

**I**T WAS DURING MY FIRST VISIT to Oshkosh in '83 that I saw the full size prototype of the 'Crackerjack'. In '83, the attendances to the E.A.A. annual convention at Oshkosh numbered 14,000 aircraft movements, yes, fourteen thousand during the week, and over 200,000 in the crowd for the first Sunday of the meeting. It must be — is — the most mind boggling show of its kind in the world. There are representative aircraft of all types there, such as World War II, antique, microlight, replica, etc; a most impressive display. However, back to the "Crackerjack"; the name, by the way, is coined from a make of popcorn. Their trademark is the Sailorboy and his dog, which appears on the fin and rudder, and the designer of the full size aeroplane had their blessing to use it.

### Wood Wing Specialities

The "Crackerjack" was designed in 1978 by a talented young man named Peter Plumb, who runs a small



Dennis Tapsfield with the 'Crackerjack', above. Some idea of the size of the 1/3rd scale model may be judged - Dennis is no midget!

# Crackerjack!

Superb 1/3rd scale model (112in span) by Dennis Tapsfield, of the Woodwing Specialities 'Crackerjack' ultralight aircraft plans are also available for 92in wing span version (.60 to .90 cu. ins. four-stroke engines).

company called "Woodwing" Specialities in Tahachabi, California. It is powered by an 850cc. flat twin, air cooled 4-cycle D.A.F. car engine suitably modified for aircraft use. Fortunately, it measures just about three times the physical size of the O.S. twin 120 F.S. 4-cycle engine — hence my interest in the aeroplane, and at



1/3rd full size it came out just right for my needs. Of course, it can be fitted with any engine of similar power, but I had a Gemini, so I intended to use it!

The designer was very helpful to me, supplying drawings and pictures taken during the construction of the full size aircraft. After checking this information, I decided that the model could be built in exactly the same way,

using the same materials and methods as for the full-sized aircraft. I made just three main concessions, the fixings of the wing roots to the centre section, the fitting of a "Cub" type sprung landing gear, and the "solid" leading edge wing ribs. The remaining structure is a faithful replica. If you don't fancy building the Warren truss ribs, you can of course cheat, and cut



them from sheet balsa, but I suggest you stay with the rest of the structure for lightness, mine weighs 14lbs complete.

### Simplify and add lightness

All aircraft fly better if they are kept light. "You'd better believe it". I bet you've seen the odd B17 or Lancaster model eating up the sky at a scale speed of about 600 mph! Bill Stout, who laid the foundations for the design of the Ford Tri-Motor (Tin Goose) had a formula; it was to "Simplify and add more lightness". Anyway, if you are

piece of 1/4in. ply, or similar, for a base, cut a pattern of the rib shape, and draw around it onto the ply base. Glue small hardwood blocks all around the outside each about 1/8in. thick, from 1/4in. x 1/4in. hardwood, 3/4in. apart. Glue in a piece of hard wood to represent the spar. Push the 1/8in. x 1/8in. top and bottom booms of the ribs up to the blocks and glue more blocks on the inside to hold them in position — taking care to keep the areas for the verticals and diagonals clear (blocks to locate these can now be glued in position). Note that the booms

and the ribs to the plan and build the wings in the usual way. Laminate the curved trailing edge root sections from 1/8in. balsa: make a jig from 1in. hardwood for bending. Allow for the thickness of the finished laminations. Soak the balsa laminations in 50% water 50% household ammonia, clamp in the jig, and allow to dry. Remove the pieces, glue, and replace in the jig. Clamp until dry. This method is used for all the laminated parts.

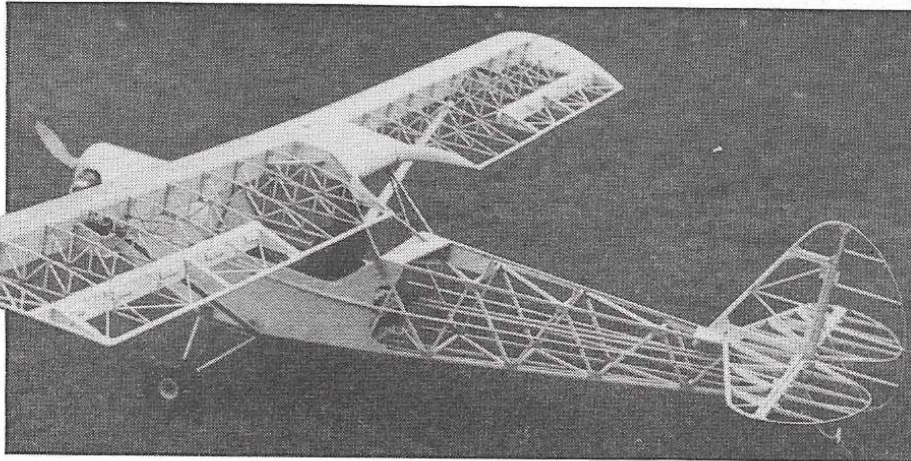
### Wide centre section

Make as shown on the drawing, remember that the main loads are in compression so do not deviate from the drawing.

### Fuselage

The prototype is built just like a model! Be sure to use hardwood and balsa where shown, and use all the plywood gussets as these help to produce a very stiff structure. There is little comment to make about the whole assembly, except to leave off the front and rear decking until the cabane struts are made and fitted.

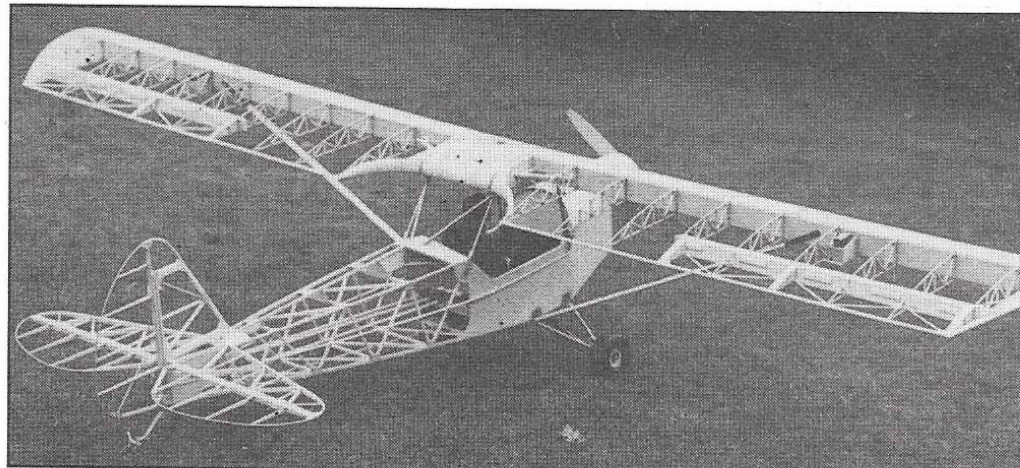
*With such marvellous construction work it is almost sacrilegious to cover it up - even if the finished results are equally excellent.*



interested in the prospect of building this pretty, and unusual little aeroplane, bear in mind that you will need to know how to silver-solder. Believe me, its very easy and very satisfactory. A highly detailed description of "how to do it" is not really necessary since, if you undertake this project, you should be a reasonably experienced modeller.

### Wings

First cut the spars from 1/4in. hard balsa, you will probably have to join the spars, since they are longer than normally available wood, splice them as shown on the drawing, and at the



## Ideal for '120' capacity horizontally opposed twin cylinder four-stroke engines or '90' to '120' single cylinder motors.

position shown (so that the ply facings serve to reinforce the strut fixing plates).

Make the strut fixing plates, clamp the spars together and, using strut fixing plates as a drill jig, drill through both spars together; this ensures identical parts, and simplifies final rigging.

### Rib jigs:

If you propose making the ribs in the full size manner, you must make a jig to ensure all ribs are identical; use a

go over the top and bottom of the spar. Build all the ribs, the parts behind the spar that is. The ribs in the aileron area are slightly different, to allow for the aileron spars. When completed, notch out the top and bottom booms to receive the leading edge 1/16in. sheet covering, place each rib back in the jig, and glue to the solid leading edge rib — now you have complete ribs.

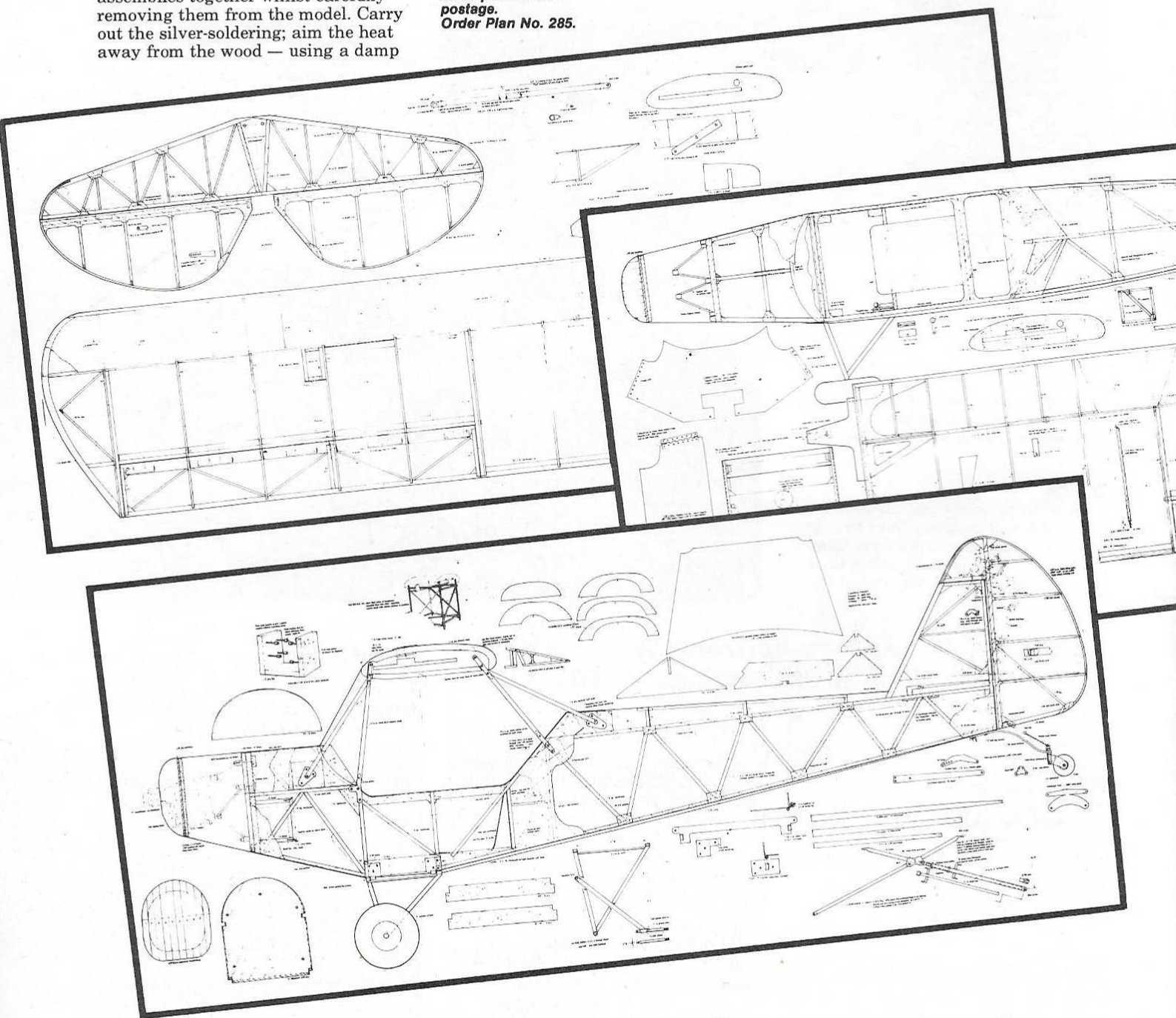
Cut the root ribs, and the locating tongue from 1/4in. ply, thread all the ribs onto the spars (you will find that the notched wing aileron spars will thread through the ribs). Pin the spars

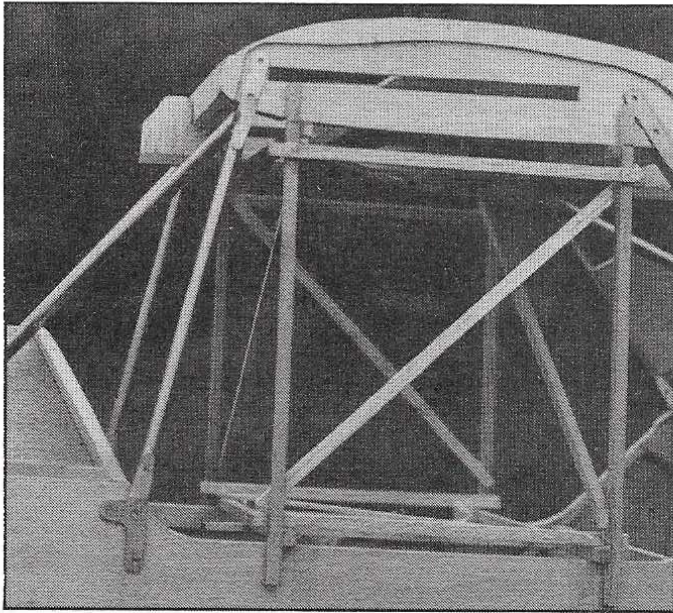
### Cabane struts

The material used for the cabane struts are 5/16in. OD x 22 swg steel tubing, if this is not available, brass can be used as a substitute. The most important feature is to jig support the centre section rigidly in the correct position during assembly. It dictates the correct incidence and symmetry of the model. A jury frame should be built, referring to the gap between the undersides of the centre section and the top of the longerons, also locating the fore and aft position. *The pictures should make this clear.* Once you are satisfied that the centre section is in its correct location you can make the cabane proper. Cut the four vertical struts to length by offering them into place. Cut the sixteen side plates and drill them as shown. The vertical struts

are now drilled so that the plates can be temporarily bolted in position to hold them whilst being silver soldered. (The heads and nuts will be filed flush when complete). Fit the four vertical cabanes into place and use a small woodscrew in each for temporary positioning. Whilst the front and rear braces are cut to the correct length and angle, make the triangular plates and bolt into position on the braces to hold them securely whilst silver soldering — do this now. The front and rear braces can now be positioned, and the fuselage drilled to hold them in place. Cut a piece of 1/4in. sheet balsa to fit into the triangle formed by each of the vertical cabane struts and its associated diagonal brace. Cyno' these in place. This will hold each of the assemblies together whilst carefully removing them from the model. Carry out the silver-soldering; aim the heat away from the wood — using a damp

**Copies of the three large drawings for the 'Crackerjack' (shown below to 1/9th scale) are available from the MAP plans service, PO Box 35, Wolsey Road, Wolsey House, Hemel Hempstead, Herts. HP2 4SS, price £15.80 plus £1.40 postage Plan No. 284. Plans for the 92in wingspan version, with greatly simplified construction, cost £7.20 plus £1.40 postage. Order Plan No. 285.**





*Illustrations to the left and below show the juryframe for the cabane struts. Silver soldering is carried out in situ - not as difficult, or terrifying, a job as one might assume. Always have a wet rag handy for cooling down components if they get too hot.*

*Dennis mentions using temporary balsa triangled between the vertical and diagonal struts for holding them in position. Be careful not to get the heat of the torch onto the cyano - the fumes can be toxic.*

friend to silver solder it with oxyacetylene, as I could not get sufficient heat in quickly enough with my butane torch. The whole thing has to be carefully jigged to maintain squareness and alignment. A sketch of the jig will be found on the drawings. However, if you choose not to be a hero, you can use a packing piece and/or ordinary type engine mount for your installation.

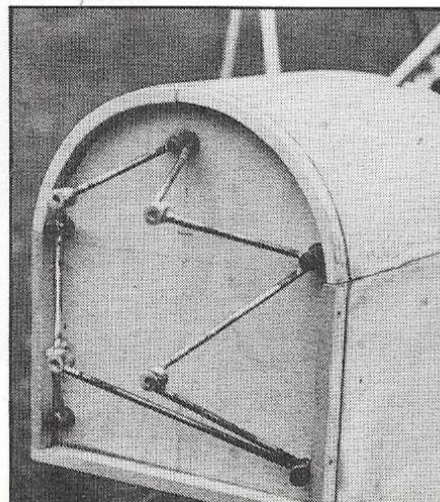
#### **Tail unit**

This is fairly straightforward. I used 1/8in. x 20swg. aluminium tube, but 1/8in. diameter solid aluminium welding rod will do quite well. My model needed a little weight in the tail anyway.

#### **Cowl**

The front of the cowl is made from 1/2in. balsa laminations as shown, the remainder is of .020in. thick litho plate, the hinge details are on the plan.

*Details are shown on the drawings for producing this scale type engine mount, below. It may look rather fragile but it is more than adequately strong.*



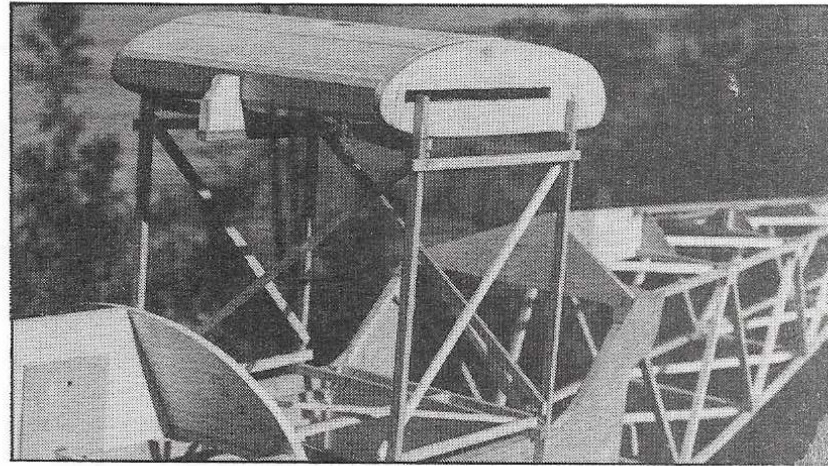
#### **Radio**

The four servos behind the pilot are:-

1. throttle
2. and 3. elevators (one for each as a safety factor)
4. rudder

There is of course one servo in each wing for the ailerons.

Do check that the long leads for the aileron servos do not upset the radio. My faithful "Fleet" is OK, but some radios are not so tolerant on this score, ask the expert!

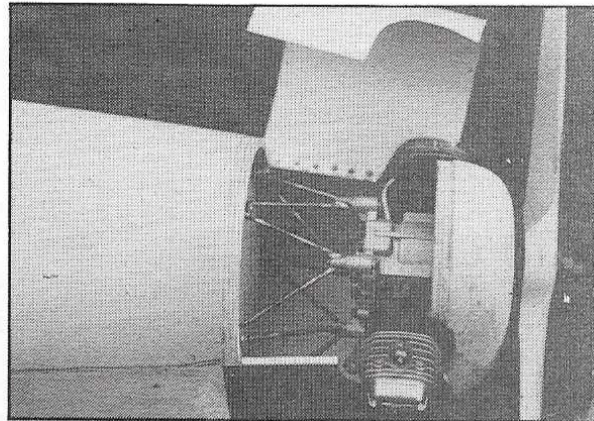


The aileron lead from the Rx goes through the L.H. vertical cabane strut, and becomes a 'Y' lead in the centre section, with sockets for the wing extension lead plugs.

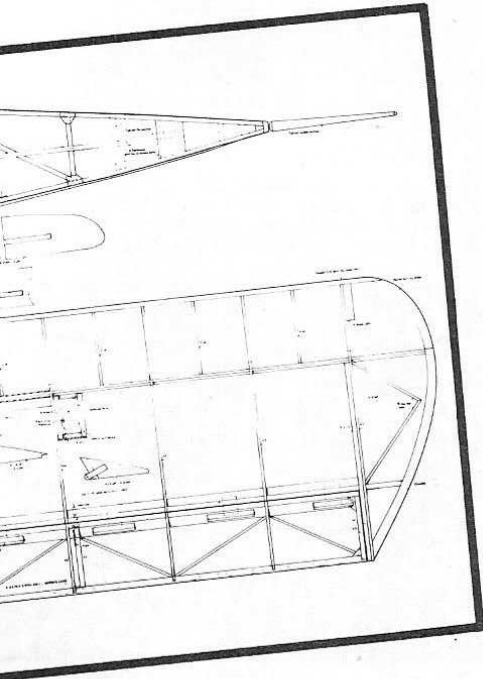
I installed an on board glo ignition system with a micro switch operated by the throttle wire under the cowl, powered by a 7Ah ni-cad under the pilot's seat; this enables the motor to be started without an external battery and maintains a very reliable idle. Arrange the micro switch to operate at about 1/3 throttle so the current is off during normal flight.

#### **Finishes**

The wing struts are made from 3/8in. OD x 20 swg. alloy tube with the ends and centre plugged with turned alloy pieces as shown, pinned in position and the whole faired with balsa. It is a good idea to get the whole model together now (if you have not

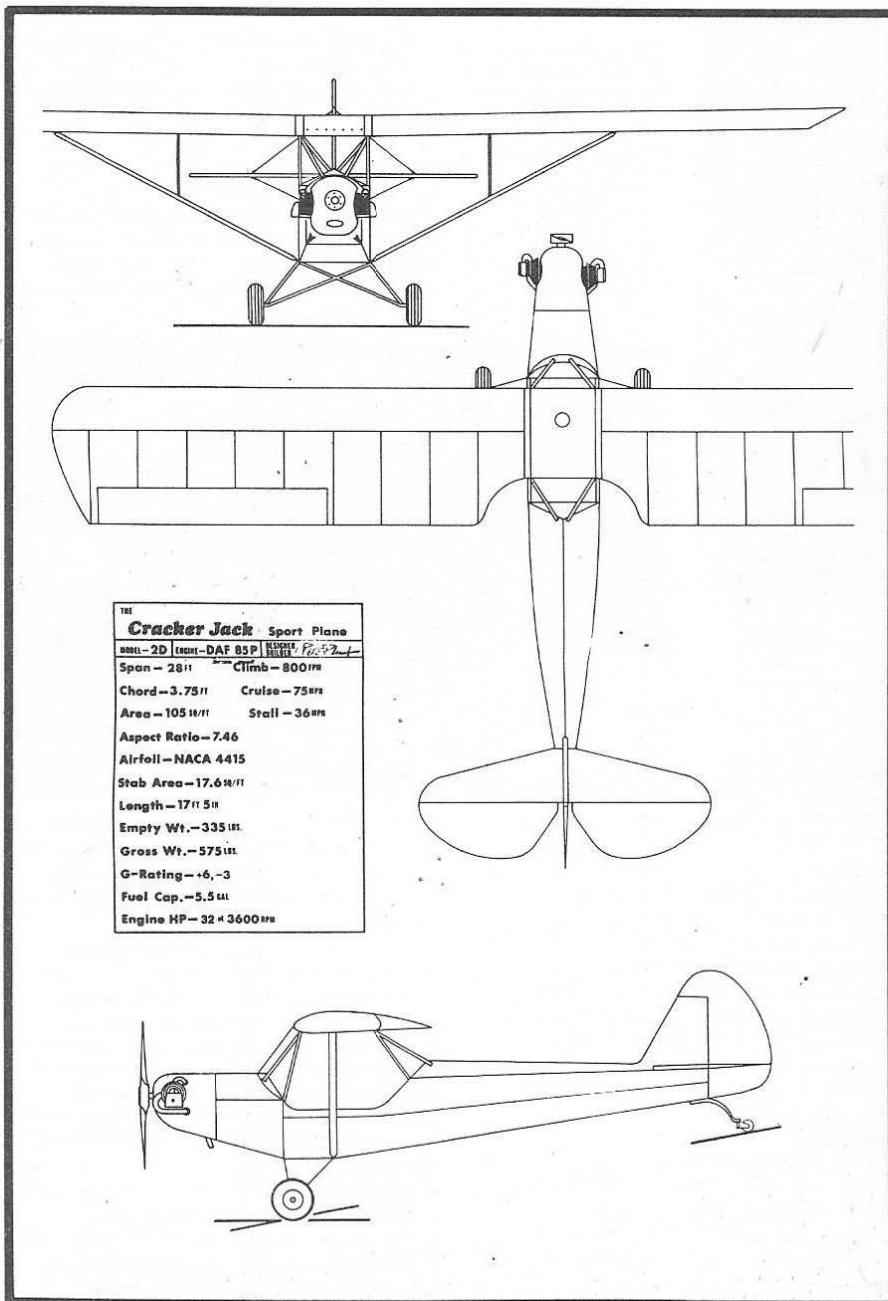


*The OS 120 'Gemini' twin four-stroke installed on the mount. See 'Storyboard' article for information on how to make piano-hinges for the cowl.*



cloth if you need to cover the wood. It really works, but be careful! If you are precise with the preparation, it will all go together like a jig saw puzzle. Do not finish drilling the fuselage or centre section until you have fitted the wings in position and checked for symmetry, i.e. squareness to datum line in plan.

Now that we are in a metal working state of mind, all the other parts can be made. Use the same bolt-together methods for the undercarriage wing strut bracket, it is all straight forward, just be accurate with your measurements. Fit all the parts to the fuselage; you must file the screw heads thinner, and re-slot, as the covering has to go over them. You will see that I made a scale engine mount which was a bit of a challenge but, I finally got a

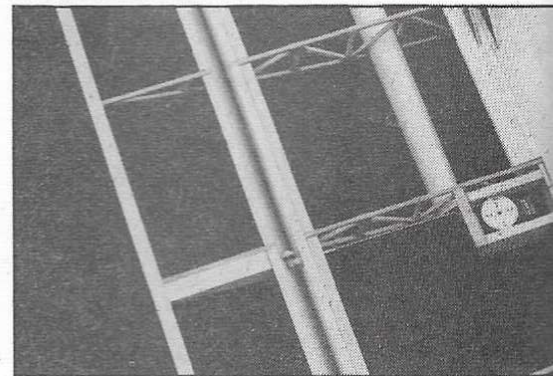


done this already) and make sure everything is square and true. Make a standard symmetry check all round, and get the whole thing set up for covering. Remove the undercarriage brackets from the fuselage and coat under the fittings with clear polyurethane enamel then replace brackets when it is dry.

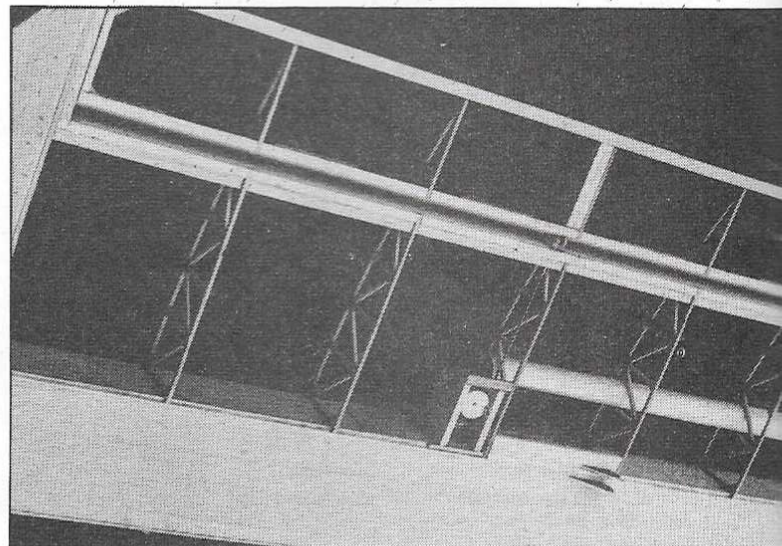
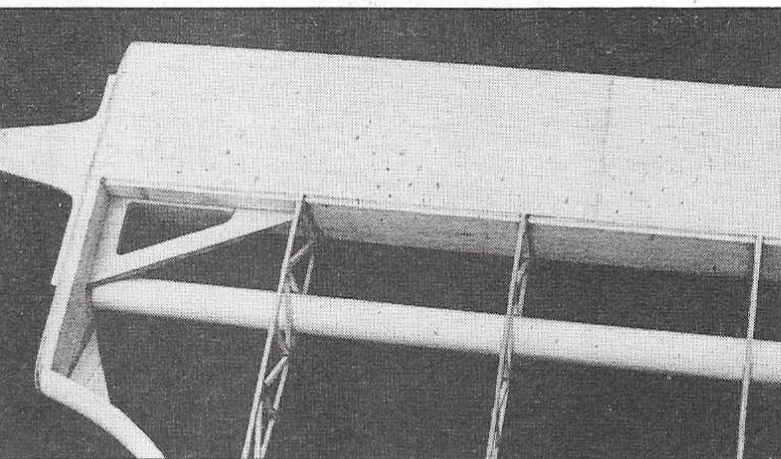
My 'Crackerjack' was covered with Solartex. I really love this material and never fail to be amazed at the way it goes around curves. The rib stitching was simulated using white glue in a hyperdermic syringe. I found by experimenting that I got the best results by allowing the glue to evaporate in a shallow tray in order to thicken it and in this way it retained its shape better whilst drying. The simulated rib stitches should be 1in. apart and, when dry, covered by a 5/8in. wide piece of Solartex cut with pinking shears. These are not true to scale but not too far out, only the 'nitpickers' will comment. Fix the 5/8in. wide tape along all the leading and trailing edges, the tips and down the fuselage side stringers, also around the undercarriage covering.

The entire model had two coats of white aircraft dope (plasticized), the red and blue decoration is

*Neat linkage from the aileron servo to the horn avoids the more normal extended aileron horn. Wing leading edge sheeting may have to be joined to cope with covering one wing panel.*



*Wing construction shown here clearly indicates the servo lead tube, servo housing, built-up-wing ribs, vertical webbing and strut fixings. Note the aileron extension head tubes fitted between the rib structure.*



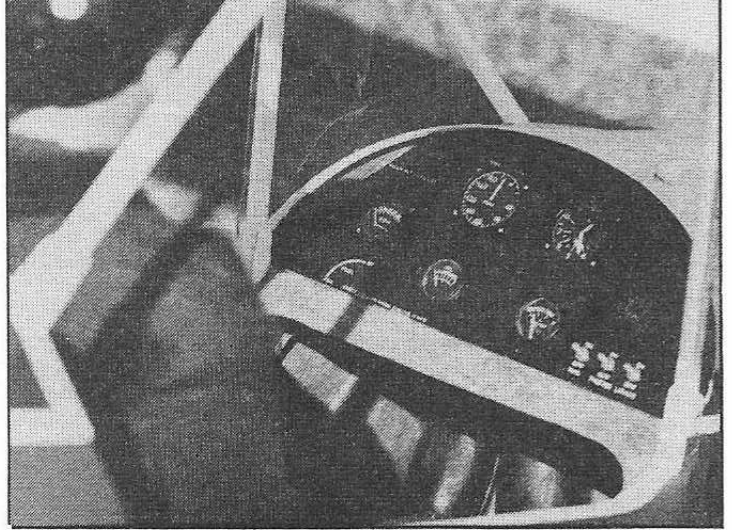
polyurethane enamel. The 'Sailor Boy' was drawn in pencil and painted in by hand. I am not much of a Michael Angelo, but it's a lot easier than it at first appears. Like painting by numbers but all one colour! A final coat of clear polyurethane was given all over.

### Flying

Be sure that the model balances level on the mainspar with the tank empty, not nose down, but level.

Satisfy yourself that the motor is running reliably. The ailerons should be set up at the trailing edge about

*Dennis describes how easy it is to make this dashboard for the 'Crackerjack' using scraper board and a little Ingenuity.*



*Carving the pilot may not be to the liking of every modeller but the project is not too difficult. Do model pilots begin to look like the owners who carve them.*

1/8in. to simulate wash out — purely a safety factor. Make sure all the control movements are to specification and operate in the correct sense. If you are happy about all of these checks you can point your 'brainchild' into wind. Open the throttle gently and, if you have done everything correctly, she should fly straight off, with a little right rudder correction. Fly her out straight and level, (this is a miniature full sized ship) and don't expect it to do anything that the full size will not do. The 'Crackerjack' is a 'Cub' like

aeroplane — fly it like one! Judges at competitions will most likely give you a minus, for non-scale flight, if you don't! This model is a great joy to me, relaxing and satisfying. I enjoyed the building nearly as much as the flying, you fly this baby like a full sized plane and the landings and touch-and-goes are out of this world.

Good luck with your project. I would be pleased to hear from you as to your progress and I am sure Peter Plumb would like to hear from you too. Happy landings.

### Pilot construction

One third full size pilots are more available, but in the interests of saving weight, (my pilot weighs in at 5 ounces) I decided, as I usually do, to make my own.

I first made the head from modelling clay (plastecine) - (give it a longish neck to enable it to be mounted easily.) When you are satisfied that it looks reasonably human, allow it to harden off, a period in the freezer helps here, and two or three coats of dope will provide a reasonable surface over which to build a fibreglass mould. If you are not sure how to do this, there have been a number of articles published covering the methods employed. The head can then be laid up using a gel-coat plus glass cloth in the usual way.

You can of course, if you prefer, carve the head from balsa.

The body, arms and legs, are made from expanded polystyrene, only very basic shapes are required, e.g. the arms and legs are each two tapered pieces threaded onto a piece of 16swg soft wire long enough to go through the body (which is just a basic block with the corners rounded off) and a hole cut out to take the head. A few soft words in the ear of your lady wife will produce a knitted roll neck pullover and a pair of cloth trousers.

The boots - feet and hands are carved from balsa. There you have it; masochistic perhaps, but light! and cheap!

### Instrument panel

A piece of black scraper board (this can be purchased from your local art shop) is cut to the shape and size of the instrument panel, and with a sharp scribe, the instruments are carefully marked onto it, you can practice with offcuts if you wish. It sounds difficult, but you will be pleased and surprised at the results. I cut my instrument bezels from plastic tube, but you can use any material you like, aluminium, brass, etc., painted black; cut circles of clear plastic and carefully cyano in position. From a few feet away, the effect is quite realistic. The remainder of the components are made from balsa.