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VH MMS

MACROBERTSON MILLER AIRLINES

*Fokker Friendship*

MMA  
Swan



$\frac{1}{2}$  in. = 1 ft. scale model for  
two .8 c.c.-1.5 c.c. engines  
with simple construction by

**MAURICE BODEY**



THIS VERSION OF the Fokker-F.27 Friendship has been specifically designed for moderately experienced builders and to use engines of 1-1.5 c.c. The simple structure is exemplified by a new form of wing assembly where there are *no* ribs and the result of which is an extremely strong replica of the full size, very narrow wing.

Of all the twin-engine prop-jet aircraft produced in the last 10 years, the Friendship is undoubtedly the most successful. It operates in many countries, carrying the bright colours of a large number of airlines and is manufactured under license in the U.S.A. by the Fairchild Corporation. It was designed to meet the demand for a modern successor to the well-worn Douglas DC-3 but applying the latest stringent safety regulations. As a fast, short haul airliner carrying around 40 passengers, it is seen most in the United Kingdom, in the colours of *Aer Lingus*.

As can be seen on the cover, Maurice Bodey chose the markings of the Australian *MacRobertson Miller Airlines* which are especially colourful and details of whose markings are given on the full-size plan.

For most enthusiasts, the most difficult part of the construction will at first sight be the well-sprung nose wheel but in actual fact, Maurice has so designed this unit that it can quite easily be made from  $\frac{1}{16}$  in brass sheet and should present no difficulty to anyone with hacksaw and small Swiss files.

Truly, this Friendship design would be our recommendation to any control line scale enthusiast wanting to make his first "Twin" and we are sure that the extensive possibilities of adding interior detail and fitting opening doors, etc., etc., will have an equal appeal to the experienced flier.

Start construction with the **Fuselage** first by cutting formers F1 and F3 from  $\frac{1}{8}$  in. ply and remaining formers from  $\frac{1}{8}$  in. sheet balsa. Keels F13-14-15 are cut from  $\frac{1}{8}$  in. sheet balsa and laid flat over plan. Cement half formers F4 to F12 in their respective positions on the keels. Now cement complete cabin sides F16 (steamed to the curve with windows cut out), followed by F3, F17 and then F2. When completely set, lift off plan and add the other halves in same procedure for the starboard side. Cut nose keel F18 from  $\frac{1}{8}$  in. ply and glue to F3 and F17 then glue F1 in place using a good resin glue, *not* balsa cement. The fuselage can now be set aside to thoroughly dry.

The **Wing** is of high aspect ratio and therefore needs to be torsionally stiff. It also has to take a fair amount of knocks in the usual control line landing procedure and so stout grade sheet balsa is employed. Because of the frontal taper it is necessary to make the wings in three sections and for this purpose, different sheet thickness are employed.

Carefully mark the centre section shape on  $\frac{3}{8}$  in. and  $\frac{1}{2}$  in. sheet balsa. The outer panels are marked on  $\frac{1}{4}$  in. and  $\frac{3}{8}$  in. sheet. Leading and trailing edges are tapered in thickness and depth as indicated in the two views on the drawing and the five cross sections. Shape these edges square and leave all sheet panels as "blanks" for the first stage of assembly. Fret the two  $\frac{1}{8}$  in. plywood spars W1 and W2 to shape and prepare the  $\frac{1}{8}$  in. ply bellcrank mounting platform. We are now ready to begin assembly.

First attach leading and trailing edges to the centre section bottom sheet. Add the  $\frac{1}{8}$  in. ply bellcrank platform after drilling and installing bolt then recess the lower sheet to allow a slot for the push-rod. Temporarily tack the top sheet in place and now rough carve the centre section to airfoil shape, checking it against the plan for the fit in F13. Sandpaper smooth, taking care all the time not to damage the protruding leading and trailing edges.

Now remove the top sheeting and fit W1 and W2, making slots in the bottom sheeting to accommodate the nacelle former protrusions. Use a good resin glue for this joint on which so much depends. The lower outer panels from  $\frac{1}{4}$  in. sheet can now be offered up to the leading edges (which should be cracked to match the dihedral in the front view) and also the extensions of W1 and W2. Again, use a good grade resin glue for these important joints. Assemble complete bellcrank unit with lead-out wires and push-rod to the plywood mount and recess the upper centre section sheet to ensure clearance at full range of movement (see fuselage side view). Solder cup washers on wires so that they cannot come loose and lock the main nuts on pivot bolt with solder. Add 2½ oz. lead weight to starboard tip and complete the tips with  $\frac{1}{16}$  in. ply ribs and  $\frac{3}{8}$  in. sheet extremities. Fit brass tubes in the port tip for smooth operation.

The upper wing panels can now be fitted beginning with the centre section and then the outer panels, shaped to true airfoil according to the cross-sections. Make frequent checks by eye from front and rear to see that the wing is being carved true and without warp, then sandpaper over all and finally offer to the fuselage, sliding push rod through all formers F7-F11.

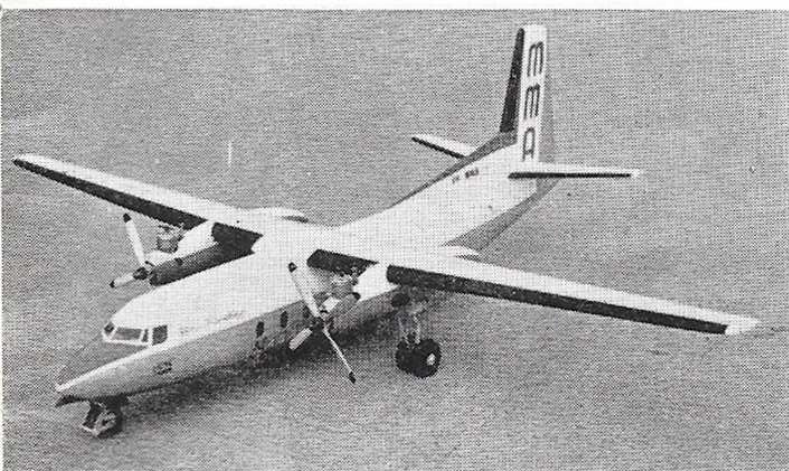
Make sure the wing sits square from front view on to the fuselage within the shape cut-away from F13—so that the correct angle to incidence is maintained.

The **Tailplane** is a simple, streamlined sectioned shape and its only complication is the dihedral angle which is maintained by plywood keepers "A" and "B". Make up the assembly and fit to the fuselage keel F13, keeping it perfectly horizontal and parallel to the upper fuselage line.



Cement  $\frac{3}{32}$  in. x 1 in. balsa spine seating strip from wing to tail over formers F8-10, also add pieces of clear acetate inside F16 at window positions. When wing and tail are firm, bend extreme end of pushrod to fit elevator horn so that controls are free and have full range of up and down elevator movement.

Make brass nose gear parts and firmly bolt to nose former F18. The fuselage should now be planked with  $\frac{1}{2}$  in. x  $\frac{3}{32}$  in. strip balsa. Add nose, tail and cabin blocks. When set, carve blocks roughly to shape and then sand complete fuselage to a smooth finish. The 1 in. x  $\frac{3}{8}$  in. balsa spine is glued



in position on rear of fuselage, followed by R3. Cut **Fin** Parts R1 to R7 from  $\frac{3}{32}$  in. sheet. The former R1 is cemented to R3, followed by R4-7. By cementing R1 and leading edge in position, one can carefully align completed fin and leave to set. The fin can now be covered in  $\frac{1}{16}$  in. sheet and sanded to section. **NOTE:**— The fin follows the fuselage in



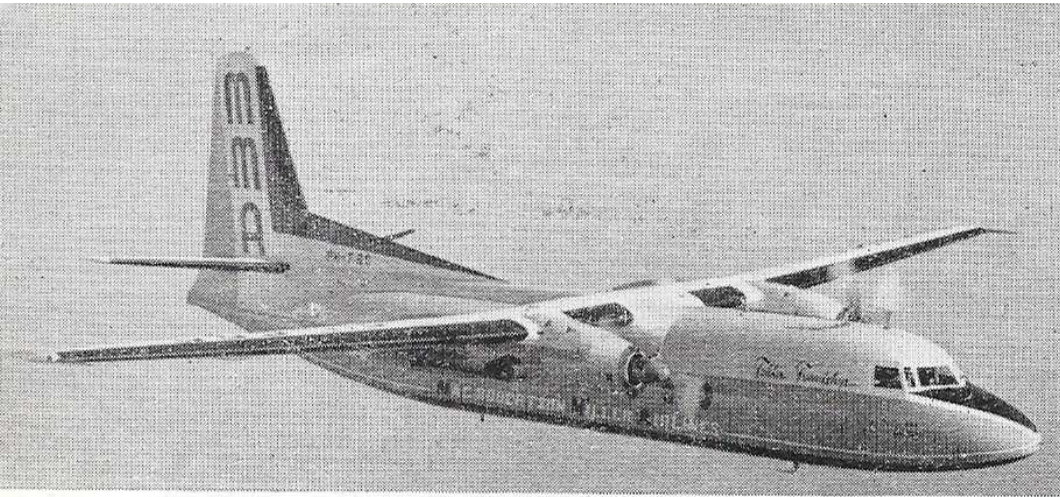
Maurice Bodey's Friendship prototype posed at Speke Airport is given away only by the exposed engine cylinders, in this case E.D. Cadets. Appearance belies the simplicity of construction for this fine model which can be brightly decorated in any of many airline colour schemes.

a continuous line. Shape dorsal fin, and cement in position.

Thread  $\frac{3}{8}$  in. square hardwood bearers through W1 and W2 **Nacelle** former extensions. Add fuel tanks at this stage. Cement former N2 and lower engine bearers, using resin glue. Study main undercarriage detail and make up as shown, binding firmly to upper hardwood bearers. Add N4 and N3 and then plank from N2 to N3 with  $\frac{3}{32}$  in. strip balsa. Upper balsa block fairings and tail block can be added, after which they are carved roughly to shape and the complete nacelle at this stage can be roughly sanded to shape. Engine cowling is carved and hollowed from hard balsa block and lightly cemented to F1. Add ply nose ring N1 and  $\frac{1}{4}$  in. balsa nose ring to their respective positions. This construction is the same for both starboard and port nacelles. The completed nacelles can now be sanded to correct shape.

The model is now ready for covering after giving it a final sanding to ensure that no bumps are left. Cover complete model with lightweight tissue and give it one coat of clear dope after sanding lightly. Follow by giving up to six thin coats of sanding sealer, when a smooth finish should result. Items such as U/C doors, rudder, exhaust pipes, nacelle corrugation and ply parts at "B" and "C" on under-





## Fokker Friendship

The real thing! Still bearing the Dutch registration PH-FBG (R.M.A. Swan) of MacRobertson Miller Airlines on test prior to delivery. This aircraft became VH-FAMS as shown on the model.

side of wings can now be added. The cockpit windows are made in six pieces with thin cardboard framing. Cut top half of engine cowlings away and thoroughly fuel proof engine bearers, N2 and inside of cowling. The engines can now be installed, and the upper cowling can be cut away to suit engine used.

Give the model one final coat of sanding sealer before painting on the Airline colours chosen. A few examples of Airlines using "Friendships" are *Aer Lingus, Philippine Air Lines, K.L.M., East West Airlines, Ansett-ANA.*

Fuelproof the completed model and check for balance. If nose weight is needed, drill into nose block and add lead. First flights should be flown off smooth ground, using  $7\frac{1}{2}$  x 4 props and 50 ft. lines. Make sure your lines are in good condition, and the model will fly at about 60 m.p.h. quite smoothly. No trouble should be experienced on take-offs or landings, or with single engine operation after full power take-off.

Treat this model with respect and you will be rewarded with many hours of happy *Friendship.*