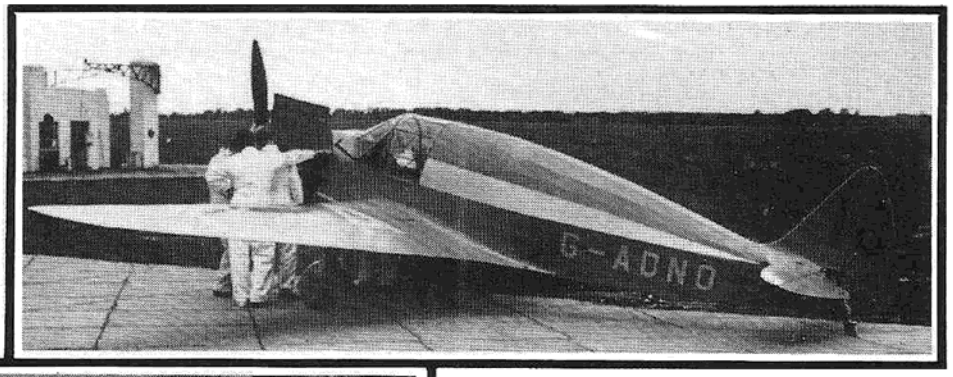
T.K.2

A beautiful 1/4 scale model of one of deHavilland's lesser known aircraft of the 1930's.

By Dennis Tapsfield

I think it is true to say that the name "TK2" does not convey much to the average model enthusiast, it was a "one-of," therefore, a little known aircraft. It was designed not by the deHavilland Company, but by a group of trainee students of the DH technical school, which trained designers, ground engineers, and production managers. The TK2 originated as a design in a competition organized among the senior students, and was in fact, a blend of the two most promising designs, and it was decided to attempt to complete the aircraft for the 1935 Kings Cup air race. It was a very tight schedule, but successfully completed on time and checked out. The TK2 competed in the air race, putting up a very good show by placing 4th overall.

The model, at 1/4 scale is a very fair representation of the original aircraft; all we know of the color is that it was highly polished scarlet, the black and white photos which exist appear to show white trim. Unfortunately, there are no color photos, or prints to be found; however, the model as described is about as authentic as we are likely to get. If you fancy building this



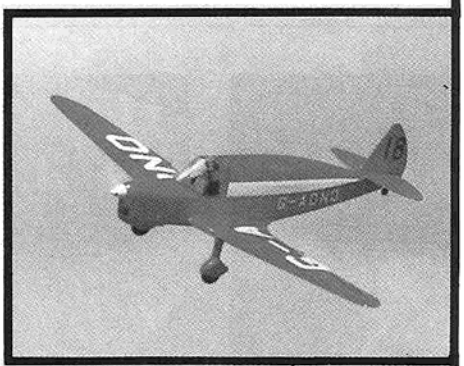
The T.K.2 in the civil registration G-ADNO with wheelpants and fairings for the 1935 air racing season. It was fourth in the King's Cup Air Race in September 1935.

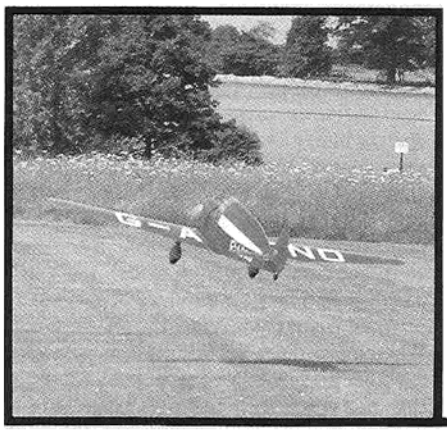
model, do not be deterred by the tapered wings. The full size aircraft was reported to have a gentle stall with no vicious wing drop, and if you build this model accurately, you will find it just as gentle; but do not make a heavyweight out of it, doing so will certainly mar the performance. My model weighs in at just under 10½ lbs. with 6 ozs. of lead in the nose; try to keep it under 11 lbs. (5 kilos) for a good performance.

CONSTRUCTION

Wing:

Mine is foam, covered with Obechi veneer 1/20'' thick (.5mm); however, you can use balsa if you wish. I know that there are purists out there who prefer to build a wing, so I've provided all the information for you to do so. The foam wing should not present any problems, make sure the cores are cut with the correct amount of washout at the tips, and have the 1/2'' diameter hole through to the servo box for the leads. It is a very big wing (96''), so if you wish to make it in two halves, I suggest you use alloy





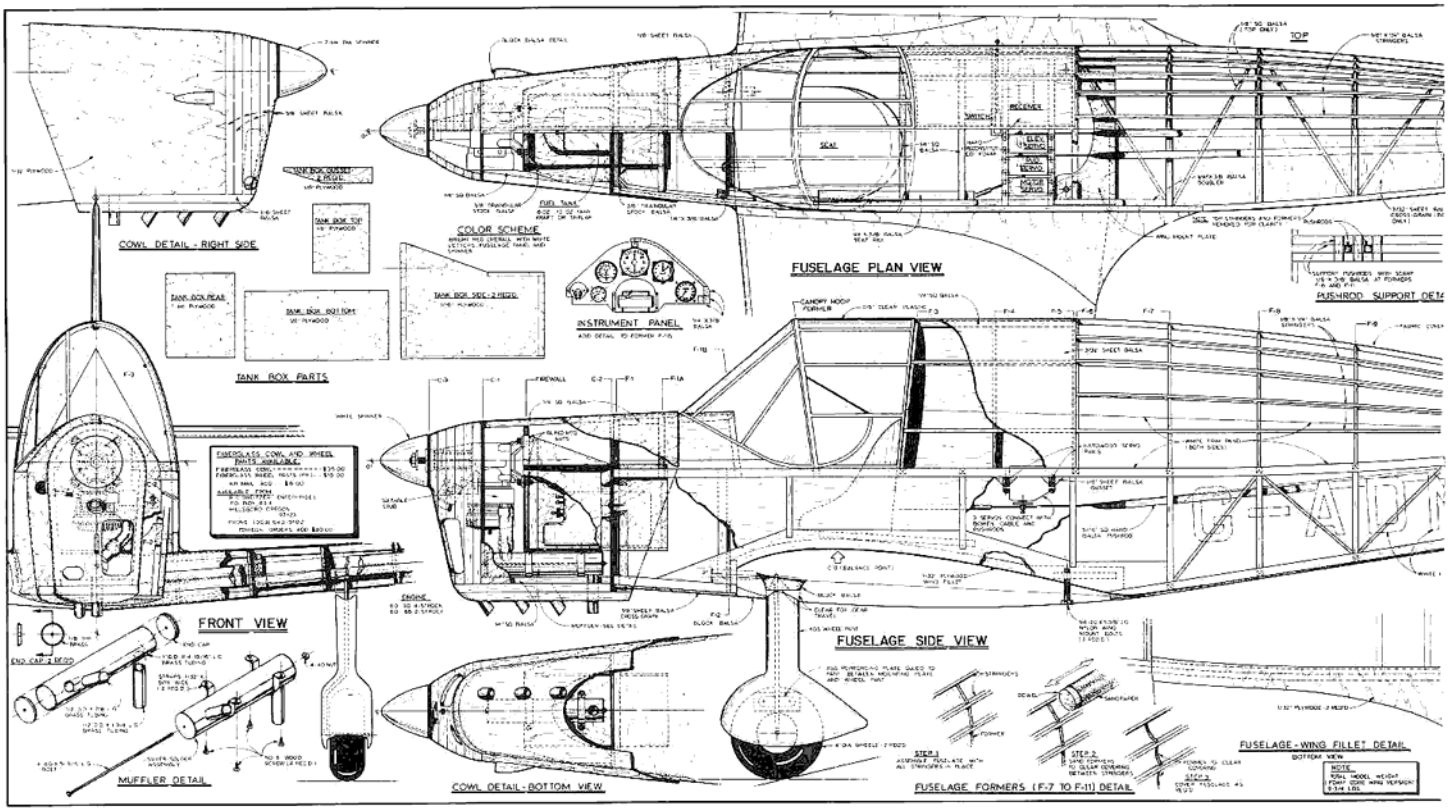
tubes with dowels of a suitable size, say 1/2'', placing two above each other at the thickest part of the wing, and one further back about 3/4 of the chord. You must take great care with the alignment, so that the root ribs are truly in line. The rest of the construction is quite conventional.

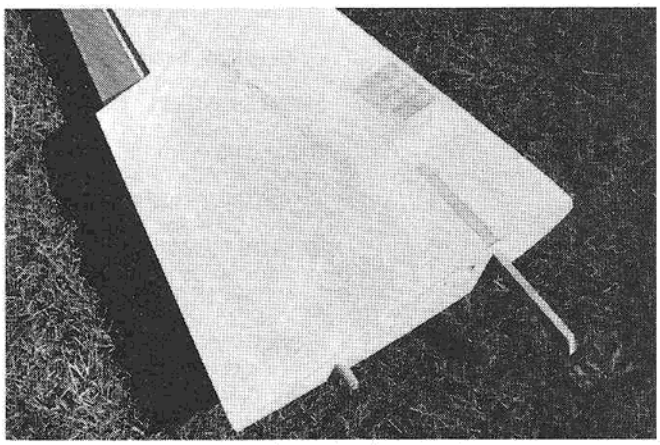
Built-Up Wing:

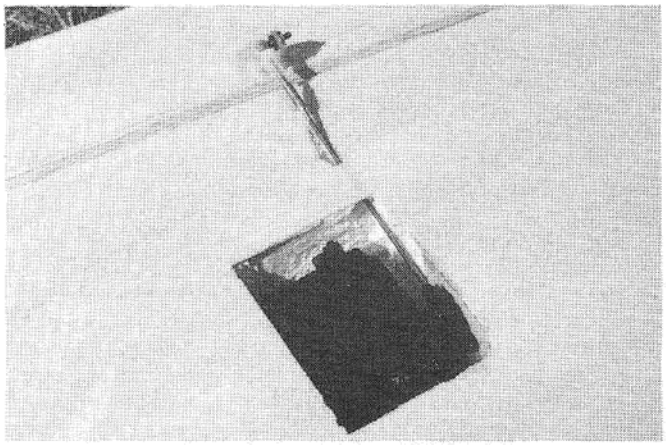
The first job is to cut out all the ribs as shown, and notch them for the spars, taking special care to make the notches deep enough. Note that there are some 1/8'' ply ribs designed to carry the landing gear which is different to that used on the foam wing. Make a small jig of 1/32'' ply to ensure that the 1/2'' holes for the tube to carry the servo leads all line up parallel to the spars. Build the wing by first pinning the lower main and rear spars to the drawing, then gluing the ribs in their respective positions. Make sure the spars are flush with the underside of each rib, and CA in place. Set the root rib to the correct angle for the dihedral. At this stage, use the 1/4'' sq. packing laid under the wing to stabilize it, and produce the correct washout. Glue in the top front and rear spars, adding the

T.K.2
Designed By:
Dennis Tapsfield
TYPE AIRCRAFT
Giant Scale (1/4 Scale)
WINGSPAN
95 Inches
WING CHORD
11½ Inches (Avg.)
TOTAL WING AREA
1058 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
4¼ Inches
OVERALL FUSELAGE LENGTH
65 Inches
RADIO COMPARTMENT SIZE
(L) 5'' x (W) 8'' x (H) 5''
STABILIZER SPAN
25 Inches
STABILIZER CHORD (incl. elev.)
6½ Inches (Avg.)
STABILIZER AREA
160 Sq. In.
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
12¼ Inches
VERTICAL FIN WIDTH (inc. rud.)
8 Inches (Avg.)
ENGINE SIZE
.60-.90 4-stroke/.60-.65 2-stroke
FUEL TANK SIZE
11 Ozs.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Foam, Veneer/Balsa, Ply
Empennage ..... Balsa
Wt. Ready To Fly . 168 Ozs. (10 Lbs. 8 Ozs.)
Wing Loading ..... 23 Oz./Sq. Ft.

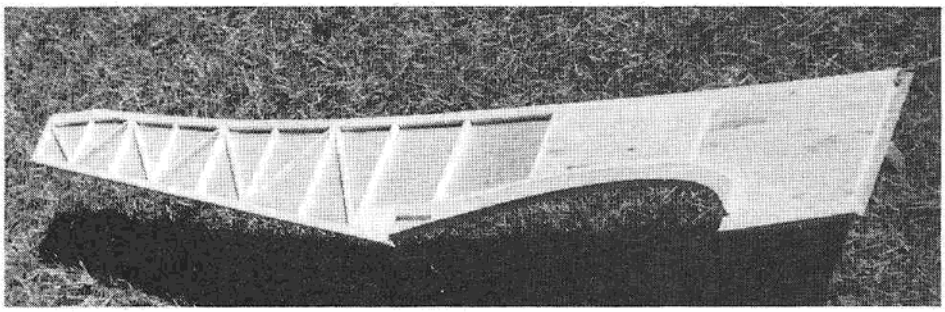
FULL SIZE PLANS AVAILABLE — SEE PAGE 227







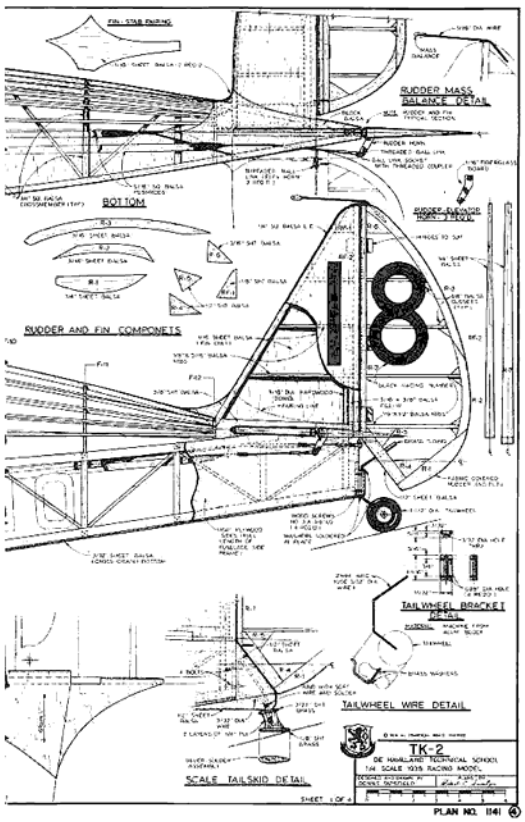
LEFT: Underside of RH wing root showing L.G. mounting block and my optional system of wing joining. RIGHT: Aileron servo on mounting bracket screwed to plywood base.



Typical fuselage side covered with 1/64" ply.

webbing and filling in-between the rear spars in the vicinity of the aileron. When all is set, fit the inner leading edge and trailing edge, and allow to dry. When this is set, cut the ribs and fit the aileron spar in place, leaving about 1/16'' gap between it and the main spar. Then, complete the aileron by adding the ribs as shown. Remove the wing from the plan and add the blocks for the mounting bolts, landing gear, the paper tubes for the servo leads, the servo box, and all the other internal details, and **sheet the underside only**.

It is best to make up the wing skins first by the following method: Use a metal straightedge and balsa cutter to straighten the edges of the balsa sheet to be used for the skins. Butt them close together and cover the joint with plastic tape or masking tape. Turn it over, open it like a book, run a fine bead of glue down the edges, using aliphatic resin (white) glue or balsa cement; close the joint, remove the surplus glue, and cover it with another piece of tape. Make up the skins big enough to cover both wings by this method. **Now very important**: Place the wing back on the plan with the 1/4'' sq. packing in place to produce the correct washout **before** you sheet the top surface. When this is done, all that remains is to add the outer leading edge, the tip, then separate the aileron, and complete the wing



according to the drawing. The second wing panel is produced in the same way.

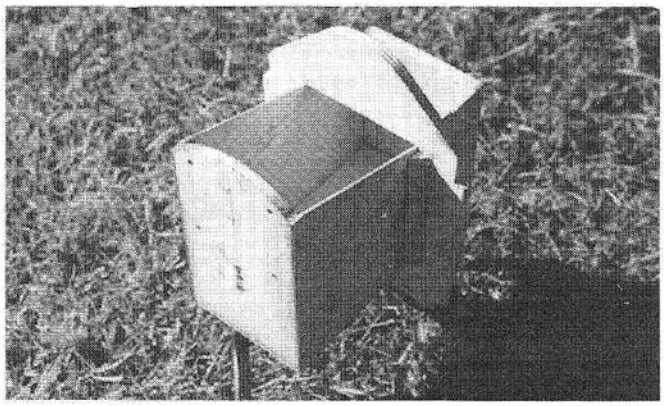
When joining the wing halves, it is essential to ensure that they are true. I prefer to glue the root ribs together with **slow setting** epoxy, which will give you time to get the dihedral right, and to be certain that both wings have equal washout and are not twisted. A distant view of the rear of the wing is one of the best ways I know of to check this. When this is set, you can add the 3'' wide cloth tape over the center joint, using aliphatic (white) glue for a good, smooth, and strong job. You can, of course, make your wing in two pieces, joined in the center using tubes or deep tongues and boxes, whichever you prefer.

Fuselage:

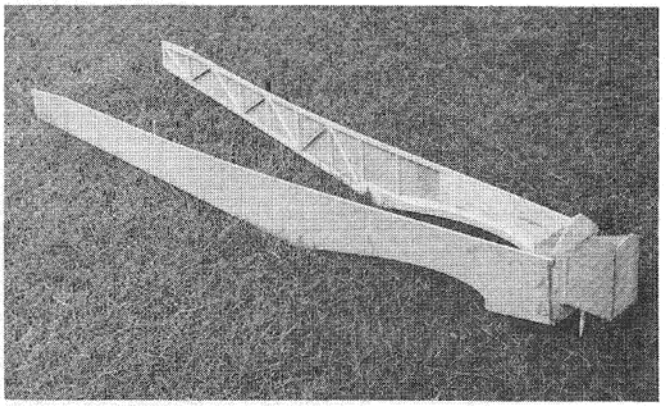
First, build two identical sides over the plan in the usual way. Cover the sides with 1/64'' ply, making one left hand and one right hand. Cut out all the formers from the material shown on the plan. Remove the center from the fire wall and make sure it is square and true all around. The piece you removed should now be reduced in size to allow for the thickness of the box used to extend the engine further forward. This assembly also accommodates the fuel tank and must now be built up prior to joining to the fuselage sides. Make sure that the engine mounting face at the end of the box will place your engine in the correct fore and aft position to match the cowl by sliding the box back or forward in the fire wall cut-out. Glue and nail the whole thing together using 24-hour epoxy, placing reinforcing gussets where shown. Make sure it is all square and allow to set.

Using 24-hour epoxy, glue the fuselage sides to the fire wall assembly; install gussets at the fire wall where shown, tape everything in place and allow to set. Make sure it is all true at this stage, and set the angle of the sides shown in the plan view accurately. When dry, the fuselage can be finished off using the formers and spacers cut to size from the drawing. The notches for the stringers are cut after the formers are glued in place to ensure that they flow smoothly and are straight. Do not omit the scallops in-between the stringers at each former to clear the covering — nothing looks worse than formers poking up through the covering and spoiling the smooth surface.

The cowl should be made at this point and is a fairly straightforward job. First, bolt your engine in place, then make the laminated balsa block front end. Glue in place the 2¼'' diameter ply ring; next, spot glue a 1/16'' ply plate on with a hole large enough to clear the prop driver, then another 1/16'' ply plate on that with a hole in the center, to give a good fit on the crankshaft. Slide the unit onto the crankshaft, fit the nut

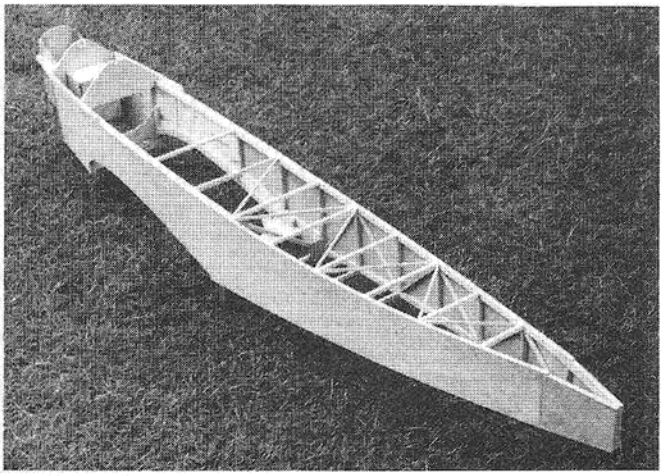


Fuel tank box and former assembly.



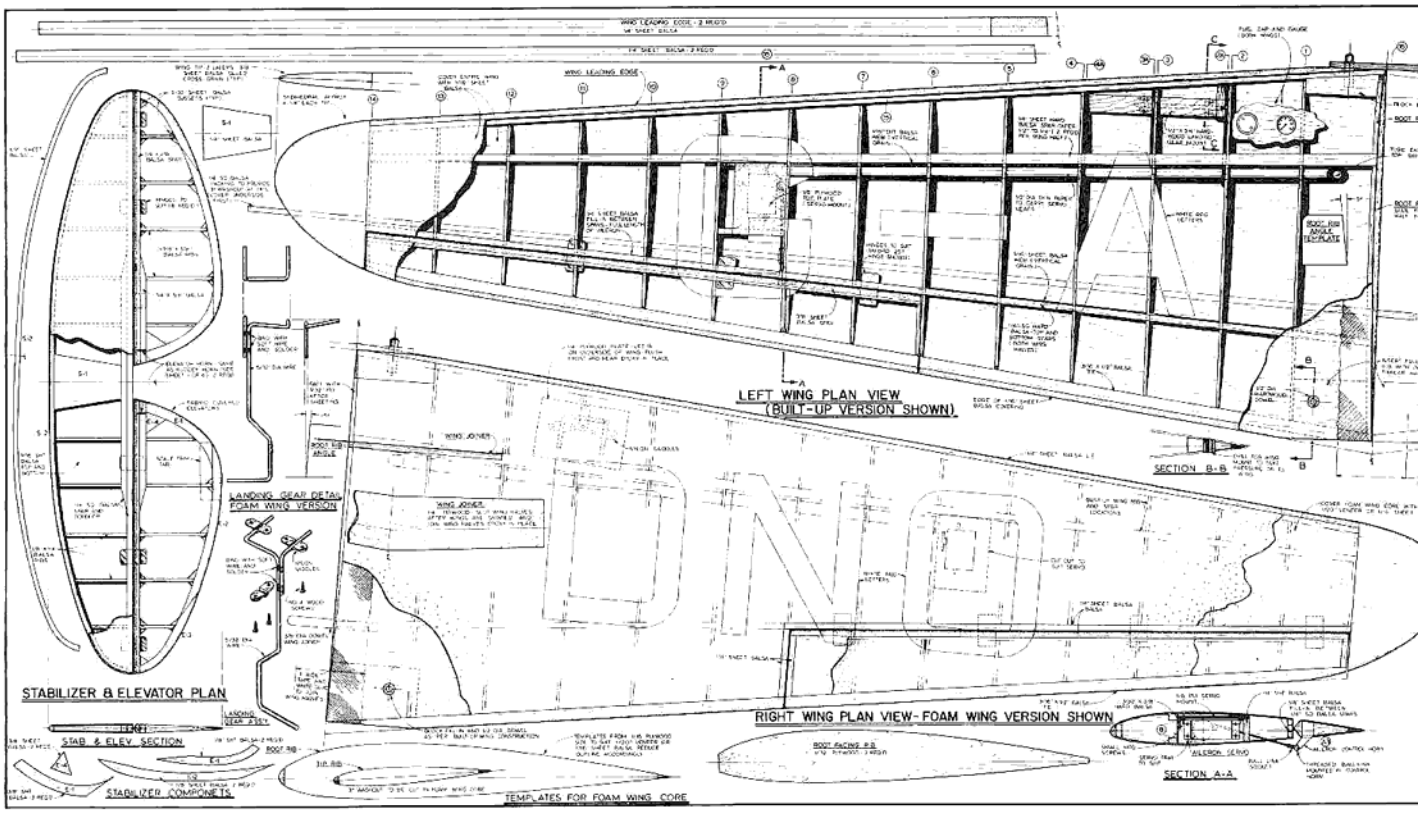
Fuselage sides glued to fuel tank box assembly.

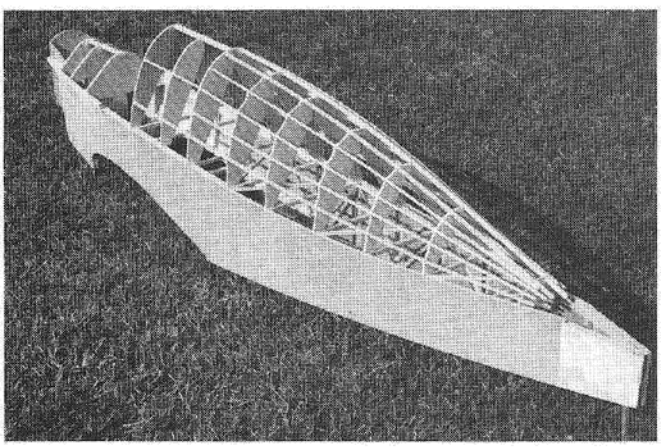
More formers added to fuselage.



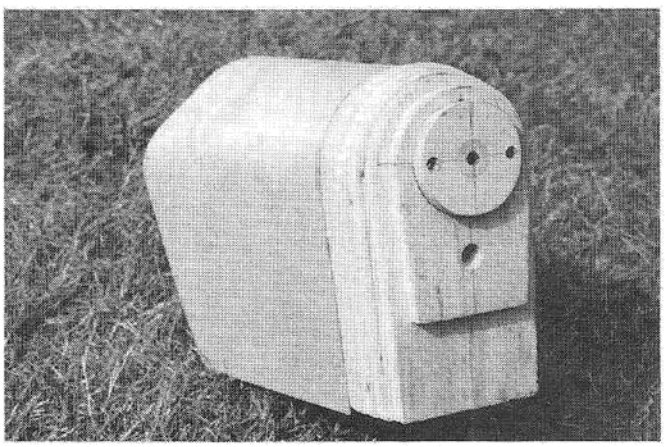
Basic fuselage structure complete.

FULL SIZE PLANS AVAILABLE — SEE PAGE 227





Top formers and stringers added. Be careful to keep those stringers good and straight --- no humps or bumps!



Cowl assembly before shaping nose block.

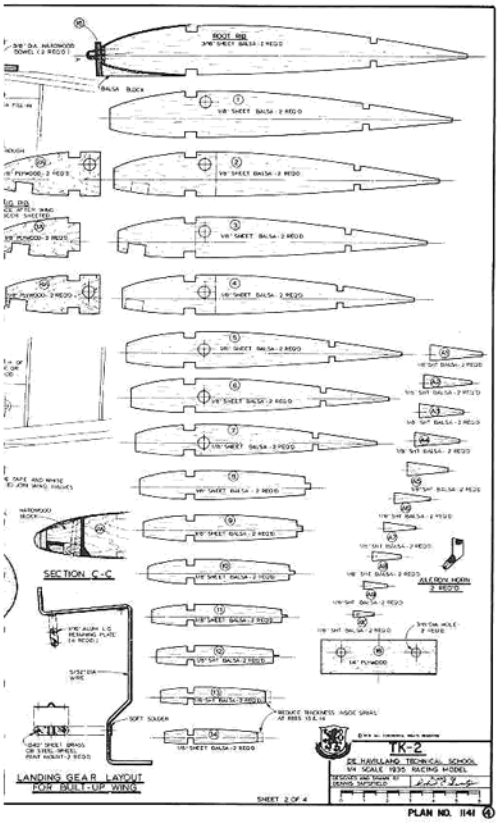
and washer and clamp in place. Your cowl front end is now held exactly centered and you can build the cowl in position. Make sure the direction of the 1/32'' ply grain is correct as shown. **Note:** You must bend the ply **across** the grain after wetting. Next, make sure that the wing is seating properly in the fuselage and fit the wing in place with its bolts to be sure all is correct and square. The seating on the fuselage can be formed by passing sandpaper between the fuselage to leave a 1/32'' gap to accommodate the ply root fairing. Carefully position the fairings and glue in place, making sure they lay flat on the wing. The fillet is made with Model Magic filler or a similar material using a piece of round material to smooth it down. Laminate the cockpit hoop as shown, and dry fit in place; do not glue in until after covering.

Tail:

This should not cause any problems, however, I did discover that having built up the horizontal stabilizer, it was only marginally lighter than if I had used a **light** 3/8'' sheet balsa for it, so you can do this if you prefer to! The rest should be made as per plan. Temporarily fit the horizontal stabilizer in place by spot gluing. Then, fit the fin the same way, with the ply fillet base sandwiched between the horizontal stabilizer and permanently glued to the fin. Now, fit the balsa fillets between the fin and the ply base. When they are set, the fin can be removed, and the fillets finished. Leave the top of the fillets slightly oversize to simulate the alloy fairing on the full size aircraft. Make the fillets for the horizontal stabilizer to fuselage joint at the leading edge. Do not glue them to the stabilizer, only the fuselage, as the stabilizer has to be removed for covering! Make, roughen, and epoxy in place, the two elevator horns and the one rudder horn. Make the tail wheel assembly as per the drawing and temporarily fit in place, checking that the rudder moves freely. Remove the tail unit prior to covering the model.

Landing Gear:

This will vary depending on whether you use the foam wing or the built-up one. The spat halves are assembled when the gear is already on the wings. First, nut and bolt the inside half to the mounting plate on the landing gear. Then, having glued small tabs of scrap A.B.S. along the inside edges of both halves so that they clear each other, check that the wheel runs free, and then glue the outer shells in place with a suitable glue. Allow to dry, then smooth the seam with



Note keyhole slots for fixing cowl to front former.

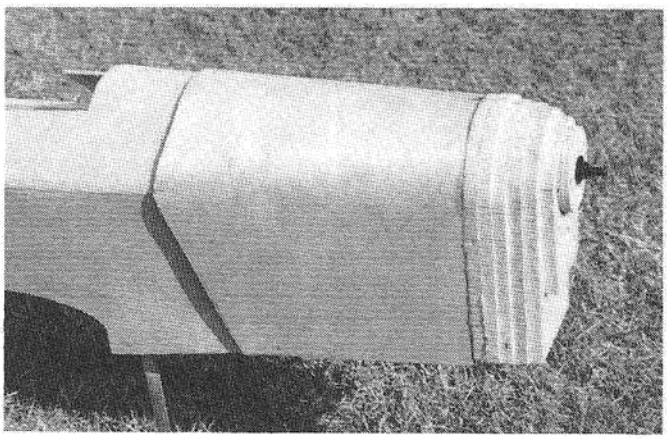
wet and dry sandpaper prior to painting. **Note:** If you use the A.B.S. moldings, you can use CA, or make a very good cement using M.E.K. (Methyl Ethyl Keytone) with shavings of scrap A.B.S. dissolved in it.

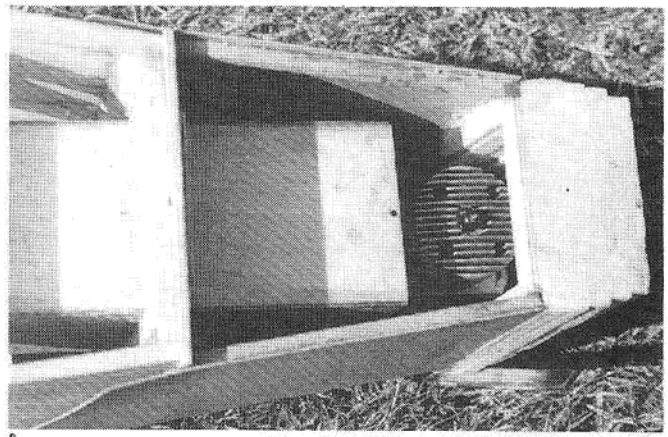
Radio:

It is a good idea at this stage to install the servos, pushrods, etc., so that everything is accessible prior to covering. It is best to position the battery when you have completely finished the model and use it to help establish the balance point as shown on the plans. Be sure to "egg box" the pushrods about every 10" in the fuselage, otherwise they will tune in to the engine vibrations and probably fracture somewhere. The range of harmonics that occur on a model are enormous, and are not fully appreciated by all of us.

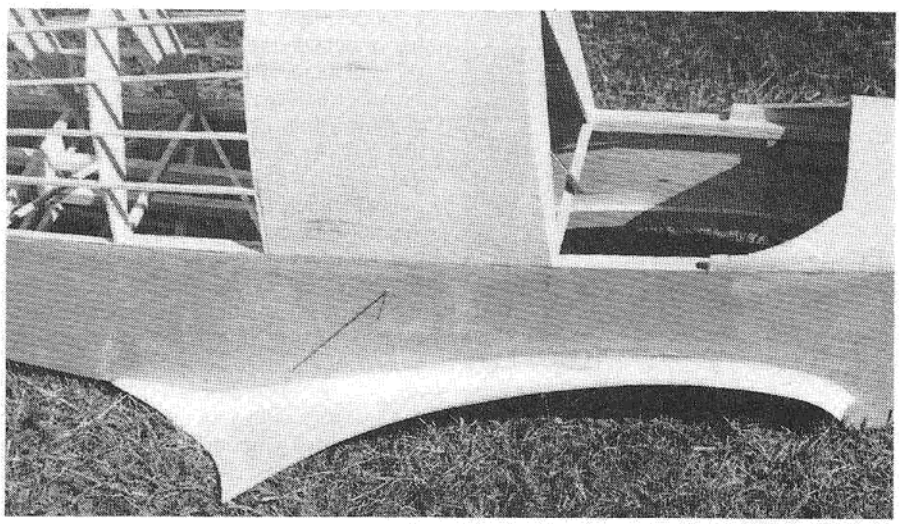
Covering:

I used Solarspan (Coverite's Black Baron film) for the main covering, and there is also a matching Solarlac paint (Coverite's Black Baron epoxy paint) to make life easier for the spats, etc. The registration letters are cut from white Solartrim (Coverite's Black Baron Presto). First, draw them full size on ordinary writing paper, then tape two layers of the trim large enough for the letters to be cut, down onto your cutting board by the edges. Then, tape the drawn letters down on the top and, using a new blade, cut through





Cowl in early stages located by the engine crankshaft.

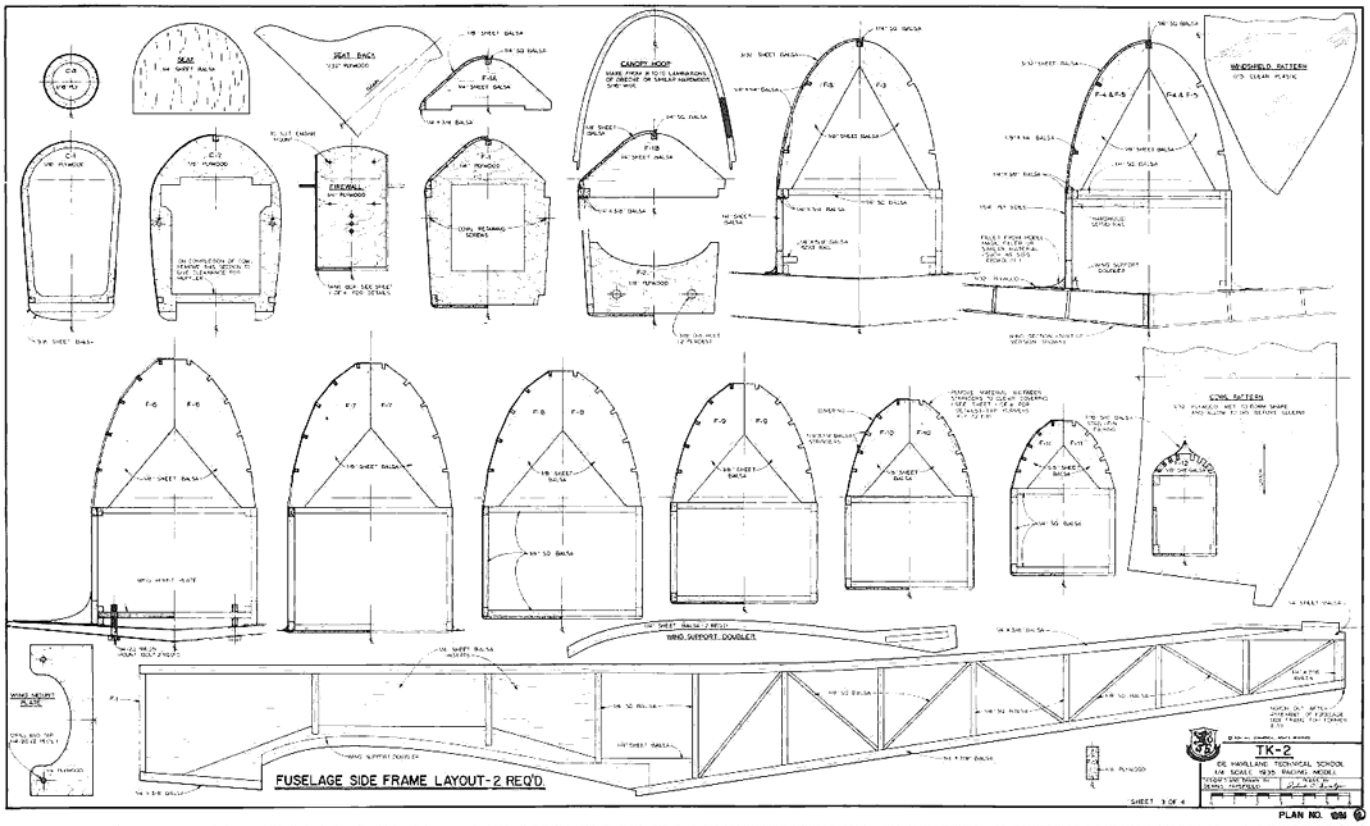


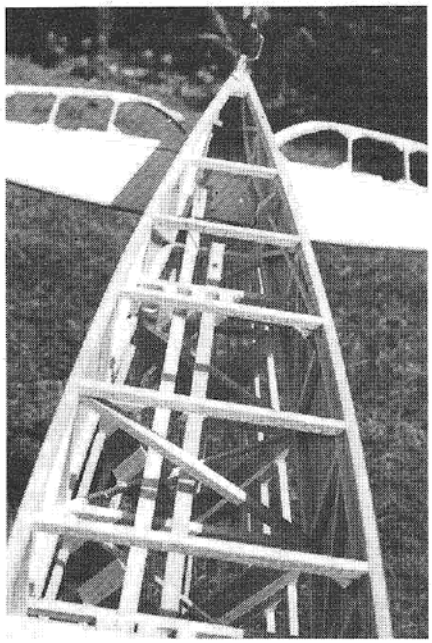
Large cockpit area. Wing fairing now in place.

the whole thing; the results are very satisfactory. Great care must be taken when applying these: Mark the exact position with a pen, then peel back a small piece of the backing and position them accurately. Carefully peel the remainder out from underneath a little at a time, rubbing the trim down as you go. The pen marks remaining can be removed with a cloth dampened with dope thinners or methylated spirit.

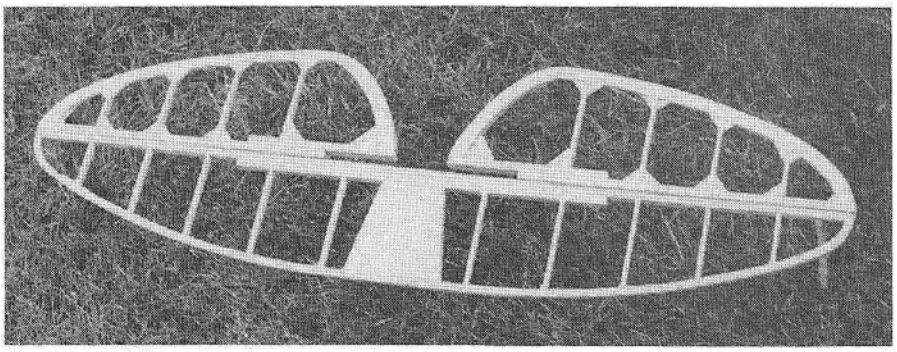
The canopy is fitted using double-sided tape (available from most large bookstores) cut to a suitable width. The hoop (former) must be chamfered for half its width to allow the front windshield to fit snugly and the lower front edge of the windshield should be held down by a 3/8" wide strip of black Solartrim (Black Baron Presto). The bars can also be simulated with black Solartrim: I have found this method to be quite satisfactory on previous models.

FULL SIZE PLANS AVAILABLE — SEE PAGE 227

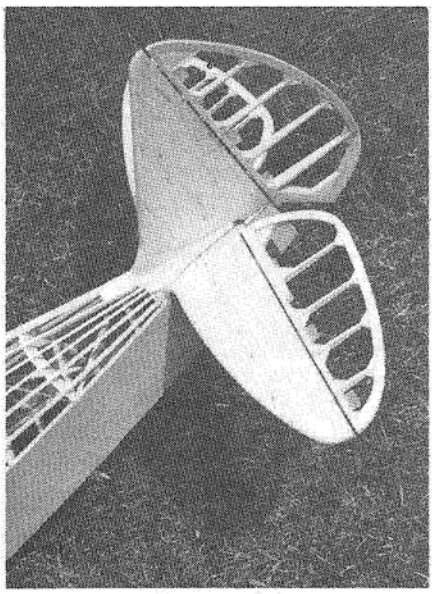




Elevator and rudder pushrods in place, note supports to prevent harmonic vibration.



Built-up tailplane structure.



Completed tailfeathers.

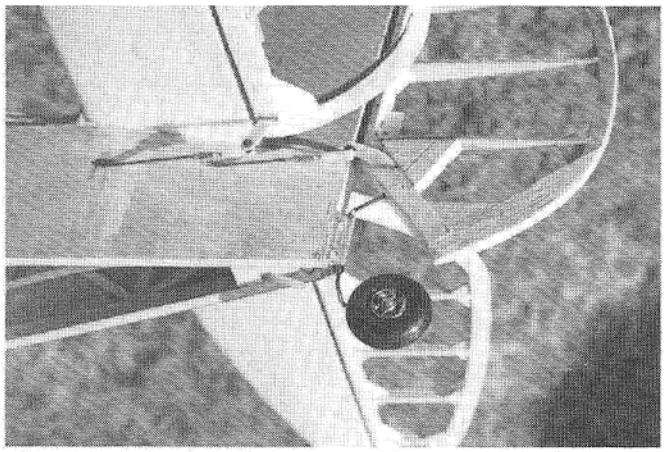
After covering the stab and the fin, they can be epoxied to the fuselage. Make very sure that they are all square and true with the wing. It is a good idea to fit the wing in place and view the model from the rear end; it is relatively easy to see any misalignment by this method, if it looks right — it is right! Do measure the horizontal stabilizer from each tip, to the nose of the model and make sure each side is equal. Set the ailerons up about 1/8'' at the trailing edge to aid differential and simulate extra washout. Check that the C.G. is at the point indicated on the plans, and then do a final check-over.

Flying:

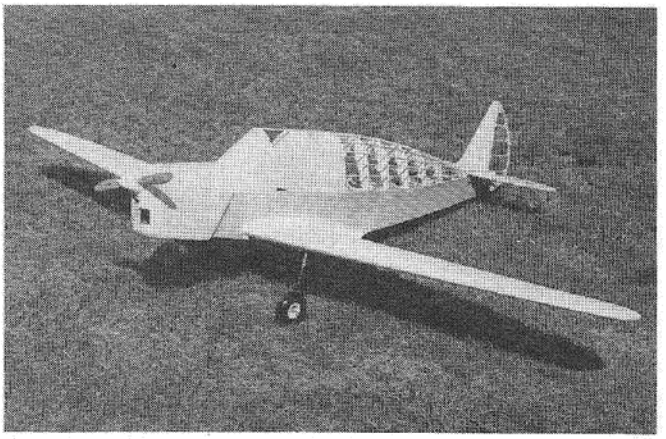
It is true to say that this model has no surprises in store, feed the power on gently, combined with a little right rudder to hold her straight during take-off. Gently ease her off, and if properly trimmed, she will fly off on her own. Keep her straight and level on a shallow climb out for maximum realism, and just check out all the controls gently. Take her to a good height and see how she behaves when you reduce the power for a simulated landing. If all is well, have some fun with her; make your landings gentle, three pointers are the rule, you can wheel her in, but it takes up a lot of field! She is quite aerobatic, but rolls are somewhat slow, mainly due to the large wingspan; but she was designed as a racer!

Good luck with your model, please send me a photo of your finished model in care of RCM if you have one to spare. Happy Landings.

□

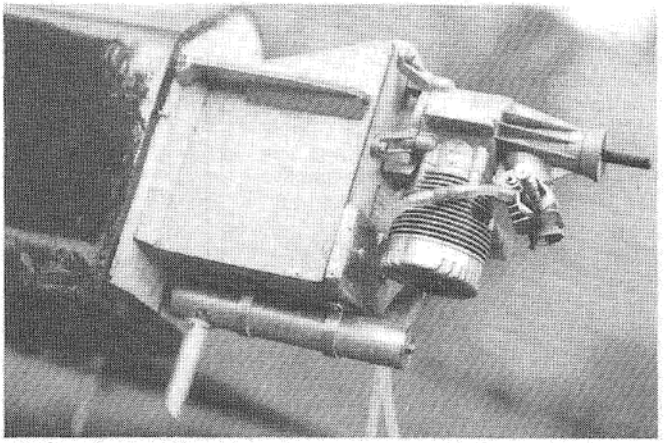


Simple but effective tailwheel assembly, note pushrod controls with ball links.

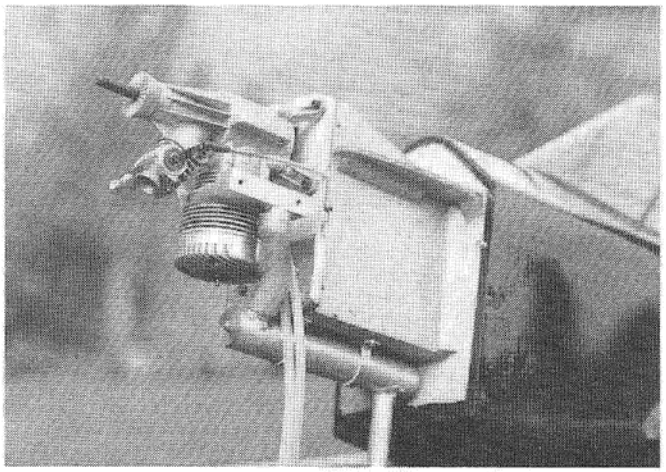


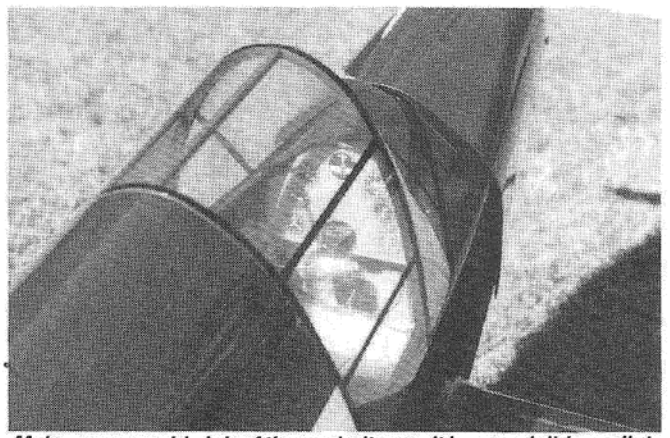
Complete airframe has good flowing lines, typical of the era.

Don't omit the large air intake for cooling, air exits at rear underside of the cowl.



ABOVE & BELOW LEFT: Neat engine installation using home-made manifold and muffler.





Make a reasonable job of the cockpit area, it is very visible, a pilot is also a "must."

FULL SIZE PLANS AVAILABLE — SEE PAGE 227