



Dennis Tapsfield has designed another award winning model aircraft. This one is a 1/3 scale model of the ultralight "Crackerjack" by Peter Plumb of Woodwing Specialties. The O.S. 120 Gemini Twin is a perfect match.

CRACKERJACK



It was during my visit to Oshkosh in 1983 that I saw the full size prototype of this airplane. The Annual Convention at Oshkosh, which is the home of the Experimental Aircraft Association, is, in my opinion, the most mind boggling show of its kind in the world, without an equal anywhere. There are representative aircraft of all types there, such as World War II, antique, vintage, home-built, micro-light, replica, etc., a most impressive display.

The Crackerjack was designed in 1978 by a talented young man named Peter Plumb, who runs a small company called "Woodwing Specialties" in Tahachapi, California. The full size plane is powered by an 850cc flat twin, air cooled, 4-cycle D.A.F. car engine suitably modified for aircraft use; it measured just about three times the physical size of the O.S. Gemini Twin 120 F.S. 4-cycle engine, hence my interest in the airplane, and at 1/3 full size came out just right for my needs. Most modelers have built a Cub, a Pietenpol, A Baby

Ace, Citabria Pro, etc., but this was different! Of course, it can be fitted with any engine of similar power, but I had a Gemini Twin, 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 the full size aircraft. I made just three main concessions: the fixing of the wing roots to the center section; the fitting of a "Cub" type sprung landing gear; and the "solid" leading edge wing ribs. The remaining structure is as faithful a replica as possible. 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 it for lightness. My model weighs 14 lbs. complete, and all aircraft fly better if they are kept light. Bill Stout, who had the foundations of the design for the Ford Tri-Motors (Tin Goose) had a



When completed, notch out the top and bottom capstrips to receive the leading edge 1/16" sheet covering, place each rib back in the jig, and glue to the solid leading edge rib, so you have complete ribs. Cut the root ribs and the locating tongue from 1/4" 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 and the ribs to the plan and build the wings in the usual way. Laminate the curved trailing edge root sections from 1/8" balsa. Make a jig from 1" hardwood for bending, but cut a slightly smaller curve to allow for spring back and for the thickness of the finished laminations. Soak the balsa laminations in 50% water and 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

formula; it was "Simplicate and add more lightness." Anyway, if you are interested in the prospect of building this pretty and unusual little airplane, bear in mind that you will need to know how to silver solder. Believe me, it's very easy and very satisfying. We will start with the wings. A very detailed description of "how to do it" is not really necessary, since if you undertake this project, you must be a reasonably experienced modeler.

CONSTRUCTION

Wings:

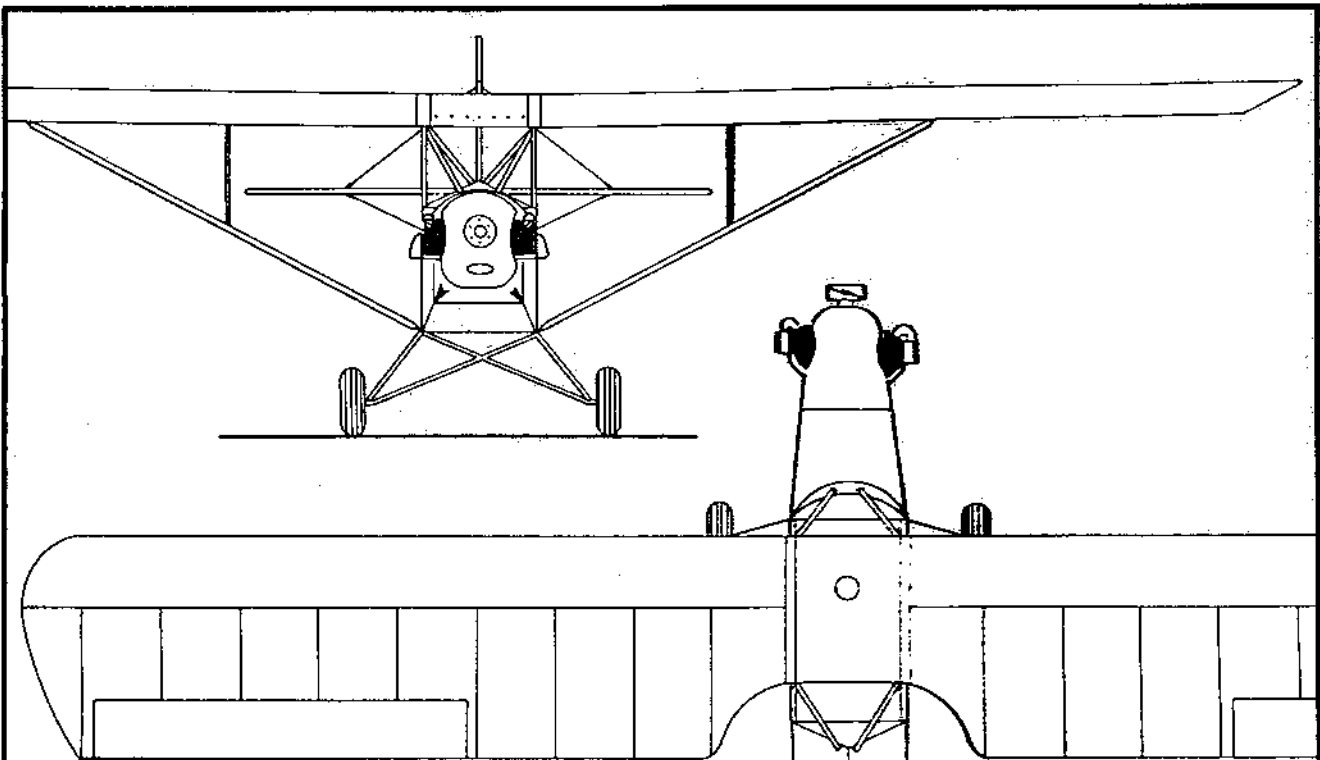
First cut the spars from 1/4" hard balsa. You will probably have to join the spars, since they are longer than normally available wood. Splice them as shown on the drawing, and at the position shown (so that the ply facings serve to reinforce the strut fixing plates). Make the strut fixing plates, clamp the spars together and, using the strut fixing plates as a drill jig, drill through both spars together; this

ensures identical parts, and simplifies final rigging.

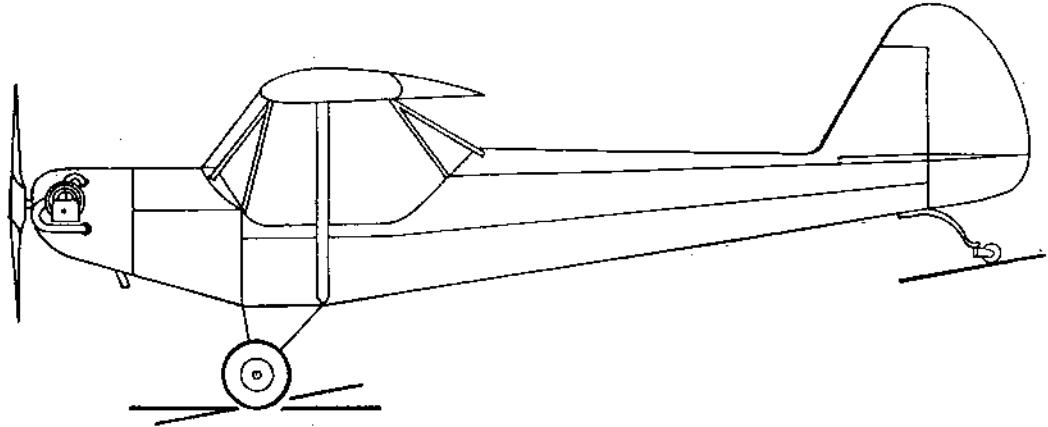
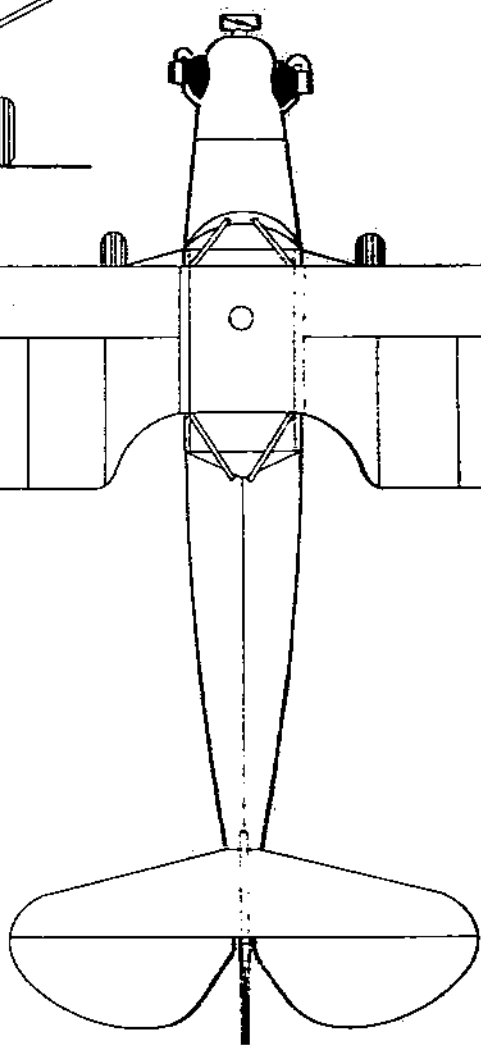
If you propose making the ribs in the full size manner (i.e., Warren truss), you must make a jig to ensure all ribs are identical. Use a piece of 1/4" ply or similar for a base, cut a pattern of the rib shape, and draw around it onto the ply base. Glue small hard wood blocks all around the outside, each about 1/8" thick, 1/4" x 1/4" about 3/4" apart, and glue in a piece of hard wood to represent the spar. Push the 1/8" x 1/8" top and bottom capstrips of the ribs out to the blocks, and glue more blocks on the inside to hold them in position, taking care to keep the areas for the vertical and diagonal truss braces clear. The blocks to locate these can now be glued in position. Note that the capstrips go over the top and bottom of the spars. Build all the ribs, the parts behind the spars, that is. The ribs in the aileron area are slightly different to allow for the aileron spars.



By Dennis Tapsfield



TM	
Cracker Jack Sport Plane	
MODEL - 2D	ENGINE - DAF 85P
DESIGNER: <i>Free Plan</i>	
Span - 28'11"	Climb - 800 fpm
Chord - 3.75'11"	Cruise - 75 mph
Area - 105 sq ft	Stall - 36 mph
Aspect Ratio - 7.46	
Airfoil - NACA 4415	
Stab Area - 17.6 sq ft	
Length - 17'11.5"	
Empty Wt. - 335 lbs.	
Gross Wt. - 575 lbs.	
G-Rating - +6, -3	
Fuel Cap. - 5.5 gal.	
Engine HP - 32 @ 3600 rpm	





for all the laminated parts.

Wing Center Section:

Build this as shown on the drawing, keeping in mind that the main load is one of compression, so do not deviate from the drawing.

Fuselage:

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

Cabane Struts:

The material used was 5/16" O.D. thin wall steel tubing. If this is not available, brass tubing can be used as a substitute. The most important feature here is to support the center section rigidly in the correct position during assembly as it dictates the correct incidence and symmetry of the model. A jury frame should be built referring to the gap between the underside of the center section of the wing and the top of the longerons; and also locate the fore and aft position.

Once you are satisfied that the center section is in the correct location, you can make the cabane proper. Cut the four vertical struts to length and 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 while being silver soldered (the heads and nuts will be filed off flush when completed). Fit the four vertical cabanes into place, and use a small woodscrew in each position as a temporary measure to hold everything in place. While the front and rear braces are cut to length on angle, make the four triangular plates and bolt into position on the braces. This will hold them in position while being silver soldered.

The front and rear braces can now be positioned, and the fuselage drilled to hold them in place. Cut a piece of 1/4" sheet balsa to fit into the triangle formed by each of the vertical cabane

CRACKERJACK

Designed By:
Dennis Tapsfield
TYPE AIRCRAFT
1/3 Scale Homebuilt

WINGSPAN

112 Inches

WING CHORD

15 1/2 Inches

TOTAL WING AREA

1674 Sq. In.

WING LOCATION

Parasol

AIRFOIL

NACA 4415

WING PLANFORM

Constant Chord

DIHEDRAL EACH TIP

5/8 Inch

O.A. FUSELAGE LENGTH

69 Inches

RADIO COMPARTMENT SIZE

Ample

STABILIZER SPAN

32 Inches

STABILIZER CHORD (incl. elev.)

9 1/2" (Avg.)

STABILIZER AREA

230 Sq. In.

STAB. AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top Of Fuselage

VERTICAL FIN HEIGHT

10 1/4 Inches

VERTICAL FIN WIDTH (incl. rud.)

12" (Avg.)

REC. ENGINE SIZE

.90 2-stroke — 1.2 4-stroke

FUEL TANK SIZE

13 Oz. Kraft

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ail., Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Spruce
Wing	Balsa, Ply & Spruce
Empennage	Balsa, Ply & Spruce
Wt. Ready To Fly	224 Oz.
Wing Loading	19.3 Oz./Sq. Ft.

struts and its associated diagonal brace, and cyno these in place. This will hold each of the four assemblies together while carefully removing them from the model. Then silver solder together — aiming the heat away from the wood. Use a damp cloth if you need to cover the wood. It works great but be careful! If you do it right, it will all go together like a jigsaw puzzle. **Do not finish drilling the fuselage or center section until later when you've fit the wings in position and checked for symmetry, i.e., squareness to datum line on plan.**

Now that we are in a metal working state of mind, all the other parts can now be made. Use the same bolt together methods for the landing gear/wing strut bracket. Its all straightforward but 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. I finally had a friend silver solder it with oxyacetylene as I couldn't get enough rapid heat with my butane torch. The whole thing has to be carefully jugged to maintain squareness and alignment. A sketch of the jig is shown on the plans. If you choose not to be a hero, you can use an ordinary type engine mount for your installation.

Tail Group:

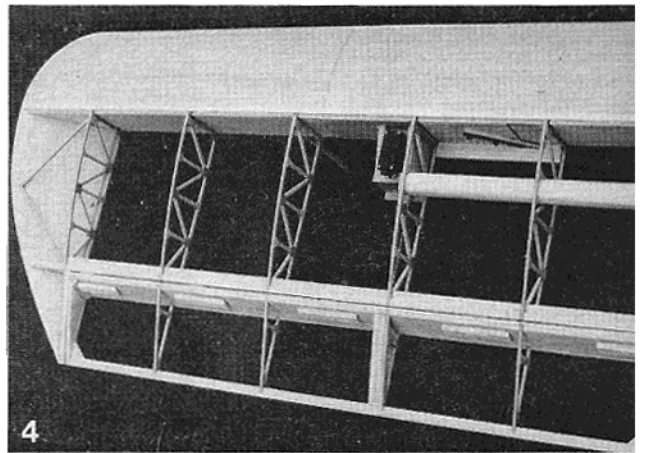
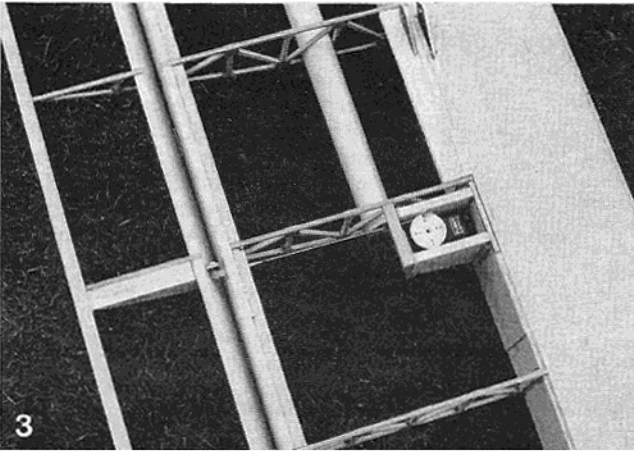
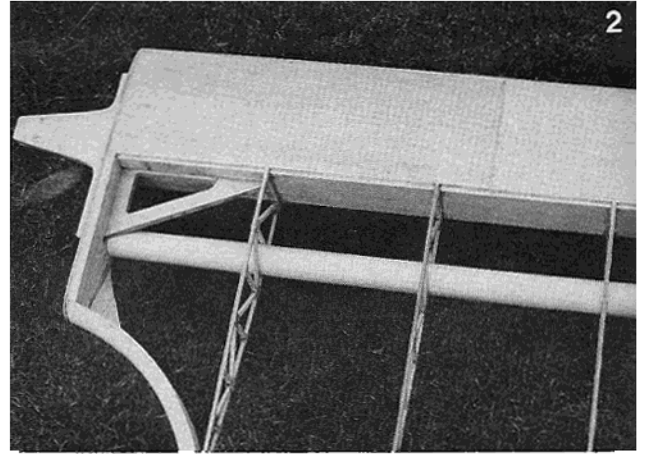
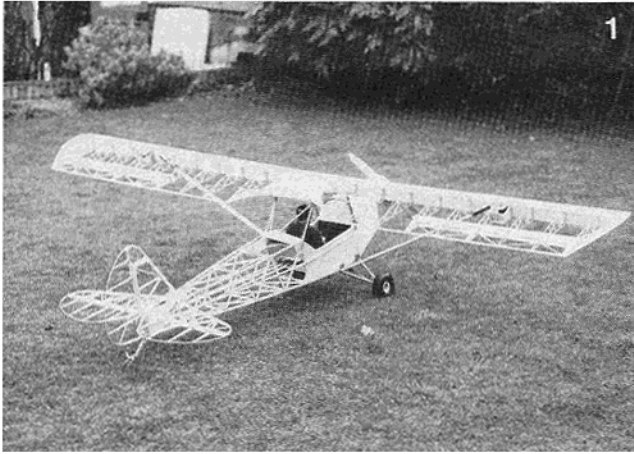
This is fairly straightforward. I used 1/8" O.D. aluminum tubing for the outlines, but 1/8" diameter solid aluminum welding rod will do quite well. My model needed a little weight in the tail anyway.

Cowl:

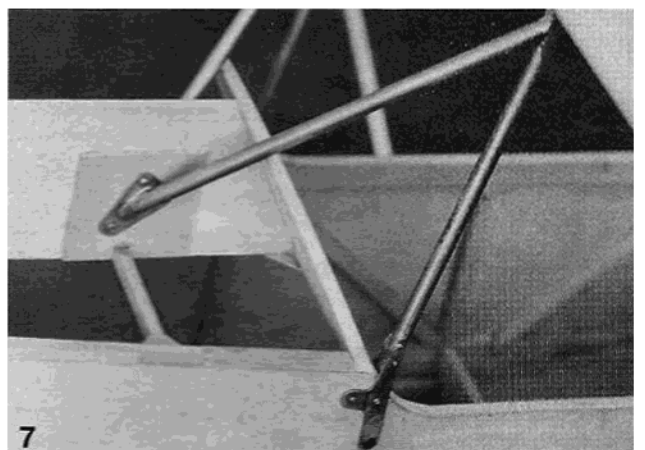
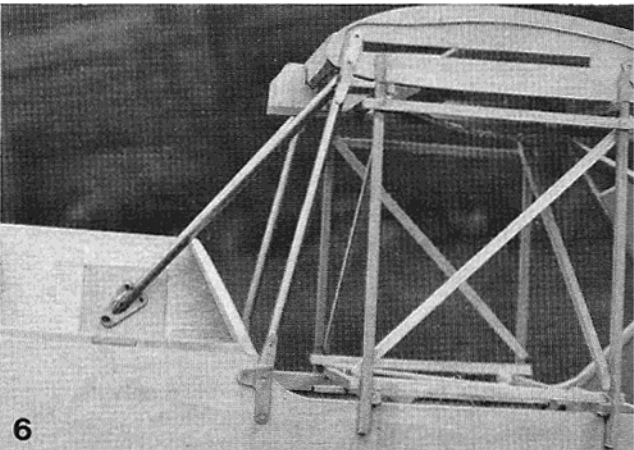
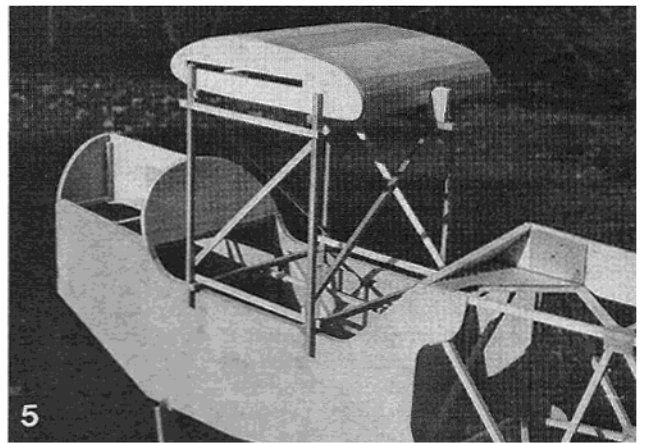
The front of the cowl is made from 1/2" balsa laminations as shown, while the remainder is of .020" thick litho plate or aluminum sheet. The hinge details are shown on the plans.

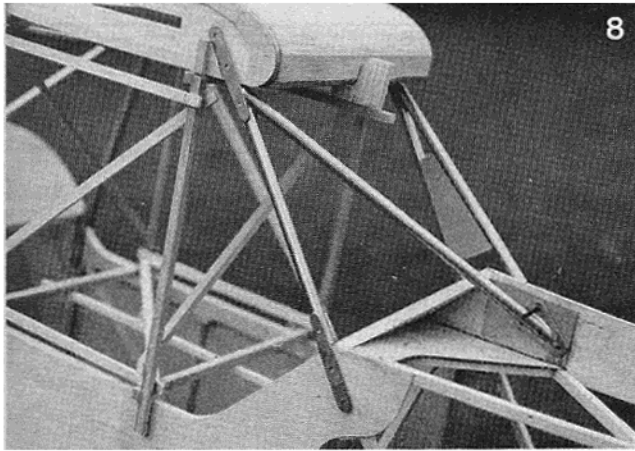
Miscellaneous:

The wing struts are made from 3/8" O.D. aluminum alloy tubing with the ends and center plugged with turned alloy pieces as shown, pinned in position. The whole strut is then faired

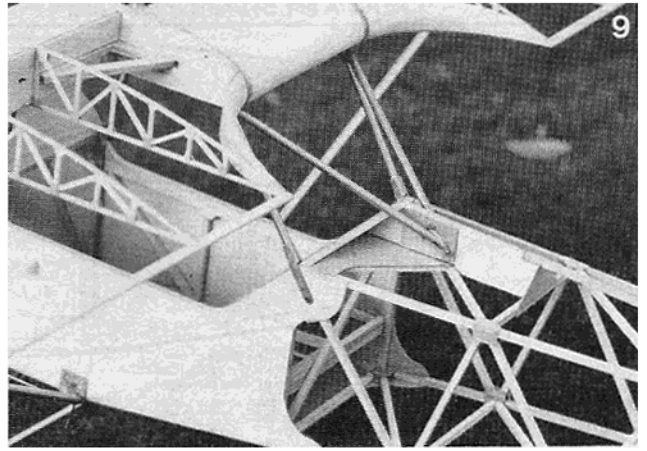


(1) Completed structure is built like the full size one. Too bad it won't fly like this.
 (2) Wing root showing plywood tongue and paper servo lead tube.
 (3) Aileron servo box with straight short linkage directly to aileron. Note linkage does not extend past airfoil contour.
 (4) View from top side of completed wing panel. Leading edge sheeting splice can be seen.
 (5) Jury frame built up to align wing center section. Cabane struts can be cut and silver soldered for perfect alignment.
 (6) Front cabanes completed and in place.
 (7) Close-up of cabane strut mounting plates. Some detail work to do but well worth it.

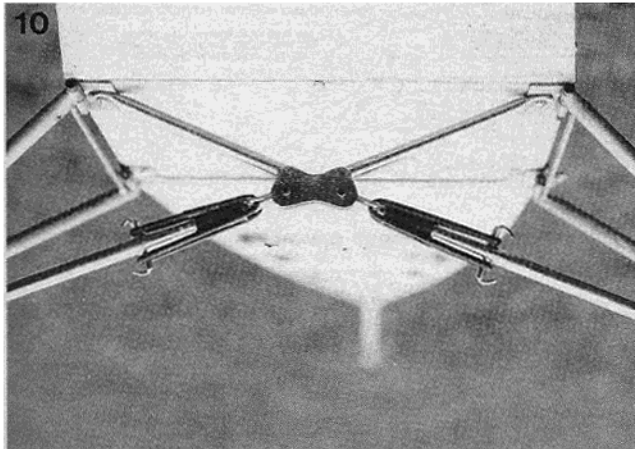




8

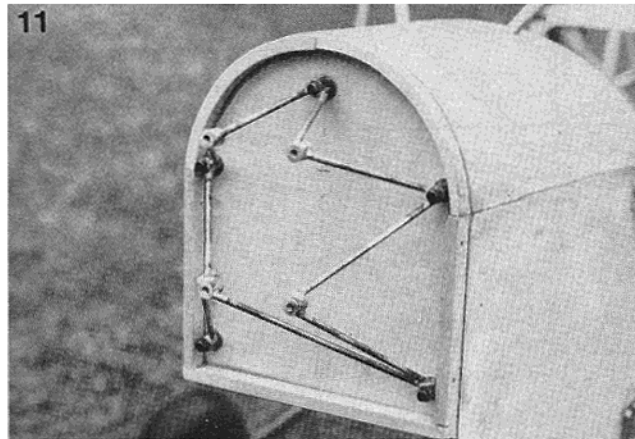


9

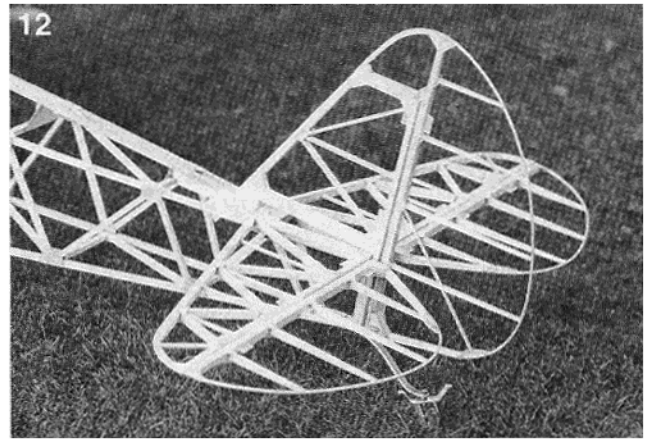


10

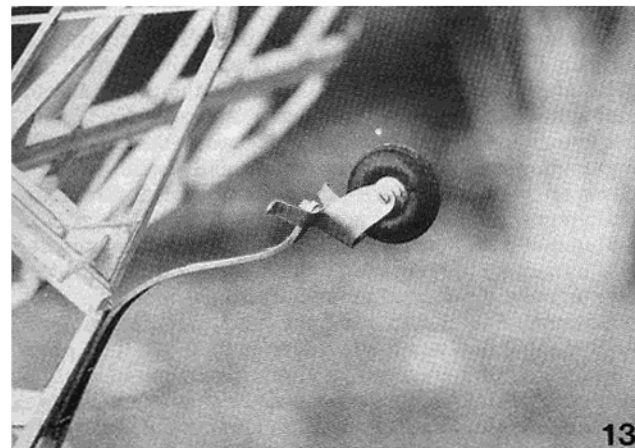
- (8) Rear struts and mounting plates complete.
 (9) Complete scale-like wing attachment adds to the beauty of the finished model.
 (10) Shock absorbing landing gear is all part of this fantastic home-built.
 (11) Even a scale-type engine mount to bolt on your O.S. 120 Twin or your favorite engine.
 (12) Tail group builds up to be very light but strong.
 (13) Close-up of scale-type tail wheel. One of C.B. Associates would work great.
 (14) The four servos are left to right: throttle, two for elevator, and last is rudder.



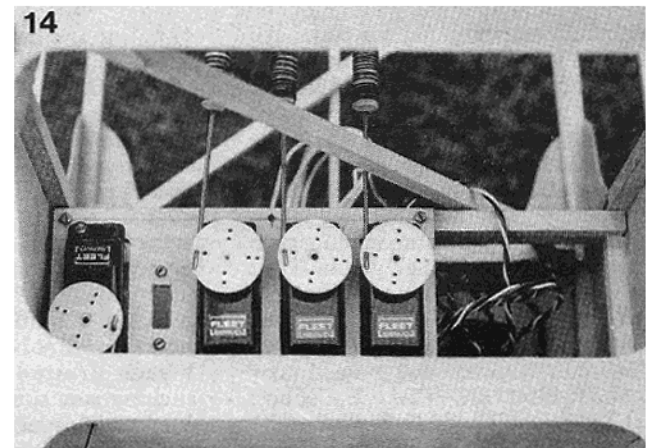
11



12



13



14

with balsa as shown on the plans. An easy way to do this is to use K & S streamline tubing. It's a good idea to get the whole model together now (if you've not done it 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 landing gear brackets from the fuselage, and coat under the fittings with clear polyurethane enamel and replace brackets when it is dry.

Radio:

The four servos behind the pilot are: (1) Throttle; (2) and (3) elevators (one for each side as a safety factor); (4) being the rudder. There is, of course, one servo in each wing for the ailerons. Do check that the long servo extension leads required will not interfere with your radio. The aileron lead from the receiver goes through the L.H. rear vertical cabane strut and becomes a "Y" lead in the center section to plug in each wing.

Covering:

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 hypodermic syringe. I found by experimenting that I get the best results by allowing the glue to evaporate in a shallow tray. This would thicken it, which made it retain its shape better while drying. They should be 1" apart and, when dry, they are covered by a 5/8" wide piece of Solartex cut with pinking shears. This is not true to scale, but not too far out, only the "nitpickers" will comment. This 5/8" wide tape goes along all the leading and trailing edges, the tips, and down the fuselage side stringers and also around the landing gear covering. The entire model had two coats of white aircraft dope (plasticized). The red and blue is polyurethane enamel.

Instrument Panel:

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

Pilot Construction:

One-third full size pilots are now available from several sources but in the interest 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 modeling clay (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 (a period in the freezer helps). Two or three coats of dope will provide a reasonable surface over which to build a fiberglass mold. If you are not sure how to do this, there have been a number of articles published in the past. 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 block. Only very basic shapes are required, e.g., the arms and legs are each two tapered pieces threaded onto a piece of soft wire. The wire has to be 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 may well 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: masachistic perhaps, but lighter and cheap!

Onboard Ignition:

I installed an onboard glow ignition system with a micro switch operated by the throttle wire under the cowl. It was powered by a 7Ah NiCd under the pilot's seat. This enables the motor to be started without an external battery, and maintains a very reliable idle. The micro switch operates at about 1/3 throttle so the current is off during normal flight.

Flying:

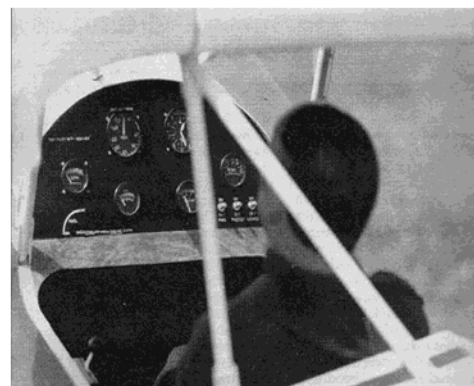
Be sure the model balances level on the main spar with the tank empty --- not nose down, but level.

Satisfy yourself that the motor is okay and reliable. The ailerons should be set up at the trailing edge about 1/8" to simulate washout --- 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 this, you can point your brainchild into the wind, open the throttle gently and, if you've done everything right, she should fly right off with a little right rudder. Fly her out straight and level (this is a small, full sized ship) and don't expect it to do anything the full sized one will not do. This is a "Cub-like airplane" so fly it like one! The judges at your competition 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; if you feel it's for you, go ahead. I enjoyed the building nearly as much as the flying. You fly this baby like a full size plane; 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'm sure Peter Plumb would like to hear from you too.

Happy landings. □



**From
RCModeler
Oct. 1985**

