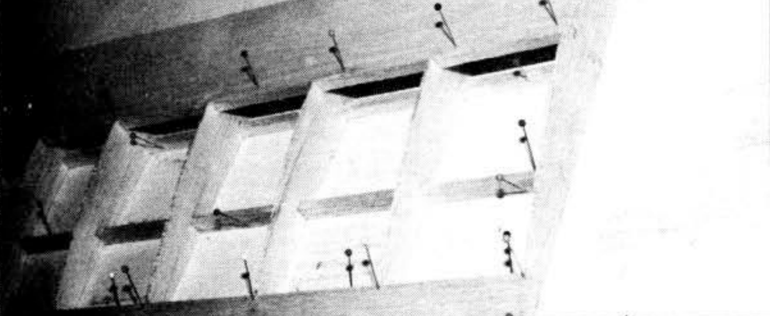
Joining the wing panels

The left and right wing panels are joined by gluing the root ribs accurately together and strengthening the joint with plywood dihedral braces. Cutting the slots in the ribs for the dihedral braces is easier done before joining the panels. A deep razor saw — or a piece of hacksaw — is used to cut the slots, the first cut should be on the line away from the spars. Use the dihedral braces to gauge the depth of the cut and check that both panels and braces align correctly. The dihedral braces should not be proud of the lower wing surface and the root ribs should mate accurately.

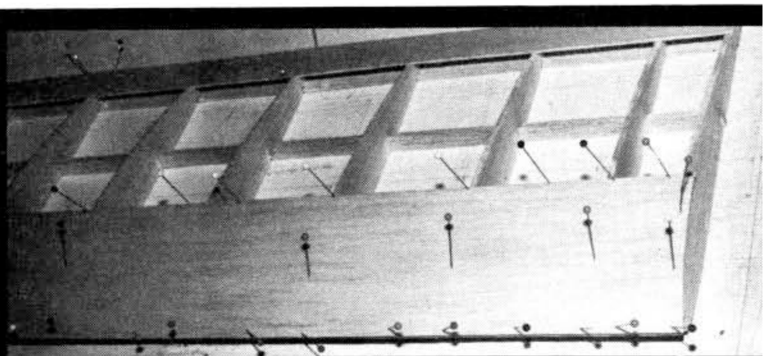
When you are satisfied with the 'dry joining' of the panels they can be permanently glued together. There are two ways to hold the panels together during this operation: the panels can be glued together (without the braces) pinned to the building board and tip ribs supported with balsa blocks to the correct dihedral height — under each wing tip. The braces are then added

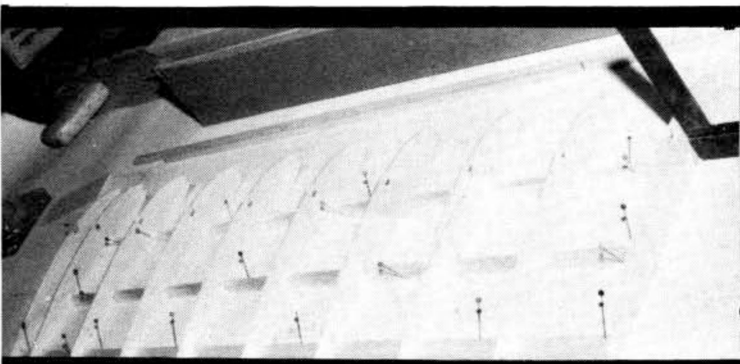


Start by gluing the $\frac{1}{16}$in. leading edge sheeting to the mainspar - use PVA glue.

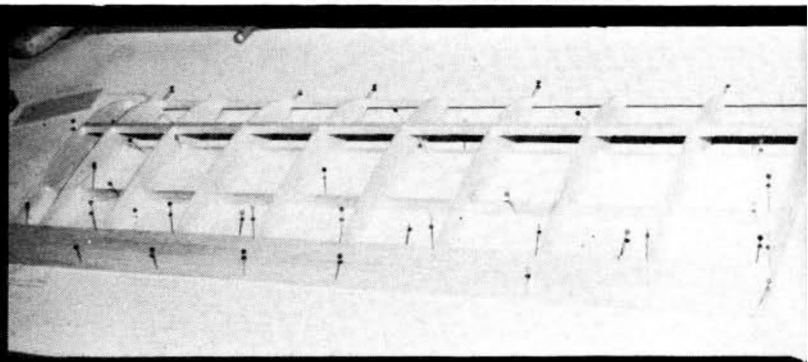


If the leading edge sheeting is flexible it can be held to the leading edge with pins.





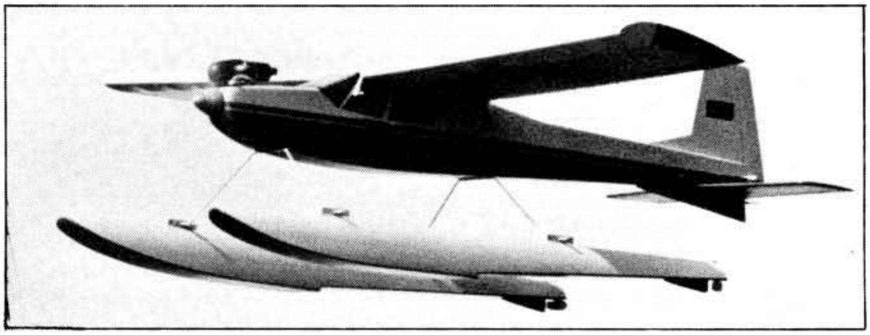
Add the remainder of the wing ribs, including the 1/8in. tip rib.



Glue and pin the top trailing edge, top spar and 1/4in. sq. leading edge in position.

when the assembly is removed from the building board.

An easier method is to glue the panels together — using pins and clothes pegs to hold them in position — and insert the dihedral braces at the same time (see illustration). With this method the wings are not pinned to the board and the assembly must be 'eye-balled' to ensure that there are no twists in the wings. View the trailing edges from the rear (about three feet away) and check that both panels are straight. There may be a slight discrepancy in the amount of dihedral incorporated in the wings using this joining method — a quarter-inch plus or minus the stated figure will not affect the flying characteristics of the *'Trainer'* unduly.



Aileron wing version

Construction of the aileron equipped wing is similar except that smaller trailing edge strips (1/16in. × 3/4in.) are used with an additional 3/8in. rear spar. A lower dihedral angle is also used, to improve the response of the ailerons during a turn. The aileron crank assembly (torque rods and tubes) and the servo bearers are fitted before covering, the ailerons afterwards.

Form the aileron crank rods by taking a threaded rod (cycle spoke) and bending it through 90° just beyond the threaded portion. Slip over a length of close-fitting brass, or aluminium tube, to the length shown on the drawings — note that the tube for the port wing is longer than the starboard one (due to the offset aileron servo). Bend through 90° so that end of the rod can be inserted in the aileron at the correct angle — see, also, the fuselage side view drawing. Remember to make a left-hand and right-hand aileron crank.

To fit the crank assemblies a groove must be formed in the 1/4in. × 3/8in. centre trailing edge pieces and a 'V' cut made where the crank arm extends below the wing. Dry assemble and check that there is free movement of the torque rods. Before gluing the assemblies to the wing (use epoxy) smear a little petroleum jelly around the ends of the tubes to prevent the adhesive from gluing the torque rod and tube together.

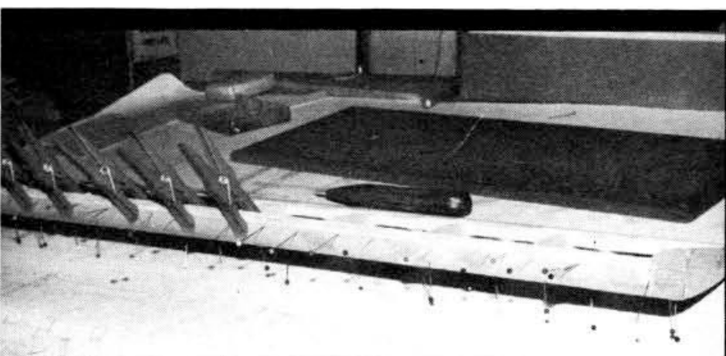
Complete the wings by gluing the 1/4in. × 1in. trailing edge stock between the trailing edge strips, in the first two rib bays, and adding the .8mm plywood reinforcement on the tops of the wings at the leading and trailing edge positions.

All sheet tail surfaces

Do not select heavy 1/4in. sheet for the tail surfaces or you will finish up with a tail-heavy model. Construction of the tail surfaces is absolutely straight-forward, the parts are cut out and glued together over the drawing. Naturally, the rudder and elevator are hinged to the fin and tailplane after, or during, covering. Sand the assembled parts smooth on both surfaces and round off the edges to a half-round section — the rudder can be tapered in section to a 1/16in. trailing edge, but this is not essential.

Hinge lines can be formed by chamfering the edges to a 'V' section (for separate hinges) or with an angled chamfer (see fuselage side view) to allow the hinge to be formed with the covering material. The basic construction is now complete and next month will see the covering of the model, radio equipment installation — and flying!

It may be necessary to hold the front of the sheeting with pegs or masking tape.



After the slots are cut the dihedral braces are checked for position - then glued.