



hot foot

Attractive lines of Harry's biplane represent the type of full-size ship he would like to own — and who wouldn't! Wing area of model is 500 sq. in.

by HARRY WILLIAMSON

► How many "bipes" have you seen at the stunt circle in recent years? It seems to us that they should be more in evidence, since a biplane is to aerobatics what ham is to eggs.

Why haven't they been more in evidence? Some of the boys, when questioned about this unnatural phenomena reply that "it's impossible to keep the upper wing glued on during a good wringing out." Others, that "it's too much work, building an extra wing, and only have one ship!" Well, maybe so, but whatever reasons others offer, it's all really worthwhile, in our opinion. Why not try it yourself and see if you don't agree?

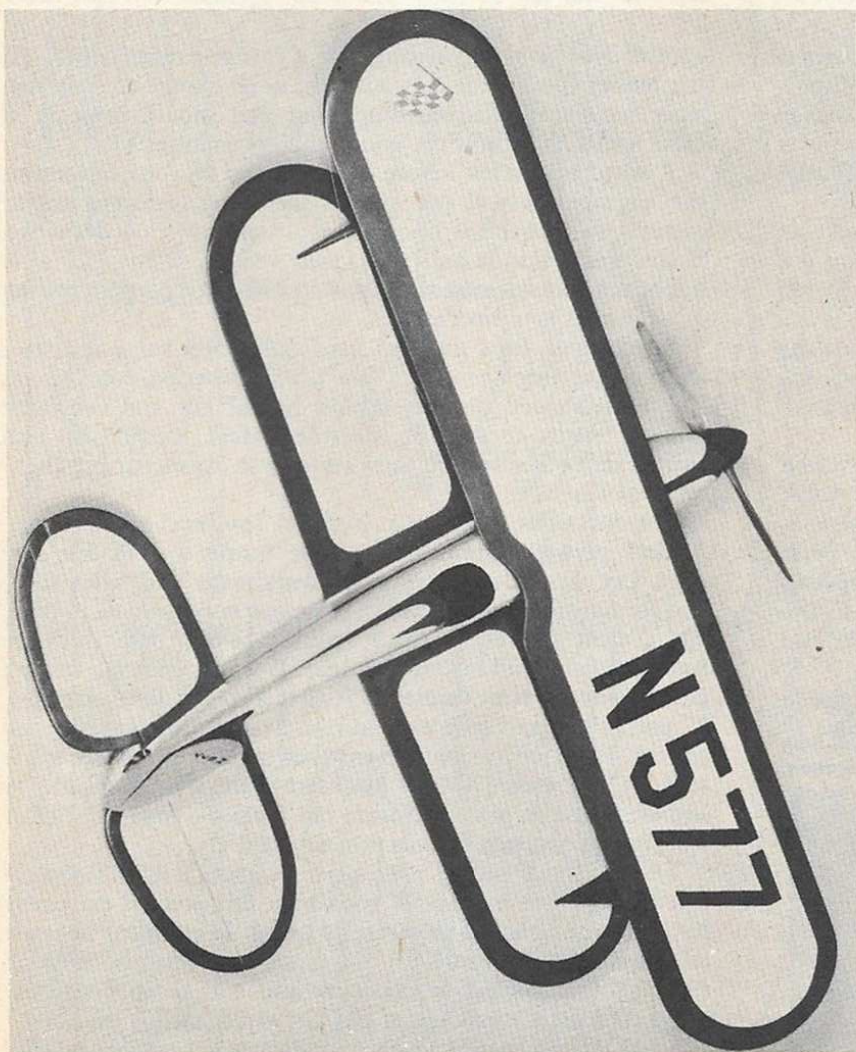
Since there seems to be little to be done about adding new maneuvers to the stunt pattern and since the skill of most contestants is of the highest order, one of the few avenues of escape left from this monotony is the addition of stunt ships to these affairs that look and fly like full sized ships.

Our reply to this problem is the *Hot Foot*! This job can keep up with the best of the "table-winged" stunt ships so prevalent today.

The *Hot Foot* is an unequal span "bipe" with the generous gap and stagger necessary for top performance. The ship as presented here will accommodate .32 to .65 engines. Built in accordance with drawings and instructions which follow, this job will perform equally well with one of the new, lightweight and red hot .35's or one of the .60's that have been gathering dust and rust on the workbench for a long time. Those with Atwood *Triumphs* can cheer up too.

Although originally designed for the Fox .59 as shown on drawings, the original ship has proven to be excellent when powered with an Atwood Model JH. Super Champ. Properly constructed and balanced, the *Hot Foot* is a potential winner at any contest and will hang together as well as any ship.

The span of upper wing is 39". The lower span is 32". Wing area, total, equals 500 sq. O.A. length



Finished in cream with red trim, this highly maneuverable biplane for 32's to "sixties" solves all the "two winger" problems and is stunting fool to boot.



Big advantage of the biplane is small overall length necessary to get the tail where it belongs in relation to the wing, a fact which explains the

from the tip of the spinner to the end of the tail feathers is 28-3/8". Kinda stubby, you say. That's the beauty of a "Bipe". It doesn't take so doggoned much fuselage to get empennage where it belongs in relation to the wing. That's one reason why Rod Jocelyn, Betty Skelton and numerous other aerobatic pilots still fly them.

The weight of the original model, ready to fly, with an Atwood 60 under cowl, weighs exactly 40 oz., working out to a wing loading of 11.5 oz. per sq. ft. Naturally, a .35 job will weigh in at somewhat less.

The *Hot Foot* as the name implies, is a fast-moving airplane but not at the expense of maneuverability. Control response is smooth and instantaneous and when balanced where shown, not the least bit jumpy.

The average modeller has, in the past, avoided inverted engines like a cat avoids water. Actually, a good rotary valve engine operates as well upside down as any other way and, with confidence gained through familiarity, we think more and more stunt ships will appear with inverted powerplants in the next several years. We flipped the engine over in the *Hot Foot*, to maintain the realism we mentioned earlier and haven't had any trouble at all.

With the addition of an arrestor hook and engine speed

Looks like a modernized *Travel Air*, don't you think? Wing struts, both cabane and interplane, are designed to stay put. She'll hang together.



popularity of biplanes for airshow work. Enjoying the same advantage, *Hot Foot* also can be converted, as per directions, to carrier work.

control *Hot Foot* is a natural for a carrier event trainer. (If the model is built for this purpose, don't skimp on materials since weight is relatively important and should come in at close to 3-1/2 pounds for good landing qualities.)

A word of caution before starting construction! Determine the engine you will use and, if necessary, relocate engine mounts, so that thrust line will occur as shown on drawings. If this precaution is not taken, your version of the *Hot Foot* might not look like the drawings and will not permit cowling or engine to fit properly.

Select good, firm, medium hard 1/8" sheet balsa and trace and cut out fuselage sides. The 1/16" plywood doublers, as shown in shaded outline, should be cut out and cemented under pressure to each of the sides. Mark location of each former on both sides; do this carefully to insure correct alignment of fuselage.

Cut out all formers from material specified on drawings. Cement plywood firewall, F-2 balsa former F-4 to one side only. Lay this side down flat on workbench and, after these two formers are rigidly fixed in place, lay opposite side in place and cement securely in place, making certain both sides are square at front and top. Add former F-3 and work out toward tail, beginning with former F-5. If this job is done carefully, all parts should fit with ease and fuselage will be straight and square when job is done. Hardwood motor mounts that are straight and square should be inserted through F-2 and F-3 and cemented in place. Measure out from F-2 with a ruler or scale to make certain mounts project equally.

The bellcrank and its 1/8" plywood mount should now be fitted in between mounts. A good fit at this point is extremely important and should be carefully noted. Use cement liberally at this point; then run 1/16 dia. music wire pushrod through fuselage and connect to bellcrank and add flexible lead-out wires. We used a package of Perfect wires for this job.

Select tank to be used (4 oz.) and mount in position, making certain that horizontal centerline of tank is level with spray bar of engine. Wedge tank in place between sides of fuselage and mounts, so it will not rattle or fall down. Add flexible plastic tubing to each vent, long enough to project about 1/4" beyond top and bottom of fuselage.

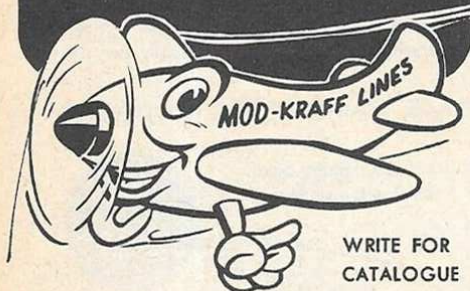
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Hot Foot

plans, paying particular attention to obtaining equal length on each leg. After bending and trimming, fasten gear to fuselage with (3) J-bolts. Solder nuts to bolts after installation, to prevent loosening from vibration.

By the way, ever have any trouble cutting steel music wire and trimming gear ends after bending? Pretty tough on pliers and cold chisels, by golly! Well, here's one way to do it, easily and safely without ruining your tools.

Make a mark on wire with a file where you want to trim and go up to the gas stove in the kitchen. Grab wire with two pairs of pliers, one on each side of file mark, allowing about one inch of wire exposed between pliers. Insert this small exposed portion of wire in gas flame and heat until it glows a cherry red. Remove wire from flame and allow it to cool in the air. *Do not dip wire in water!* In a few minutes wire will be cool enough to handle and may now be readily cut with a chisel, file, or hacksaw without damaging them. Also, and most important, gear will be as lively as it should be. Do not however attempt this method to aid in bending music wire. It will bend readily enough but spring temper will be gone where it's most needed, unless you know how to re-temper wire.

Locate your engine between mounts and bolt in place after adding just a little right-thrust to prevent any suicidal maneuvers in flight. Soldering nuts to a brass plate which in turn is cemented to mounts aids engine removal, so don't overlock it. Cement plywood former F-1 in place after making certain it's aligned parallel with engine drive washer, so that spinner will track properly and not scrape against it.

Make up stab and elevator assembly and cement to top of fuselage. The rudder should also be built and cemented to top of stab, after connecting pushrod to control horn. Check controls for freedom of movement and eliminate any restrictions. The tail wheel assembly should be made up and cemented to former F-8.

Trace outline of cabane struts carefully on 1/8" ply and cut accurately to shape. Sand exposed portions to a streamline shape and cement them securely to formers F-2 and F-4. If these formers were accurately cut and notched, struts will align themselves; if not, make certain they project equally and are square with respect to fuselage before allowing cement to dry.

Before completing fuselage, go to work on wings. Accurately trace outline of wing rib on a piece of brass, aluminum or thin bass wood. Cut this template out very carefully. Using template, trace outline on material speci-

fied on drawings.

Select a medium hard and perfectly straight piece of 1/2" sq. balsa and two pieces of 3/16" x1/12" balsa and make up leading edge channel for lower wing. Mark off position of each rib on this channel very carefully and begin assembly by laying leading edge on workbench with open side of "U" upward. Cement ribs in piece of 1/2" sq. balsa and two pieces of 3/16" rib by rib, to opposite tip. Do not cement W-2 ribs or center rib in place at this time. Square up each rib, using a small triangle and sight along assembly to make certain ribs are aligned before allowing cement to dry. The wing trailing edge is made up from two pieces of 1/16" x 1" sheet balsa. Bevel the rearmost portion of each half about 5/16" wide with a sanding block and cement to each side of ribs.

The tips are cut from one inch thick soft balsa blocks or laminated up to one inch from any number of sheets. Roughly carve them to shape and cement to end ribs.

With a sharp knife and coarse sandpaper, whittle leading edge down to shape and blend in with tips. Cut wing in half directly on centerline and bevel cut edges slightly to allow for 3/8" dihedral at each tip as shown. Cut out two dihedral formers from 1/8" plywood and cement two wing halves together, blocking up tips the required amount and adding center ribs and dihedral formers as shown.

Cut down three center panel ribs 1/16" on top and bottom and cover center section of wing with 1/16" sheet. Fill in between upper and lower halves of trailing edge with 1/16" x 3/16" balsa strips, cementing these pieces in place to each rib and trailing edge. Do not install interplane strut (W-2) ribs as yet.

Cover dihedral break on both sides with a strip of nylon or muslin about 1-1/2" wide. This will impart a good deal of strength to wing. The lower wing may now be assembled to fuselage. First, cement 1/8" x 1/2" strips across bottom of F-3, F-4, F-5 and F-6. Fit wing snugly into cutout in fuselage and cement in place. Check wing for proper alignment, viewing first from top and then from the front, adjusting if necessary before cement dries.

Let's go back and wind up fuselage. The curved upper portion of fuselage is planked with dead-soft 1/8" x 1/4" balsa strips. The side and top of head rest is cut from 1/8" medium hard sheet, cemented to each former.

Soft balsa blocks, 3/4" x 1/2" x 3-1/2" are cemented to each side of rudder and butt against rear of F-8. These blocks are carved and sanded to conform to fuselage cross section and follow curvature of top view of fuselage and fair into rudder at what would normally be called rudder hinge line. Soft balsa tail cone pieces measuring 1/4" x 2-1/2" x 2-1/2" are cemented to each side of rudder under

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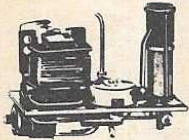
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elevators and are also carved to a curved out-
line and blended into trailing edge of rudder.

Before sanding fuselage, don't forget cow-
ling. It should be made up of three pieces;
top is a soft block, 1-1/4" x 2-3/4" x 4-1/2" and
cowl sides are made of two pieces, medium
balsa sheet 3/8" x 3-3/4" x 4-1/2". These three
pieces plus 1" x 2" x 1" soft pine spacer block
are spot-cemented to firewall and engine
mounts and roughly carved to shape. Take
cowl assembly down to finished size with
coarse sandpaper and then sand finish entire
fuselage assembly after adding wing and stab
fillets of plastic balsa.

The cowl sides are made removable as
shown on drawings, by cementing hardwood
blocks to firewall, holding cowl sides in po-
sition with number two wood screws... two
into engine mounts on each side and one into
each side hardwood block on firewall. A single
number two wood screw goes through F-1
into soft pine spacer block. The upper wing is
built in same manner.

All ribs except W-2 and W-3 are cemented
in place. The curved trailing edge at center
panel is made by inserting a wedge-shaped,
soft balsa block between upper and lower
halves of trailing edge and cementing to ribs
on either side. Pad this block up with 1/16"
sheet until it matches thickness of wing and
blends in with airfoil. Rib W-3 may now be
inserted and cemented in place.

Wing tips and gussets should be added and
entire wing carved and sanded to final shape.

Interplane struts should now be traced on
1/8" plywood and cut to shape. Sand to an
airfoil shape and let's start the final assembly.

Lay upper wing on workbench and block
up trailing edge so that chord line is parallel
with bench. The fuselage should be placed
exactly over center of upper wing, with cabane
struts resting on bench. Block up fuselage as
necessary to get thrust line parallel with chord
line of upper wing. Check to make sure upper
wing is square with fuselage and that gap,
stagger and upper wing overhang are equal.

Now insert all W-2 ribs in approximately
the correct position and insert interplane
struts. The W-2 ribs on inside of cabane and inter-
plane struts are now cemented in place. *Do
not cement W-2 ribs on outside of struts in
place yet!* After cement has dried, slip outside
ribs in place and bolt thru intersection of each
W-2 rib and strut with No. 2-56x1/2 machine
screws. When you are satisfied with alignment,
remove upper wing by removing bolts.

For maximum strength, entire model should
be covered with silk or nylon. If financial
strain is too great, *Silkspan* may be used with-
out sacrificing too much. The fuselage, cowl
and tail surfaces should be covered with one
inch wide strips of whatever material is used.

The original *Hot Foot* was given six coats
of clear dope on wings and same number of
coats of sanding sealer on fuselage and tail sur-
faces. Five to ten coats of colored dope of your
selection, plus trim, will finish decorating.

The model should now be finally assembled.
Cut away covering from underside of upper
wing and top side of lower wing where struts
are located. Bolt wing in place and cement
outside W-2 ribs in place and also squirt
plenty of cement between these ribs and struts.
Recover where small strips were cut away and
finish as before. Run lead-outs thru 1/8" ply-
wood tip guide and form loops in ends. Check
all controls once again for freedom of move-
ment. Solder wheels in place and check for
smooth running. The model should balance at
front lead-out wire.

We suggest that those who intend to use
smaller engines would do well to build up
stab from 3/16" sheet and strips as shown
and to substitute 3/32" sheet for fuselage.

BILL OF MATERIALS

5 pieces—1/8 x 3 x 36" sheet balsa; 4 pieces
—3/16 x 3 x 36" sheet balsa; 2 pieces—1/16
x 3 x 36" sheet balsa; 1 piece—3/8 x 3 x 36"
sheet balsa; one piece—1/2 x 3 x 36" sheet

balsa; 3 pieces—1/2 x 1/2 x 36" balsa strip;
12 pieces—1/8 x 1/4 x 3 x 36" planking stock;
2 sheets—1/8 thick x 6 x 12" plywood; one
sheet 1/16 thick x 6 x 12" plywood; 2 pieces
—3/8 x 1/2 x 12" hardwood; 2 blocks—3/4 x
1-1/2 x 3-1/2" balsa; one block 1-1/4 x 2-3/4
x 4-1/2" balsa; one block 1 x 1 x 2" soft pine;
one length 1/4" dia. birch dowel; one piece
1/8 dia. x 36" long steel music wire; one piece
3/32 dia. x 36" long steel music wire; one piece
1/16 dia. x 36" long steel music wire; one 3"
ballcrank; one package .020 dia. leadout wire;
one Veco bellcrank; one pair 2-1/2" dia.
wheels; one 1-3/4" dia. Scamper spinner; 6—
No. 2 x 5/8" flat head brass wood screws; one
package No. 440 engine mounting screws.