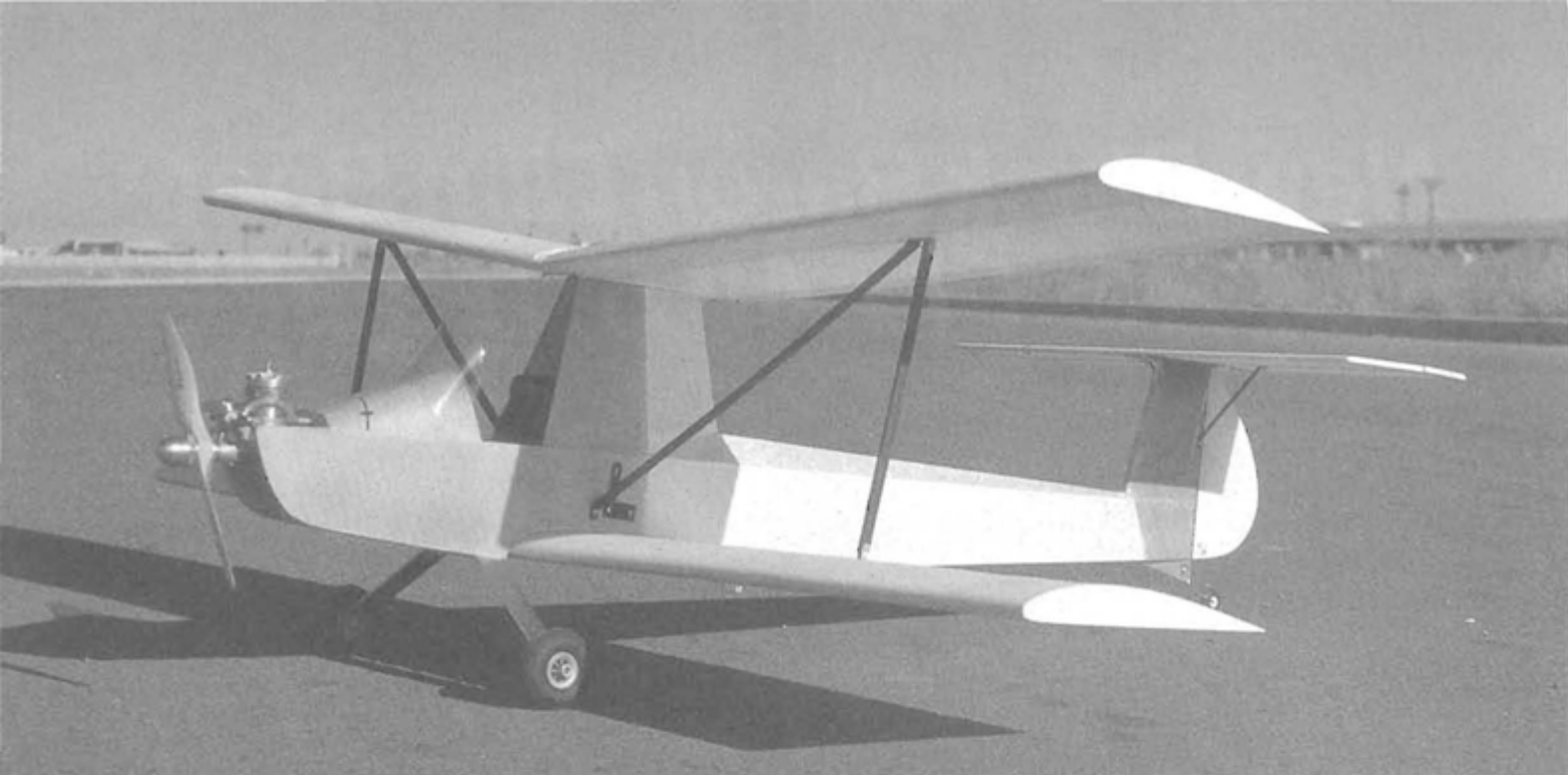




ABOVE: Paul Denson's Stand-Off Scale version of the Biplum. **BELOW:** Maurice Guerpont's full size Biplum cruising the skies of France. Superb little ultralight.

BIPLUM



The December 1984 issue of Sports Aviation covered a fly-in at Brienne, France, which is near Paris. Among the many planes photographically presented was the ultralight Biplum. In Europe, ultralights are known as ULM's. The Biplum was built by M. Maurice Guerpont.

Our Biplum is Stand-Off Scale and was constructed using only a color photograph. The photograph was furnished through the courtesy of Mr. Jim Eich (EAA 34624) who wrote the article in Sports Aviation. By the time we were able to contact M. Guerpont, we had finished Biplum and were

**An exciting .15 to .25
powered Stand-Off Scale
model of an ultralight that
was conceived in
Paris, France.**

By Paul F. Denson

We have built quite a number of "T" tail planes, both glider and power planes but they were mostly full flying stabs, two halves both of which pivoted in the center and built so the pushrod moved horizontally. The problem was --- we had to --- with vertical movement --- pivot a hinged

CONSTRUCTION

Wings:

Using the plans as a guide, cut all ribs to shape. Cut the spars to length and the webbing to width; then, as you need something, it is ready. We made two templates out of 1/32" ply. One a full root rib template for wing tips, root ribs and the pylon wing mount. The other one for cutting inner wing ribs. After all of the ribs, plus a few extras, are cut, then the spar notches are cut into the template which is then used to cut all the notches. If you are very careful when you cut your leading edge sheeting from 3" sheets of 1/16" balsa, you can use the edge



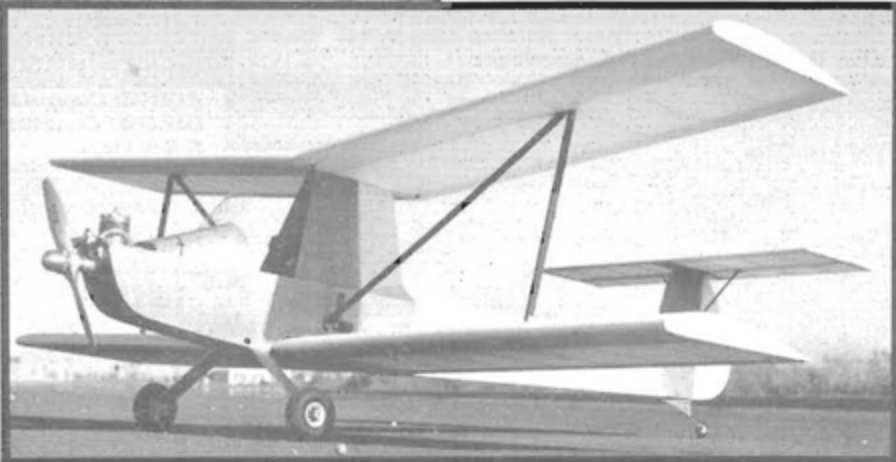
Which Biplum is the model and which is the full size? The photo at left is the full size Biplum photographed at a 3-day fly-in in Brienne, France by James P. Eich of Alhambra, California. The model is pictured below.

flying it regularly. He was kind enough to send many photos of the full size Biplum under construction as well as finish and flight shots. Also we received one sheet of 3-views. Should you wish to construct a scale model or a full size Biplum, you may contact us through RCM and we will furnish you with his address.

To the best of our research ability, and Parlez Vous-ing Francaise, the name Biplum means two feathers or more exactly, two quill pens. We have an idea that the two feathers is a colloquialism referring to the two wings of the plane.

When we saw Biplum, it was love at first sight. We are not active bipe builders but that was not going to hold us back from building this little staggerwing lovely. From the beginning it was obvious that there were quite a few features that would call for a bit of ingenuity; this heightened the challenge.

Our first idea was to build the plane with two one-piece wings and, if you wish, it still could be done; the pylon wing mount could be built into the top wing. The wing struts would then become more or less decorative. We have always liked the manner in which the top wing of Proctor Bipes is mounted so we decided to go that route.



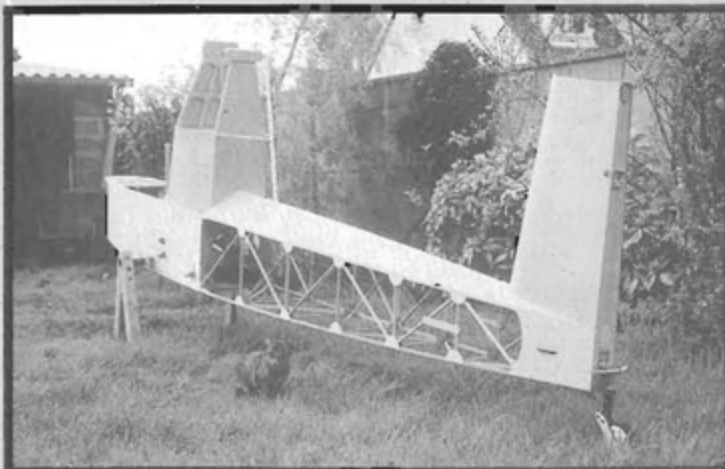
stab. The method we used gives some differential motion (more down than up) which may be corrected by offsetting the clevis on the servo wheel. We did not make this correction and there seems to be no inherent problems; in fact, it helps a bit when you fly upside-down.

We could see no ailerons in the picture of the plane so we did not include them on the model. We felt the 4° dihedral on the top wing would make the plane quite stable and the 5/8" dihedral under each lower wing tip would also help. After the first flight, we were relieved to find that Biplum was quite stable without ailerons.

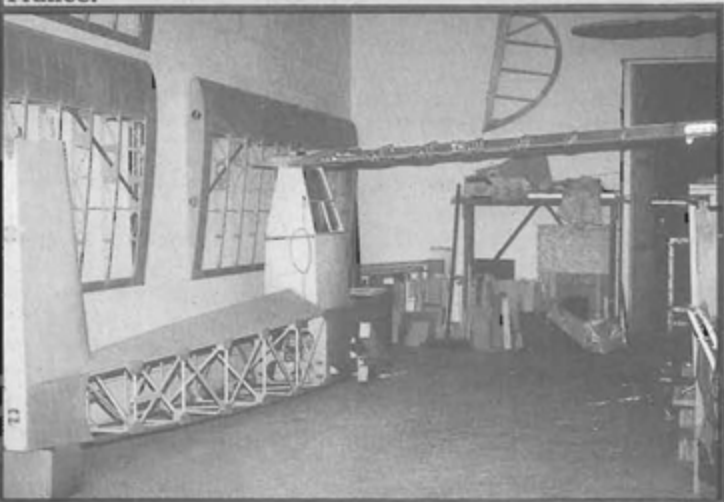
material for wing ribs. There will be other uses for the cutoffs so save them.

Start with the lower wing. Even though, when finished, it will be in one piece, it is constructed in three pieces. Cover the plans with waxpaper or plastic wrap and lay down all the leading edge sheeting, butting but not gluing the ends together. We could not find any 1" TE stock that was thick enough to match the airfoil so we used 1 1/4" stock and removed the front 1/4". Cut this stock to length; then, using two hacksaw blades taped together, saw the rib notches in the TE stock. Pin the trailing edges to the plans and start with the center section of the wing. Glue the spar stock to the center

Full size Biplum photos by Maurice Guerpont, Paris, France.



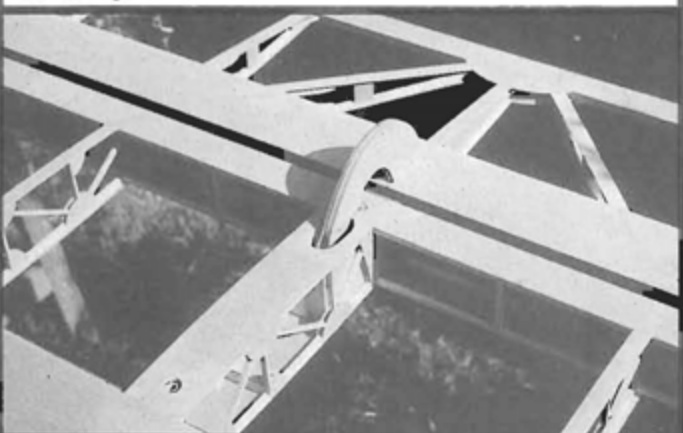
Fuselage being protected by family "guard cat."



"Biplum" in near completion stage in Mr. Guerpont's workshop.



Designer, Maurice Guerpont, holding wing panel. Shows what the word "ultralight" stands for.



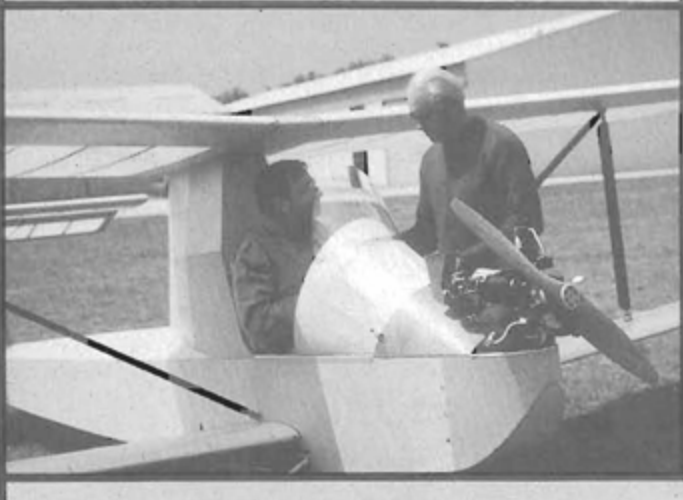
ABOVE: Control horn on elevator. Beautiful workmanship. BELOW: Complete airframe assembled and nearing the finish stage.

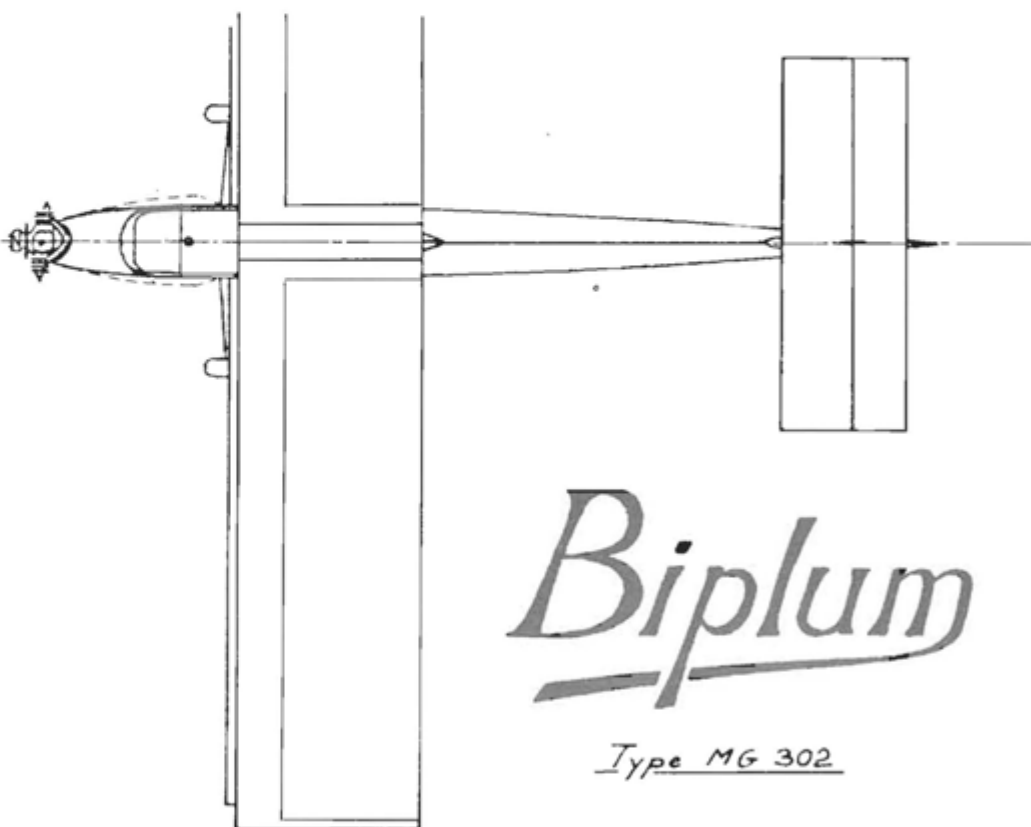
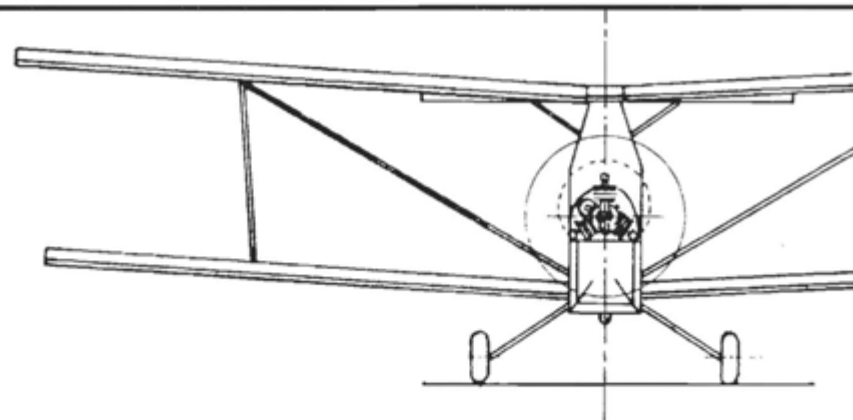
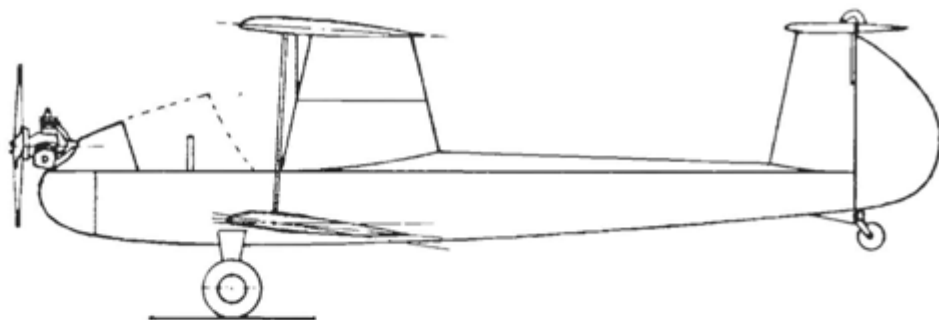


ABOVE: Closeup of landing gear. BELOW: Closeup of instrument panel and 3-cylinder Koenig engine.



BELOW: Claude Chouart, pilot for Air France in cockpit with Maurice Guerpont, designer, standing alongside.





Biplum

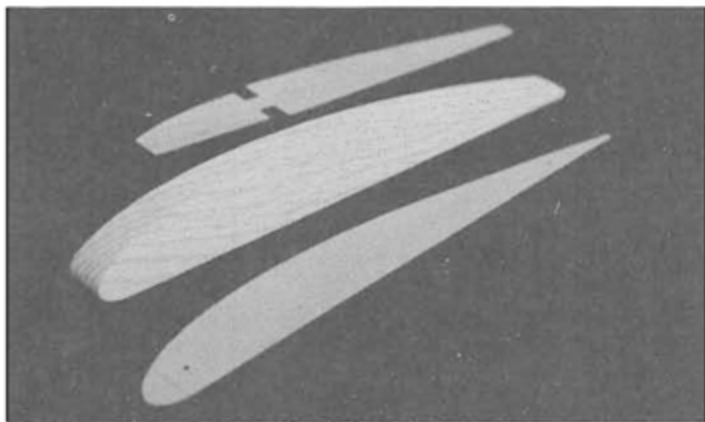
Type MG 302

Caractéristiques générales	Performances calculées
Envergure 6 ^m 50	Vitesses:
Longueur h.t. 5 ^m 10	- max. au sol: 102 km/h
Surface alaire 12,7 m ²	- aux 3/4 de la puissance 92 km/h
Poids à vide 95 Kg	- " " " à 1000 m 87 km/h
Poids en charge 190 Kg	- mini de sustent ^{ce} 50 km/h
Charge alaire 15 kg/m ²	- d'atterrissage 42 km/h
Moteur König 22 ^{cv} à 4200 ^{tr} /mn	- ascensionnelle max 2 ^m /sec
Charge au cv 8,64 kg/cv	- " aux 3/4 de la puissance 1,2 ^m /sec
Pilotage 3 axes classique.	Plafond théorique 4600 m
C ^d de gauchissement différentielle +35-6° par ailes inf ^{es} mobiles	
Profil Naca 23003	

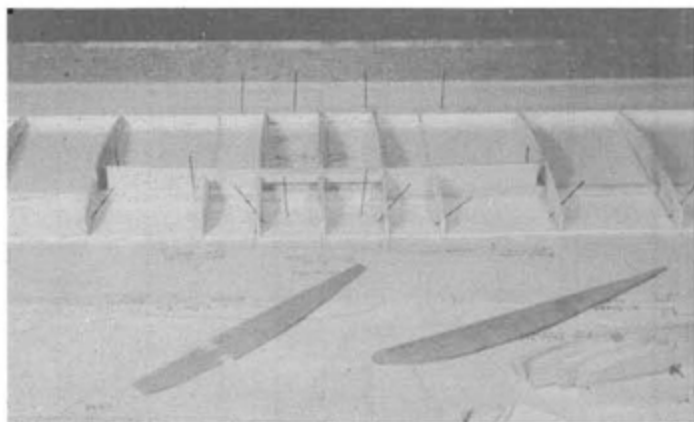
Ensemble 302-00-01

ech 1/40

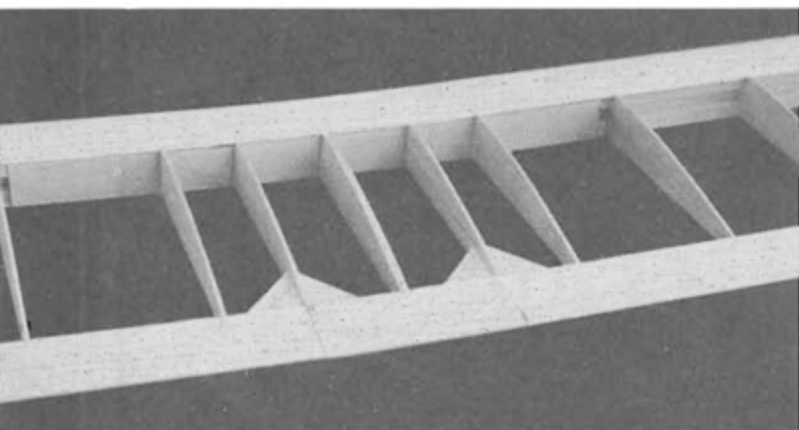
Maurice Guerpont 5/81



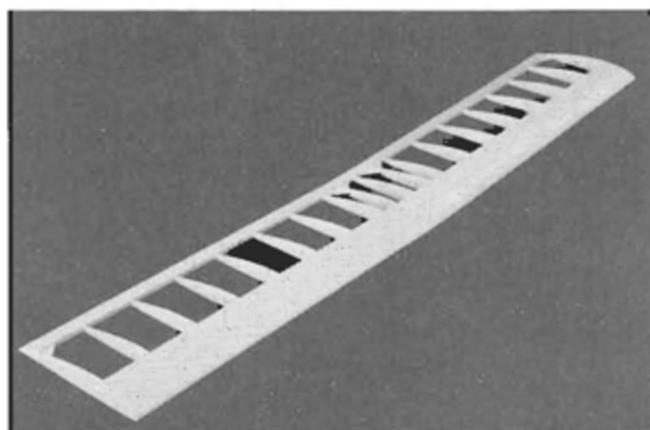
Notched template, pylon wing mount and rib template.



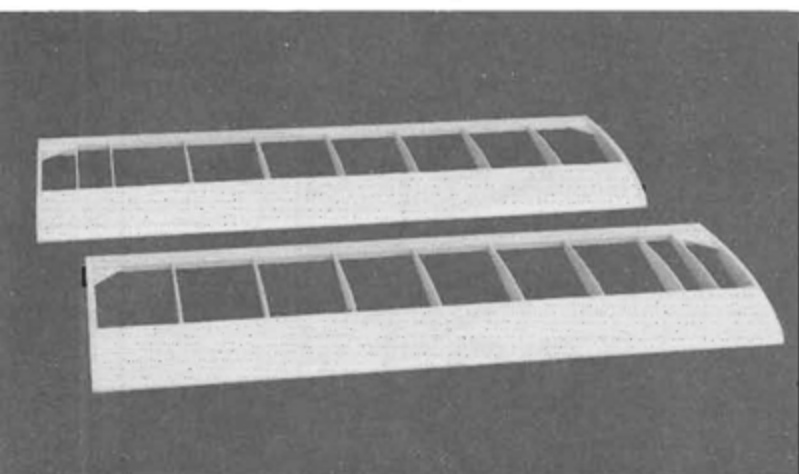
Bottom wing under construction — no dihedral as yet.



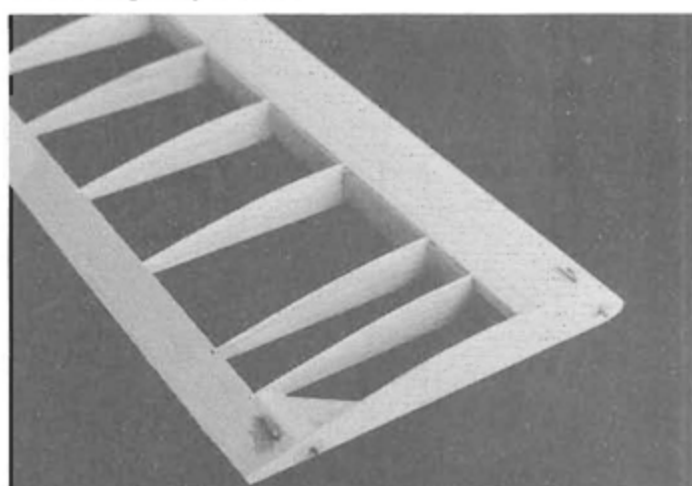
Center section of bottom wing.



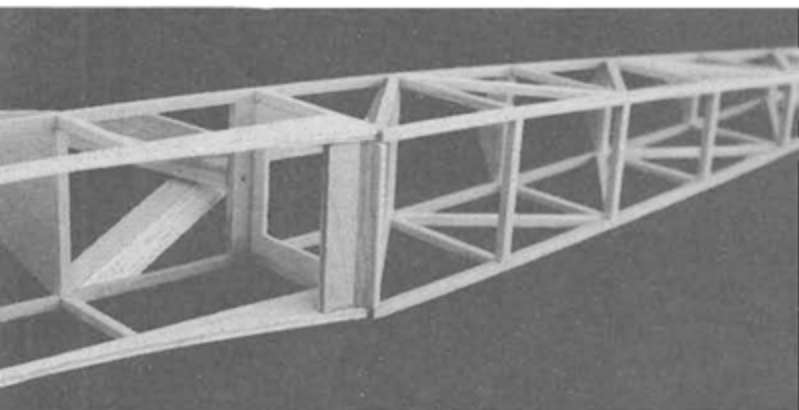
Bottom wing ready to cover.



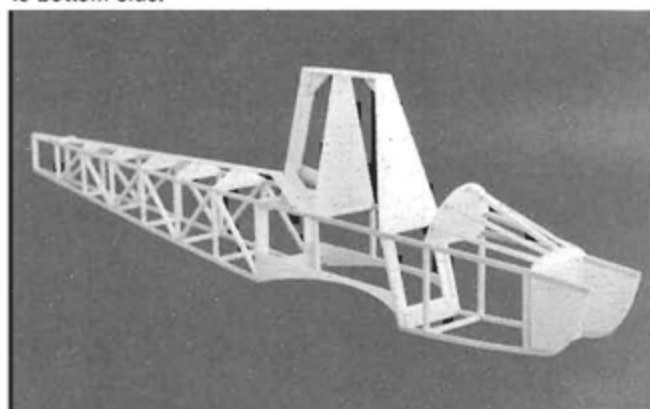
Top wing panels.



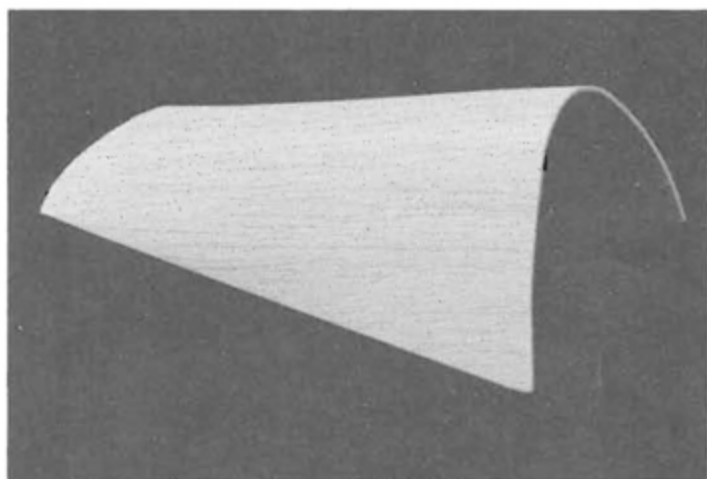
Inboard end of top wing with wing hooks top side — later moved to bottom side.



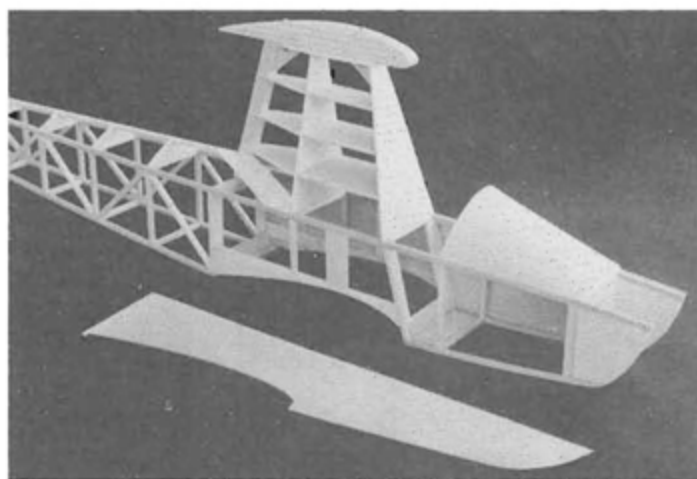
Bottom view showing 3/16" ply wing hold-down plate.



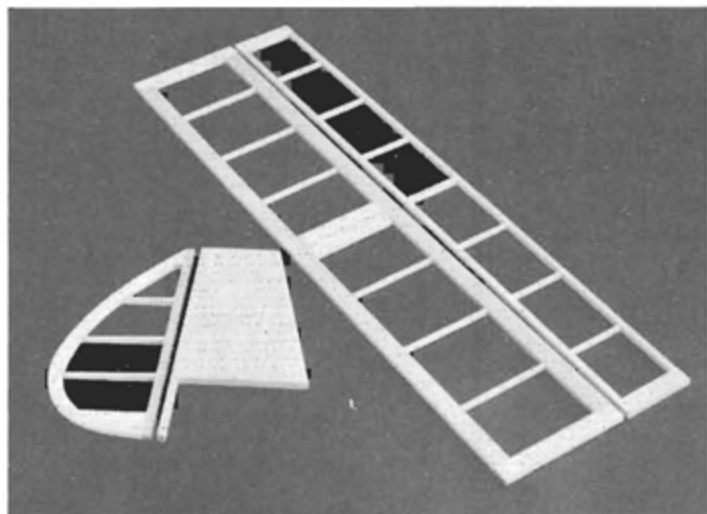
Fuselage skeleton with pylon covering anchors installed.



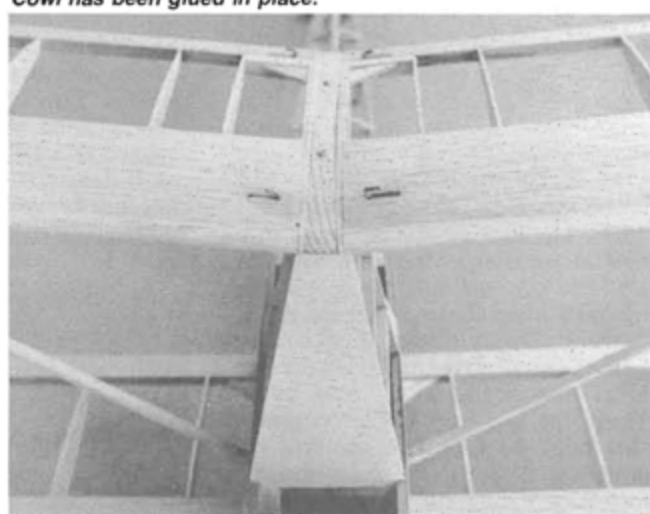
Balsa cowl cut and shaped for installation.



Closeup of fuselage before right 1/32" ply skin was installed. Cowl has been glued in place.



Tail group completed.



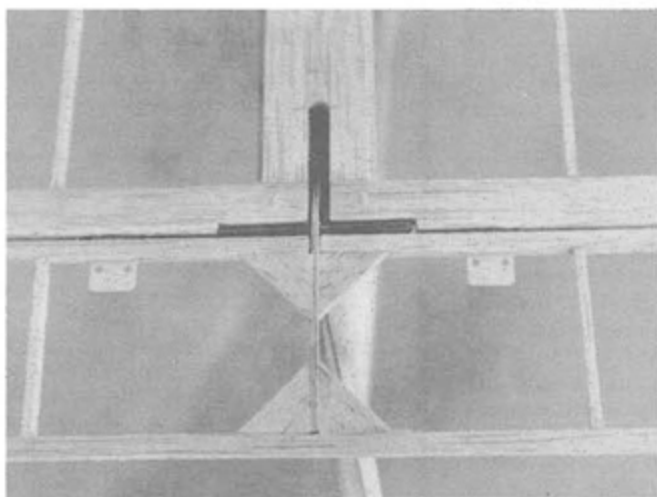
Wing pylon showing hook detail — hooks were subsequently moved to bottom of wing for appearance.

section of one ply dihedral brace top and bottom. When dry, sandwich the spar stock with the other dihedral brace and epoxy. This spar sandwich is erected on the back edge of the center bottom leading edge sheeting.

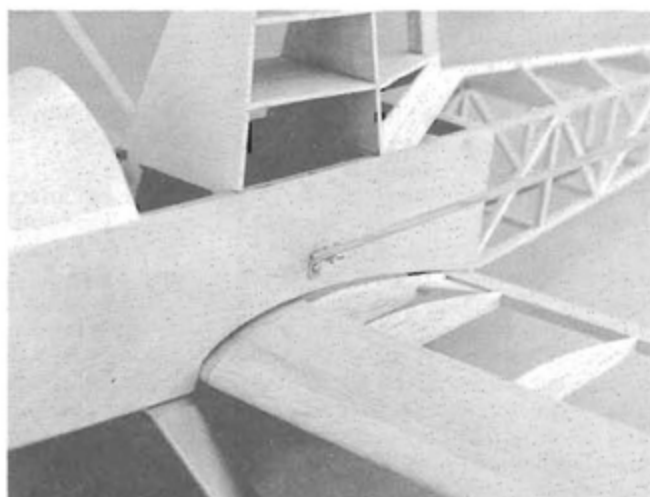
The center section wing ribs are cut to length and glued in place fore and aft of the sandwich spar. The leading edge stock is then added. Remove the

center section of the wing from the plans so it is out of your way, then construct the two outer panels. We layed down the bottom spar on top of the bottom sheeting. When held in place with a group of installed ribs, it was then tacked in place with CA. Either remove the ribs and glue them in one at a time or use CA to hold them in place. Do not install the two

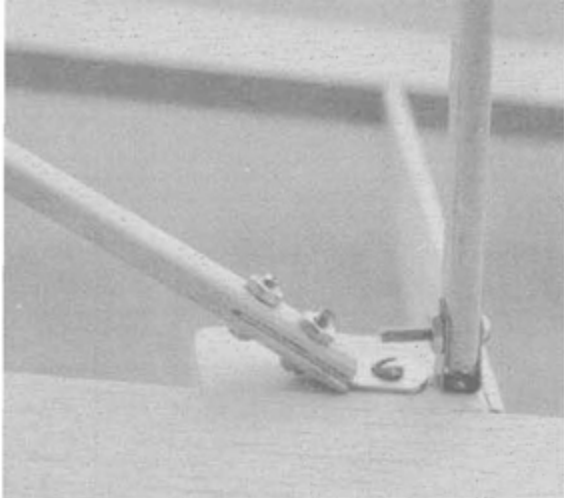
innermost ribs at this time. Add the leading edge stock. When the glue has all set up, remove the end panels from the plans and return the center panel to its place. Slide the inner ends of the spars between the open ends of the dihedral braces; prop up each wing tip 5/8" and check for fit. The ends of the spars, leading edge and trailing edge may have to be beveled slightly for fit.



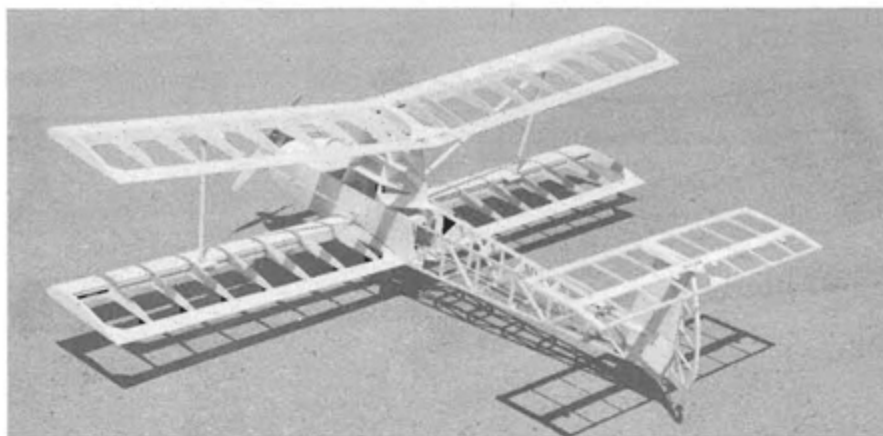
Elevation detail showing horn and method of attachment to stab.



Closeup showing strut mounting to fuselage.



Interplane and diagonal strut mounted on bottom of top wing (plane inverted).



Completed Biplum resembles the full size one.

When all checks out, separate, add epoxy, return into place, clamp and allow the epoxy to cure completely.

Glue the ribs in place at the dihedral joint. Add the top leading edge sheeting and, when dry, sand or plane to match the airfoil. Drill the hole and insert the wing hold-down dowel.

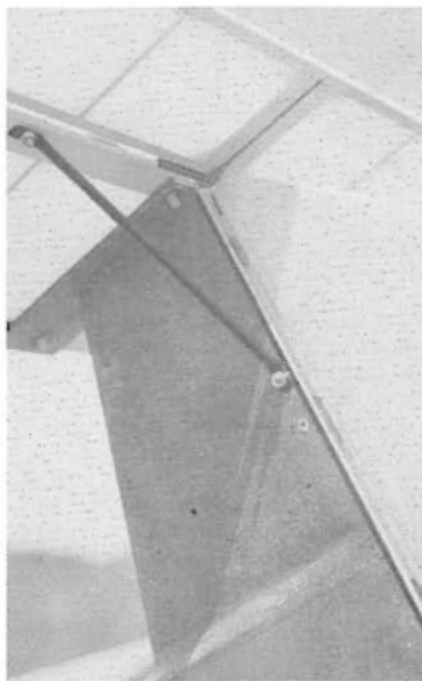
The top wing halves are built in a similar manner. When dry, add the 1/8" lite ply root ribs. As you noted when building the upper wing halves, there are balsa blocks between the first and second ribs, these blocks will help support the 5/64" wing wires. There are two very important holes that must be drilled in the root rib template. These guide holes are for mounting the top wing in place on the pylon. Using the template, drill the holes for the wing wires, insert and CA in place. Add the top leading edge sheeting. Sand all wing parts carefully with two or more finer grades of sandpaper and set aside.

Using the root rib template and a piece of 1/2" white pine, etc., draw and cut out the pylon wing mount. The wing mount is beveled each side 4°. We used a heavy duty sander to cut this bevel. It could just as well be planed then sanded. The root rib template is used to determine the location of the holes which will take the wing wires. Utmost care is necessary, in locating the wires in the wing and the holes in the pylon wing mount if you want the wing and wing mount to line up exactly.

Fuselage:

The sides of the fuselage are about 3" too long for standard size spruce and balsa stock. If you build the fuselage sides as we outline here you will minimize waste. Start with the bottom longeron just aft of the wing saddle, cut to length and pin in place. Take the cutoff and another longeron and bevel both so they may be spliced together and add glue. When dry, cut the top longeron to length; put the splice toward the tail. Take the cutoff, soak it in hot water until it is fairly

pliable and physically put a bend in the piece, then cut it to length for the bottom longeron forward of the wing saddle. The whole thing may be accomplished with two standard 36" lengths of 3/16" spruce. Using 3/16" sq. balsa, fill in all vertical and diagonal braces. Next, add the wing saddle. We cut two identical pieces from 1/8" lite ply and two more



1/8" brass tubing stab brace on bottom side of stab.

identical pieces from 1/16" sheet balsa. The balsa and ply are laminated to 3/16" thickness. Be careful when installing; the ply goes to the outside. Add the wing strut anchor, making sure it is flush with the exterior of the fuselage side. Cut and fit the 1/16" balsa filler located just below the empennage. One of these will support the rudder pushrod exit. Make another side similar but opposite to the one you have just made. While the glue is setting, cut all the formers from lite ply, aircraft ply, and balsa.

BIPLUM

Designed By:

Paul F. Denson

TYPE AIRCRAFT

Fun Fly Biplane

WINGSPAN

48 Inches (Both)

WING CHORD

8 Inches

TOTAL WING AREA

768 Sq. In.

WING LOCATION

Biplane

AIRFOIL

Clark Y

WING PLANFORM

Constant Chord

DIHEDRAL EACH TIP

Top 1 1/2" — Bottom 5/8"

O.A. FUSELAGE LENGTH

42 Inches

RADIO COMPARTMENT SIZE

(L) 7" x (W) 3" x (H) 3"

STABILIZER SPAN

20 Inches

STABILIZER CHORD (incl. elev.)

6 Inches

STABILIZER AREA

120 Sq. In.

STAB. AIRFOIL SECTION

Flat

STABILIZER LOCATION

T-Tail

VERTICAL FIN HEIGHT

5 Inches

VERTICAL FIN WIDTH (incl. rud.)

6 Inches (Avg.)

REC. ENGINE SIZE

.15-.20 2-stroke

.20 4-stroke

FUEL TANK SIZE

4-6 Ounce

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Rudder, Elevator, Throttle

BASIC MATERIALS USED IN CONSTRUCTION

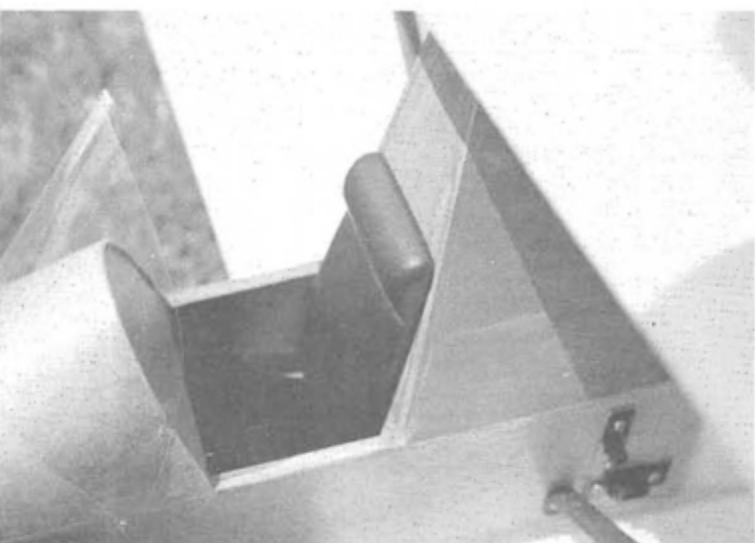
Fuselage Balsa, Ply & Pine

Wing Balsa, Ply & Spruce

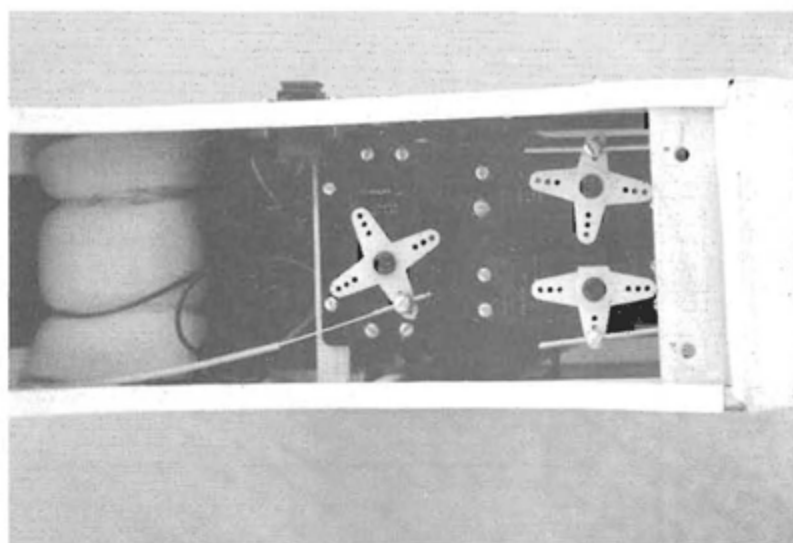
Empennage Balsa

Wt. Ready To Fly 56 Oz. (3 Lb., 8 Oz.)

Wing Loading 10.5 Oz./Sq. Ft.



Cockpit closeup. Switch and charging jack shown in lower corner.



Bottom view of fuselage looking into radio compartment.

Pin the right fuselage side to the plans and, with the formers, make a box of the center portion of the fuselage. When dry, pull the front ends of the fuselage together and epoxy the firewall in place. Bring the fuselage sides together at the empennage and add a tail post. Make sure the overall width of the fuselage is exactly $3/8"$ at this point. This is done so the fuselage matches the width of the fin.

Install the upper and lower fuselage cross braces. Cut all the top rear turtledeck formers. Glue in place and, when dry, add the $3/16"$ sq. hard balsa longeron. Form the rear pylon upright from a short length of $1/2" \times 3/8"$ balsa stock. Cut the wing platform from $1/8"$ lite ply and glue in place. The $1/8"$ sheet balsa triangular fillets will solidify the pylon so you are able to cut and insert the $3/32"$ horizontal

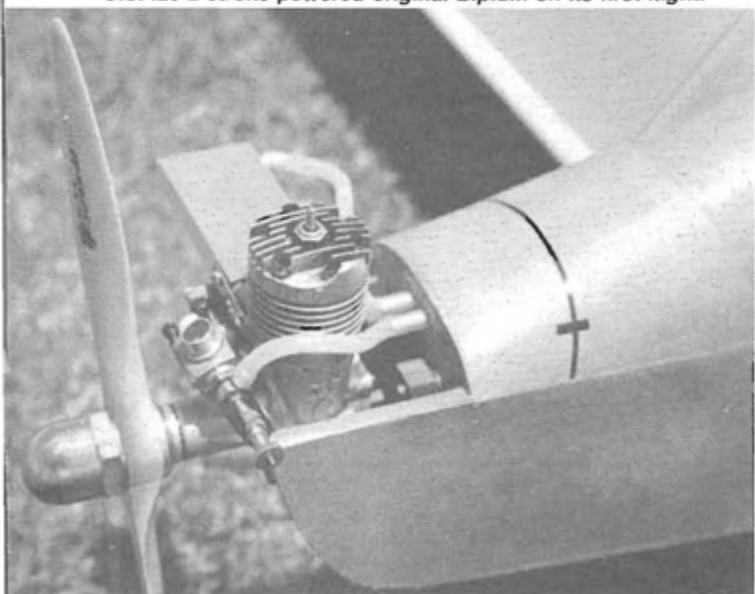
stiffeners. Do not worry about the width of these pieces; just cut to length and glue in place. The extra width may be cut off and sanded when you contour the pylon. Those to the rear are fitted between former F-4 and the rear upright. After the rear section of the pylon is trimmed and sanded to shape, little triangular fillets of $3/32"$ balsa are added to the surface of the rear upright as fillers. Next, add the $1/16"$ balsa strips where the pylon and the fuselage intersect; these strips are used to anchor the ends of the covering material. We installed the tank at this time although it may be put in place through the radio compartment.

Next, add the two cowl formers forward of the pylon. When secure, add the $1/8"$ square balsa longerons. These longerons will fit the square notches in former F-2 but no way will they twist enough in that short span to

fit into square notches in former F-1. We used half diamond notches then sanded off the top corners of the longerons. This makes a real neat base for the $1/16"$ balsa cowl cover. The cowl was cut to approximate shape from two pieces of $3"$ sheet balsa which had been glued together in the center. Use CA here as the aliphatic resins will deteriorate when wet. Soak the cowl cover in hot water for a few minutes, dry with a paper towel and put in place. Drape masking tape over the cowl, pull down neatly and secure the ends of the tape to the lower fuselage longerons. Allow to dry overnight, then trim to shape and glue in place. Formers F-1 and F-2 should be sanded slightly undersize at each end so there is an edge of the longitudinal stringer showing, to act as a gluing shoulder for the cowl.

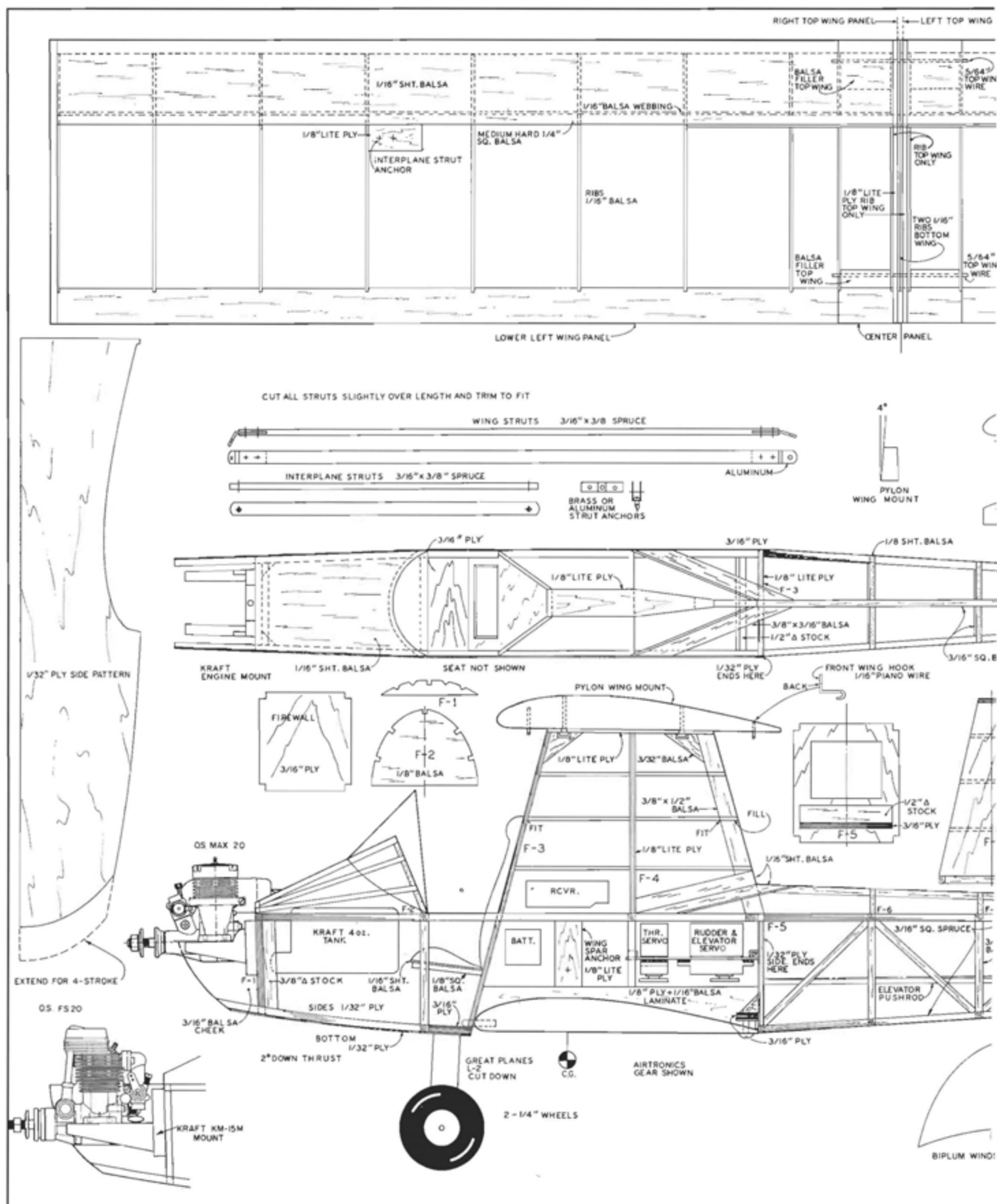
Cut to size and insert the landing

O.S. .20 2-stroke powered original Biplum on its first flight.



O.S. .20 4-stroke was installed with great results.





gear anchor block. The rear wing hold-down block is inserted and doubled with 1/2" triangular stock. Drill the hole for the wing hold-down

dowel in former F-3. Add the 1/32" fuselage skin on the sides and bottom of the fuselage. Sand all surfaces neatly.

Empennage:

Construction of the horizontal stabilizer and rudder are straightforward. The fin and elevator



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BIPLUM

DESIGNED & DRAWN BY

PAUL F. DENSON



PLAN NO. 983

plans and apply the right side 1/16" sheeting. Weight down until dry, then add the short 1/4" sq. using the 1/16" sheeting to hold it in place. Do not add

Aristocraft/Hitec Presents:

THE "KANGAROO" STARTING LINE READY 1/10 SCALE OFF ROAD CAR



A brand new concept in R/C cars: competition class, fully assembled, not toy grade. With a revolutionary electronic, solid state, speed control & Challenger 2 channel system installed.

FEATURES:

- Starting line ready out of the box
- Electronic dependable solid state speed control
- Fully proportional electronic reverse
- Advanced open chassis design for strength
- Double wishbone Independent susp.
- Pre-lubricated differential high speed gear box
- Oilite wheel bearings & ball joint connectors
- Optional ball bearing provision
- Factory oil filled shocks
- Built in receiver battery eliminator circuitry (B.E.C.)
- Reduced wt. due to B.E.C. for extra performance
- Semi-pneumatic rear off road posi-grip tires
- Adjustable receiv'r tray for wt. balance
- Extra large front bumper design
- High performance Mabuchi RS540S motor
- Low & high speed pinion gears
- Servo saver device factory installed
- Professional extra long range quality radio control unit
- R/C on less crowded 75MGHZ freq.
- Up to 13 cars can race at one time
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- Independently replaceable servos & rec'v'r
- Indirect drive water resistant high torque servo

(NOTE: 7.2V battery pack not incl.)

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the left side sheeting at this time.

Cement the vertical fin in place on the fuselage. Remember, the fuselage was made 3/8" wide at this part to match the rear spar of the fin which has 1/16" sheeting both sides. Run the red outer Gold-N-Rod pushrod tubing on the exterior of the fuselage, marking with pencil the largest curve

possible. Drill holes, cut away small pieces of the cross braces, then thread the pushrod tubing in place. It will hold itself there. The top end will stop just above the top cross brace. Note on the plans how the pushrod curves away from the rear spar of the vertical fin. It does this so it will meet the elevator horn at right angles. Epoxy the pushrod tubing in place.

The elevator is standard except for the horn which also acts as the center cross brace. The leading edge spar is butt joined against both sides of the elevator horn. Triangular braces made of 1/16" stock are inserted to maintain rigidity at the center of the elevator. They are flush on the bottom and act as covering anchors. Cut the horizontal stabilizer mounting from 1/8" lite ply and glue in place on top of the fin. This mount has a 3/16" notch in the center to clear the elevator horn. We experimented with five different elevator horns to get the proper movement. We have used wooden elevator horns before and never encountered a problem. The horizontal stab is fastened to the ply mount with three #4 metal or nylon machine screws. This makes the stab easy to remove and the linkage easier to adjust. Add the 1/16" sheeting to the other side of the fin.

Additional Construction:

We would like to suggest that the plane be assembled before any covering is added. Holes must be drilled for the rigging and pieces fitted; this way you can approach the task from both directions. Put the wing seating tape in place and attach the bottom wing to the fuselage with two 1/4-20 nylon bolts. Add the stabilizer, then place the model on a flat table with the fuselage blocked up horizontally. Shim up both wing tips so they are solid in respect to the table. To insure this, we also added weight in the cockpit.

The wing mount is now fastened to the top of the pylon with two 2-56 machine screws and blind mounting nuts. A small area of the triangular brace under the ply pylon top must be cut away so as to insert the blind mounting nuts. Using #2 sheet metal screws, fasten the four interplane strut brackets (see plans for dimensions and construction) in place on the ply anchors which are built into the wings. The interplane and flying struts were made from 3/16" x 3/8" spruce which was planed to a symmetrical airfoil section. Push the metal pins of the top wing into the wing mount and wrap a couple of turns of rubber bands around the wing hooks to hold the wings in place. You are going to find out like we did that the rubber bands tend to pull the wing into negative dihedral. Knowing this was going to happen in advance, we

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A. Total no. copies printed (net press run)	121,950	132,000
B. Paid circulation		
1. Sales through dealers and carriers, street vendors and counter sales.	91,102	100,406
2. Mail subscriptions	27,654	28,626
C. Total paid circulation	118,756	129,032
D. Free distribution by mail carrier or other means, samples, complimentary, and other free copies.	1,057	591
E. Total distribution (sum of C & D)	119,813	129,623
F. Copies not distributed.		
1. Office use, leftover, unaccounted, spoiled after printed.	1,016	1,438
2. Returns from news agents.	1,121	939
G. Total (sum of E and F—should equal net press run shown in A)	121,950	132,000

I certify that the statements made by me above are correct and complete.

Patricia E. Crews

made a couple of wing tip props of 1/4" x 1/2" x 12" balsa which we clamped to the wing tip ribs with Kraft clamps. Thus by releasing the tension on the clamp, we could move the wing tip up and down until it was the correct height above the table.

Measure the exact distance from the workbench to the underside of the

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wing mount block. Four degrees at the wing tip is $1\frac{1}{2}$ " above the bottom of the wing mount block. Because of the dihedral, the wing tip props will be at an angle to the table. Do not measure down along these props; measure straight down from the underside of the wing tip rib to the table top. This distance will be $1\frac{1}{2}$ " greater on each side than the height from the table to the bottom of the wing mount block.

Cut two interplane struts from your stock to a plus length then cut and try until they fit exactly between the two strut brackets. Using the holes in the ends of the brackets as a guide, drill holes through the ends of the interplane struts. Secure with 2-56 machine screws, lock washers and nuts. Do the same on the other side.

Cut the wing struts to approximate length. Make tabs from aluminum sheeting and insert in saw cuts in each end of the struts. Drill two holes through the struts and tabs, then secure with two 2-56 machine screws, lock washers and nuts. Drill a hole $3/16$ " from the outer end of each tab to take a #2 sheet metal screw which affixes the strut in place. Later, the anchor holes in the fuselage and wing may be drilled out and a 2-56 blind mounting nut may be added so you can secure the wing struts in place with 2-56 machine screws. This strut must be loosened at one end or the other in case you intend to take the plane down for transportation.

When originally constructed, we had the wing hooks on top of the wing where they would act similar to landing wires on a full size plane. Before covering, we moved them to the bottom where, when bound with monofilament line to each other, they now act as dihedral braces. Of course, their sole purpose in being there is to keep the wing pins solid in the wing mount block, so they do double duty and, besides that, they cannot be seen under the wing. When on top, they stuck out like a sore thumb.

Now that you have the wings in place, it is time to add the horizontal stabilizer braces. They are

manufactured from $1/8$ " brass tubing with the ends pressed flat in a vise then bent so they will form a 45° angle with the fin and horizontal stab. The ends of the tubing are drilled to take a 2-56 machine screw. As long as you have everything else together, you might as well add the landing gear. We used a standard Great Planes landing gear (L-2) which measures $3\frac{1}{4}$ " beneath the fuselage, $3\frac{1}{4}$ " high and $10\frac{1}{4}$ " between the insides of the wheels. To make the landing gear more scale-like, we hacksawed it in such a way as to leave the front $3/4$ " in place. It is mounted to the fuselage with two $1/4$ "-20 nylon bolts which hopefully will shear when you hit a curb or such.

Covering:

After you have taken a couple of pictures of your baby without clothes, now is the time to apply your favorite covering. We used white Micafilm from Coverite. Since this material does not have its own adhesive, it will be necessary for you to purchase a can of Balsarite which you brush on to every surface where you intend for the covering to adhere. If you overlap the covering, put a layer of adhesive between these two surfaces. You will be rewarded for the time you spend in getting the plane covered by having one of the strongest surfaces you will find on a plane. To give the plane a scale-like finish, we used a laquer based wood stain on the front and tail then added two coats of clear finish to keep off the oil and dirt. This translucent covering was the nearest we could come to looking like the covering used on the original plane.

Flying:

We would like to use the old stilted phrase "it flew right off the board," but we can't because of the engine. It did take off just like we wanted, and we gave a bit left then a bit right to see if the rudder had control. Just about this time, the engine quit, and we really didn't have flying speed. The nose tucked a bit and full-up would not flare the plane. Since we were no more than 10 feet off the ground, the

damage was minor. The engine was pushed back against the tank which was pushed back into the cockpit. We cut a portion of the bottom ply sheeting away so we were able to get into the tank compartment. We pushed the firewall forward against the cowl cheeks, epoxied it back in place then installed $3/8$ " triangular stock (now on the plans) behind the firewall. The tank was pushed back in place and we replaced the $1/32$ " ply on the bottom, added a new piece of Micafilm and the plane was as good as new. The engine problem was traced back to using old fuel from which the nitromethane had evaporated months ago. It was okay for a .40 but the .20 just couldn't hack it. We switched to a new gallon of 15% and have had no problems since.

Now -- "it flew right off the board." After you have spent a number of years flying with ailerons, you have a concern about 3 channel rudder control. We had 5° of dihedral in the top wing at the beginning and we reluctantly took the advice of our flying buddy and dropped it to 4° , he was right as usual. The first trip to the field, our old biplane flying buddy wanted a session at the sticks, just to make sure it was okay for us to fly our plane. As we stood nearby, knees trembling, he put it through its paces. The more he flew, the prouder we became, the trembling stopped and we threatened dire things until we got our transmitter back in hand. One thing we discovered, it would fly straight up until the engine could pull it no further then it would flip over backwards rotating on the high dihedral wing tips and pull out to straight flight. Of course it flew regular loops beautifully. It takes an awfully large barrel to contain a roll and don't try it unless you have a lot of altitude.

We have had many comments on the stability of this little plane and one thing we particularly like is the fact that it does not balloon every time the throttle is shoved forward; it grooves like an aileron plane. On the runway, it does not act like a taildragger, it is much more stable like it has a trike landing gear. We have found it is just as stable upside-down as it is wheels down. Give it full down on top of a loop and it holds itself there just as proud as punch. Remember, you aileron jockeys, left isn't left any more, if you want to go left, you have to give her right. Think about it for a moment or two before you do so.

If the fun and enjoyment we have had from this little staggerwing biplane is any indication, you are going to fall in love with your Biplum and have everyone at the field staring at it with envy. A great little plane -- enjoy.



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