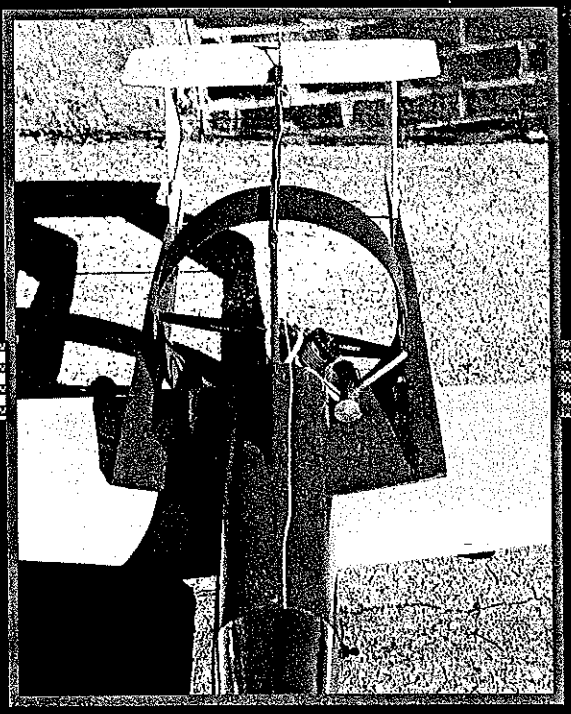

Hero
40
Joel Cimmino

Satisfy your RC appetite with this .40-powered pusher!



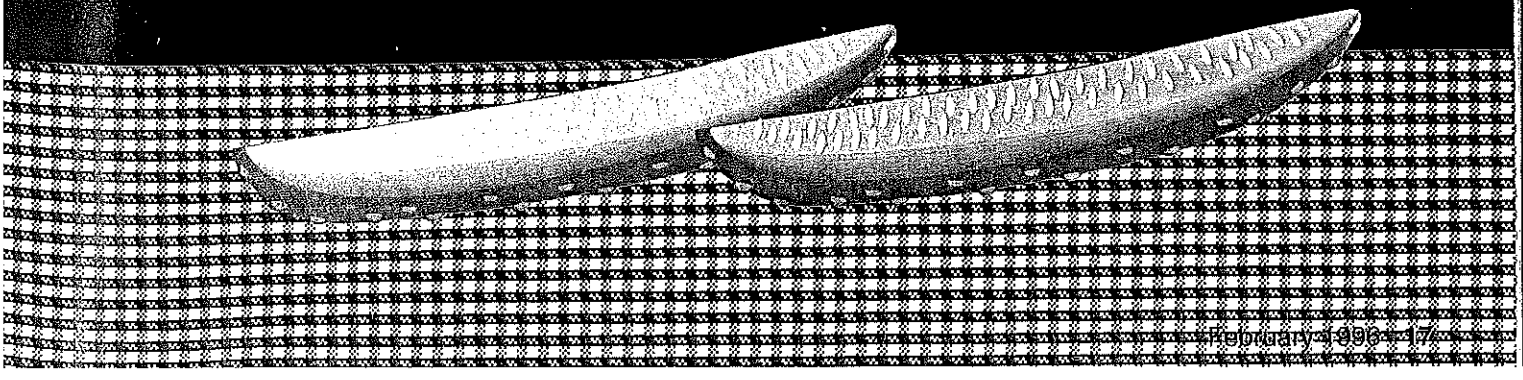
Photos by the author Graphic Design by Carla Kunz

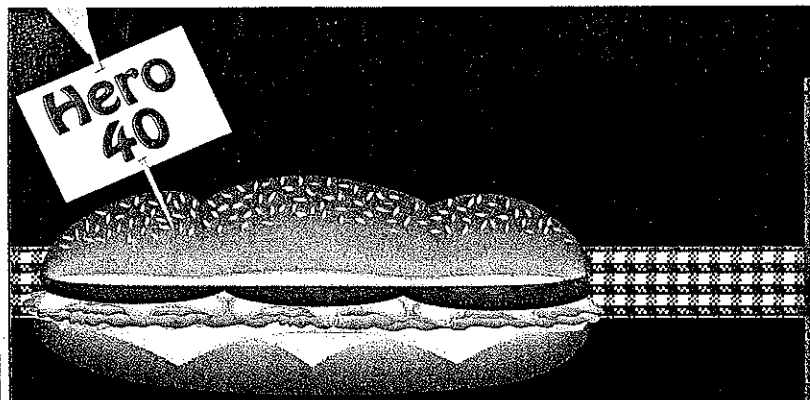
Above: The orientation of the stabilizer, tailbooms, and propeller shroud. Note muffler location.

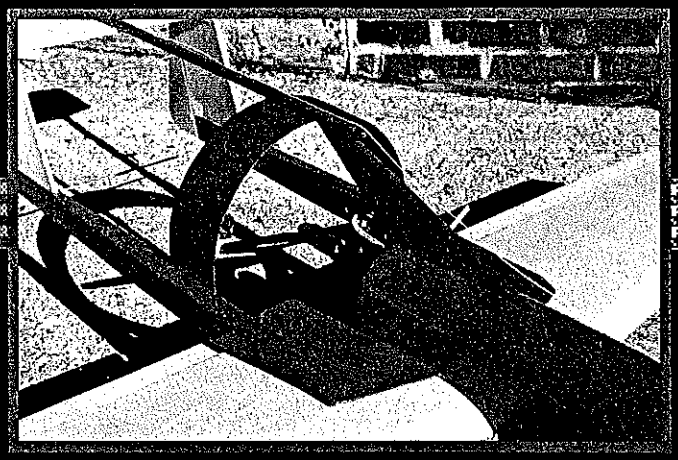
Below: The wings of the 50-inch-span model remove for transportation; the booms remain with the fuselage.

I am a modeler who likes to design and build different types of aircraft—ones that are interesting, but not too offbeat. I was a draftsman and Computer Aided Design and Drafting operator for 35 years. It's not too difficult for me to sit down at the computer and draw a set of plans, and I've been building and flying RC airplanes for more than 30 years. This project uses proven construction techniques that produce a strong, light, fast-building model.

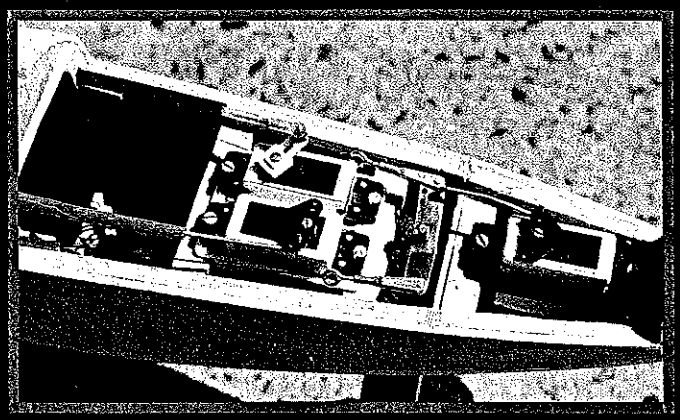
The Hero 40 is interesting and different—it's a pusher with three booms.







A crankshaft extension keeps the K&B .40 near the center of gravity. Exhaust to the rear keeps the fuselage oil-free.



The front servo controls the nose wheel and the rudder. The pull-pull rudder system crosses over behind the radio.

The wing is removable for easy transporting; it's a standard .40-size Kaos wing with a swept-back leading edge. (Thanks to Joe Bridi for this great flying platform.) The interesting thing is that the booms stay with the fuselage and not the wing. The fuel tank is at the center of gravity (CG) and therefore the trim does not change as the fuel is used.

Since the model is a pusher, all of the flying surfaces are in "clean" air. Another advantage is that the engine exhaust is between the booms at the rear of the model, keeping the fuselage clean and oil-free. The model would make an ideal front-mounted camera or TV platform. I have not tried this yet, but I plan to do so eventually.

Before you start construction, you should consider some options:

1) I used a 1¼-inch aluminum drive shaft extension on the engine. This places the engine closer to the CG. I used a K&B .40 with a longer ¼-28 shaft. If you can't make one, perhaps a friend with a lathe could make one

Today's Special

Hero 40

Type: RC Sport

Wingspan: 50¼ inches

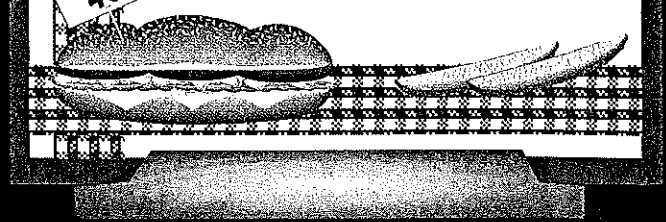
Engine: K&B .40 or equivalent

Functions: Throttle, elevator, ailerons, rudder (optional)

Construction: Built-up

Covering: Super MonoKote or equivalent

Flying Weight: 5½ pounds



for you. If not, a work-around would be to use a standard engine and cut an inch out of the rear center section of the wing for prop clearance.

2) I wanted rudder control. I used a pull-pull system that crosses over in the compartment behind the radio receiver. This give you the correct relation between the rudder and nose wheel. The pickup for the rudder is on the top of the nose-wheel shaft. The rudder servo (mounted all the way up front) moves the pickup bar and turns the nose gear at the same time.

You can glue the rudders to the fins; a rudder is not needed to fly this aircraft. (On one flight I used rudder control to save the airplane when the ailerons unplugged just after takeoff.)

3) I wanted to see what effect a prop shroud would have. The model picked up some speed, but even without it there was more than enough power. It would also be possible to use the Hero 40 as an entry-level ducted-fan aircraft. Getting interested?

CONSTRUCTION

Wing: If you can get a Kaos 40 wing kit, you won't have to cut any ribs. If not, make all of the ribs from 3/32 sheet. I make photocopies of the ribs, then attach the patterns to the sheet with a glue stick. Remove the pattern from the wood right after you cut the rib, *before* the glue has a chance to set.

Lay down the spars as shown, then glue the ribs in place. (I used Titebond II for the entire wing.) Glue the top spars in place. Place a tapered jig under the rear of all the ribs. Glue the trailing edge to the rear of ribs. Make the trailing-edge sheeting from a 25-inch-long piece of 3/32 sheet. (Save the leftover piece for the center-section sheeting.) Glue these pieces in place.

Glue the leading edge to the ribs. Make four pieces of tapered leading-edge sheeting from 3/32 sheet (save the leftover wood). Cut a 13 x 1½-inch triangle from one corner of the 26-inch sheet. Using cyanoacrylate (CyA), glue it to the top edge and the other end to form the tapered sheeting. The finished sheet will be 4½ inches wide at one end, 26 inches long, and 1½ inches wide at the other end. Dampen the top of the sheeting, then glue in place.

Glue the vertical webbing between the ribs. This will form a D-tube. Finish the top by adding the cap ribs. Sheet the center section and allow it to dry. Flip the wing over, and add a 1/16 rib doubler to ribs 2 and 3. Glue in the hardwood landing-gear block. Cut, fit, and glue the three filler blocks where the hold-down screws come through the wing.

Follow the same steps to complete the bottom of the wing. Make the center spar brace by adding 1/16 plywood to both sides of 3/8 sheet, then fit it between the top and bottom spars. See the plan for the exact size and shape. There is no dihedral in the wing; the top of the wing is flat.

With the wing top-side down, insert the spar brace between the top and bottom spar and glue both halves of the wing together. Add the wingtip blocks. Place the tapered jig under the rear of the trailing edge and let everything dry.

Fit the aileron torque rods to 6¾-inch trailing-edge stock and glue in place. Make a right and left unit. Note that the aileron hookup is on the bottom side of the wing. Shape and sand the wing, then set it aside.

Fuselage: Make formers F1 through F6. Follow the small triangle shown on the plan and cut the sides of the fuselage from 1/8 sheet. Cut 1/32 plywood doublers (shown on plan as arrowheads) and glue the doublers to the left and right sides.

After the sides are dry, glue stringers along the top and bottom edges. Carefully mark the location of the formers. Glue in formers F1, F2, and F3. Be careful to keep the formers square to the sides.

Attach a Goldberg nose-gear block to former F5. Pull the sides together and glue in formers F5 and F6. Add stringers to the top and bottom. Sheet the top from F1 to F3. Sheet the bottom from F2 to F3. Tack-glue F4 in place.

Using strips, plank from F4 to F6; start planking at the center top. Add a plank to the bottom-right section, then plank the top-left center section, then the left-bottom. Alternate planking from right side to left side, and work from top to bottom.

Planking is not hard, and things build fast if you use Titebond between the planks and CyA to hold to the formers. This method requires fewer pins. The area between formers F4 and F6 will be cut off to form the access hatch for the radio compartment. Plank the bottom from F3 to F6, and set it aside to dry. Cut out the access hatch. Glue on the nose block.

Make the fin from 1/8 Lite Ply. Cut lightening holes, then cover each side with 1/16 sheet. Shape it and glue it to the fuselage. This finishes the basic fuselage.

The only thing left is the 1/8 Lite Ply platform between the left and right booms. Using the top view, cut the platform to size.

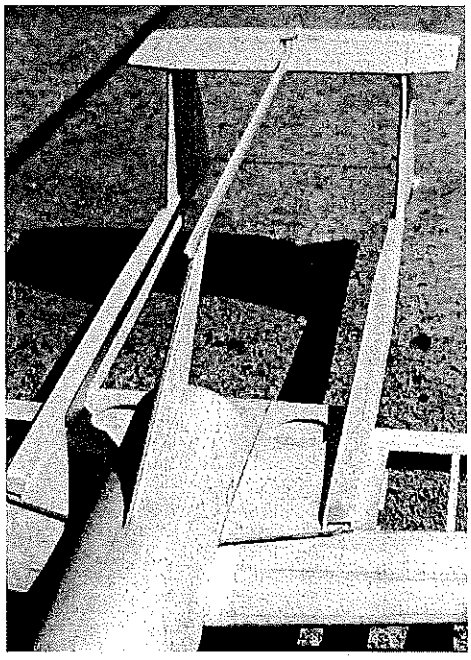
If you're not going to use a shaft extension, make the platform one inch shorter at the trailing edge. Wet the top of the platform and clamp it to the top of the wing and let it dry—it will have a curve that matches the top of the wing. Glue the platform to the fuselage, being very careful to keep the outside edges of the platform parallel to the fuselage sides.

Booms: The two booms are made from balsa sheet—no formers are needed. Glue the booms to the platform. Make sure the booms stay parallel to the centerline of the fuselage.

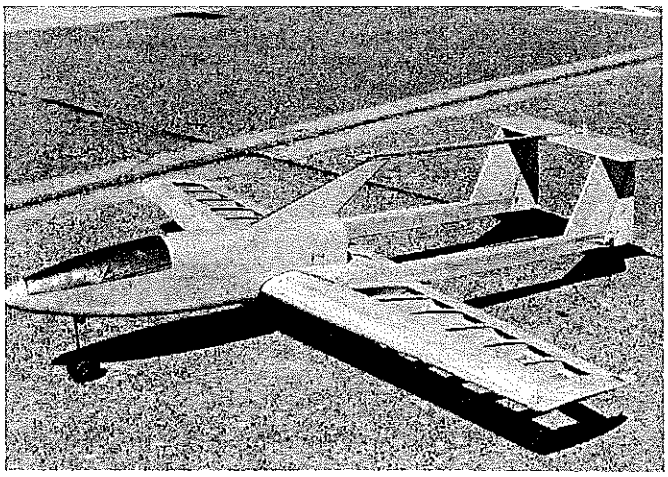
The upper-middle boom has basswood sides, the top and bottom are balsa. Use a straightedge to keep the boom true. I used a 5/32 rod in the center of mine. After the glue dried, I pulled the rod out and put the Nyrod in.

Rudders and Stabilizer: Cut and fit the rudders from ¼ sheet. Glue them to the top of the booms. Use ½-inch strips of light glass cloth and CyA to reinforce these joints. Cut the stab from ¼ sheet. Carefully mark the centerline of the rudders on the top of the stabilizer. Glue the stabilizer to the top of the rudders. Be careful not to build in a twist. Reinforce these joints. Glue the third top boom to the fin and the top of the stabilizer.

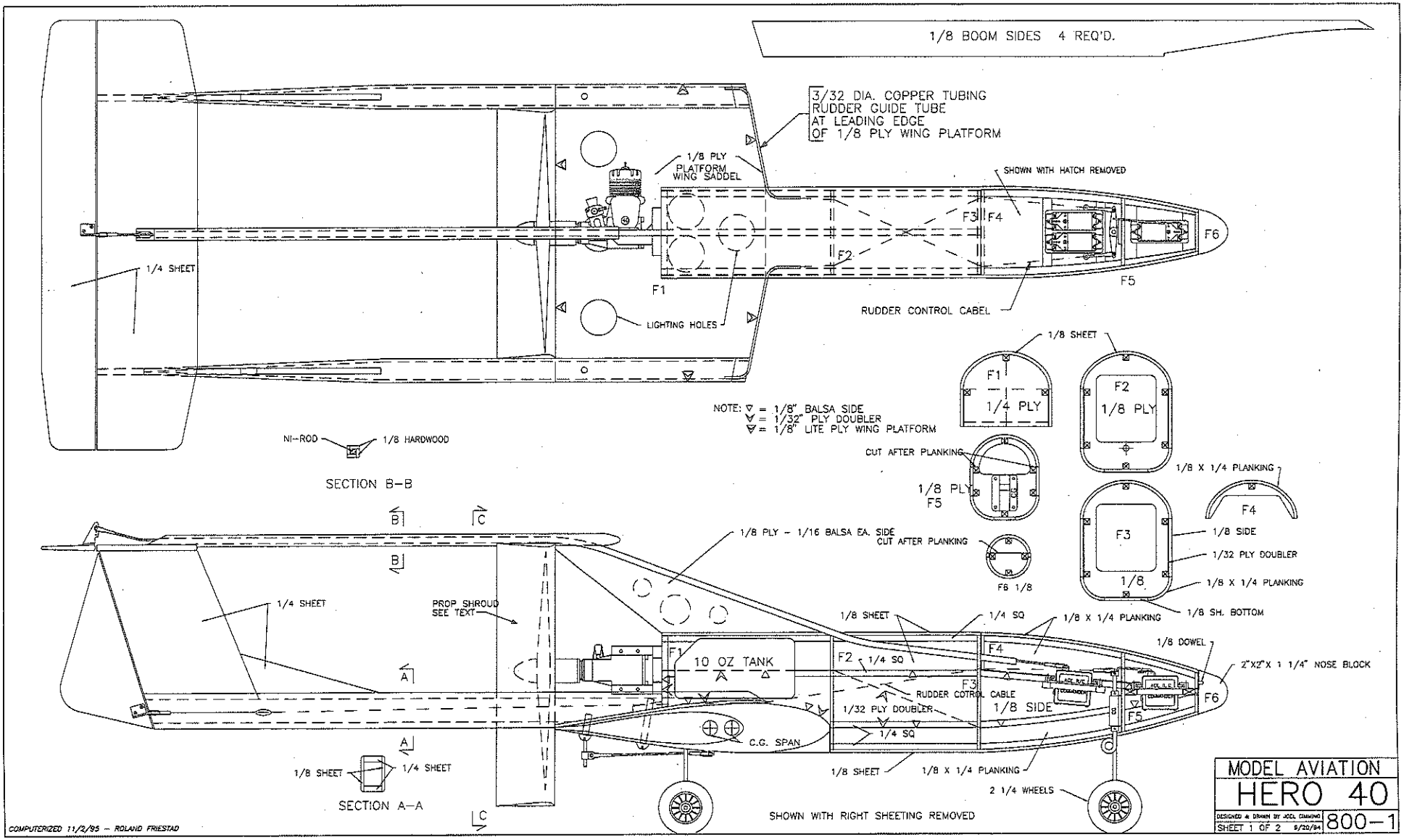
At this point you can adjust the incidence of the stabilizer by lengthening or shortening the top boom. All surfaces are set at 0°.

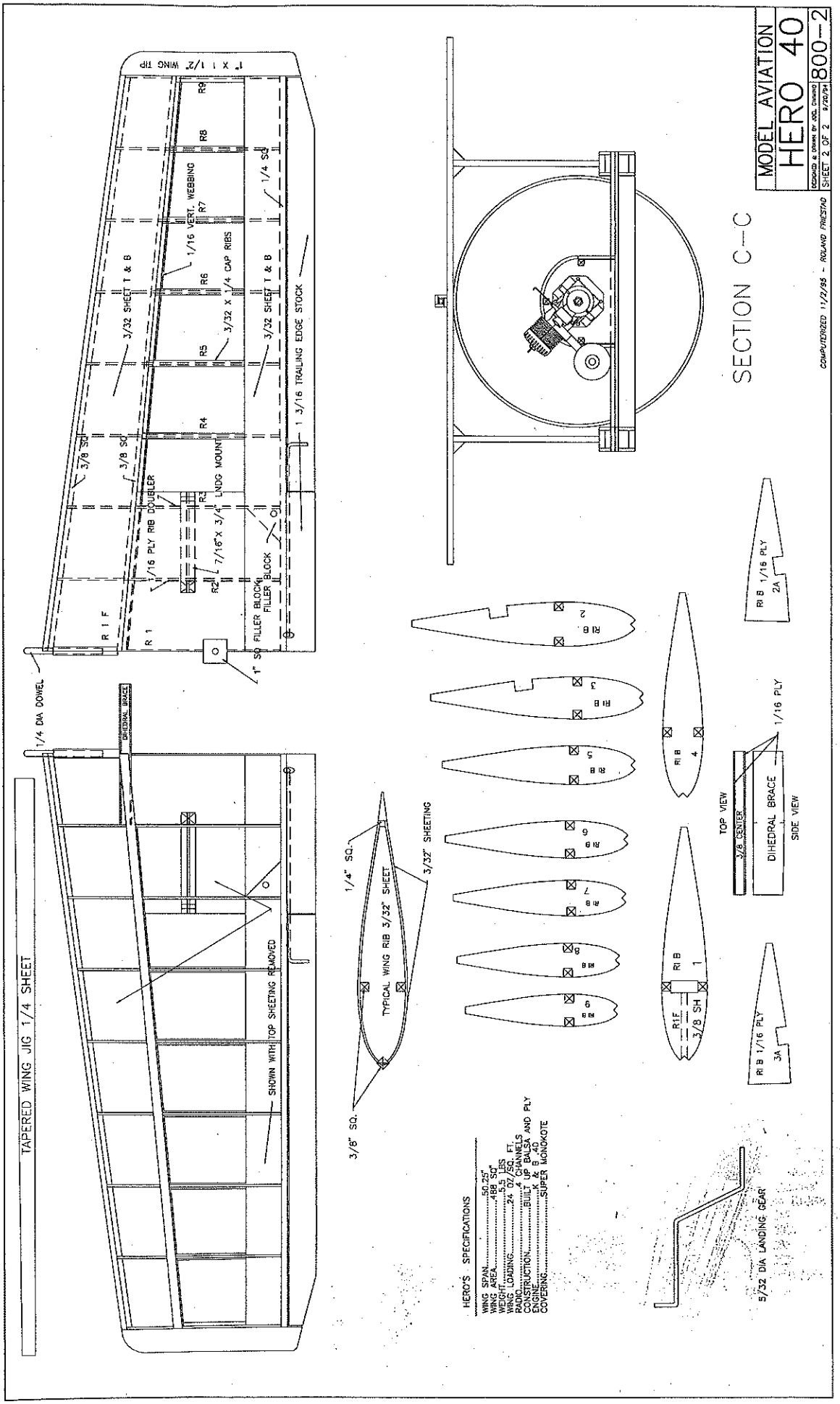


The elevator control Nyrod forms the leading edge of the center fin, then passes through the center boom.



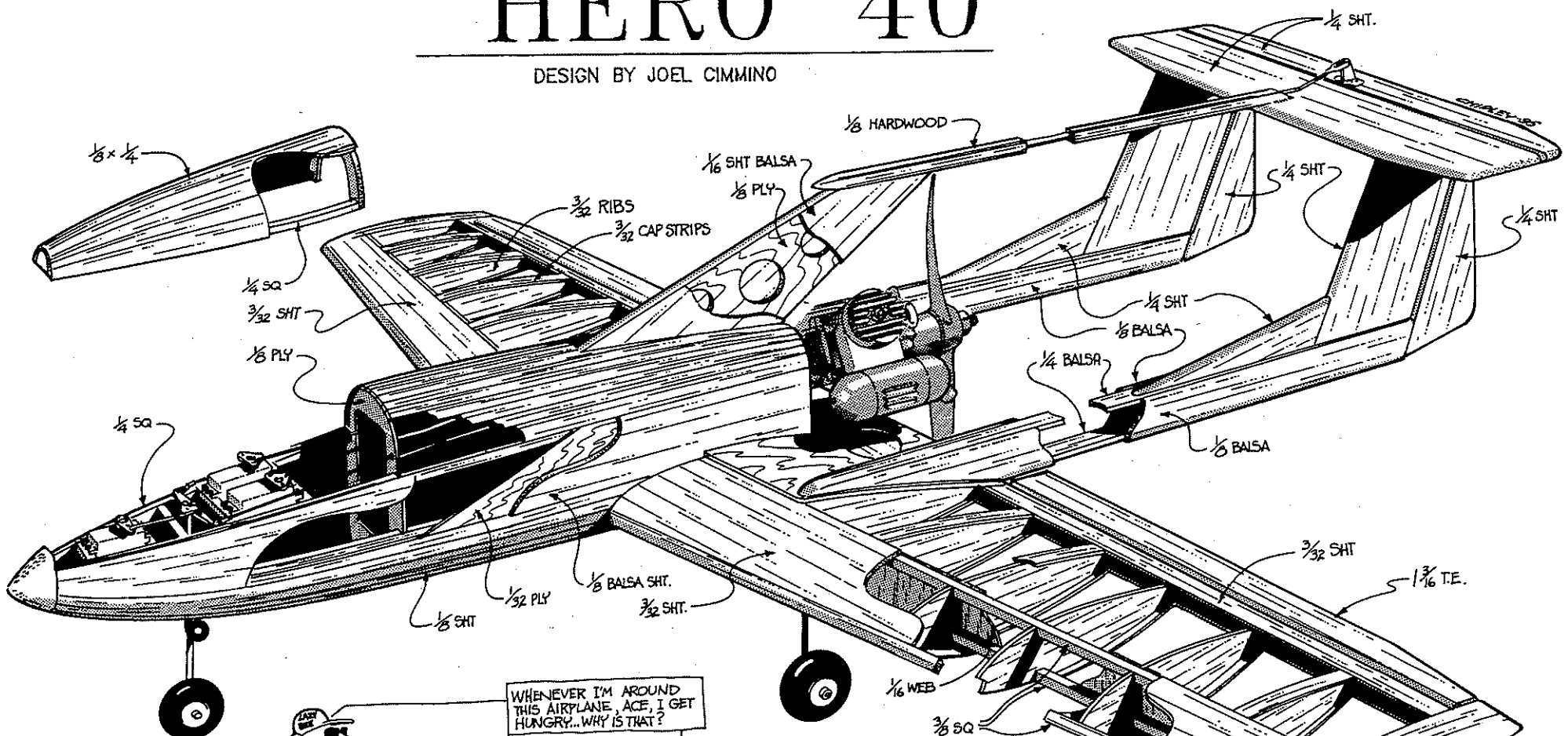
The framework prior to covering. With some modification the Hero could be used as an entry-level ducted-fan model.

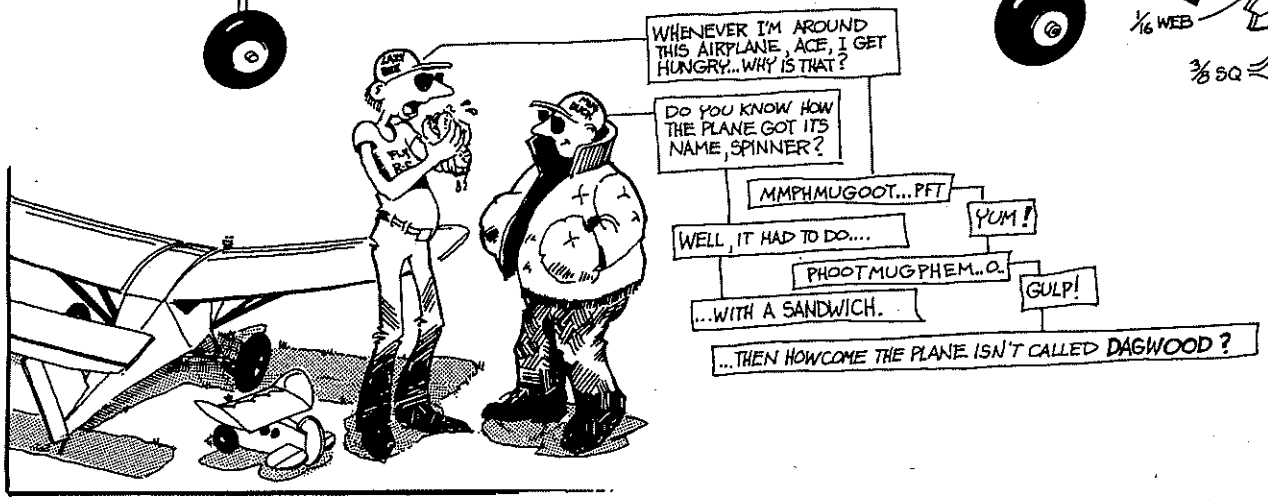

1/8 BOOM SIDES 4 REQ'D.
3/32 DIA. COPPER TUBING
RUDDER GUIDE TUBE
AT LEADING EDGE
OF 1/8 PLY WING PLATFORM
1/8 PLY
PLATFORM
WING SADDLE
SHOWN WITH HATCH REMOVED
1/4 SHEET
F1
F2
F3
F4
F5
F6
LIGHTING HOLES
RUDDER CONTROL CABEL
NOTE: ▽ = 1/8" BALSA SIDE
▽ = 1/32" PLY DOUBLER
▽ = 1/8" LITE PLY WING PLATFORM
NI-ROD
1/8 HARDWOOD
SECTION B-B
1/8 SHEET
1/4 PLY
1/8 PLY
CUT AFTER PLANKING
1/8 X 1/4 PLANKING
1/8 SIDE
1/32 PLY DOUBLER
1/8 SH. BOTTOM
F6 1/8
1/8 PLY - 1/16 BALSA EA. SIDE
CUT AFTER PLANKING
1/4 SHEET
PROP SHROUD
SEE TEXT
10 OZ TANK
1/4 SQ
1/8 DOWEL
2"X2"X 1 1/4" NOSE BLOCK
RUDDER CONTROL CABLE
1/32 PLY DOUBLER
C.G. SPAN
1/8 SHEET
1/8 X 1/4 PLANKING
2 1/4 WHEELS
SECTION A-A
SHOWN WITH RIGHT SHEETING REMOVED
COMPUTERIZED 11/2/95 - ROLAND FRIESTAD
MODEL AVIATION
HERO 40
DESIGNED & DRAWN BY JOEL CUMMINS
SHEET 1 OF 2 5/20/94
800-1


MODEL AVIATION
HERO 40
800-2
SHEET 2 OF 2
COMPUTERIZED 11/2/95 - ROLAND FRIESTAD
SECTION C-C
TAPERED WING JIG 1/4 SHEET
1/4 DIA DOWEL
DIHEDRAL BRACE
SHOWN WITH TOP SHEETING REMOVED
1" SQ FILLER BLOCK
FILLER BLOCK
1/16 PLY RIB DOUBLER
7/16"X 3/4" LNDG MOUNT
3/32 X 1/4 CAP RIBS
1/16 VERT. WEBBING
3/32 SHEET T & B
1/4 SQ
3/8 SQ
1 3/16 TRAILING EDGE STOCK
1" X 1 1/2" WING TIP
R1F
R1
R2
R3
R4
R5
R6
R7
R8
R9
TYPICAL WING RIB 3/32" SHEET
1/4" SQ.
3/32" SHEETING
3/8" SQ.
TOP VIEW
1/16 PLY
3/8 CENTER
DIHEDRAL BRACE
SIDE VIEW
RIB 1/16 PLY 2A
RIB 1/16 PLY 3A
RIB 3/8 SH
5/32 DIA LANDING GEAR
HERO'S SPECIFICATIONS
WING SPAN.....50.25"
WING AREA.....858 SQ"
WING WT.....45 LBS
WING LOADING.....24 OZ./SQ. FT.
RADIO.....4 CHANNELS
CONSTRUCTION.....BUILT UP BALSA AND PLY
ENGINE.....K & B .40
COVERING.....SUPER MONOKOTE

HERO 40

DESIGN BY JOEL CIMMINO





Prop Shroud: The basic airframe is complete; the prop shroud is not needed to fly this airplane. If you wish to build the shroud, get a five-gallon bucket—the type used for joint compound or laundry detergent. This will be used as the former for the ring. These buckets are 10½ inches in diameter at the bottom—just the right size. Cut a ⅛ balsa sheet into three-inch strips. Using CyA, glue them side-by-side, forming a cross-grained plank about 33 inches long.

Place plastic wrap around the bottom of the bucket. Wet one side of the plank, then wrap it around the bottom edge of the bucket. Let it dry. Glue the open ends together to form one big ring around the bottom of the bucket. Epoxy a layer of medium glass cloth around the plank.

After the epoxy has cured, remove the shroud from the bucket. Now put the prop shroud *inside* the bucket. Trim and sand the airfoil as shown. You must add a layer of cloth to the inside of the prop shroud. Tack the cloth in place with CyA first. Cut slits that run parallel to the grain, then work the epoxy into the cloth. When the epoxy hardens, sand the shroud completely. The shroud is very strong and light.

I did not use the prop shroud on my first flight. I trimmed the airplane *first*, then added it on the fifth or sixth flight.

Finish: After making the ailerons, the elevator, and the rudders, hinge all of the surfaces. Install Nyrods (the type that do not expand or contract with temperature differences) to the elevator and the engine.

At this point I add two coats of clear acrylic lacquer to the airframe, sanding between coats. I find that this makes the wood stronger, and the MonoKote seems to stick better.

My friends tease me because I always make my models' wings yellow and the fuselages red. They say I have 500 yards of each color. They're wrong—I have *1,000* yards of each. Anyway, they're the colors I see best in the air.

If you are going to use rudder control, install copper tubing (bent in an S shape) to the front of the Lite Ply platform.

I originally used 30-pound-test stainless-steel fishing leader for the pull-pull to the rudders. I had problems with radio interference, so I moved the radio antenna from the top boom to the wingtip. I later changed the pull-pull to 30-pound-test monofilament. That cured the interference problem.

Install the engine and tank. The tank pickup will have to be modified. Bend a U in a length of copper tubing. This goes inside the tank; the pickup will be at the aft end of the tank.

After all of the radio equipment is installed, check the CG. It should be between the two marks shown. I found the rear mark (at 30% of the mean chord) to be best.

Flying: The first flight was a knee-knocker. As the model rolled down the runway

picking up speed, I advanced the throttle to full—and the engine coughed. I pulled back on the throttle and the airplane lifted off unexpectedly. I applied power slowly, and proceeded to circle the field. Once around, then I landed.

I had expected the aircraft to pitch down, so I had put up trim in the elevator—it did not need it. Because the mass of the aircraft is concentrated near its center of gravity, the airplane needs little elevator movement. It will respond very quickly to elevator—⅜ inch up and down is all you will need.

The Hero 40 doesn't fly differently than other airplanes, but it definitely *looks* different in the air. The booms are thin and become virtually invisible.

Landings are a joy. At 5½ pounds the model doesn't want to stop flying. At low throttle, pull back on the stick—when it slows down, the nose comes up, and the model lands on its main gear.

I should explain how the airplane was named. I had finished building the fuselage one day, and to help the glue dry I took it to the field and left it in the hot car. Around noon I took it out of the car to do some sanding (no mess in the house). Before long I had finished, and I put the fuselage back in the car. Fay, the wife of a fellow flier, asked me if I had finished eating my hero. (Here in New York, a large sandwich on Italian bread is called a "hero.") I explained to her that my new, unnamed airplane was not a sandwich but a triple-boom swept-wing .40-size pusher, where the booms were part of the fuselage. Fay looked at me, laughed, and asked "Did it have any cheese on it?" And so the name Hero 40.

If you choose the build the Hero 40, let me know how you like it, and what you think we should change.

Thanks to my good friends Norm Franzino and John Barbieri for their suggestions and their editing help. Thanks to my wife for allowing me to spend all that time at the computer and the flying field. ✈

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