



**it's a  
Winner**

# CASSUTT MODEL "2"

#### ABOUT THE AUTHOR

Donald C. Hewlings was born August 31, 1924. His first ride in a real airplane was in 1932, and here is where the first love started. He began building models in 1935 and began winning contests from 1938 through 1941 in an era when Megow Kits were given as prizes. World War II marriage and family put modeling aside until 1958 when he built another F.F. gas. In the meantime Don earned his private pilot's license in 1948.

In 1968 radio control became his number one choice both as a hobby and as a sport. Most of his time is spent training newcomers in either one of the two clubs that he belongs to. Don has taught or helped to teach over seventy newcomers and feels a lot of pride standing on the flight line and seeing a fledgling pilot making his first successful take-offs and landings.

Don helps with club work, flies demonstrations, runs club fun-flies, does benefits, and, tries to be a good Sunday Flyer.

In presenting the Cassutt "2," Don hopes that a few of you will benefit and enjoy building and flying something just a little different.

**A**fter seeing the 3-views of the Cassutt "2" racer in E.A.A. Magazine, May, 1962, my first impression was, "Boy, that would make a beautiful model, some day I will build it!" Numerous times over the years the pictures were pulled out, looked over and the words "some day" uttered again. Last October, hunting a new challenge, out came the Cassutt "2" pictures again — that "some day" finally arrived! What size plane do I want? What scale? (16'-0" overall length equals 48" in 1/4 scale; 13'-8" wing spread equals 41" in 1/4 scale; 59" chord equals 14 3/4"; 41 x 14 3/4" equals 604.75 sq. inch total area.) Material plus radio and engine was estimated to equal 5 3/4 lbs to 6 1/4 lbs. finished weight. Here you have a 1/4 scale aircraft that will fly with a good .40 engine in its nose or really perform with a .60 engine. The real plane had a top speed of 240 mph (1/4 scale equals 60 mph).

**CHOSEN AS THE FIRST PLACE WINNER IN RCM'S DESIGN CONTEST, THIS ONE QUARTER SCALE CASSUTT BUILDS INTO A BEAUTIFUL MODEL THAT NOT ONLY FLIES WELL BUT OFFERS NO TRANSPORTATION PROBLEMS BECAUSE OF SIZE. BY DONALD C. HEWLINGS.**

With the above calculations laying on the dining room table in front of me, and a glass of refreshment in my hand, the decision was made. I could go 1/4 scale without buying a new engine and have a plane that is easily transported in most any car --- a plane that fits the bill as a 1/4 scale pylon plane or a fine subject for scale buffs. The plans are as near scale as possible with four exceptions --- namely: (1) scale spinner should be 2 7/8" (commercially available spinners are 2 3/4" or 3", I chose the 3"); (2) the strip ailerons; (3) the size of the tail wheel, and (4) the canopy --- more about these later.

Having dreamed, designed, cut, fit, and built this bird, read the next line and decide if you fit the plane. If you are the type of builder who wants three bulkheads, and four slabs to make a fuselage with, a ready made foam wing, some iron-on covering, and be out at the field next weekend with a new bird, don't read any further! But if you have some time to spare and aren't afraid of a challenge, read on --- the finished product is worth it. This Cassutt is not for the beginner builder but if you have built two or three kits and one or two scratch-builts you should have no problems. After all, scratch-building is only making your own kit before you assemble it, **right?** Use loving care as you make each piece, remember you

are the craftsman or butcher who has to use these pieces during assembly, you decide which.

What building technique to use was my next hurdle. After much sketching and planning I decided to try a new method (probably not new to some of you but it was new to me). I decided to hang eight plywood bulkheads on two 1/4" x 1/2" spruce stringers running internally through these bulkheads (Photo #1). This seemed to sound like a very strong frame. Add a 1/8" balsa skin and, with all those external angles, they should give plenty of strength for a tail-dragger on rough field landings. Use solid balsa parts for the empennage. The wing scale thickness came out to .999". If foam is used, spruce spars and sheeting should be used so I decided to build up the wing with double "I" beams plus 1/16" balsa sheeting which raises the "G" forces well into the safety zone.

Now to the nitty gritty of the fuselage. Lay your 1/4" x 1/2" beams (wishbone) over the plan view and mark the angle points behind bulkheads No. 4. Mark the bevel angles at the tail. Now cut the tail bevel angles; carefully cut a narrow "V" notch 3/4" through the angle points behind bulkhead No. 4. Replace on the plan view and dry fit these parts. When you are satisfied that they match the plan, epoxy the angle joints and epoxy the bevel joints at the tail. Pin to the plan

and let it set-up (Photo #1). Mark and cut off the 1/4" x 1/2" wishbones 1/4" in front of the bulkhead No. 1. Now, on a straight building board, erect eight equal height piers (Photo #2). Use the view given to you at the top of plan sheet No. 1. This view has been inverted for you.

After assembling the jig or fixture, it resembled bridge piers. After making the 1/4" x 1/2" beams for the fuselage the beams looked like a 4' long "wishbone." Never having seen this method used, I will name it the Hewlings Bridge or "Wishbone Method" of building. No matter what you call the method it is by far the best way I have found to keep an irregular shaped fuselage straight, true, level, rigid and firm during all those early bendings of sheeting over bulkheads.

Space the bulkheads 1/2" away from the piers, so that the bulkheads can be epoxied with a little room to work gussets and fillets (Photos #2 & #3). Next, epoxy the 1/4" ply landing gear mount and 1/4" ply floor below tank. Drill, tap and bolt the landing gear in place; lock these bolts because soon they will be seen no more (Photo #4). Now begin the 1/8" skin, bottom first. When dry, bevel the edges and add the next two pieces of skin, one each side. These first 3 pieces of skin go from the No. 2 bulkhead to the tail. Next add the two lower side skins, from bulkhead

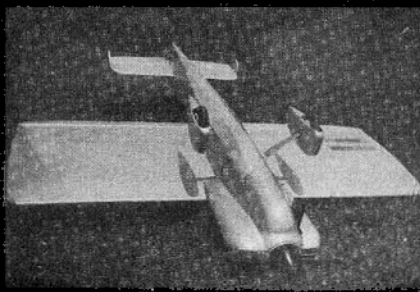


No. 1 to the tail. Fill in the bottom skin between bulkheads No. 1 and No. 2. Add the bottom skin to the cheek cowl between bulkheads No. 1 and No. 2. (Your fuselage should now look like Photos #5, #6, & #7.)

Next, bolt on your engine mount and engine. Put a piece of duct tape over the exhaust port. Use several thicknesses of Saran Wrap and rubber bands over the carburetor to keep the dust and chips out of your power plant. Next hang former F-0 over the engine; cut a 1/16" balsa spacer like F-0 and hang this over the engine. Now bolt on the backplate for your prop spinner. A C.B. Associates 3" plastic and aluminum spinner was chosen, mainly because of the thick aluminum backplate to clamp the F-0 former to and its close to scale shape. Next take three "C" clamps, clamp the spacer and former F-0 to the rear of the prop spinner and align carefully. Its relation now will always show throughout the plane's life. Next cut pieces to fit from F-0 to the bottom of the firewall. (I used up a lot of 1/4" scrap balsa and made 1/2" wide pieces like the chin block.) Start on the center line and add 1/4" each side until you have the chin block complete for the width of the fuselage (Photos #8 & #9). Isn't it nice to do all of this kind of work with the fuselage nice and solid and not being bumped around the work bench? Another little hint, look at the pictures of the fuselage on the bridge --- at the tail end you will see a white rectangle sticking out. I always set my bottom rudder hinge between the side sheeting at assembly. Beats the devil out of trying to cut epoxy out to center a hinge late. Try it, you will like it! Now cut out 1/8" deep x 1 1/2" long from the rear bottom. Epoxy a piece of 1/8" plywood in its place to screw your tail wheel mount to. Release your hold-downs and lift your fuselage off the bridge and turn it over. It is fairly light, it is as straight as your bridge, and it is strong (Photos #10 & #11).

Next add your elevator and rudder NyRods, or whatever your favorite pushrod material might be. Epoxy them fast to the skin where they exit and to bulkhead No. 7. Leave the front lying loose inside the fuselage until you install your servos. Add the turtledeck from bulkheads No. 4 to No. 8. Next construct the cooling duct from bulkhead No. 1 to the bottom of the cheek cowl (see plan). Build the box and glue it in, you can cut the exit hole later from the bottom. Finish covering the cheek cowls from the front of bulkhead No. 1 to rear bulkhead No. 2 and up to the edge of the hatch both sides.

Now let's look at the wings. If you decide to go the foam core route, use the same template as used for the wood ribs. It is hard to burn out the notches for the spars, so cut the core and then route the 1/16" deep spar grooves. Make sure



## CASSUTT RACER

Designed By : Donald C. Hewlings

### TYPE AIRCRAFT

1/4 Scale Racer

### WINGSPAN

41 Inches

### WING CHORD

14 3/4 Inches

### TOTAL WING AREA

604 3/4 Square Inches

### WING LOCATION

Shoulder Wing

### AIRFOIL

Mod. NACA 23006

### WING PLANFORM

Constant Chord

### DIHEDRAL, EACH TIP

None

### O.A. FUSELAGE LENGTH

48 Inches

### RADIO COMPARTMENT AREA

(L) 7 1/4" x (W) 3" x (H) 3 1/8"

### STABILIZER SPAN

17 Inches

### STABILIZER CHORD

6 1/4" Average

### STABILIZER AREA

93 3/4 Square Inches

### STAB AIRFOIL SECTION

Flat

### STABILIZER LOCATION

Mid-Fuselage

### VERTICAL FIN HEIGHT

2 1/2 Inches

### VERTICAL FIN WIDTH (Inc. rudder)

5 1/2" Average

### REC. ENGINE SIZE

40-.61 Cu. In.

### FUEL TANK SIZE

10 Ounces

### LANDING GEAR

Conventional

### REC. NO. OF CHANNELS

4

### CONTROL FUNCTIONS

Rud., Elev., Ail., Throt.

### BASIC MATERIALS USED IN CONSTRUCTION

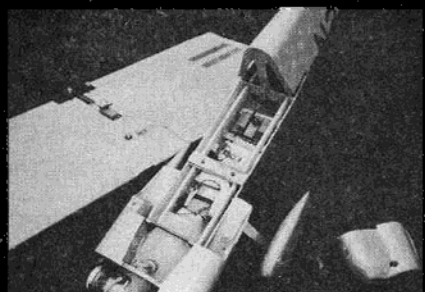
Fuselage ..... Balsa, Ply & Spruce

Wing ..... Balsa, Ply & Spruce

Empennage ..... Balsa

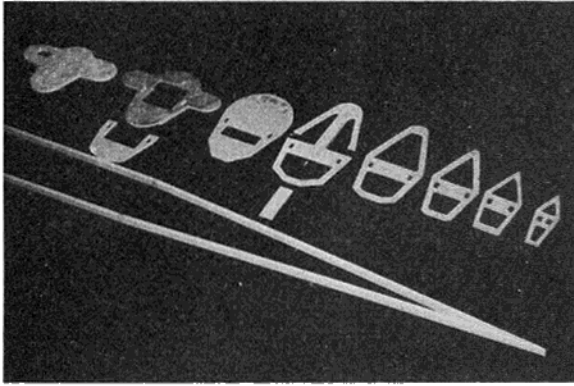
Weight Ready-To-Fly ..... 100 Ounces

Wing Loading ..... 23.8 Oz./Sq. Ft.

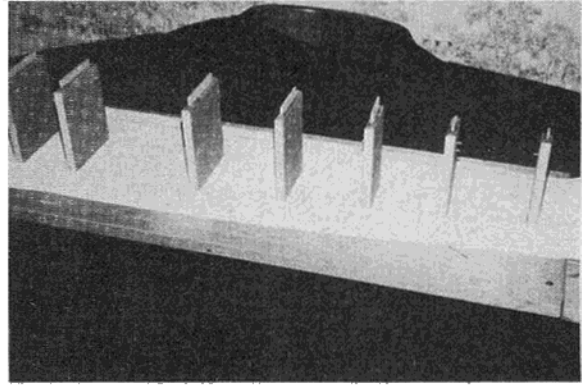


the 1/8" thick spars and the 1/16" sheeting match on the outside before any gluing is done. If you go the built-up route it is pretty straightforward. Build it over the plan on a straight building board or drill the ribs and use a wing jig (Photo #12). If you use the board method, tack down the bottom main spar over the plan, use a 3/16" shim under the front edge of the rear spar, continuously across wing length. Start in the center with the two 1/4" plywood center spacers and 1/4" ply with dowel on rear spar. Now, alternately, place wing ribs and shear webbing until you reach both ends; adjust last shear web for length so that your last rib is flush with the spar ends (Photo #13). Now add the top spars and come back to the center and finish your servo opening, etc., using 1/16" balsa, sheet the top (Photo #14). Remove from board, turn over and sheet bottom. Remove from board add 1" square balsa wing tips. Rough sand the entire wing. Place it in the fuselage and work the fuselage sheeting away until the wing sits firmly on bulkheads No. 3 & No. 4. When you are satisfied that the wing is properly aligned, drill and tap two 1/4"-20 thread holes per the plan for hold-downs. (See Photos #15, #16, #17, #18 & #19.)

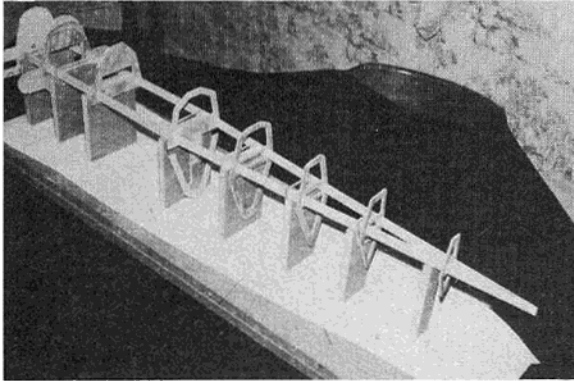
Lift the wing slightly so you can slide waxpaper between the wing and the fuselage sheeting, tighten 1/4"-20 bolts firmly, turn over the fuselage and the wing. Now complete the cheek cowls from bulkhead No. 2 to where they terminate under the wings, and up to the center line of the leading edge. Be sure the waxpaper keeps the new work from adhering to the wing. Make sure the new work is well glued to the fuselage side sheeting. While the plane is upside down, now is a good time to cut out the exit from the duct work which you built into the cheek cowl earlier. Turn the plane right side up; leave the wing in place. Cover the center of the wing with waxpaper and build the framework for the cabin hatch. While the framework is drying, trace the canopy outline from the side view of the fuselage, cut four 1/16" medium balsa sheets this size and shape with enough left over on top to bend over and meet on the top center line. Glue two of the 1/16" sheeting to the cabin hatch frame. When dry, remove from plane. Cut the center portion that you wish to use from a Sig World War II Canopy 13" No. WC-813. Let the canopy material cover the wood 3/8" on all sides, hold in place with rubber band and mask the line of the canopy opening, leaving the 3/8" overlap clear. (I now laid the canopy aside and black doped the inside of the hatch because you can't do it very easily later.) Contact cement the 3/8" inside of the canopy and 3/8" around outside of hatch. When this has set, spread canopy with all 10 fingers and set in place



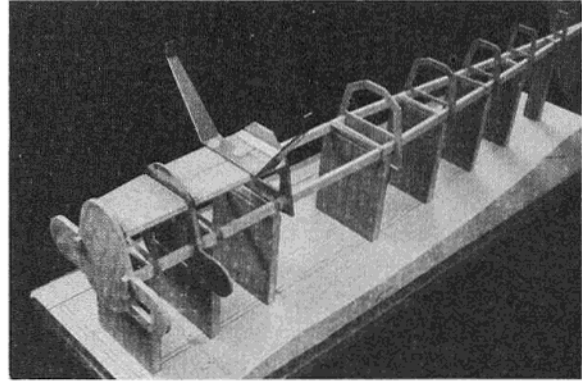
1) The completed wishbone and the eight bulkheads.



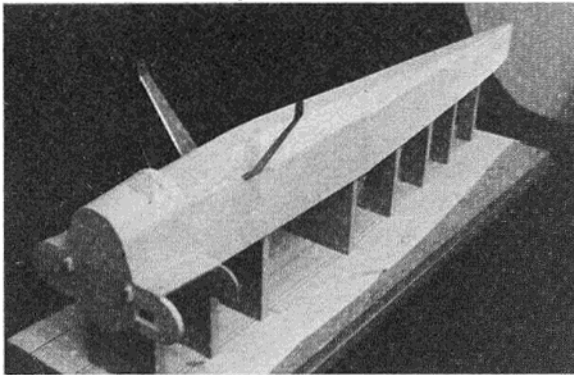
2) The row of bridge piers with spreaders on top. Use a centerline and make sure everything is symmetrica around it.



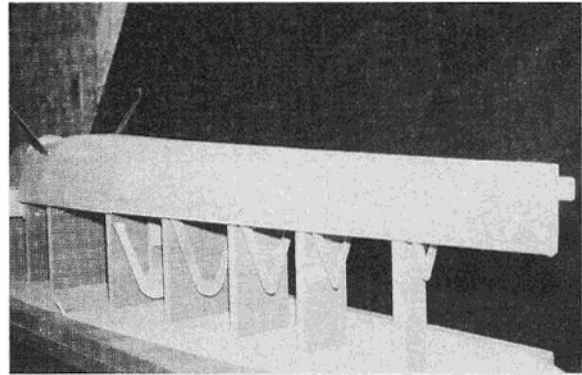
3) Frame ready for landing gear mount and floor board.



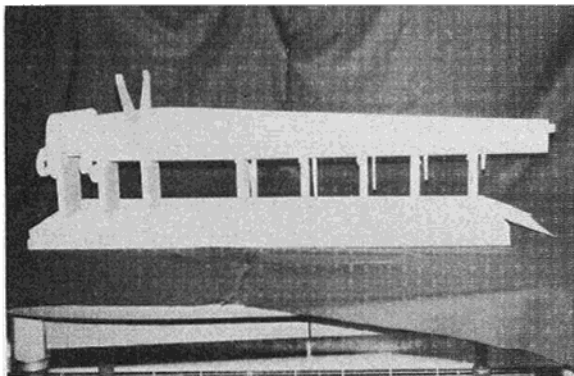
4) View of bridge piers, wishbone, bulkheads, floor boards and landing gear. All work has been epoxied (3) 1/4"-20 nylon bolt heads seen holding down landing gear.



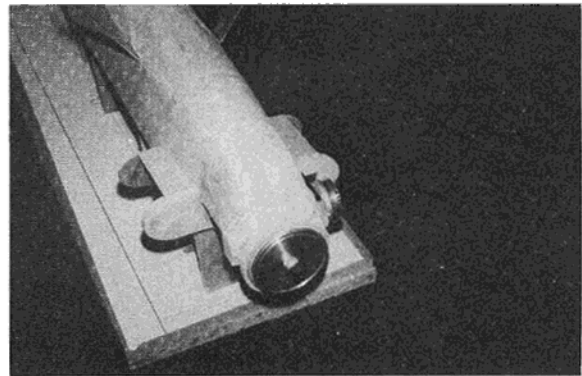
5) Front view ready for engine and former "F-O".



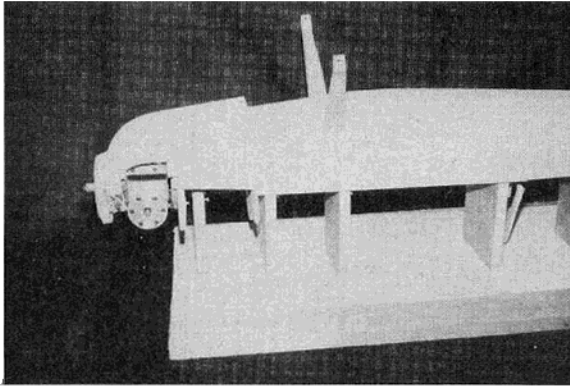
6) Rear view of fuselage after bottom sheeting is complete. Note bottom rudder hinge already sandwiched between the sides.



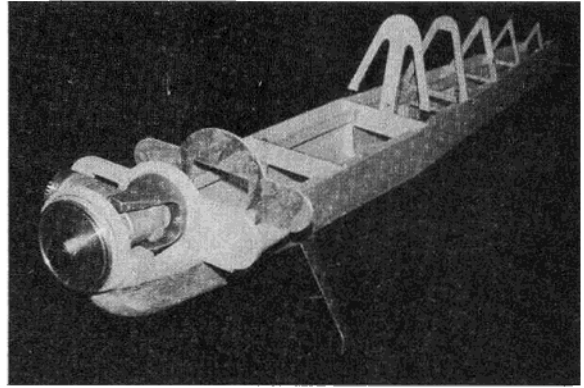
7) Lower fuselage ready to receive engine and chin work.



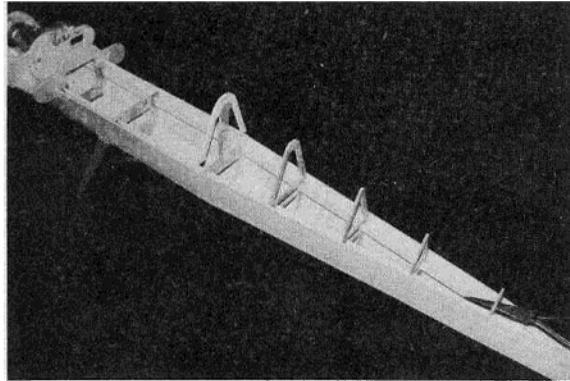
8) Chin blocks complete, whittled and sanded ready to remove spinner back plate.



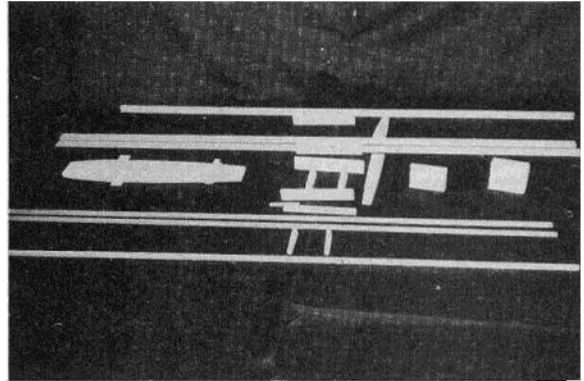
9) Side view of chin block.



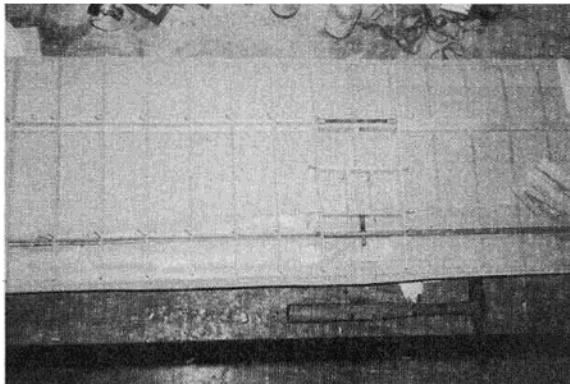
10) First view after fuselage is removed from piers.



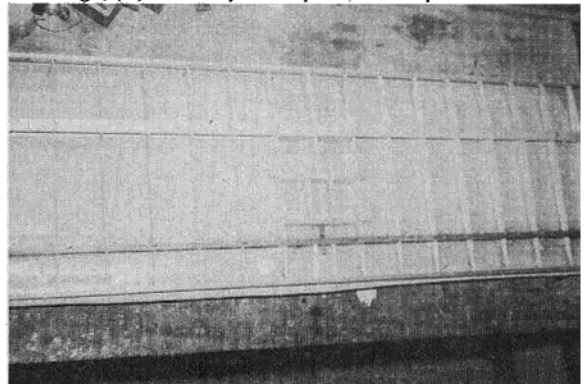
11) Fuselage ready for turtle back.



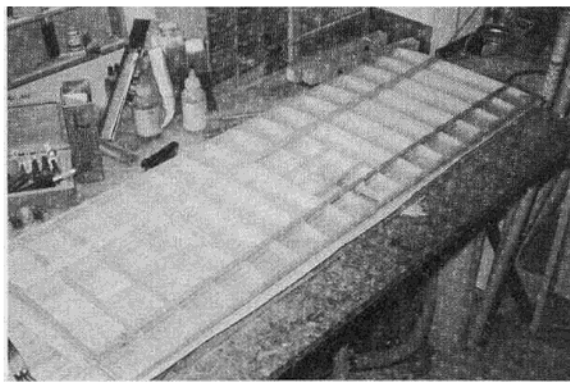
12) Wing frame members top to bottom 1/4"x1/2" balsa leading edge, 2 spruce spars 1/8"x3/4". (L) 3/32" wing ribs, (C) servo mtg. frame, (R) 2 piles 1/8" thick spruce shear webbings, (B) 2 rear spruce spars, 1/4" sq. T.E.



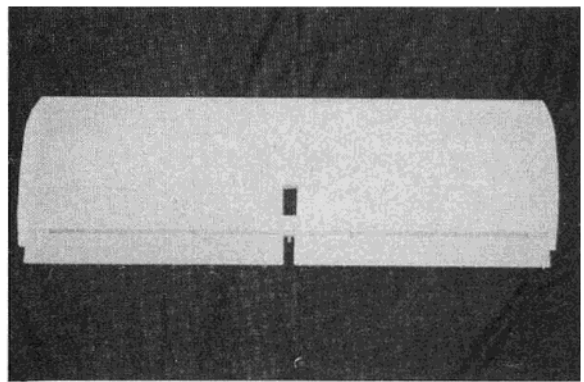
13) Wing left side ribbed and shear webbed, right side ready for the same treatment.



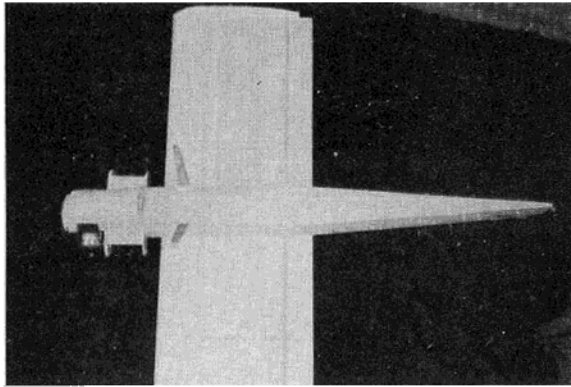
14) Wing ready for top sheeting.



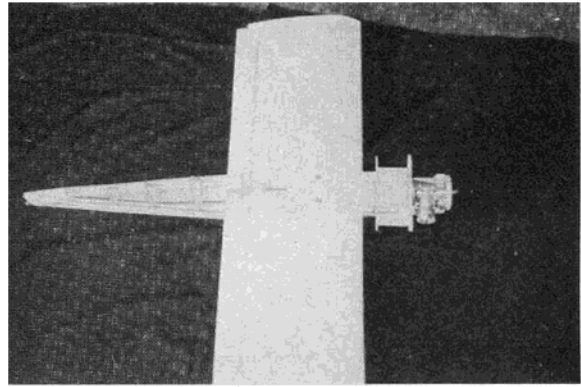
15) The wings top sheeting is complete. Wing has been turned over and is ready to have its bottom skin applied.



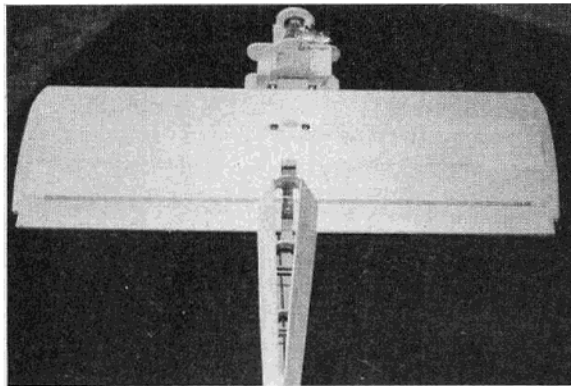
16) Wing skin complete, tip blocks added, rough sanded and ready to be fitted to fuselage.



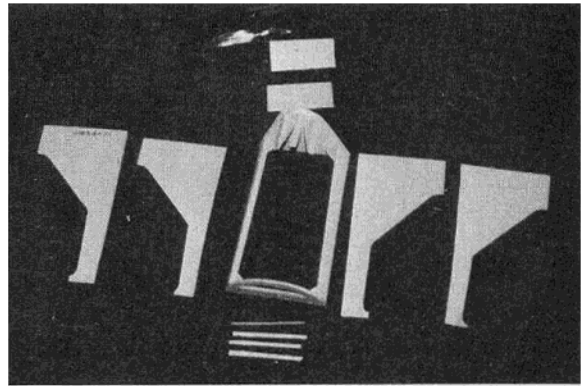
17) Bottom view of wing being fitted to fuselage.



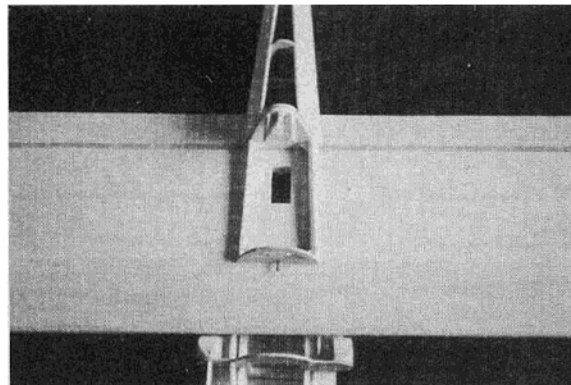
18) Top view of wing after being fitted, hold-down holes drilled and tapped. First time bolted down.



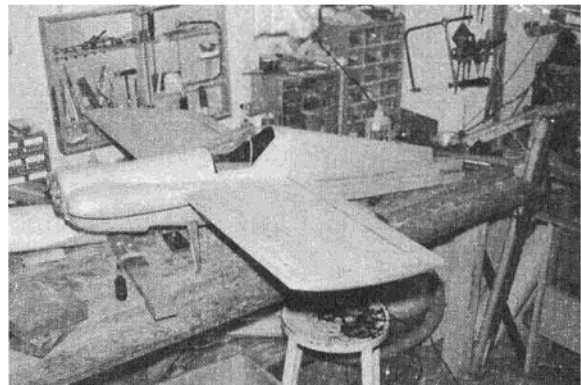
19) Here we see the side sheeting of the turtle deck being fitted to the fuselage and around the trailing edge of the wing.



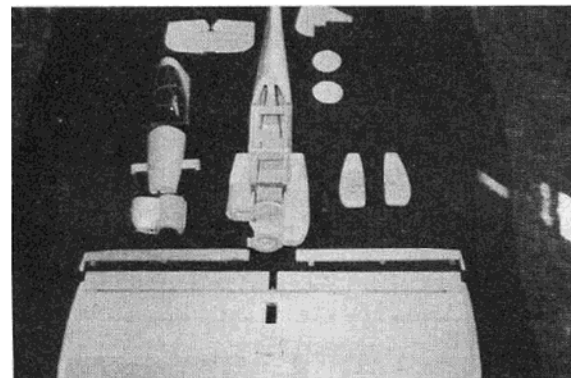
20) Cabin hatch frame in center, 1/16" sheeting around it with the canopy above. Sounds hard in the text, but really isn't.



21) Cabin hatch frame being fitted to wing, drill 1/8" dowel to align hatch with bulkhead No. 4.



22) Here we see the final fitting of all three hatches to the wing and fuselage. Note the neat well organized shop in the background. H and Northrop thought his work bench was Cluttered!



23) An exploded view of the Cassutt already for fine sanding, except the cabin hatch. Canopy and outer skin to be contact cemented yet. No those white discs are not the wheels, they are the horizontal stab tip plates.



24) The proud author showing off his completed Cassutt "2".

touching both front and back top centers first. Firmly work from these points to the bottom both sides. Now apply contact cement outside of the hatch and the remaining two 1/16" sheetings; line up edge of canopy openings and carefully place outside skin in place. When all sheeting has been added to the hatch, remove the masking and marvel at the neat canopy you have constructed. No sloppy epoxy lumps around the edges or what have you (Photo #20 & #21).

Build the engine and radio hatch next with the wing and the cabin hatch in place. This is easy going so I will say no more here. Follow the plans. Add the upper part of the cheek cowls to the top of the wings. This leaves us looking at a partially naked nose. I used a solid soft block for the left cheek cowl. The right cheek cowl will take some time no matter what route you decide to go. Personally I like an engine that can be reached easily when one has to. I took small blocks and strips of wood, fitting each one to the plane and around the engine. Here again, keep waxpaper between the parts that you don't want stuck together. These projects help keep the small balsa pieces used up. By removing two #4-40 cap screws my entire engine is exposed for cleaning or checking. A thought I better convey to you now, for those of you who may want to use either a .40 or a .60 size engine, build around the larger engine then drill and tap a motor mount so your .40 size fills the distance from the firewall to the spinner.

Now let's look at the other end --- looks small doesn't it? Here I had a great urge to enlarge it, but as the tail grew on the plans the nice lines of the Cassutt faded. The elevator is short in length but wide, they look like little barn doors once they are hinged. Add the stab tip plates to the vertical fin area and this starts to look good. Build all parts out of 1/4" medium balsa. Be sure the tip plates are on square and parallel with the plane center line.

Ailerons are well shown on the plan. The only thing I wish to convey to you here is about tip washout. The washout line and the 1/8" dimension shown on plan sheet two is the cut line. Mark this line, then whittle or plane the bottom of the aileron away. Now, with a sanding block, smooth it and blend it. When you are done sanding, even some of the bottom wing sheeting blends in and becomes washout. Work carefully. Get both wing tips the same. When finished the washout is near 3/16" each tip.

Wheel pants, scale say 3/4" diameter wheels. A trip to the hobby shop and I found Williams Brothers #142, right diameter and, most of all, slender enough to keep scale thickness on the pants and still have room to spin freely inside.

You are now ready to finish your work of art. I know you will use your own pet technique so I will not elaborate too much here. I used two coats of K & B

resin and two coats of Hobby epoxy #H-93 silver. The license and race number is bright red, 3" high license numbers; start 1" behind aileron and center with aileron both sides of fuselage. Use your own AMA number. 6" high racing number on top left wing and bottom right wing. Tom Cassutt raced with number eleven or use your N.M.P.R.A. number. Two 1/2" wide 1/4" spaced apart black vertical stripes on the outside of the stab tip plates finished his decorations. No striping or multi colors to dazzle the eyes --- just a functional clean airplane.

Photos #22 & #23 pretty well tells it all! You can now start feeling that urge to get it out to the field. I will now tell you about this prototype's first trip to the field.

#### MATERIAL LIST

##### Spruce

- (3) 1/8" x 3/4" x 48" (wing)
- (3) 1/8" x 3/8" x 48" (wing)
- (2) 1/4" x 1/2" x 48" (fuselage)

##### Plywood

- (1) 1/4" x 12" x 12" (wing and fuselage)
- (1) 1/8" x 12" x 36" (fuselage and wheel pants)
- (1) 1/16" x 6" x 12" (wheel pants)

##### Hard Wood

- (1) 3/8" sq. x 6" maple (hatch hold downs)
- (1) 1/4" dia. x 8" maple dowel
- (1) 1/8" dia. x 1" maple dowel

##### Balsa

- (1) 1/4" x 4" x 36" (empennage and misc.)
- (2) 1/4" x 3" x 36" (empennage and misc.)
- (1) 3/8" x 2" x 36" (ailerons)
- (2) 1/8" x 4" x 48" (fuselage sides)
- (7) 1/8" x 3" x 36" (fuselage sheeting)
- (13) 1/6" x 3" x 36" (wing sheeting)
- (2) 1" x 1" x 12 1/4" (wing tips)
- (1) 1/4" x 1/2" x 48" (wing L.E.)
- (1) 1/4" Sq. x 48" (wing T.E.)
- (1) 1/2" x 3" x 36" (wheel pants)

The moment of truth. On a clear crisp April morning my good friend and flying buddy, George Prosser, and I took a couple of hours off from work and went down to the field. No crowd or commotion, just the two of us. I gave him a quick course on operating my 35 mil camera and told him to catch what he thought was good --- if need be we would get more later. I fueled up, started the K & B, checked the controls, took a deep breath and eased the throttle ahead. Some up elevator was required when taxiing, rudder control was good on the ground. I turned into the wind, checked the idle and controls once more, pulled full up elevator, full throttle and a little right rudder, straight down the field, neutral elevator then a blip of down elevator, tail came up, speed good, a little up elevator and it lifted off then I released right rudder, climbed out clean for a short ways. Then the climb steepened, down elevator was sharp and abrupt. For the next few minutes it looked like a roller coaster. I then throttled back, the slower it flew the

better it handled, brought it around, lined it up, cut throttle, came in, flared and touched down three point. George and I checked balance, etc. I decided to try one more slow flight --- at least we knew now what to expect but nothing new was learned. Going back in the car we discussed **why!** That night I took out the one degree 30 minute incidence. Next day's lunch found us back at the field with a zero degree wing and tail. No improvement but now the landings were a little hotter. Next lunch found us back there two degree down engine, zero degree wing and tail. No great improvement here either.

My fear from the beginning now stood in front of me like a wall --- that beautiful small scale tail had to go, we needed more area back there to control it. Off came the tip plate, added approximately one third more horizontal stab and one third more elevator. Went out to the field again, good elevator control now, shows signs of needing some right thrust. Back to the shop. Tip plates put back on, 1 1/2° incidence put back in the wing, 1 1/2° right thrust added to the engine and it's back to the field to see if this will give us a plane that the average flyer can handle and be happy with.

Again George and I take off from work and slip down to the field at 8:30 a.m. Check everything and turn it loose. Good take off, steady climb out, a touch of down trim and a touch of left aileron. Turn around and straight level hands-off flight back past us. No dutch roll or yaw, no roller coaster, I do a split S, three rolls coming back left, three rolls right, same roll rate both ways. Good clean loops and Immelmans. Sharp pylon turns and low fly by. Then music to my ears, George is saying, "Don, we have it now, that's wonderful." I climb upstairs and throttle back, it settles into a steady predictable glide, down to a nice flair and touch down. Taxied it by into the pit area; it felt just like a bird that had been around for a long time.

The plans reflect the final version with the large stabilizer and elevator; you will see the small scale elevator in dotted lines if you wish to experiment. Any average pilot who can fly an Ugly Stick, Kaos, or Eyeball, can handle this. You will just have to learn a little about a tail dragger.

I suppose you wonder why all the gory details in the last couple of paragraphs. Here is the truth of it all --- damn few planes fly right off the drawing and building boards. It takes a lot of just what you read here: a dream, follow it through with work and then iron out all those kinks. Problems have solutions, some are just harder to solve than others. I added this for all the young modelers who despair and lose heart too easily and for the older modelers who never tried anything but a kit or a ready to fly. But most of all I added it for those who

think they fly right off the drawing board. Some do, but most don't. When I see an article where the author says this is the third, fourth, or fifth prototype before it really did what he wished, I believe him and respect his honesty and dedication.

Some other items not shown here or on the plans (1) Kraft aluminum engine mount. (3) 8-32 bolts and tee nuts. (5) 1/4"-20 x 1 1/2" long nylon bolts. (5) 4-40 capscrews 1" long. (2) 8-32 x 1 3/4" long bolts, nuts and washers. (1) Du-Bro Muff-L-Aire Muffler.

Happy flying.

□

**From  
RCModeler  
Nov. 1979**