LE POU DU CIEL

Now you can enjoy flying a model of the most unique classic homebuilt aircraft ever designed.

By Randy Wrisley

The 1930's might truly be called the decade of the home-built aeroplane. Lindy had flown the mighty Atlantic, and interest in aviation was at an all-time high. Around the world men pulled strange contraptions out of barns and workshops to try their wings. In America, Ed Heath and Bernie Pietenpol, among others, designed lightweight, low-powered aircraft. Many pilots got their first aerial view of the pasture from such a platform.

In France, a man named Henri Mignet was determined to design a safe home-built. It seems Henri was far from a born pilot and wanted something even he could fly! He believed the greatest danger in flying was the stall, so his machine must not be capable of doing that. After three years of trial and error failures, the strangest of all contraptions clattered into the air, Henri's Pou Du Ciel.

The Pou was a tiny creature, spanning barely 17'. With a length of only 12', it was almost toy-like. The entire main wing pivoted up and down for pitch control and there were no ailerons. A 17 horse, 2 cylinder inline engine provided enough noise to get airborne. Henri's flight tests proved his Pou couldn't stall or spin. Deep in his heart, Henri felt his beloved Pou was the safest aeroplane in the world.

Henri published a book of plans titled "Le Sport De L'Air." Would you believe it sold 6000 copies the first month? The Pou gained rapid popularity. At one point, over 500 were known to be under construction. Many people built their Pous in thirty days, then took it out to the pasture and taught themselves to fly it. Being so fast building, inexpensive, and easy to fly, it looked as though Henri's Pou was indeed the answer to the average man's quest for flight, well almost!

It must have been Henri's inability as a pilot that lead to the Pou's design defect. Henri carefully never called his beloved Pou an aeroplane, always a Pou. He even stated on more than one occasion, aeroplanes frightened him. His creation neither looked like an aeroplane, nor flew like one. In 1935, the first of 11 fatal accidents claimed a Pou pilot. The aircraft tucked into a dive and never recovered. Most of the pilots who were killed had experience in conventional aircraft. Investigation revealed that if a Pou were put into a dive and the angle got steeper than 15 degrees, there could be no recovery. The slot effect so vital to pitch stability vanished when the nose went down. Pivoting the main wing created a venturi effect which helped the rear wing lift better. Most likely Henri never discovered the problem because he couldn't sense a stall and felt no need to put his Pou's nose down! Experienced pilots weren't so lucky. Pous were quickly banned by most European governments and slipped into obscurity.

But what of Henri? He and his staff worked hard to solve the Pou's problem. In the end, a new airfoil, some rigging changes and, eventually,

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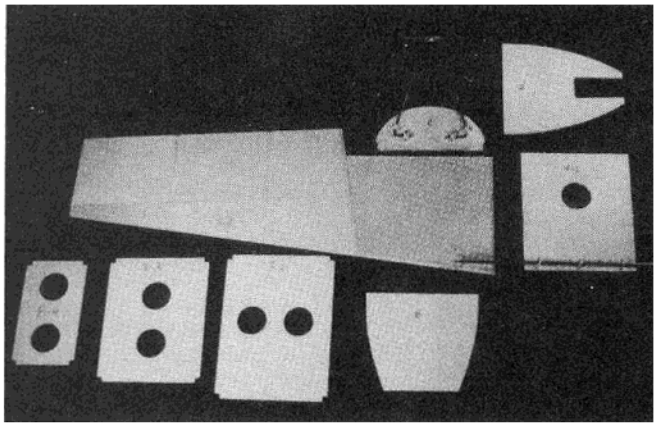
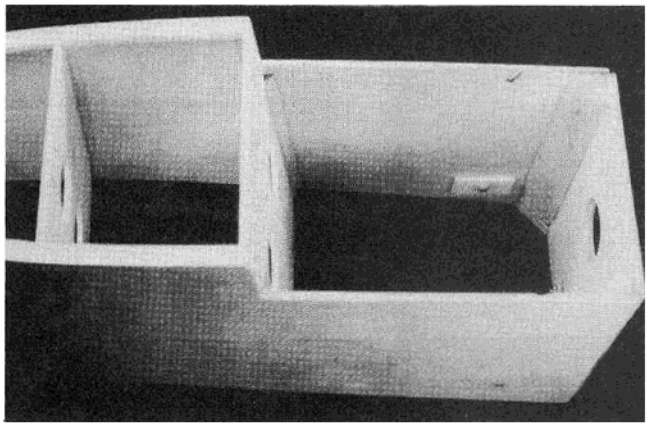
LE POU DU CIEL
(Flying Flea)
Designed By: Randy Wrisley

TYPE AIRCRAFT
Sport Scale
WINGSPAN
66 Inches
WING CHORD
14¼ Inches
TOTAL WING AREA
812½ Sq. In.
WING LOCATION
Parasol Wing
AIRFOIL
Undercambered Reflex
WING PLANFORM
Constant Chord Center
Elliptical Tips
DIHEDRAL EACH TIP
3⅜ Inches
O.A. FUSELAGE LENGTH
36 Inches
RADIO COMPARTMENT AREA
More Than Ample
REAR WING SPAN
42⅜ Inches
REAR WING CHORD
13⅛ Inches
REAR WING AREA
445½ Square Inches
REAR WING AIRFOIL
Undercambered Reflex
REAR WING LOCATION
Top of Fuselage
REAR WING DIHEDRAL
2¼" Ea. Tip
RUDDER HEIGHT
12¾ Inches
RUDDER WIDTH
7½ Inches
REC. ENGINE SIZE
.30-.40
FUEL TANK SIZE
4 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Throt., & Wing Pivot
BASIC MATERIALS USED IN CONSTRUCTION

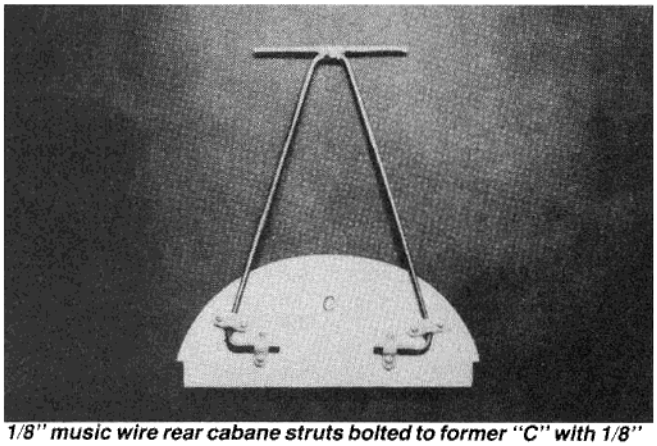
Fuselage	Balsa, Ply, Lite Ply
Wing	Balsa, Ply, & Spruce
Empennage	Balsa, Ply, & Spruce
Wt. Ready To Fly	**88 Oz.**
Wing Loading	**10.06 Oz/Sq. Ft.**



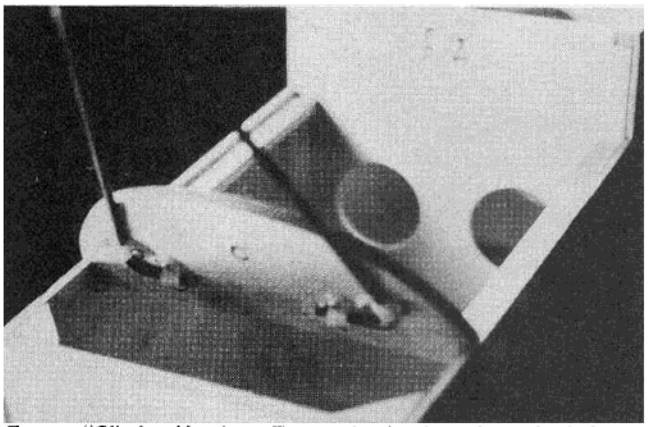
Basic fuselage parts with some sub-assemblies completed.



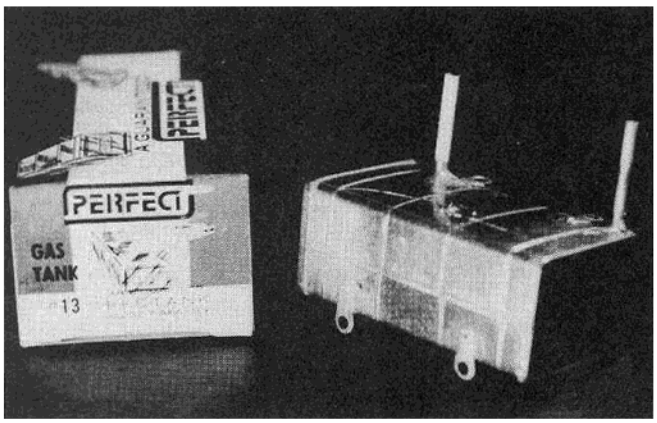
Front end of fuselage with spruce bearing blocks in place for wing pivot control horn.



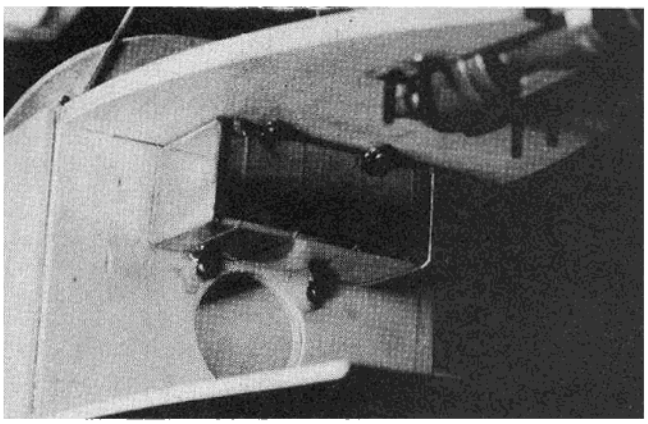
1/8" music wire rear cabane struts bolted to former "C" with 1/8" Sig L/G clamps.



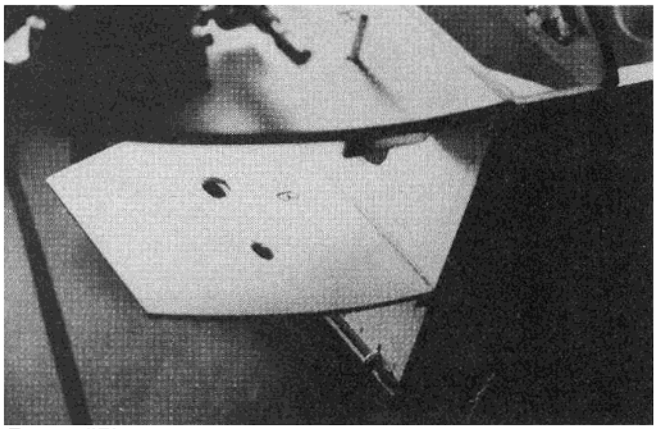
Former "C" glued in place. Be sure to check angle against plans.



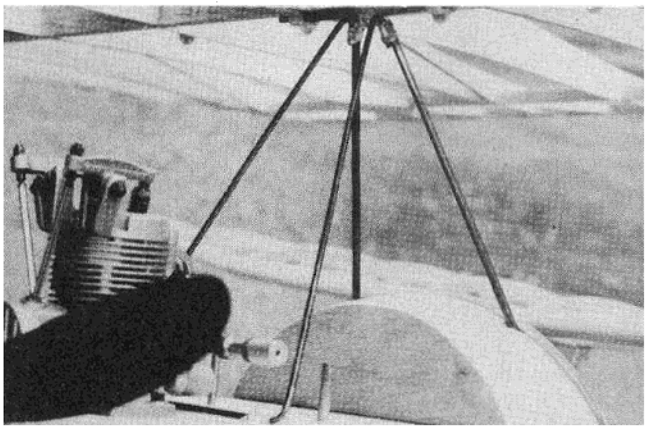
Prototype model used a modified metal fuel tank (Perfect #13) with mounting tabs soldered on.



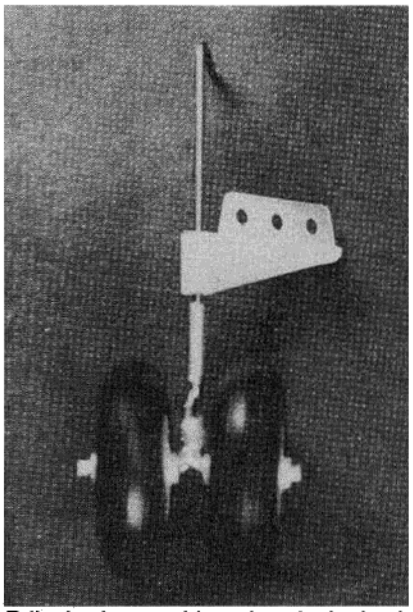
Tank fits very nice under engine mounting plate. Plastic tank would work just as well.



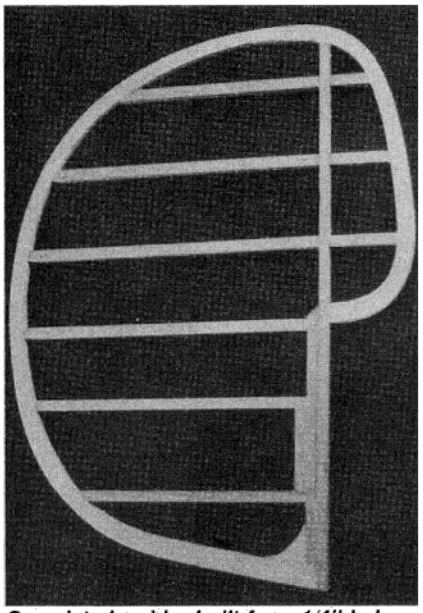
Former "B" is base for battery pack and receiver. Note fuel tank vent and filler tubes thru former "A".



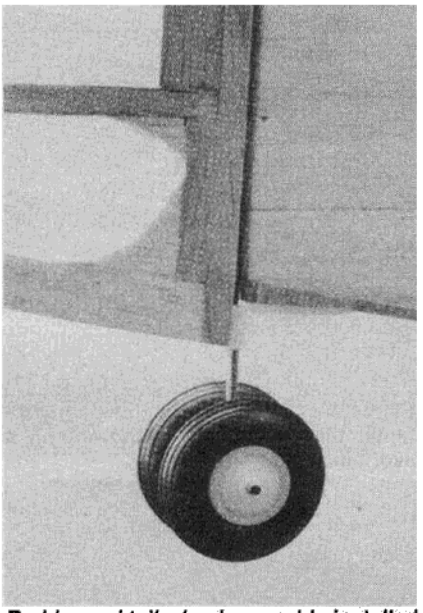
Close-up of cabane struts showing the pivot attachment to the wing. This system works very well.



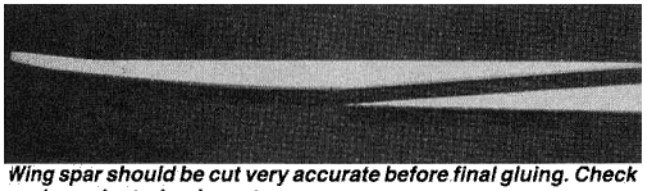
Tail wheel assembly using dual wheels and Goldberg tail wheel bracket.



Completed rudder built from 1/4" balsa.

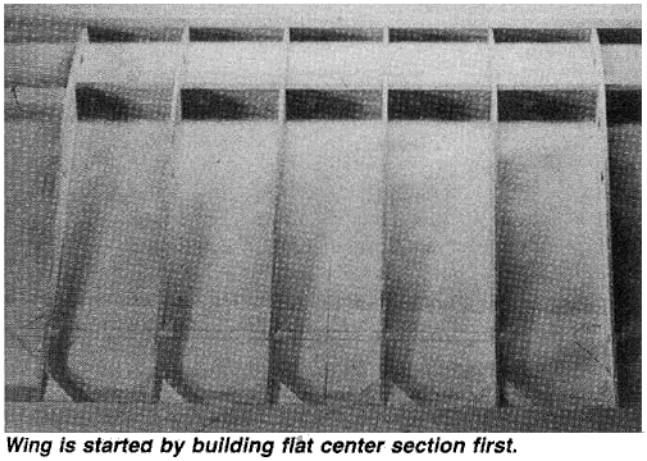


Rudder and tail wheel assembly installed to fuselage.

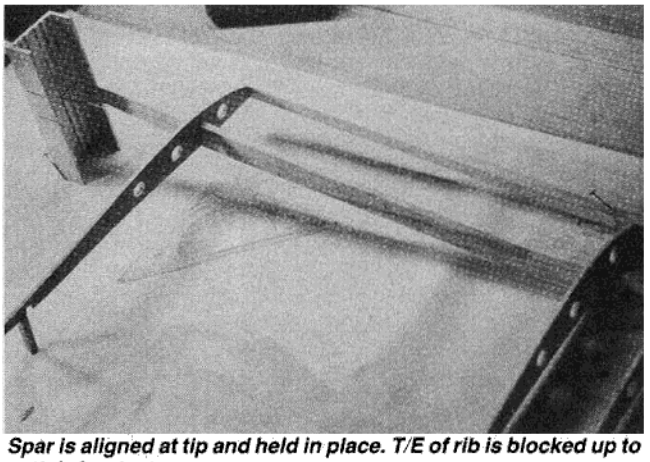


Wing spar should be cut very accurate before final gluing. Check angle against plan layout.

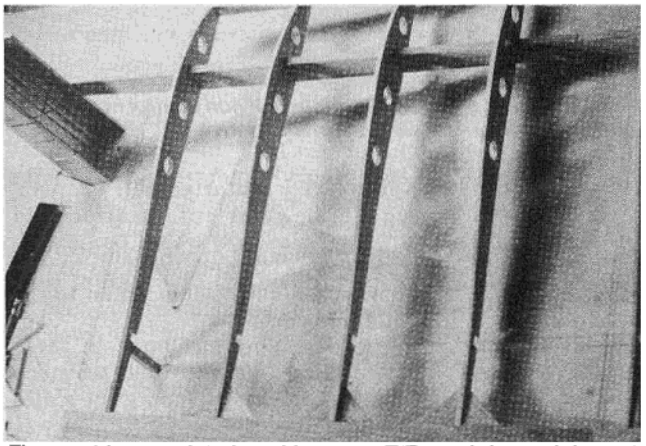
Wing spar glued and ready to start wing assembly.



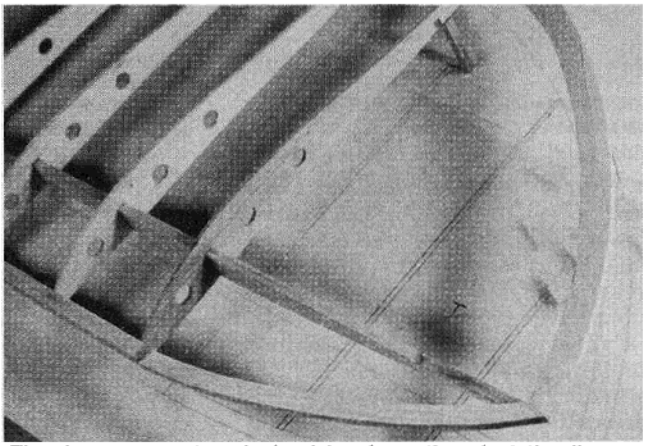
Wing is started by building flat center section first.



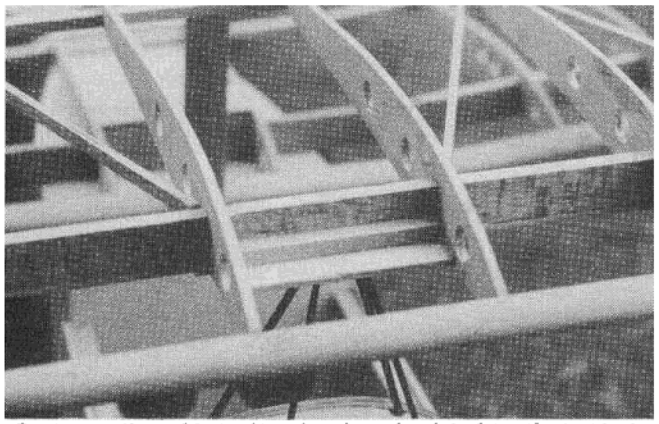
Spar is aligned at tip and held in place. T/E of rib is blocked up to match front spar.



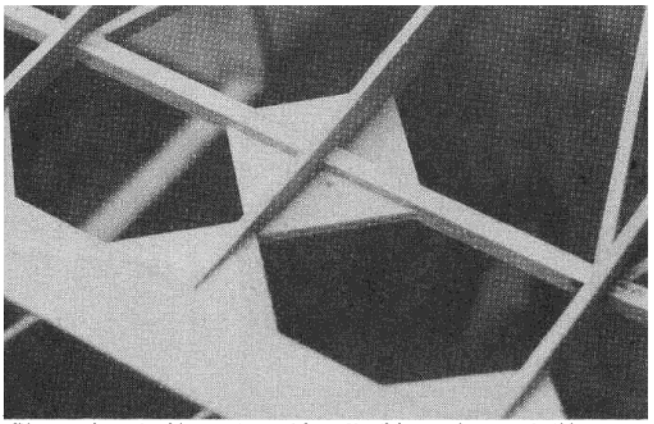
Tip panel is completed, making sure T/E stock is straight and true.



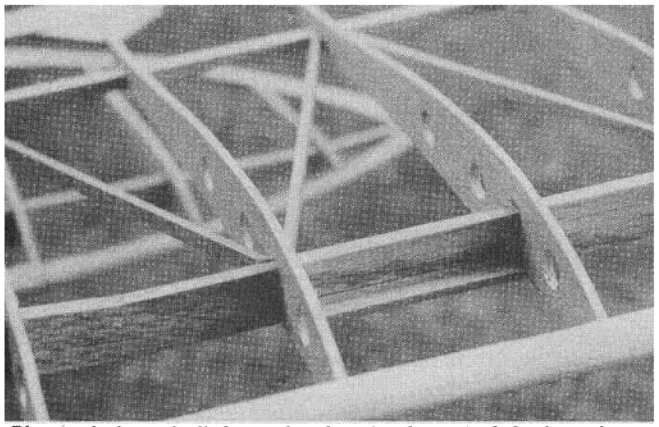
Tip pieces are cut and glued in place, then last tip ribs are installed.



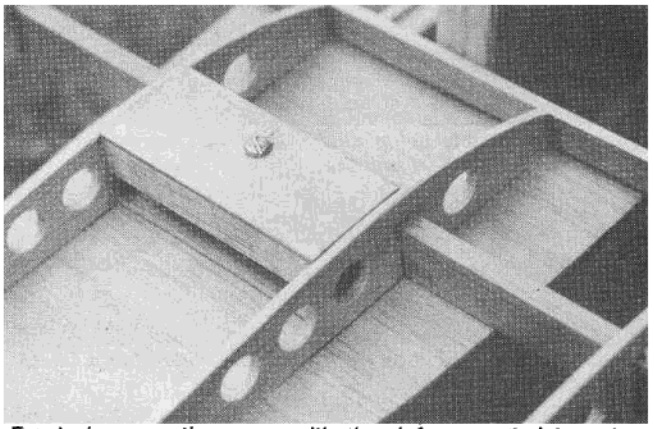
Center section of top wing showing ply plate for cabane struts pivot bracket.



Plywood control horn gusset for attaching nylon control horn on top wing.

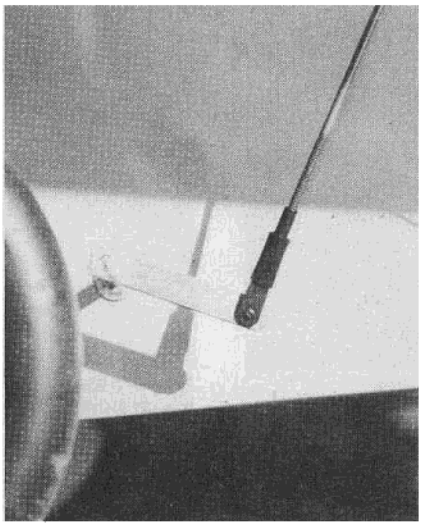


Plywood plates built into wing for attachment of rigging wires.

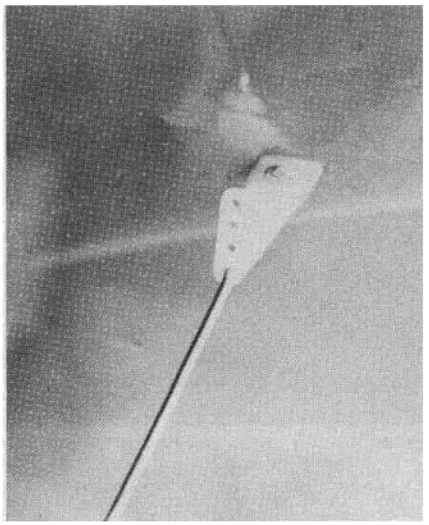


Front wing mounting screw with ply reinforcement plate on top of rear wing.

Cockpit area showing the excess room for the three req'd servos.



Wing pivot control horn with linkage going to top wing.

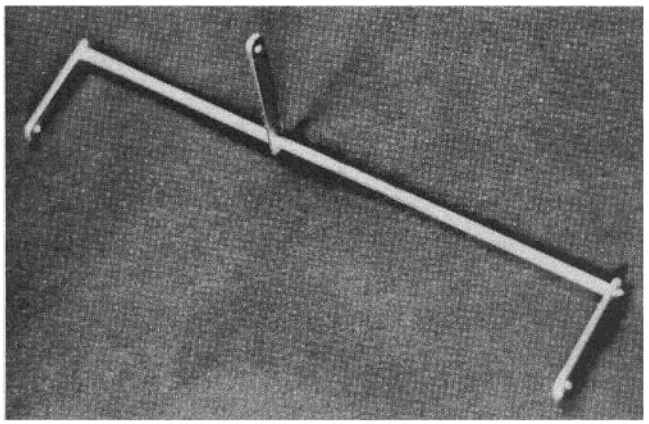


Small Goldberg nylon control horn on top wing for pivot control.

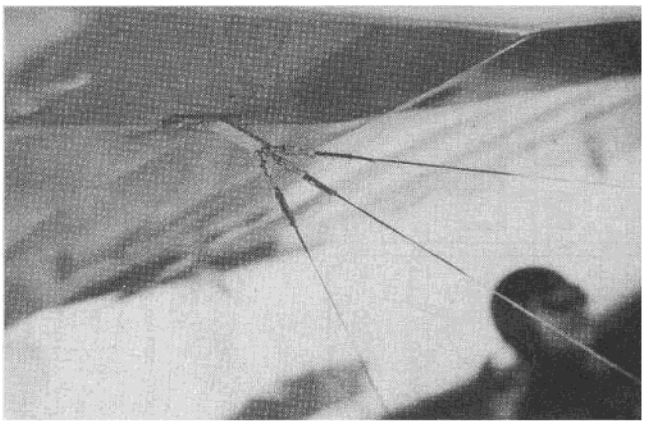
an elevator working with the main wing solved the tucking tendencies. However, the damage was done and while Henri continued to promote his dream until his death in 1965, the public never showed much interest.

I've always felt the Pou had possibilities as an R/C model. The aircraft had more character and personality than the law now allows! Since Henri's goal was simplicity, the model had to be easy to build too. First I located a set of plans for a 1" Scale Pou drawn by Ken Hamilton back in the 1930's. This British version had a 22' wingspan and a 30 horse Ford automobile engine for power. G-ADMH had a cowl around the engine making the model's nose much easier to build. I was most fortunate to run into Mr. Hamilton at a free-flight scale contest shortly after I obtained his plans. I picked his brain for ideas and he proved most helpful. I'm not ashamed to admit, my Pou is scaled from his great drawings! Thanks, Ken! Next I contacted Bill Hannan, regarding color information and anything else that would be helpful. Now I was armed with as much information as possible, so on to the building board.

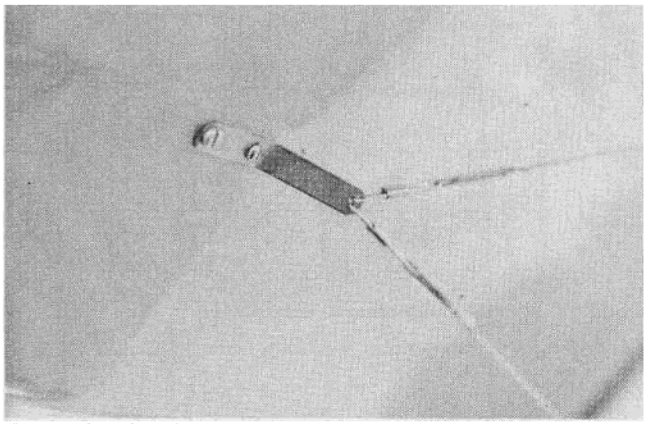
The first Pou was built in three days. (I didn't want to waste too much time, just in case.) Tipping the scales at 33 ounces, this 2" Scale Pou was first powered with a Fox .15. The first flight was like that of an Atlas missile, in slow motion! The Pou stood on her



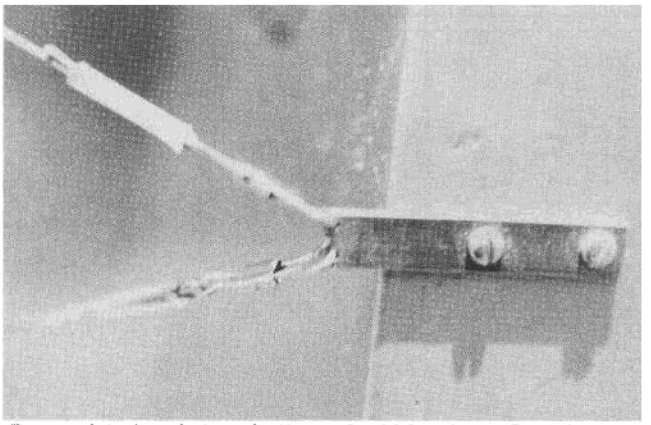
Wing pivot control horn before installation. Final soldering after installation.



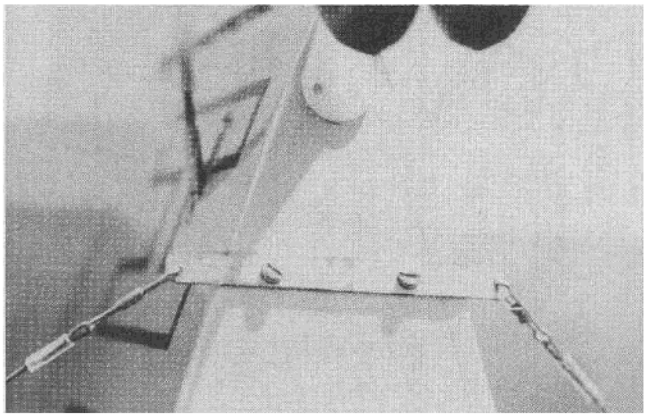
Brass plate bracket on top wing for attaching rigging wires.



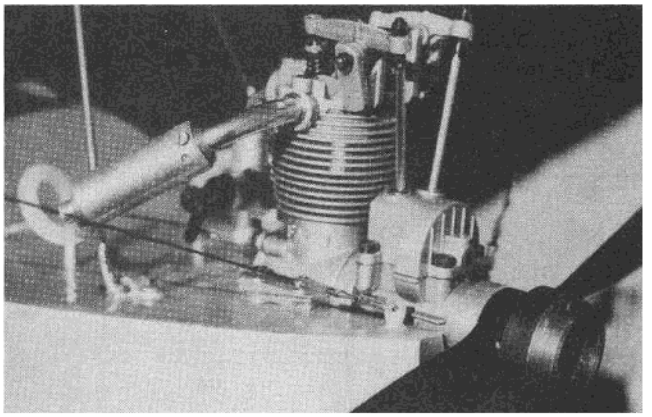
Brass plate bracket on rear wing for attaching rigging wires.



Brass plate bracket on bottom of mid-fuselage. Contains one rigging wire from top wing and one from rear wing.



Brass strap across fuselage bottom at tail wheel. One rigging wire on each side from rear wing.



That Saito .30 was just made for this type of aircraft. Note rigging wire attach point at front of engine.

stubby tail and climbed at about a 45 degree angle. Instinct told me to chop the throttle, so I did. That wonderful, reliable old Fox promptly quit cold, and I discovered another problem. Seems I had about 1/2" too much positive incidence in the main wing! I chose to stay with the pivoting wing for pitch control and was now holding full down on the transmitter stick. My Pou just weather-vaned and flew backwards, bobbing up and down but never stalling. The landing was uneventful, taking place about 20' behind the launch point. The .15 was quickly replaced with an Enya .09!

Experimenting with the angle of the main wing taught me I could live with too much positive, but a Pou won't stand for too much negative. With very little effort really, I had this bug flying so well I was sorry I didn't take more time building it. I feel a modified airfoil, more reflex in the rear wing, and a more forward Center of Gravity solved the design problem from a model standpoint. At least that's what worked for me. Yes, a Pou will still tuck, but it takes real effort. If you hold down-wing long enough it will go down. Unlike its full size counterpart, however, yours will recover if you apply up! Once you get used to flying it, you will find out, just like Henri did, it's not necessary to put the nose down. Since Quarter Scale models are the rage, I enlarged the Pou to that size. Believe me, it flies just as well, if not better. So build it light, don't over-power it and, for gosh sakes, get the incidence angles right! If you follow those guidelines, yours will fly as good as mine does, so let's build one!

CONSTRUCTION

Fuselage:

Begin by cutting two identical sides. Select lumber that is flexible, but not so soft as to dent easily. Mark the former locations with a felt tip pen to prevent scoring across the grain. The 1/16" plywood doublers are installed

first. Remember, the doubler ends 1/8" from the front of the fuselage. Epoxy the 1/4" x 3/4" spruce bearing support blocks in place. Pin the sides together and carefully drill the 5/32" hole for the wing actuator bearing. The bearing is nothing more than a piece of 5/32" brass tubing Hot-Stuffed into the holes.

Cut Formers 1, 2, 3, and 4 plus A, B, and C from the size and type of plywood indicated. Lighten all the formers aft of the cockpit with several large holes. Former A should be cut to fit your motor. I used a Saito .30. Any glow engine from a .19 to a .35 can be used.

Now is a good time to install the blind mounting nuts and, with the motor in place, build a box under it. This box will later keep fuel out of the nose.

Assemble the fuselage by first epoxying Formers 1 and 2 in place using a triangle to align them. Note #1 overhangs the front edge by 1/8". Carefully pull the sides together, installing the larger formers first with Hot-Stuff. When you're satisfied it's straight, go over all the joints with Titebond for more strength.

The tail block is made from three pieces of 1" T.E. stock. Install it before cementing on the soft 1/4" square balsa edge pieces. Cut the 3/16" music wire landing gear to length and install it with "J" bolts. Epoxy the 1" triangle stock to F-1, trimming as necessary to clear the J-bolts.

Install Former A using a couple of temporary gussets to get the proper slope. I chose to use a metal tank in the

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model.

Begin assembly by carefully centering the rear wing and screwing it in place. I used long sheet metal screws on mine, figuring if one pulled out, there would be lots more to repair than the screw hole! Snug the rear wing down and use it to align the main wing. Slide a piece of 1/8" music wire through the cabane. Use two Sig 1/8" landing gear clamps, with 1/2" sheet metal screws to hold the wing on.

Install the two short control horns on the wing, then build up the somewhat different wing actuator. The actuator consists of a piece of 1/8" brass tubing with a "joystick" in the middle and an arm at each end. Solder one arm in place. Slide a washer on, then push the tube through 1/2" of the fuselage. Insert the joystick, slide the tube out the other side of the fuselage, add a washer, then solder the other arm on (whew!). Make sure both arms point exactly the same direction.

Mount three servos towards the rear of the cockpit and make the one on the left side the elevator servo. Install a pushrod from the joystick to the control horn, then, with the actuating arms lined up even with the bottom of the fuselage, solder the stick assembly in place. Again silver solder works very well. To prevent sideways movement, the washers are carefully soldered in place close to the fuselage sides.

Connect the radio and spend a few minutes playing with the wing servo. Ideally, you should have more "down" movement on the arms than up. Remember, moving the wing's T.E. down will raise the model's nose!

Connect the two pushrods and try the controls. You should have 1/2" down travel and 3/8" up travel to start with. To set the incidence angle properly, raise the wing's T.E. 3⅝" above the rear wing. This is a ball park figure. Remember, it's better to have too much positive instead of too much negative!

Epoxy the rudder in place and hook up the pushrod; 1½" throw to either side is about right.

Follow the diagram to rig your model. I used some 50 lb. test fishing leader for rigging, but you could use Proctor turnbuckles and cable if you choose.

Use a 3" scale pilot attached to the cockpit cover as a handle for easy access. Install some 4⅜" wheels with a collar on each side. Stow the receiver and batteries forward with plenty of foam packing. If you haven't done so already, bolt the engine in place and connect the throttle pushrod to the carb. Carefully balance the Pou 1½" aft of the main wing spar.

Add your scale details, then get ready to fly your completed Pou.

Flying:

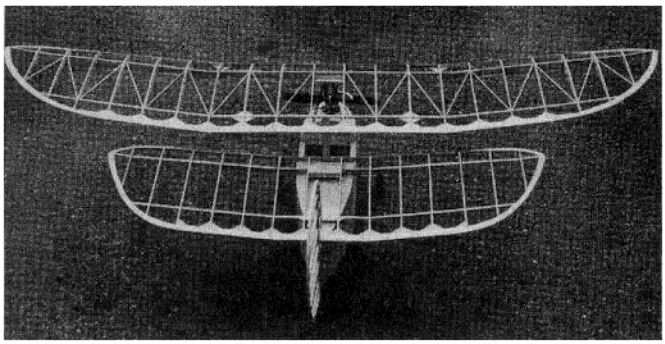
To fly well, your Pou must have an engine that idles reliably. Once you get your engine to idle well, you can make some taxi tests. Ground handling is very good. The Pou will track very straight and requires very little right rudder.

Once you get up enough nerve to let your model take-off, watch it closely. It should climb out at a shallow angle, flying very slowly. If yours pitches up sharply, and almost stops flying, don't panic! Run in some down trim and gently turn out of the condition. Come back on the throttle, and set her down. You will find the problem is either that the model is tail heavy or that you have too much positive in the main wing. If the C.G. is okay, adjust the incidence in the main wing a little at a time until you get smooth flights.

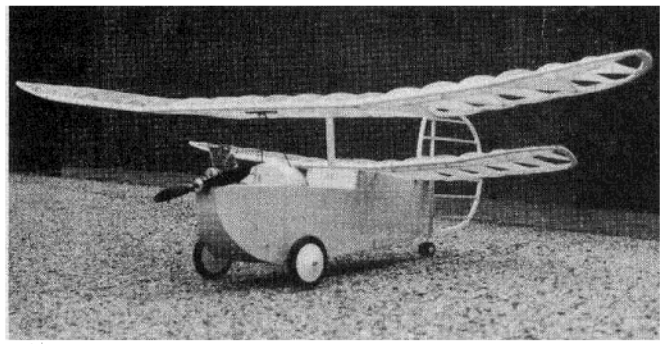
On the other hand, if your Pou runs down the runway on the mains, hops into the air, and dives back into the ground, you have too much negative incidence.

Remember, in any case, to do all flying in calm weather. The Pou is not a windy weather airplane! Mine flies along happily at about 1/3 throttle, flying slower than you would think possible. Have fun with yours. If you have any problems write me in care of R.C.M. I'll help you all I can. □

From RCModeler Nov. 1981



Rear view of framed up "Pou Du Ciel."



William's Brothers vintage wheels are the finishing touch to this classic.

prototype. The Saito .30 gets 15 to 20 minutes on 4 ounces of fuel, so a bigger tank wasn't necessary. I made it part of the structure by soldering tabs on the top front and bottom rear, then bolting the tank to F-A and F-1. If you use a plastic tank make those gussets permanent.

Bend the main cabane from 1/8" music wire. I took the temper out of the wire before I bent mine. Cut the 5/32" brass tube to length and carefully attach it to the cabane with fine copper wire. Using the stove as a heat source, silver solder the parts together. I used low-temperature silver solder and have had no problems. Bolt the cabane to Former C, taking care to get the alignment exactly right. Use Sig 1/8" landing gear clamps to hold it in place.

Epoxy "FC" into place making sure the forward rake is exactly as shown on the plan. Cut the top block to the approximate shape and hollow the back so it fits flush to Former C. Epoxy the block in place, sanding it final contour once the epoxy sets.

Bend the front of the cabane to shape from 3/32" music wire. Solder it to the main cabane after wrapping the parts together with copper wire. The placement of the wire on Former A isn't critical, just so long as it isn't in the way. Use Sig 3/32" landing gear clamps to hold the assembly in place.

Now is a good time to cement Former B in place. Make sure the hole in Former A is large enough to slide your radio through. Cut the nose cowl sides to shape from 1/8" balsa. Note the grain runs up and down. Drill a 1/8" hole at the location shown. Epoxy one side on at a time, carefully coating all surfaces with the glue.

Block sand the outer cowl edges so the 1/32" plywood bottom/front piece will fit flush. Plank the fuselage bottom with 3/32" balsa except those areas where plywood is indicated. Now install the 1/32" ply nose piece taking care to see it fits smoothly into the balsa bottom.

Epoxy the rear wing hold-down blocks in place and plank the top rear of the fuselage with 3/32" balsa, again using plywood in the specified areas. Add the spruce cockpit edging to the inside of the cockpit. This runner will later be used to keep the 1/16" plywood cockpit cover in place.

Make the cover now, making sure it fits without distorting the cockpit. To use the nylon tailwheel bracket you must add a small filler block to the bottom of the fuselage as shown on the plan. Do this before giving the fuselage a final sanding.

If you haven't already done so, install the 1/8" brass tube through the cowl and Hot Stuff it in place flush with the sides.

Rudder:

Cut the outline from soft 1/4" balsa. Lay it over the plan and cement the 1/4" square interior pieces in place. Make up the tailwheel from 1/16" music wire, slide it through the nylon bracket then fit the assembly to the rudder. Sand the rudder to shape, then fit the rudder to the fuselage using three heavy duty hinges.

Wing:

Make a template from plywood and cut sixteen main ribs. Do the same for the four tip ribs.

The toughest part of this wing is the spar. Build it directly over the layout. Briefly, it consists of a 1/4" x 3/4" balsa strip, capped with a 1/4" x 1/8" spruce stiffener. 1/4" square spruce blocks are epoxied in place to support the rigging fittings, and a small filler piece on top supports the wing tips.

If your angles are correctly cut, the spar will fit together so well that no dihedral braces will be necessary. If you have doubts, epoxy a 1/64" plywood side piece to each joint.

While the spar dries, mark the rib locations on it and cut all the leading and trailing edge pieces to correct length.

If you decide to cut lightening holes in your ribs, do it now, but don't lighten the two center section ribs. Stand the spar up in place over the wing plan. Carefully center it, using large triangles at the tips.

Pin the center section L.E. and T.E. in place and cement the ribs in. Note that the T.E. is blocked up 1/4" during construction. Cement the gussets in place at the trailing edge, then get ready to move out to the first dihedral break.

Install the last rib before the wing tip, as shown in the photos. Carefully square it, then block the rear up 1⅜". Fit the L.E. and T.E. to it, using Hot Stuff.

Eyeball the reflex towards the tip, using the center section as a guide. Slip the rest of the ribs in place and cement well. Add the gussets, then install the wing tips. Finish this "board work" by adding the tip ribs. Pick the completed wing off the board and carve the L.E. to shape.

Use filler blocks at the wing tip to L.E. joint to achieve a smooth contour. Cement the rear spar in place. Use hard lumber in the center section, but be sure to use stock that is soft enough to bend to the proper shape in the tips.

Epoxy the 1/4" x 3/4" spruce wing hold-down blocks to either side of the main spar at the center section. Likewise, install the 1/8" plywood gussets which will later support the control horns.

Cement the 1/8" x 1/4" diagonals in place, taking care to get them high enough to clear the undercamber.

Give the wing a very careful sanding, then it's finished.

Rear Wing:

This structure is really too big to be called a stabilizer. A study of the plan will reveal that it is built exactly like the main wing, so no additional instructions are necessary. Note that there is no cap on the main spar, and provisions are made for two hold-down screws at the spars.

Covering:

By all means cover the structures before assembly. "G-ADMH" was overall silver, with black numbers and wheels. I used MonoKote, but most any covering will do. Take care not to warp those big wide wings, you will have trouble if you do!

Assembly and Rigging:

To keep it simple, I made all the metal fittings from 1/4" brass shim stock. Look at the drawings and drill the necessary holes for each part. Screw the parts to the proper components before you assemble the