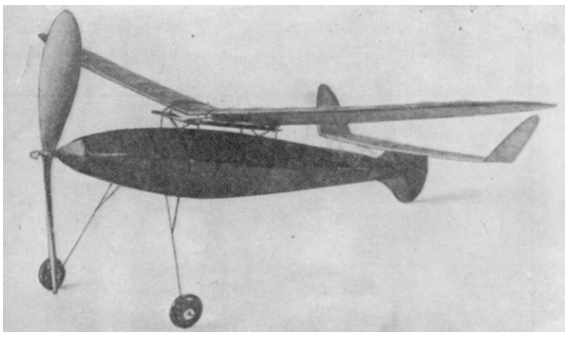
The Baby Duration Trainer

Complete Data From Which You Can Build a Duration Trainer of 100 Sq. In. Wing Area or Contest Models of Larger Size

By FELIX GILBERT



The completed model gives high performance and is very stable

It is a beautiful climber and does not lose altitude by erratic maneuvers

IT DIDN'T take this little job long to get used to the ozone. She flew "right off the bat" and has been one of the writers most consistant fliers to date. A steep climb characterizes the ship and the glide couldn't be much more desirable. As an all-weather flyabout that can take a beating and put up a real performance, this is the ship to build; and its construction requires no super experience. The day this plane made its swell 5'3" flight it had rained slightly. The sky was overcast and the writer would not even have thought of flying it except that he promised to meet some friends at the field. At the time the plane was equipped with an experimental 10" propeller, and 14 strands of 1/8" rubber. Without any testing, the plane was given 580 turns and released. A bit of extreme speed was expected and the plane didn't fail us. It shot up to 100 feet, did a complete and perfect loop whizzing down within 10 feet of the ground. The loop completed, it proceeded to spiral up to 300 feet at quite a rate. The sky had now cleared slightly and the plane caught a thermal over the field. With stopwatch in hand and head pointed skyward, the writer followed the plane by walking under it at a normal rate. The wind was negligible and the drift was only about 1,000 feet or less. After flying over a wooded area in the park, the plane finally glided down, being careful to miss every tree except one which it hit head-on about a foot over the ground and two feet from the highway, for which it was headed. Thus a perfect flight was made, a tree saved the model, though clumsily, and there was no damage.

The plane is very graceful in appearance with its taper wing, diamond body, and twin-tip tail which is a variation of the double-rudder type and has been found to work very well. The original was completely covered with tissue, but it is suggested that the builder cover the body with 1/32" sheet as well as the two center wing panels. This will not only improve the looks, but materially increase the strength.

The original plane was designed just as a sport model. Those who want to build it as a contest model need merely build the small extra center section shown on the small plate, and glue it between the wing halves when assembling the model. This will give the wing the few needed square inches of area to bring the model within N.A.A. specifications. The area will be slightly over 100 square inches.

Builders who would like a larger model may scale up the plans. The area will be 150 square inches, by increasing the dimensions shown on the plans by 25 percent. A very simple method of scaling up the plans is to use dividers or proportional dividers. Since the plans are 1/3 actual size, scaling up the reduced drawings four times will give a model with a wing area of 170 square inches.

If the model is to be between 100 and 150 square inches, use stock of the size specified on the

drawing. If it is 170 square inches, use 1/8" square for the body and correspondingly larger sizes for the other wood.

Wing

A full size drawing of the wing should be made by following the dimensions on plate 2. Notice that the trailing edge is straight. Use this as a reference line in the layout. The ribs must now be plotted carefully. A table of ordinate values will be found in the September 1938 issue of MODEL AIRPLANE NEWS on page 36. The same article also gives explicit instructions for plotting the ribs. Ordinates for the Clark Y tail sections will be found on page 35 of the October 1938 issue of MODEL AIRPLANE NEWS. When the ribs are plotted and cut out (they are plotted on paper and transferred to balsa wood afterwards), assemble the two wing halves. Cut the leading and trailing edges to shape, pin them on the full sized layout, glue the tips in place and hold with pins. Then the ribs may be cemented in their respective positions. When the halves are dry they are lifted from the board. (Put waxpaper over drawing to prevent frame from sticking.) The tips must be cut off and reglued with the proper amount of dihedral shown. Use pins to hold in place. Then the main dihedral is formed. Check all the settings for accuracy. When all the dihedral is in place and dry, the spars of hard balsa are glued into the notches in the ribs. The wing structure is now complete. Reinforce all the spar joints with cement. Note also that all the dimensions and wood sizes are on the drawing, so they are not repeated here.

Tail

The elevator is built just like the wing except that there is no dihedral at the center, so the spar and trailing edge are in one piece. It is assumed that the tail ribs and wing ribs were plotted and cut out in one operation. Such a method would save time. Also since the surfaces are small, it might be a suggestion to build the tail and wing simultaneously. To make the tail tips, make a full size pattern by scaling up the right tip on plate 2 which is graphed. Draw 1/2" squares on some thin cardboard and then draw a dot on each side of each corresponding square where a line of the tip passes through the one on the drawing. Connecting the dots will give the outline. This is transferred to a piece of 1/8" x 3" balsa and cut out. Note that two are required. The tips are then streamlined, sanded and glued in place, checking the angle they make with the board with a 45 degree triangle.

Fuselage

The diamond type body is a streamlined version of the old box-type and has proven its worth. It is not very hard to build, but it has its own peculiar method of construction. To begin with, a *top* view of the fuselage should be drawn up using the dimensions given on that view on plate 2. Draw in all the cross-brace and jig positions. Before the body can be built up the jigs must be cut out; all the dimensions and instructions for this process being clearly shown on the main plate. Note that the tail hook bulkhead is the only permanent jig. The tail hook is bent and inserted into the bulkhead before the latter is glued in its place along the body. Make the hook of .034 music wire. Make it the locking type hook and before it is fastened to the bulkhead run some protective rubber tubing around it.

To start construction of the body, pin the two side longerons of 3/32" square on the outline. Glue the *bottom* halves of the jigs in their respective positions. *Don't* glue in the tail hook bulkhead now. Taking a third strip of 3/32" square, fit it in the notches in the jigs, running the full length of the body. Taper it where it meets the tail end and make a permanent joint here. Put a small drop of cement in each notch of each jig to hold it temporarily in place. Now fill in all the cross-braces and allow to dry. The perspective view of the lower right-hand corner of plate shows this preliminary process clearly. When all the joints are firm take out all the pins and lift this bottom half of the body off the board.

Now glue on the *tops* of the jigs, this time putting the tail bulkhead in place. The same operation as explained before is repeated here, and this will result in a complete, accurately made fuselage. When this is dry all the jigs except the very last have to be cut out of their positions with a razor and slipped out of the openings in the frame. All joints on a structure of this type must be especially strong. The .034 wire landing gear is now bent. Looking at it from the front it consists of two "M" shaped pieces; the rear having shorter legs than the front, with the axles bent into the front piece.

Observe that the landing gear is bent forward looking at the side. In the braces where the landing gear struts attach cut shallow "V" grooves to accommodate the wire. Cement the pieces into the grooves and bind with thread. Now recement. The front and rear struts are similarly connected with each other half-way down. The wheels are made as according to plate 2; well streamlined, painted and attached. The wire wing mount is shown in complete detail on the drawing and special perspective and is attached to the body frame just like the landing gear.

The tail block and sub-rudder are both made of 1/4" plywood made by laminating two sheets of 1/8" balsa. They should both be glued in place before being given the proper section and the fuselage should be covered before they are given the final

sanding. A "V" cut is made in the sub-rudder. The bamboo outline is glued into this and held down with pins till dry. Then the pins are removed and the balsa around it is sanded so that the bamboo will look integral with the rudder.

Propeller

The prop dimensions are shown on the drawing and should be laid out on the balsa accordingly. It might be a good idea to make three propellers; a 10", a 11 ", and the 12" shown. If the first breaks replace it with one of another size; noting any difference in performance and speed. The propeller of course is of the standard right-hand type. All the different sizes would be carved from 1" x 1-1/2" blocks. The prop is finished down with three to five coats of dope or banana oil and should then be painted silver. Make it strong at the hub.

Covering

Now that the whole framework is done, covering is the next logical step. Cover the wing and tail with a bright tissue. Red or orange are recommended for visibility, though any color may be used. Apply tissue to frame with banana oil. Spray with water to tighten. When no moisture is left on the covering, apply three coats of banana oil or dope.

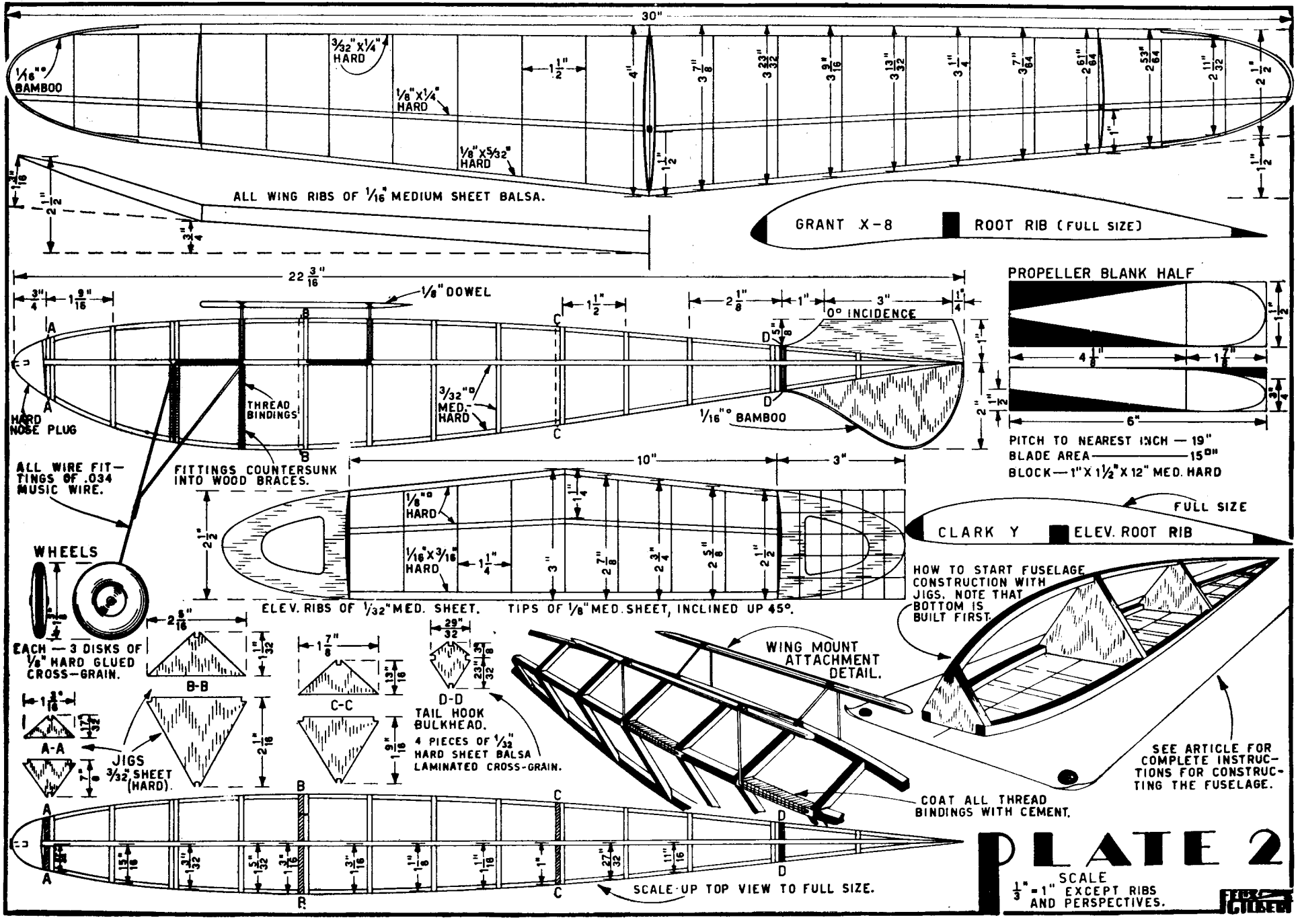
To cover the body, obtain some 1/32" medium soft sheet balsa Cut to approximate shape and cover one side at a time. Apply cement quickly over the particular side to be covered, place the balsa on top and hold in place with an abundance of pins. The diagonally opposite side may be covered next. When these two are dry the pins are removed, and they are roughly trimmed down so as not to interfere with the covering of the remaining two sides. When all the body is covered, carve a nose block to shape and drill a hole in it to accommodate the prop shaft. The nose block is slipped in place and the whole body is sanded down smoothly. When finished sanding it should look as if the nose block is part of the body, and the tail block and sub-rudder are molten into the contour. Use ten-nought sandpaper for a final finish and then apply three to five coats of banana oil with intermediate sandings.

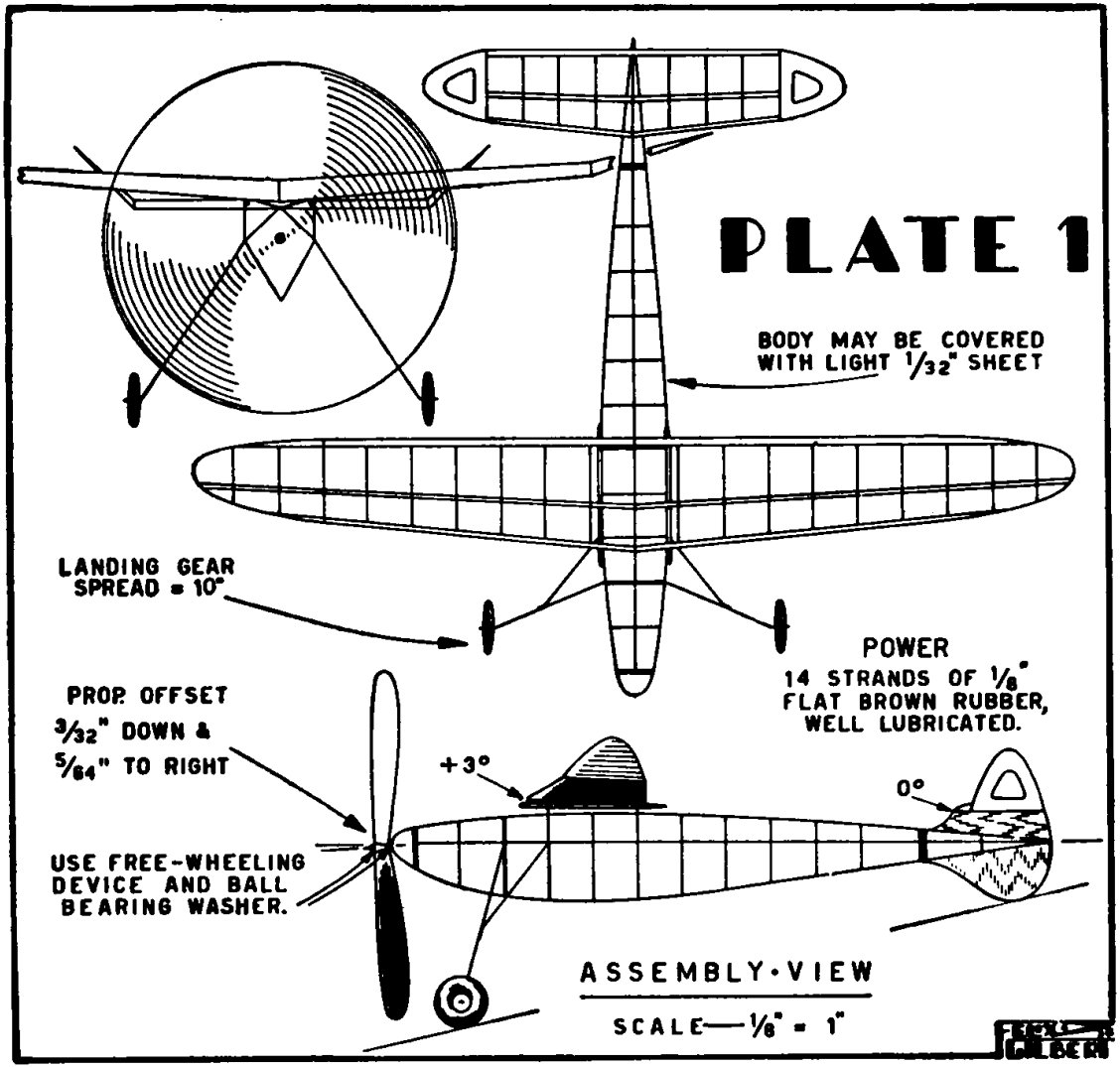
Assembly

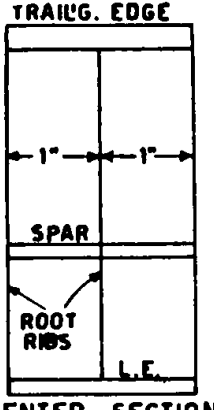
Before the tail is glued to the top of the tail block, cut away part of the tissue on the bottom at the center so that the wood of the tail will make a direct contact with the wood of the block. It may now be cemented in place and should be lined up accurately and carefully. The wing is held in place with a rubber band of 1/8" flat rubber. The propeller should use a good free-wheeling device and possibly a ball-bearing washer. Otherwise use about six bronze washers. Put a long bushing in the nose block and smaller ones into the front and back of the propeller. See that all bearing friction is minimized. The propellerd shaft should end in a locking hook so that extreme rubber tension will not straighten it out. Use 12 to 14 strands of 1/8" flat brown rubber that may be lubricated with castor oil, glycerine, green soap or any other popular "lube."

Flying

If the model has been well built is should fly "off the workshop table." Test by adjusting for a good glide first. See that the prop has the down and right thurst specified on the assembly plate. Wind up a few turns by hand, launch the ship and note the reaction. If satisfactory, increase the turns gradually; 800 is about the limit on 14 strands but this is enough to get the model out-of-sight on a favorable day. If the test flight is not perfect work on the wing and prop adjustments till everything is O.K. Your efforts should be recompensed by a compact and beautiful little soaring job.


30"
1/16" BAMBOO
3/32" X 1/4" HARD
1/8" X 1/4" HARD
1/8" X 5/32" HARD
ALL WING RIBS OF 1/16" MEDIUM SHEET BALSA.
GRANT X-8
ROOT RIB (FULL SIZE)
22 3/16"
1/8" DOWEL
0° INCIDENCE
HARD NOSE PLUG
THREAD BINDINGS
3/32" MED.-HARD
1/16" BAMBOO
ALL WIRE FITTINGS OF .034 MUSIC WIRE.
FITTINGS COUNTERSUNK INTO WOOD BRACES.
PROPELLER BLANK HALF
PITCH TO NEAREST INCH — 19"
BLADE AREA — 15.0"
BLOCK — 1" X 1 1/2" X 12" MED. HARD
FULL SIZE
CLARK Y
ELEV. ROOT RIB
WHEELS
EACH — 3 DISKS OF 1/8" HARD GLUED CROSS-GRAIN.
ELEV. RIBS OF 1/32" MED. SHEET.
TIPS OF 1/8" MED. SHEET, INCLINED UP 45°.
HOW TO START FUSELAGE CONSTRUCTION WITH JIGS. NOTE THAT BOTTOM IS BUILT FIRST.
WING MOUNT ATTACHMENT DETAIL.
B-B
C-C
D-D
TAIL HOOK BULKHEAD.
4 PIECES OF 1/32" HARD SHEET BALSA LAMINATED CROSS-GRAIN.
A-A
JIGS 3/32" SHEET (HARD).
COAT ALL THREAD BINDINGS WITH CEMENT.
SEE ARTICLE FOR COMPLETE INSTRUCTIONS FOR CONSTRUCTING THE FUSELAGE.
SCALE-UP TOP VIEW TO FULL SIZE.
PLATE 2
SCALE 1/3" = 1" EXCEPT RIBS AND PERSPECTIVES.
FLIGHT CIRCLE





CENTER SECTION FOR WING (OPTIONAL) INSERT TO RAISE AREA TO 100 ""