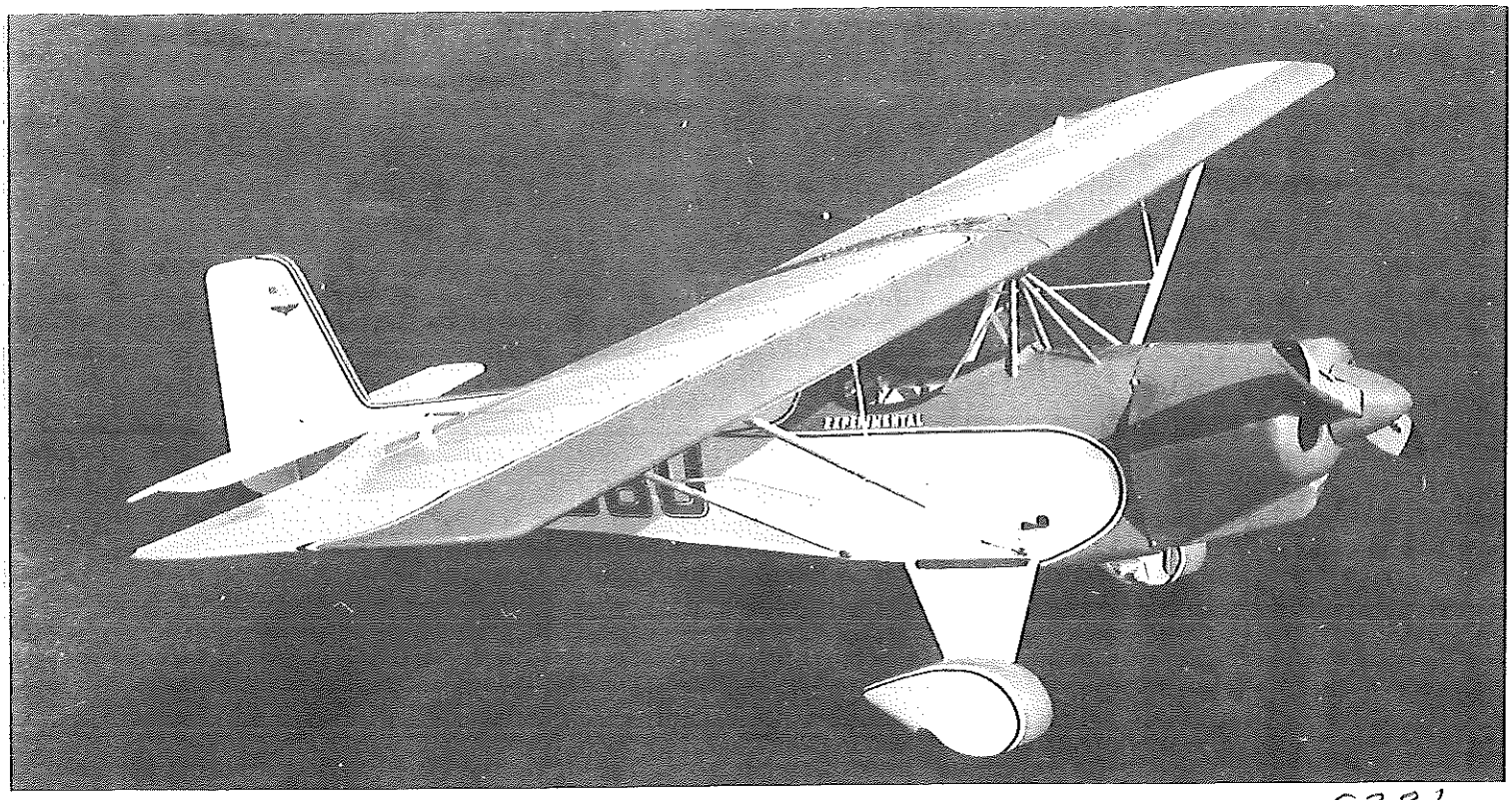

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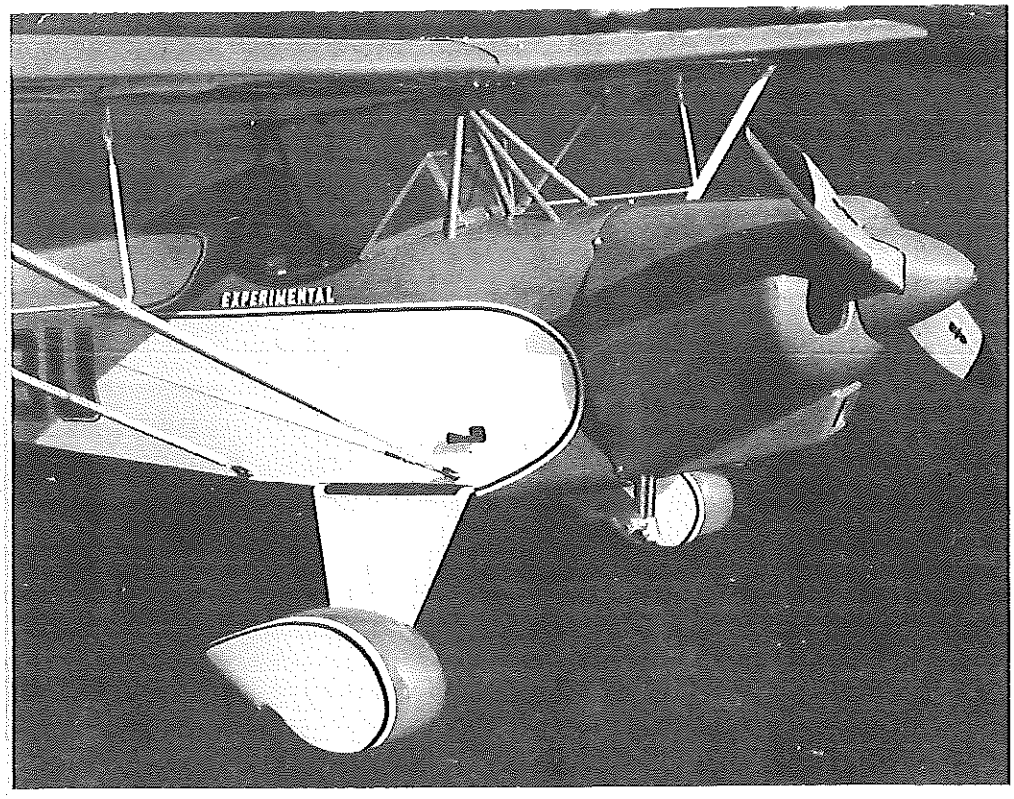
BOB UPTON'S 1 AND 1/4 BABY ACES

PHOTOS BY AUTHOR AND DICK TICHENOR

By BOB UPTON . . . What could be more natural for a modeler than to build a quarter-scale replica of the full-size aircraft he had also built? Imagine flying your proof-of-scale documentation to a contest!!



A good perspective of many details is clearly shown in this photo. Cross reference between the plans and the photos will aid the builder.

BACKGROUND

As a relatively new pilot in 1972, I was looking for a homebuilt project that would be both within my means and within my building and flying qualifications. The Corbin "Baby Ace" seemed to suit the foregoing parameters.

The aircraft was purchased in the fall of 1972 with the fuselage partially welded together and the finished product was signed off for flight December 31, 1975. N98U is powered by a 65-horsepower Continental and will cruise 85 mph with a top speed of 100 mph. The aircraft is semi-aerobatic and currently shows 115 hours on the recording tachometer.

Incidentally, Cliff Wierick, former Nats pattern champ and AMA president, rebuilt my Continental for me and it runs like a fine watch.

THE REPLICA

Being a long-time modeler, it was natural for me to design a model of my full-size aircraft. Don Butman, Rocketdyne engineer, good friend, and frequent contributor to the Peanut section of this magazine, agreed to help me draw up the plans

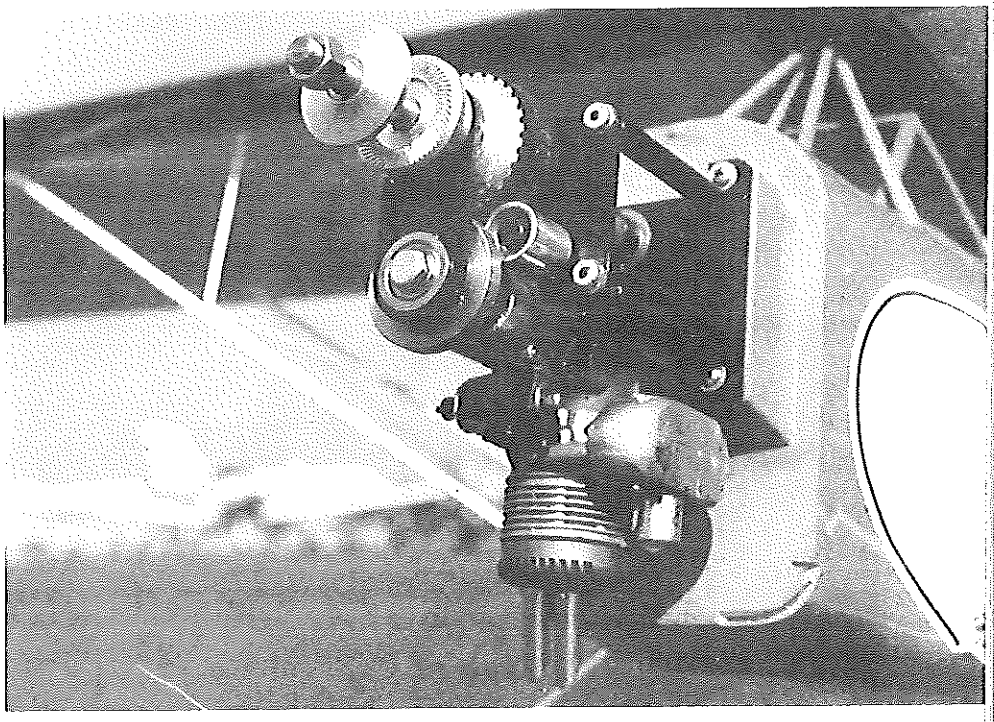
Bob Upton with his Babies. Talk about tough decisions, does he pick up his transmitter or does he climb in and grab the control stick?

for the "ACE". Don took on the wings and stabilizer, and I took on the fuselage after I had decided on the basic building technique. The outline of the model is exact scale for you AMA scale buffs. The rib spacing, with the exception of the two center ribs, is exact scale as is the airfoil section. The two center ribs were spaced apart to accommodate an aileron servo as well as a pylon platform for mounting the wing. The fuselage truss work is exact scale, as is the turtle deck. While the empennage is fabricated from sheet balsa, the tail feather outline is exact scale and the center lines for the rib spacing are included on the plans if the builder chooses to build up the rudder and stab.

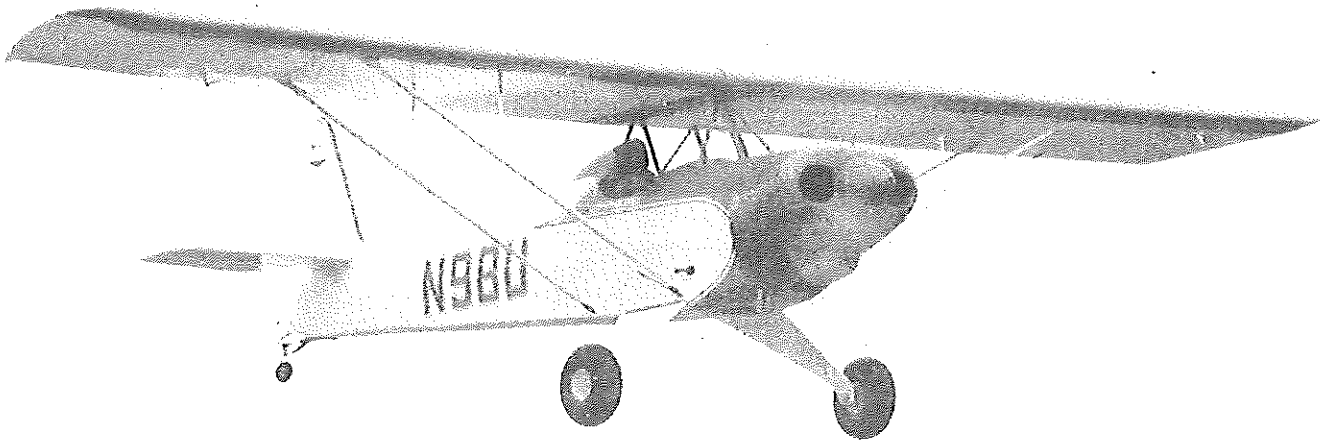
FUSELAGE

The fuselage is started by cutting out the fuselage plywood doublers, and the landing gear support rails. Formation of the front and back Cabane struts is next. Select the Cabanes from 1/4-inch brass tubing and cut to length. Flatten an end of each Cabane per the plans and bend the tubing to shape right on the plans and proceed as follows: Drill the holes for 4-40 screws in the flattened end of the Cabanes and the ply doublers. Next build the hardwood landing gear support frame and form the front and back pylon support plates from .032 brass plate. Scribe the ply doublers on the inside surface following a line that corresponds with station 2 and 4 and gently crack the plywood along the scribed lines. Place the doublers on edge on the top view and angle the forward and aft portion to conform to the shape of the fuselage when viewed from the top. Epoxy the cracked scribed line and allow to dry. You now have a left and right side shaped to conform to the angular fuselage planform. Now screw the front and back Cabanes in place on each side of the ply doublers. You are now ready to assemble the basic structural support member for the fuselage (see photo).

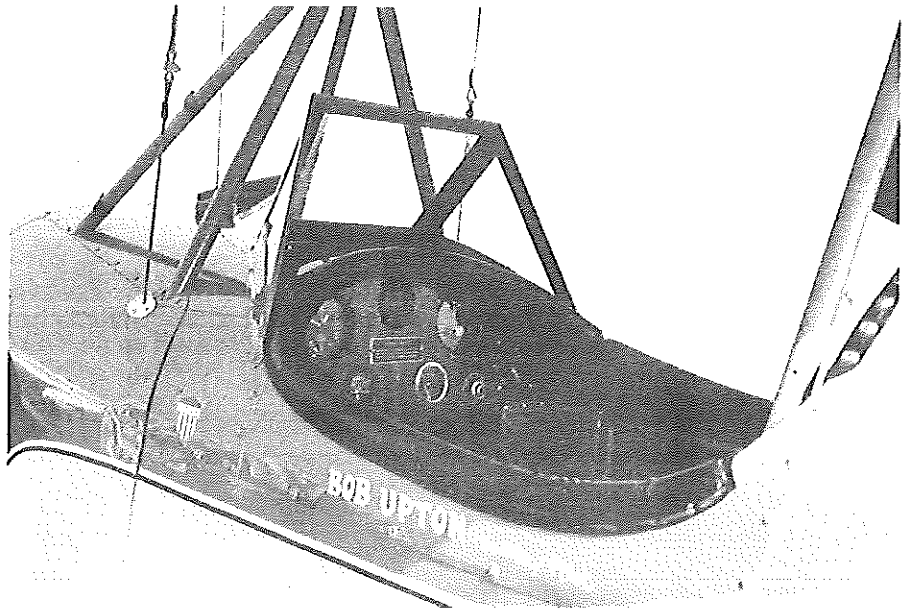
Select a 2x6 about 18 inches long and nail two scrap 1/4 x 1 inch hardwood vertical pieces 10 inches long on each side of the 2x6 about 5 to 6 inches apart so that you have a 2x6 with 4 upright legs attached to it. Place the 2x6 with the flat side down so that the 4 sticks stand straight up. You now have a jig to assemble and align the Cabane struts on the support structure. Place the fore and aft Cabane pylon brass plates flat on the 2x6 between the uprights, then place the plywood doublers with attached Cabanes upside down between the uprights so that the ends of the fore and aft Cabanes contact the brass plates. Next cut front and back cross members from the top view to be installed in front of the instrument panel and behind the first turtle deck former when the landing gear support frame is positioned and glued per the plans, thus forming a box structure. The end result is a basic box structure supported by the jig with the Cabanes forming an upright "V" with the ends of the Cabanes in contact with the fore and aft brass pylon support



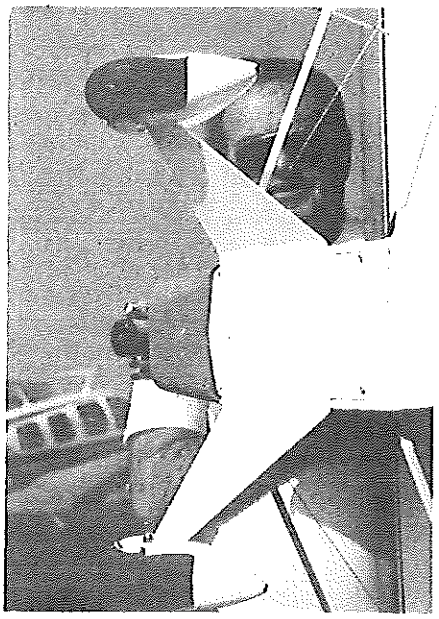
Power plant installation showing the Super Tigre engine fitted with a Tatone muffler and mounted in the Du-Bro belt driven reduction gear unit.



The first flight was made with the wheel pants removed as a precaution against landing in the muddy field surrounding the runway.

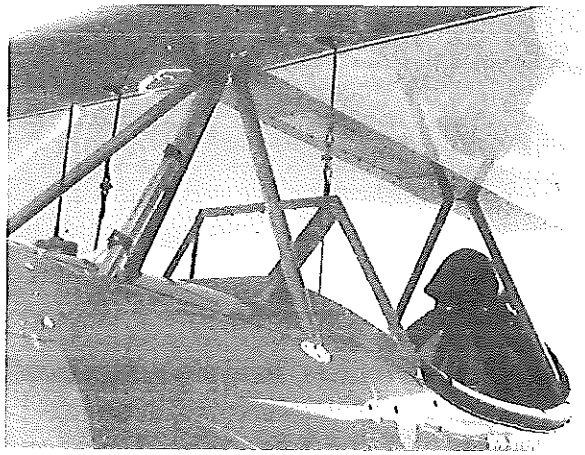


Cockpit area of the full size Baby Ace. The instrument panel is natural finished mahogany.

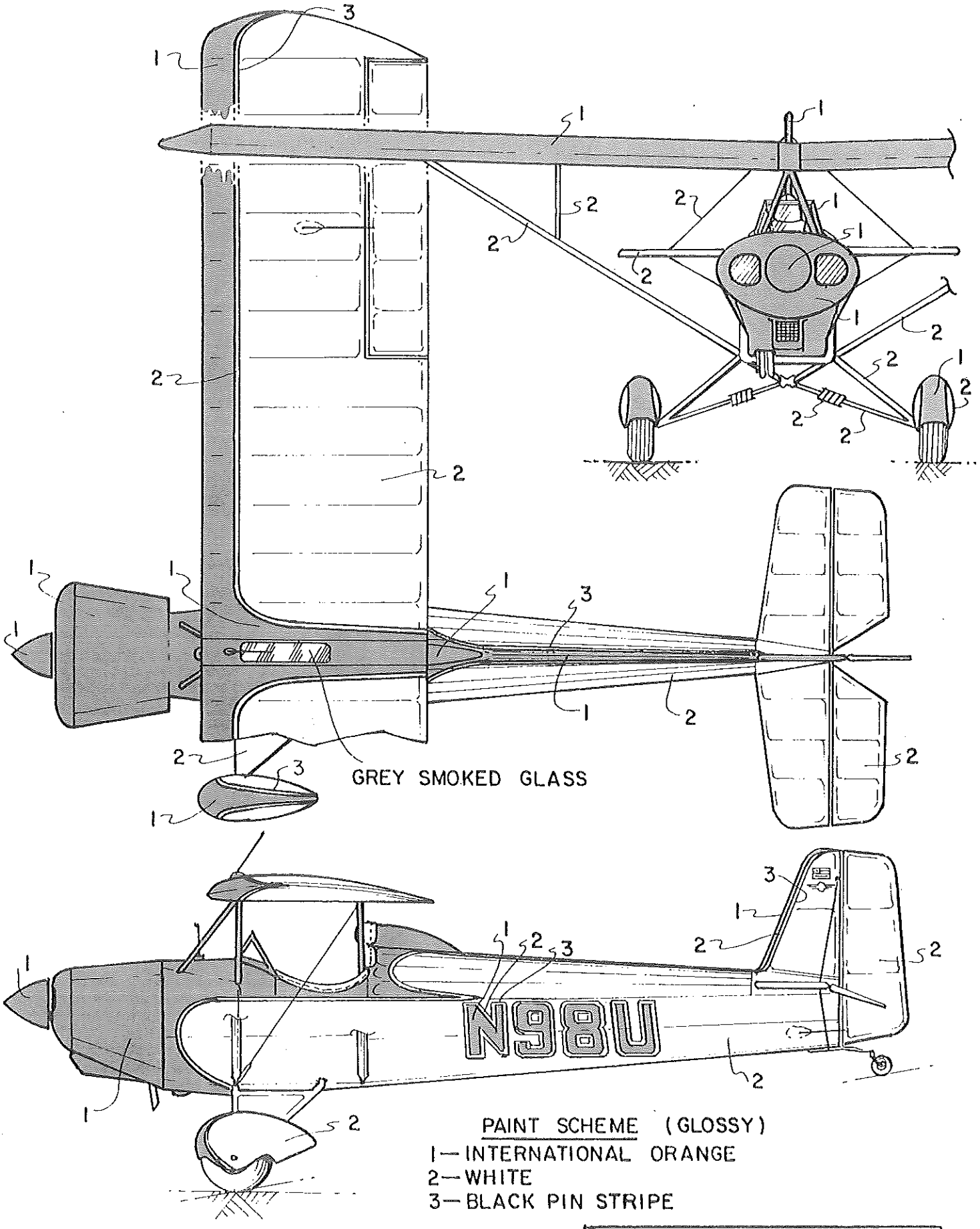


Bottom view shows removable landing gear.

Cockpit area details of Bob's model. Hinged back rest is baggage compartment door.



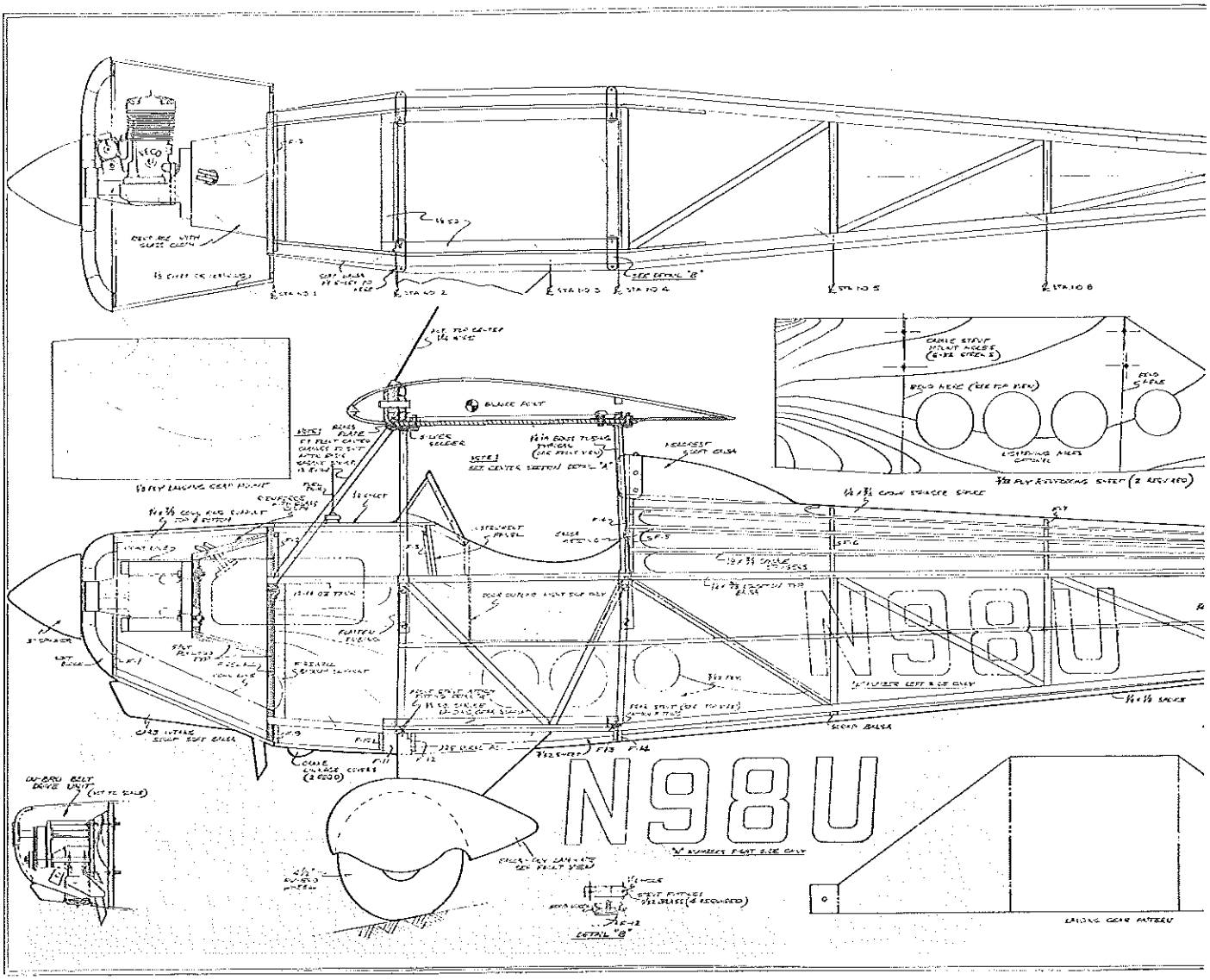
Cockpit area details of the big machine. Standard old time fuel gauge shows a full tank.

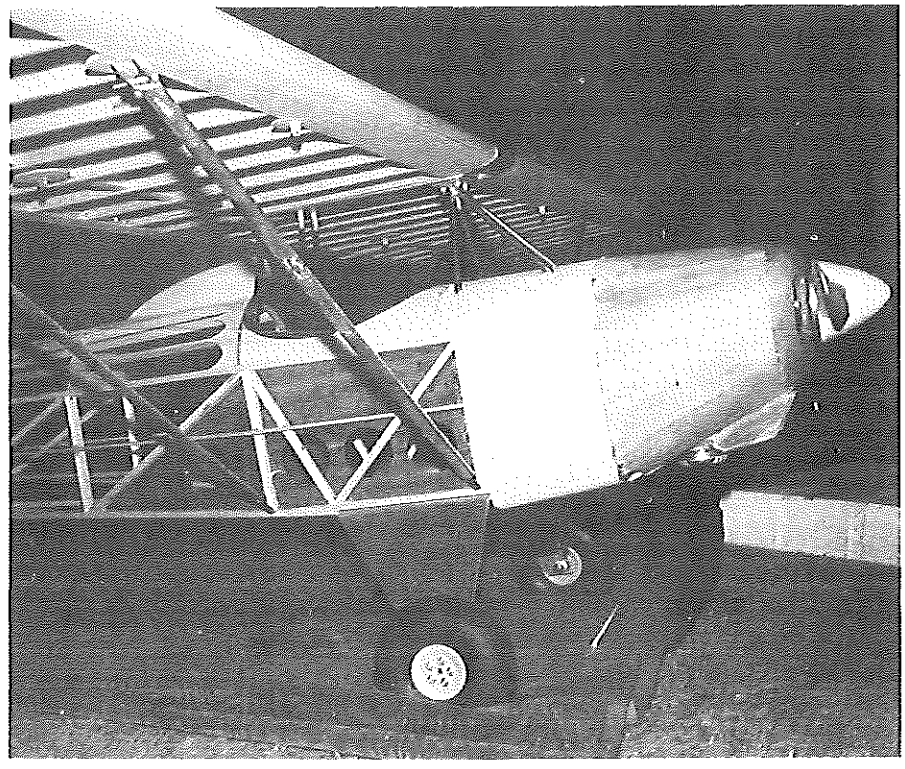


PAINT SCHEME (GLOSSY)

1—INTERNATIONAL ORANGE
2—WHITE
3—BLACK PIN STRIPE

UPTON — BABY ACE
3-VIEWS
NOT TO SCALE



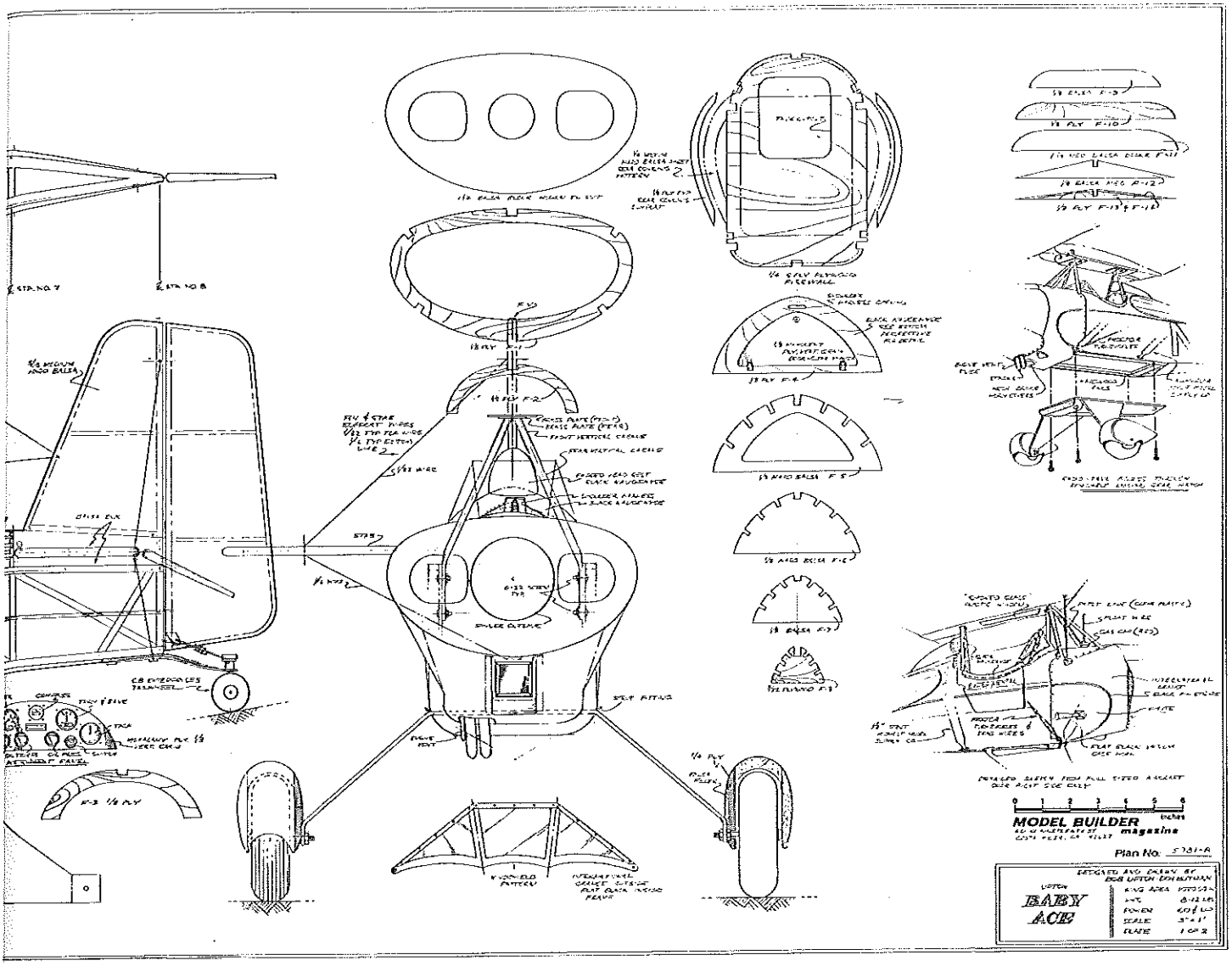


This is the way the uncovered structure looks. Note the plywood doubler in cockpit area.

plates. Silver solder the ends of the Cabanes to the plates after careful alignment. The advantage, of course, of soldering the Cabanes in the jig is that the plates will provide a perfectly flat surface for the aluminum wing support plate that is eventually bolted to the plates. Holes are drilled in the fore and aft plates to accommodate 8-32 pylon support screws prior to soldering.

The aluminum wing support is fabricated from .125 aluminum sheet and formed per the plans. The holes for the wing dowels are drilled in the wing support after the wing is built and the dowels are in place in the wing (see photo).

The fuselage sides are then traditionally built right on the plans. Please note the bottom longerons are 1/4 x 3/8 *spruce*. The prototype used all balsa longerons and the doped covering bowed the bottom longerons between stations more than I would like. Additionally, in order to duplicate the angular shape (note the top view) of the full size aircraft each longeron is cut part way through with a Zona saw at

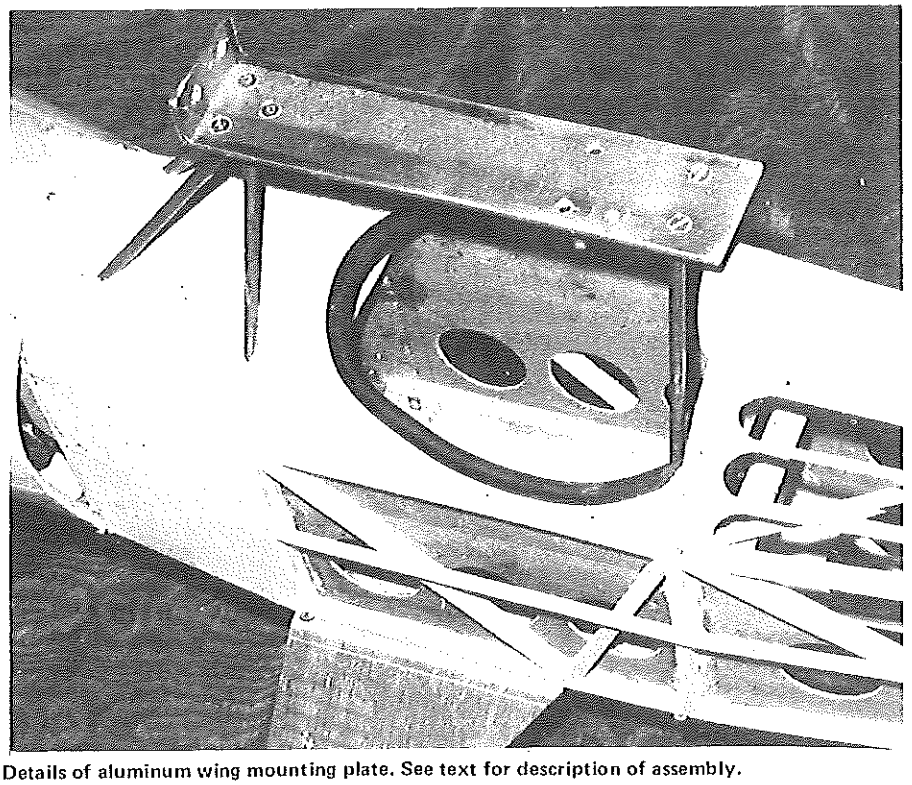


FULL SIZE PLANS AVAILABLE — SEE PAGE 144

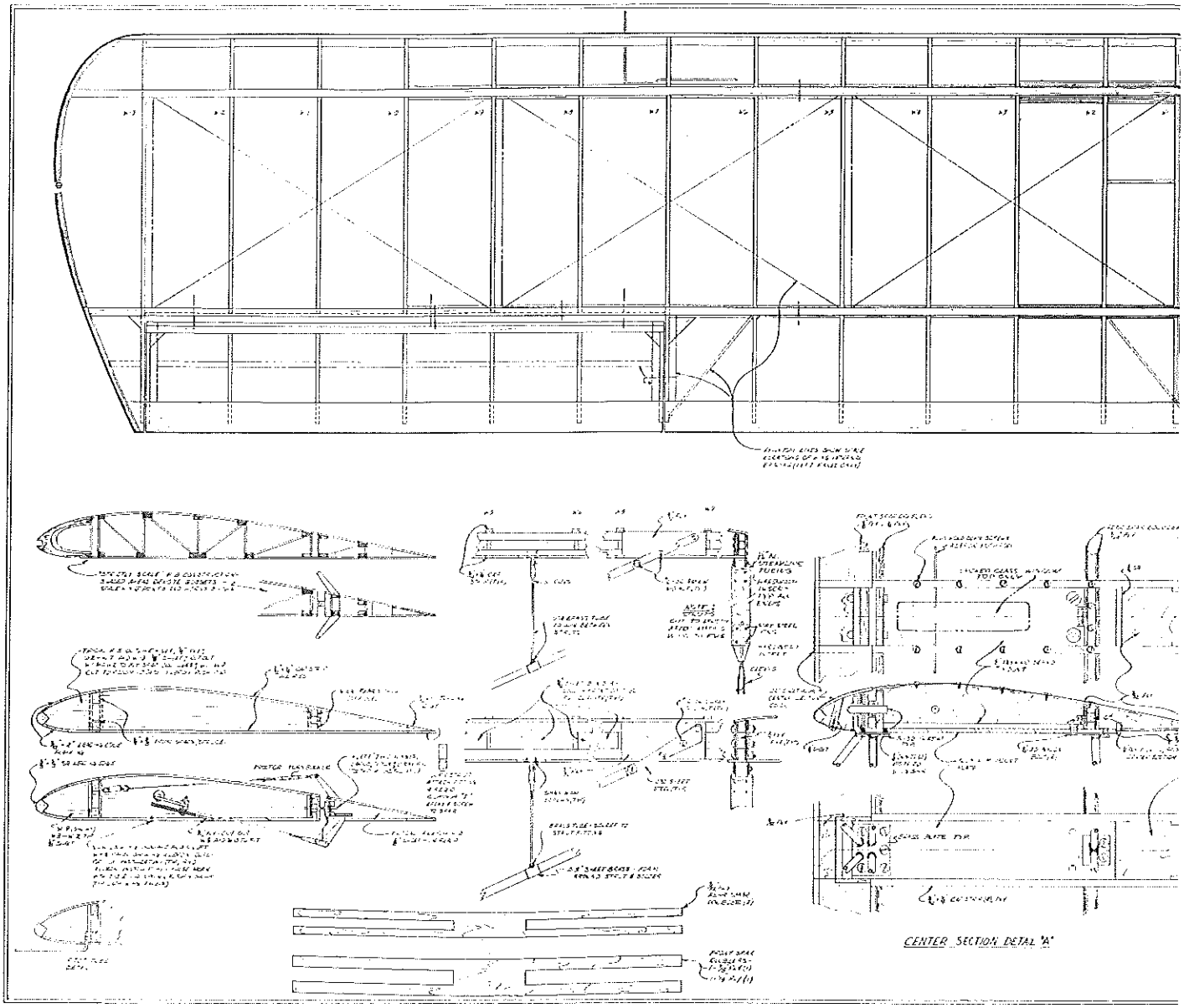
stations 2 and 4 prior to assembly of each side. Also extend the top and bottom longeron beyond the firewall so that the notched firewall will be keyed to the fuselage. The built-up sides are now ready to assemble on the previously built plywood "box" support frame.

Carefully line up the slots cut by the Zona saw at stations 2 and 4 on the edge of your workbench and bend the overhanging sections until they conform to the angle shown on the top view of the plans. The longerons will most likely crack slightly, however, when the sides are epoxied to the outside of the pre-shaped plywood doublers, the structure will be very strong, and you will have duplicated the angular straight line effect of the original welded tube fuselage.

After the sides are attached to the box structure and the tail post is pulled together and glued, the cross members and diagonals are installed per the plan. The firewall is installed and reinforced with triangular stock. The forward angled brass Cabanes positioned between the



Details of aluminum wing mounting plate. See text for description of assembly.



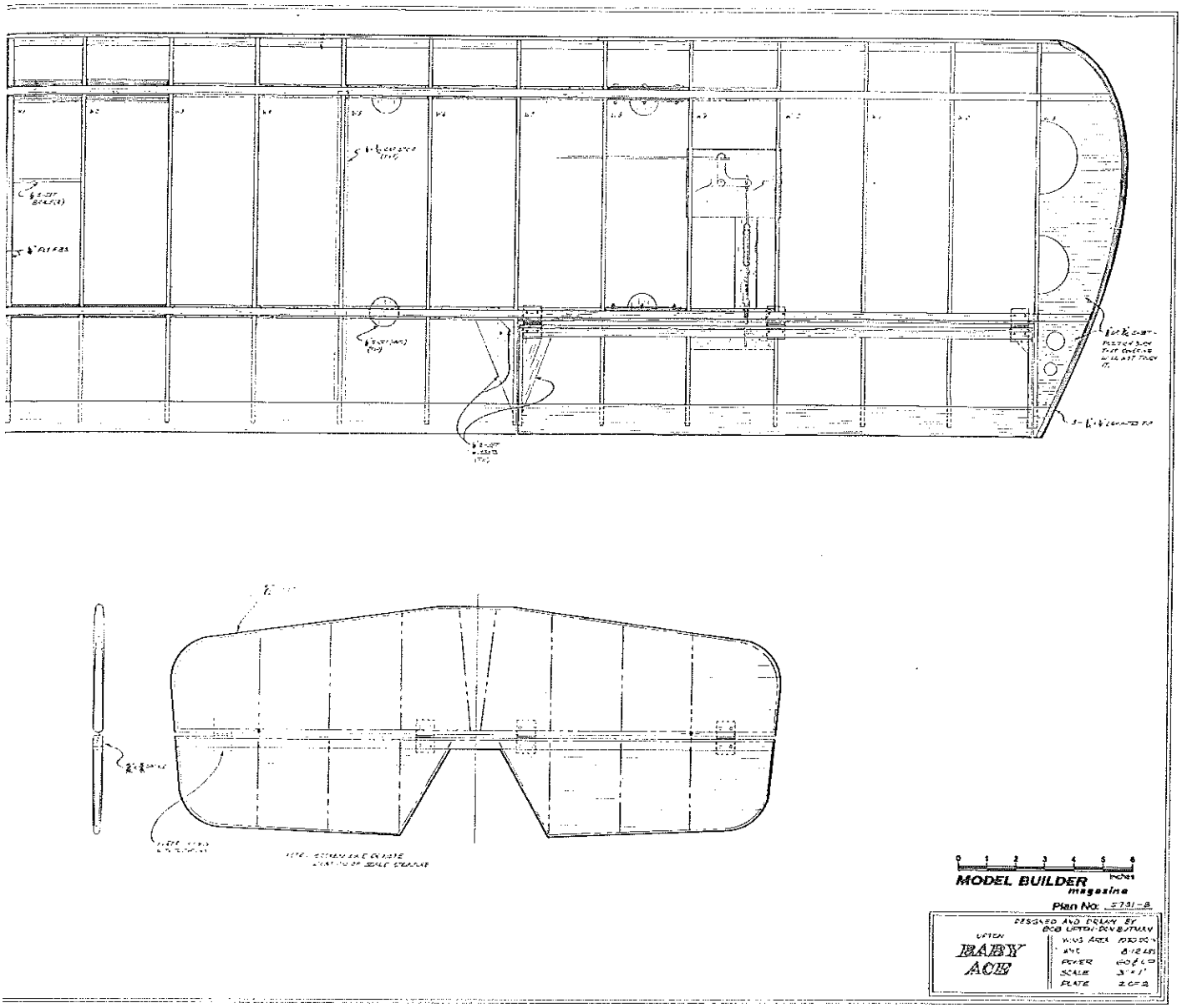
firewall and the top of the forward Cabanes are now installed. The ends of the angled Cabanes are flattened and screwed to the back side of the firewall while the upper ends are soldered to the top of the forward Cabanes near the aluminum pylon support plate.

Forward bulkheads F-2 and F-3 are now glued in place. Turtle deck bulkhead F-4 forms part of the back support and baggage door and is fabricated from 3/32 mahogany plywood backed up by support bulkhead F-5. Note the inside opening formed by the balsa backup bulkhead F-5 is slightly smaller than the outside peripheral edge of the mahogany baggage door so that the door is provided with a "stop" to seat against when in the closed position. Turtle deck bulkheads F-6 and F-7 are formed from 1/8 balsa. The stringers are 3/32 x 3/8 spruce with the exception of the 1/4 x 3/8 spruce crown stringer. The aft turtle deck bulkhead F-8 near the base of the fin is formed, of necessity, from 3/32 plywood, since the stringer slots are very close together near the tail. The top decking between the firewall and the instrument panel bow is planked with strips of 1/8 x 1/4 to 3/8 balsa. This method is best suited to work around the protruding Cabane struts in front of the cockpit. The cockpit opening may easily be formed by wetting 1/8 balsa sheet and taping the sheeting to a curved surface approximately simulating the curvature of the instrument panel bow. After the balsa dries, cut and fit the preformed balsa over the cockpit opening. Since the rear Cabanes protrude from just aft of the seat, no cutout is necessary for the Cabanes in the cockpit sheeting.

Note the 1/4 x 3/8 balsa strip filler between the bottom of the stab and the top rear longeron. The original aircraft mounted the steel tube stabilizer through vertical tubes which suspended the stab above the upper rear steel longeron. This was done to allow the builder to change the incidence angle of the stab for aircraft trim purposes.

The side and bottom stringers are 1/8 x 1/4 spruce. The side stringers are positioned per the plans. The forward section immediately aft of the firewall from station 1 to 2 is filled in by 1/4 soft balsa sheet and sanded to shape. This effectively simulates the sheet aluminum on the original aircraft. The bottom stringer is added after the landing gear assembly is screwed to the landing gear rails of the fuselage support structure.

The landing gear mounting plate is cut from 1/8 five-ply plywood and the landing gear itself may be formed either from .125 aluminum or 3/16 spring steel. The prototype incorporates an aluminum gear; however, be forewarned that the aluminum gear blank *alone* weighs one pound less wheel pants and wheels. The removable landing gear mount provides a logical means to service the radio/tank compartment



FULL SIZE PLANS AVAILABLE — SEE PAGE 144

and also serves to reduce the size of the "ACE" for transportation when the gear is removed. The section forward of the leading edge of the gear when viewed from the bottom between stations 1 and 2 is a continuation of the simulated metal side panels, thus its shape conforms to the bottom of the firewall from the firewall to the leading edge of the gear. The fabric of the full-size bird terminates just forward of the cockpit roughly in line with the instrument panel. Thus, the fabric line is simulated over the removable landing gear hatch. Cut out formers F-9, 10, 11, 12, 13 and 14, and glue to the gear hatch and bottom of the fuselage. Next, glue in place the bottom 1/8 x 1/4 spruce stringer. Fabric is simulated over the removable hatch by 1/8 sheet balsa. Half-round inserts from scrap balsa are added between the stringer and the bottom longeron just aft of the removable gear to strengthen this section for the covering material. The turtle deck has similar half-round fillers between stringers aft of the baggage compartment bulkhead to provide a gluing surface for the covering material per the full-size A/C.

The cowling is fabricated next after your particular engine installation has been decided. The prototype utilizes a Du-Bro belt drive unit driven by a Super Tigre blue head with Perry pump and carburetor combination. While this unit is heavy, it performs very well and swings a 20-inch prop rather smartly. The engine and belt drive assembly weighs three pounds, but this is not a problem with 1/4 scale and larger models. For example, with this model the Du-Bro engine installation balanced the model perfectly without the usual "where do I put two pounds of lead?" situation faced by almost all flying scale builders. Cut out the plywood nose cowl ring from 3/32 plywood and epoxy the soft balsa nose cowl block thereto. While this is drying, cut out another firewall from 1/4 balsa sheet with cowling bows included per the phantom lines superimposed on the firewall outline on the plans. Cut out the center of the balsa firewall section it will slip over the engine mount. Next, temporarily attach the balsa firewall to the plywood firewall. Place a sheet of wax paper or the like between the two firewalls so that they may be easily separated after the cowling is assembled. Next, locate from the plans the center line of the propeller shaft and mark the spot on the nose cowl block attached to the nose cowl ring. Drill a hole to fit the shaft of the Du-Bro unit or your engine crankshaft and bolt the nose cowl to the engine assembly. Install the 1/4 x 1/4 hard balsa structural supports between the nose ring and balsa firewall.

Now all that remains is the painstaking task of planking between the plywood nose cowl ring and the balsa firewall. Use medium-soft 1/8 x 1/4 to 3/8 balsa planking material and allow to dry overnight. Carefully remove the "mess" from the fuselage and "whack" to shape.

The moment of truth, at liftoff of the model's first flight. Aside from a slight left yaw, corrected with rudder trim, and later with push rod adjustment, no further trimming was necessary. The Du-Bro reduction drive unit functioned perfectly. Engine was hand-propped for starting.

Before I epoxied the soft nose cowl block to the nose ring, I first carefully cut out the cylinder head openings in the block. This made it easy to carve to shape the nose cowl without worrying about forming these openings after the nose cowl is shaped. I inserted aluminum members in the cowling adjacent the rear attach points to provide adequate support for the five wood screws that secure the cowling to the firewall. The carburetor intake scoop provides a natural air duct to cool the inverted engine for the Du-Bro drive unit. Since the cylinder head of the engine protrudes slightly from the bottom of the cowling, cooling is not a problem. My Tigre runs well with this particular set-up. At least three layers of glass cloth and several coats of K&B Super Poxy filler resin will finish the cowl.

EMPENNAGE

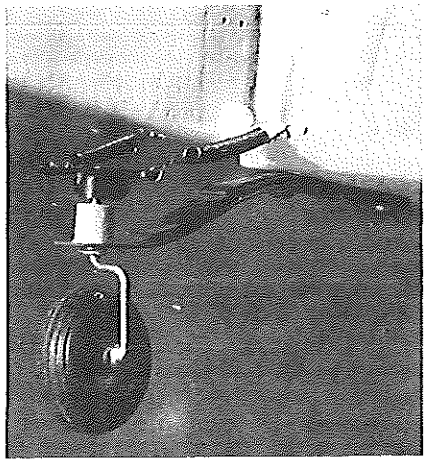
The tail feathers are fabricated next, and since they are quite conventional, they need no further explanation except to note that the stabilizer and elevator are built from 5/16 or 3/8 medium-hard sheet balsa, while the fin and rudder are built from medium-hard 1/4 sheet balsa. If 3/8 sheet is used for the stabilizer, sand down to the 5/16 dimension. I chose to mount the elevator horn outside the fuselage due to the limited space at the tail post. The tail wheel is, of course, a Bob Seigelkoff product and is easily installed as is. The scale size is almost perfect for the "ACE". All I did was reshape the leaf springs to suit. I chose to use different horns on the base of the rudder for the tail wheel springs, although the one provided by Seigelkoff could be cut down to fit.

Incidentally, Lou Proctor, of "Antic" and "Nieuport" fame, provided me with an assortment of superb fittings for the prototype "Baby Ace". Lou has available different sizes and varieties of turnbuckles, strut fittings, cockpit combing, nuts and bolts, etc. Send for his brochure for his list of goodies.

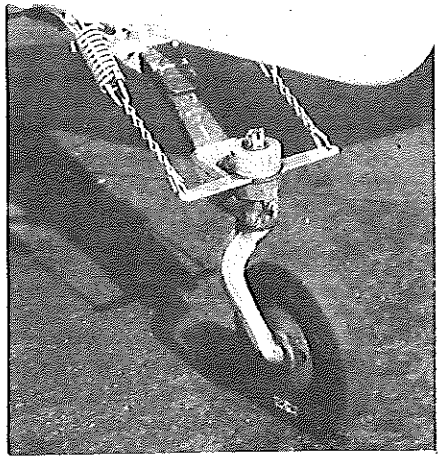
WING

The wing construction, monster that it is, is fairly conventional, and should offer the accomplished modeler no surprises. The true scale "nut" will note the scale built-up rib pattern provided on the plans, and if you so desire, be my guest and make yourself a jig and build the ribs just like the big one. If you go this route, however, I don't see how you can bring yourself to cover it all up with fabric and paint! The sensible and sane types will form the ribs from sheet stock after fabricating one or more rib patterns from metal. Please note the two inboard ribs forming the servo bay are 1/4 inch five-ply plywood to accommodate the wood screws for the aluminum wing center section cover, and also to provide additional strength for the covering material which tends to bow the ribs inwardly, yielding to the pulling power of the doped cover. Before gluing in the plywood inboard ribs, make sure the gap between ribs is wide enough to accommodate your particular aileron servo.

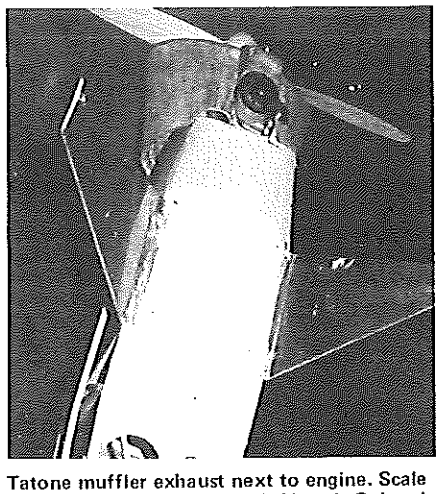
One half of the wing is built at a



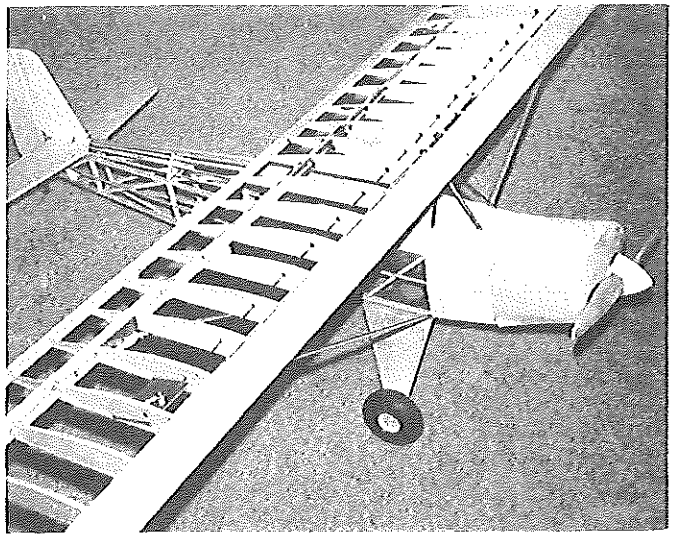
C. B. Associates tail wheel assembly. The spring leaves can be shaped as desired.



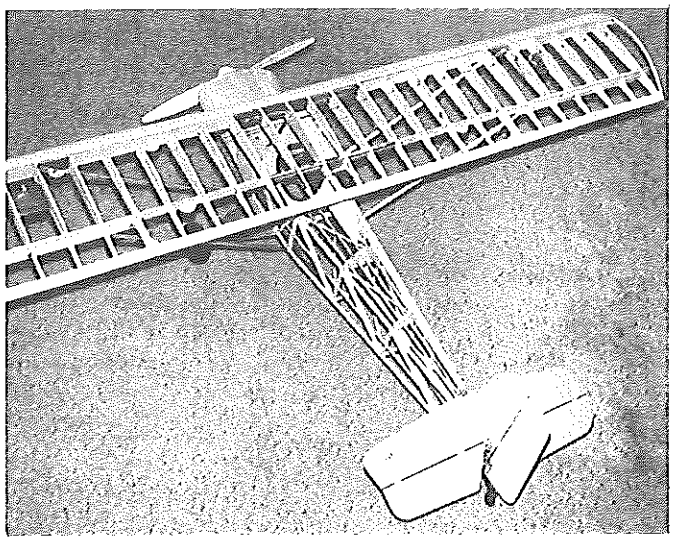
Steerable tail wheel assembly on big ship. Note antenna in upper left corner of photo.



Tatone muffler exhaust next to engine. Scale exhaust at rear edge of cowl. Note L.G. hatch.



Aileron pushrod and bellcrank plates installations are shown in this structural view.



Another angle on structural details.

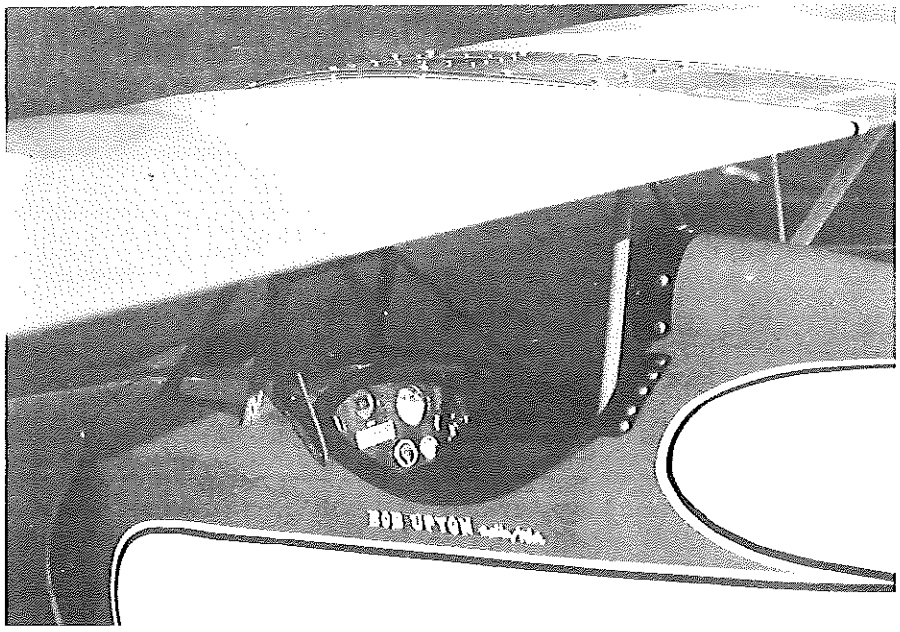
time, with the plywood spar reinforcements installed in one of the wing panels. Since the wing airfoil is pretty much a basic, flat-bottomed Clark "Y", no fancy wing jig is required. The wingtip bows are laminated strips of water-soaked medium-hard balsa, glued together and allowed to dry in a pre-shaped jig. Please note the vertical grained balsa web spar reinforcement material that extends out to the strut attach fittings in each panel. This bit of "insurance" takes little time and provides tremendous strength where it is needed the most.

The ailerons are fabricated separately; the aileron ribs, of course, are the trailing edge part of the outboard ribs. The ailerons are center-hinged per the plans, just as the full-size "ACE" is hinged. Note the differential bellcranks shown on the plans. If you use differential ailerons (more "up" aileron than "down") you will find that the model turns and banks with ease without the use of coordinated rudder. This is more than I can say for the full-size aircraft. Needless to say, the additional trouble of fabricating the differential aileron bellcranks is well worth the trouble.

The trailing edge sheeting is a little wider than scale, but is needed for strength. The wing is sheeted and cap strips are added after the wing halves are joined and carefully aligned. The 1/8 five-ply plywood wing platform is added to the bottom of the aileron servo bay. The platform is inserted to accommodate the .125 aluminum wing pylon mount attached to the Cabanes. The wing strut fittings are now bolted to the spars per the plans. Be sure and insert hardwood fillers between the strut fittings. The inner plane strut fittings are screwed to the spars

Continued on page 106

Don Butman, assisting Bob in removing the cowling for engine photos, participated in the Baby Ace model project from the beginning.



Engine cooling air has ample exit area at aft edge of cowling. Wing center section cover plate attachment screws can be seen.

the design and construction is solid. The systems both exhibit ample and solid air range, and have not shown the most minor undesirable characteristics. When the time comes to drop them into my more expensive and extensive projects, I will do so without fear of "I ain't got it!" •

R/C Baby Ace . *Continued from page 25*

through plywood inserts epoxied to the bottom of the two spars. The false upper aileron horns are optional, but provide a nice touch to the finished model. The wing is fitted to the pylon mount after the dowel holes are drilled in the aluminum mount plate to align with the 1/4-inch hardwood wing dowels.

STRUTS

The hardwood landing gear rails provide support for the four fuselage wing strut attach fittings formed from .032 mild steel or brass. The 1/2-inch width struts are aluminum and are teardrop-shaped in cross-section. Jerry Nelson, of Midwest Models, supplied these streamlined struts for me and they come in three-foot lengths. Midwest Models, of Chicago, Illinois, has a variety of sizes and lengths of streamlined tubing for the model enthusiast.

The upper end of the struts are fabricated as follows: Brass tubing with an inside diameter to fit 2-56 bolts is cut to fit between the upper strut fittings in the wing. The tubing is then soldered to brass sheet. The sheeting is inserted into an end of the aluminum strut with a pre-shaped hardwood plug and pinned with, for example, 1/16 O.D. soft steel wire per the plans. The opposite end of each strut is fitted with the new Kraft clevis. I particularly like this clevis for a strut fitting because of the obvious strength of the steel pin in the end, and the ball socket-type of "lock" for the clevis pin. Since the struts on the model are fully functional and structurally load bearing, the fittings must be strong. The clevis wire is locked into a hardwood plug shaped to be inserted in the end of the strut with a 90° bend in the wire and secured to the strut with mild steel pins.

The inner plane struts are fabricated from, for example, Goldberg pushrod clevises. The strut fittings for the inner plane struts consists of thin brass sheet wrapped around the streamlined tubing, soldered in place with a section of tubing soldered to the brass sheet that will accommodate the clevis wire. To assemble, simply determine the approximate distance between the angled attached wing struts with inner plane fittings in place on the struts and the inner plane fittings in the wing, bend the clevis wire 90° and insert the ends through the soldered tubes on each strut. Subsequently, join the ends of the bent clevis wire with a length of brass or copper tubing. You now have adjustable inner plane struts that may easily be aligned. In addition, the wing struts may be conveniently folded flat against the wing for transporting purposes by disconnecting the inner plane struts and allowing them to fold against the wing.

WHEEL PANTS

The wheel pants are straightforward in construction. Cut out the inner surface of the pants from 1/8 sheet ply and epoxy to the soft balsa center block rough cut from the plans, then enclose the wheel opening with a sheet of 1/4 inch balsa glued to the outside of the block. Now carve to shape. The wheel pants are then secured to the aluminum gear by two 4-40 cap-head screws and blind nuts epoxied to the inside surface of the plywood inner wheel pant plate. After the wheel pants are aligned and secured to the landing gear, a layer of soft 1/8 sheet balsa may be glued to the outside surface of the inner plywood plate to "round out" the inner surface of the wheel pants. One layer of glass cloth and a couple of coats of K&B Resin Filler Coat will nicely finish the wheel pants. Du-Bro 4-1/2 inch semi-inflated wheels most closely simulate the tires of the full-size A/C.

COVERING & FINISHING

Modelers have their favorite methods of finishing a model . . . so have at it! I will, however, relate my method simply because it's a neat way to end this lengthy narration. I covered the model with medium-weight silkspan, applied wet, and glued it to the frame with *nitrate* dope. A note of caution is appropri-

ate here . . . be *painfully aware* of the extremely flammable nature of nitrate dope!!! After the entire model was covered with silkspan, five to six coats of thinned nitrate dope were applied.

To simulate the reinforcing tapes of the full-size A/C, a good grade of 1/2-inch masking tape was applied to all seams, edges, ribs, etc. After this was accomplished, the model was covered with silk, applied dry over the silkspan and tapes, and shrunk with water after covering. Five to six additional coats of thinned nitrate were applied to seal the silk to the silkspan. Using this method eliminated the tedious task of filling the holes in the silk with dope, while providing a very neat way to simulate the tapes of the "big bird". I used nitrate dope primarily because it is compatible with K&B Super Poxy paint. The full-size "Baby Ace" is painted with high gloss "Imron" epoxy paint, and K&B Super Poxy is almost an exact match. I shot one medium coat of Super Poxy primer, carefully sanded the primer and sprayed the basic high gloss white primary coat. The international orange paint was applied a day later. The black pinstriping is DJ Multi-Stripe material. The "N" numbers on the side of the fuselage are Monokote or like material, that has been painted with orange Super Poxy to get an exact paint match with the rest of the model. Carefully clean the surface of the Monokote prior to painting. Cut out the numbers with a sharp Uber Skiver blade and cut *down* through the paint and Monokote so that the edges curl under. This method helps prevent peeling of the surface and assures proper adherence to the surface on which the Monokote is applied.

CONCLUSION

As an aside, the model has been flown recently with very good results. The one surprise was the "P" factor associated with the large prop driven by the Du-Bro belt drive unit. The model wanted to turn left, but was easily corrected with rudder. For the first flight, a full-power, "Goodyear" style release was employed, and the model fairly leaped off the ground even though it weighs close to 14 pounds. A left turn tendency, easily corrected, was the only out-of-trim condition, and the model exhibited no longitudinal "hunting" characteristics. In short, it's an easy model to fly, and several runs made down the runway for Dick Tichenor's camera confirmed that the model is a delight to fly . . . but then, of course, I'm slightly prejudiced!

I want to thank Don Butman for his help. Who else would take a day off from work to drive the assembled model in his van to the airport while I flew the full-size version to that same airport from a different location? The purpose was to rendezvous with Dick Tichenor to get the photos for this project. Don is a good friend indeed!

Any questions with the project, please write or call me (see Contents Page) and I will try to help if at all possible. Good luck and keep 'em flyin'!! ●

Pylon . . . . . *Continued from page 31*

Numerous models are flying here in the Midwest, and all the flyers I've talked to say it's a stable, honest and fast design.

Let's start out the kit review by saying that if you follow Prather's very complete step-by-step instructions, you'll wind up with a well-built airplane. I'm just going to touch on some minor changes that could be made for ease of building and some other points in building that aren't absolutely necessary, but that you might want to follow. Our changes are written to follow along with the kit instructions and photos we took.