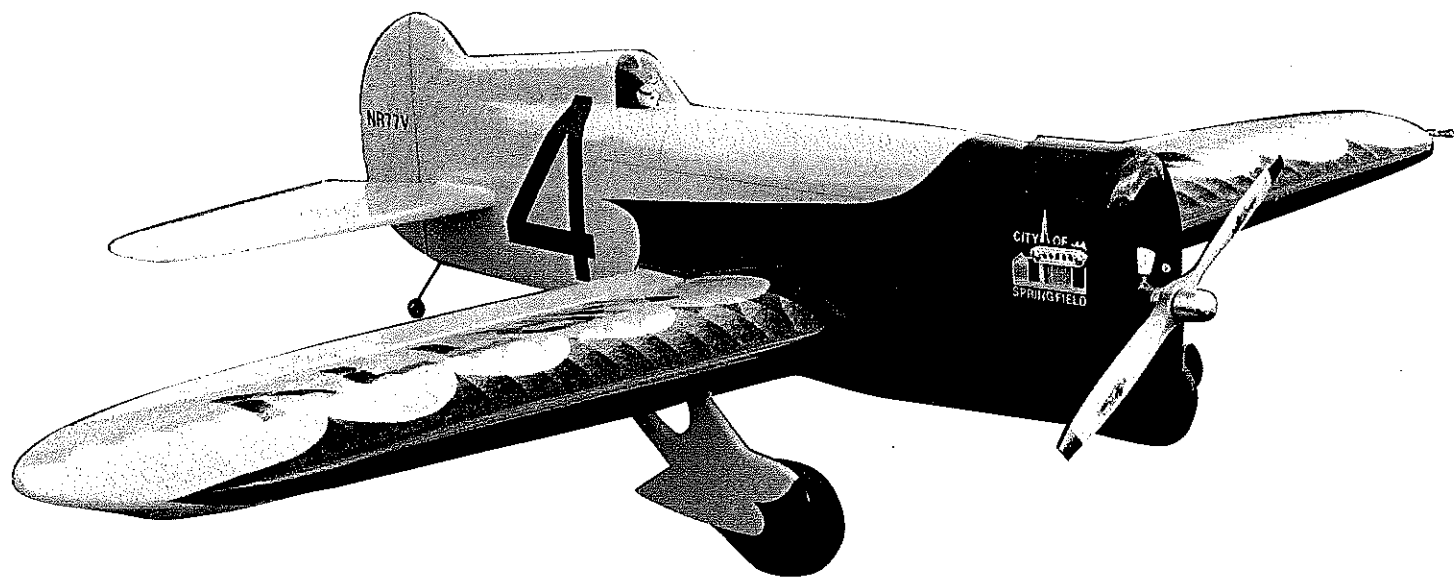


■ Jeff Kemp



# Gee Bee Model Z

*A different look for CL Aerobatics*

ROUGHLY THREE YEARS ago at a local hobby shop, I picked up a copy of *Model Aviation* in pursuit of some Control Line (CL) information. That, coupled with a recent visit with my younger brother, brought back the fun and exciting memories of flying.

When we were young, after farm chores we would drag out our 1/2A Goldberg models. My brother's was painted all yellow, and mine was painted orange and black—school colors.

Combat was our favorite game, and we would fly until one of us couldn't fly anymore; that is, until one of the airplanes was lacking too many pieces and enough covering to keep flying!

Now that I have a wife and two boys, I thought this would be a great father-and-son activity, and my wife would be entertained in the process. So after many years of no airplanes, we're back at it. (For the last four years, we've enjoyed going to area CL contests and camping and cooking out.)

The Granville Brothers' aircraft, commonly called Gee Bees, have always been "awesome" to me. After finding an article about Pat Johnston's Profile Scale R-2 Gee Bee in the May 1996 *Model Aviation*, I knew I'd found my beginner Stunter.

A call to Pat to help me reduce his .46-powered model to a .35-.40 size gave me an airplane that would fit in my car trunk. Thanks to Pat for his help and information.

During competition with the R-2, many individuals came up to talk to me about the Gee Bees and their builders, the Granville Brothers.

A trip to the local library brought me up to speed on the five brothers' lives, which were filled with hard work and fueled by their dreams for success and fame. Racing became their passion and livelihood.

Their first purpose-built racer was a showstopper. It was resplendent in yellow and black, and it seemed to exude an attitude of all-out speed. It was called the Model Z—possibly taken from the first letter in Zantford, who was the oldest brother.

The Model Z was later christened "City of Springfield" for the financial support and backing of the town's merchants.

It's time the Model Z hit the air again. This time not as a Thompson Trophy racer, but as a precision CL Stunt model.

### CONSTRUCTION

**Engine:** Whether your intentions are to fly for sport or competition, a good engine is the name of the game. Having the thrust to perform maneuvers such as the Horizontal Square Eight or the Hourglass is very important.

A steady, consistent engine run is fundamental to your timing in maneuvers such as Loops and Squares, and for giving yourself enough time to respond if your airplane is looking for a spot to become a lawn dart.

I did experience some engine difficulties, to say the least. The O.S. .40 that powered the R-2 Profile for two years, without missing a beat, suddenly went sour.

It didn't help that I had ground off the head fins to save weight and had enclosed it in a cowling. Naturally, this led to chronic overheating problems.

Bill Calkins pointed out to me that my cowling inlet-to-outlet ratio was off. He also said that a baffle to deflect air out the sides would help greatly. The cowling was changed to incorporate an outlet that was three times larger than the inlet.

I also dropped in a Stuka Stunt Works O.S. .35 engine swinging a 12.5 x 5.5 Bolly propeller.

With these changes made, I'm all smiles!

**Wing:** The wing for the featured Gee Bee consists of built-up ribs (Tom Morris) and laminated spar (Bob Hunt) with crossbracing. It may sound complicated, but build it in the order described, in a fixture or frame, and it will be the most awesome wing you'll ever build.

You'll need to cut 96 strip ribs first. Don't let this spoil your party; it can be done quickly and accurately with a template. (See photo.)

The wing will be built in halves, so construct the spar first. Follow the plans, building the 1/8-inch vertical-grain core. Taper this to match the plans.

Cap the top and bottom with 1/8 square spruce sticks using Bob Smith's medium-viscosity cyanoacrylate (CyA) glue. Spruce is five times stronger than balsa and only twice the weight!

Cut the 1/16 plywood doublers and epoxy them in place. When dry, CyA diagonal 1/16 sheeting all the way to the tip on both sides.

Cut out the bellcrank and leadout sections, and mark and drill pilot holes for the nylon landing-gear clips, and install the landing gear.

Mark the rib locations on the spar, and slide on the built-up ribs (A). Do not glue yet.

Taper the leading edge per the plans, and mark the rib locations on the leading and trailing edges. Support them on your building frame or fixture, making sure there are no warps and that everything is laying flat.

CyA the first rib out from the fuselage and the last rib before the spar tapers. Check the spar alignment, and CyA the remaining ribs in place. Glue in the rib-support spar and wingtip. Add strip ribs (B, C, D, and E) top and bottom from where the taper begins to the wingtips.

With the wing still in the fixture, add the 1/8 square



The author is justifiably proud of his scalelike Stunter. It's unique in the event, yet is very competitive.



Details make any model come alive. "City of Springfield" logo is shown on cowling. There's outstanding work in this model.



The Gee Bee's cowling must provide adequate cooling for the engine and have the proper inlet-to-outlet ratio.



A Stuka Stunt Works tuned O.S. .35 engine is nestled in a rigid mount. Notice the remote glow-plug wire and the plug-in jack system.

crossbracing with .007 carbon-fiber laminate using CyA. Do this on both sides.

Note the locations on the plans, and glue in, shape, and sand the leading and trailing edges.

The wing halves should be complete now, and they will be joined when the inner fuselage structure is complete.

**Fuselage:** Start with stiff C-grain  $\frac{1}{16}$  balsa sides (for the inner structure), and cut the sides to the dimensions shown on the plans.

Use 30-minute Bob Smith epoxy to attach the  $\frac{1}{32}$  plywood doublers. I like to laminate a piece of .02 carbon veil between the sides and the doublers for added stiffness.

Construct engine mounts from  $\frac{1}{2}$  square spruce with  $\frac{1}{2}$ -inch cross-grain balsa, as shown on the plan, and epoxy together. Be sure to bush the bolt holes with thick-walled aluminum tubing to prevent crushing the spruce mounts.

Mark the former locations on the inside and the bulkhead locations on the outside of the fuselage sides, and notches for the leading and trailing edges, bellcrank, and stabilizer slot at the rear. Cut the formers and mark centerlines on them.

It's time to join the halves. You can save yourself some headaches by joining the two fuselage sides in a fixture; it will hold everything in place.

Now it's time to join the wing halves to the inner fuselage structure. On a large, flat surface covered with a piece of drafting paper, draw a centerline for the fuselage and a  $90^\circ$  cross-line for the wing trailing edge.

Align the fuselage centerline with the line on the paper. With the fuselage upside-down, add weights so it won't move.

Align the trailing edge to the  $90^\circ$  line, and attach the wing half with the bellcrank, leadouts, flap horn, and linkage set inside the fuselage. Block each wingtip for half-inch dihedral; this improves the vertical center of gravity (CG) on this "fat"-body Stunter.

Epoxy in the  $\frac{1}{16}$  plywood braces and the  $\frac{1}{2}$  square spruce bellcrank mounts.

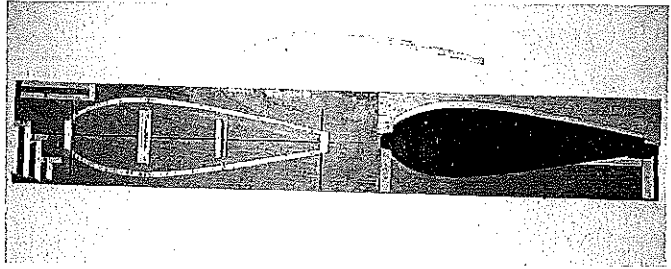
I need to stop here and mention an excellent video by Bill Werwage and Bob Hunt titled *How to Build I-Beam Wings*. It will knock the edge off any uncertainty in the wing and fuselage construction.

The video is available from Robin's View Productions, Box 68, Stockertown PA 18083.

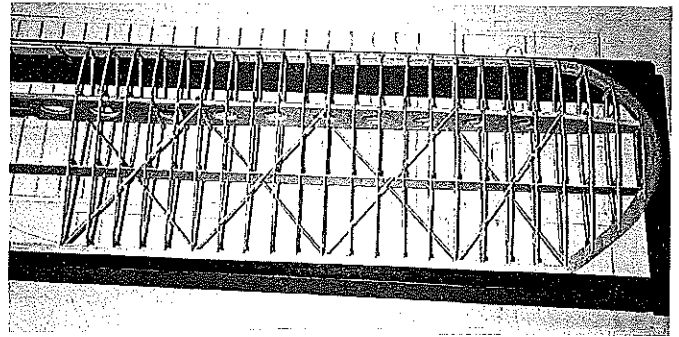
Take a break from the wing and fuselage at this point, and start cutting sheet balsa for the flaps, stabilizer, and elevator. Cut the centers of these pieces to accept the  $\frac{1}{16}$ -inch ribs, and assemble. This gives it a classic Gee Bee look.

The construction photos show crossbraces in all these surfaces. With proper wood selection, such as a hard C-grain, the bracing could be omitted to save weight.

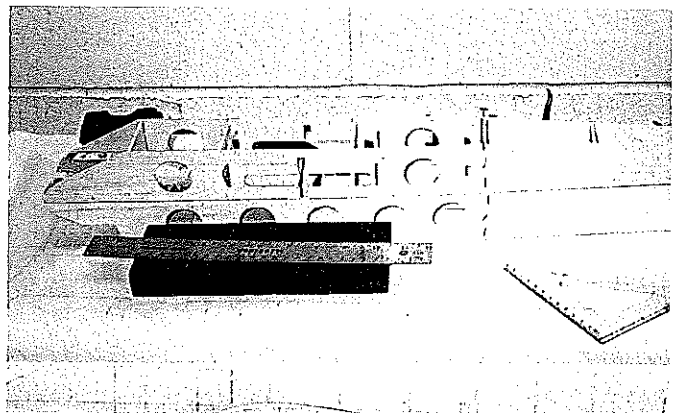
Cut the hinge slots, install the elevator horn, and construct the flap-to-elevator pushrod. I prefer a carbon-fiber pushrod.



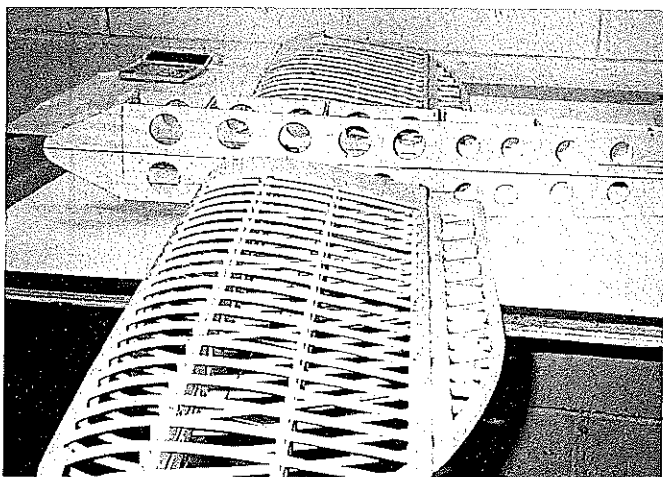
The rib fixture and the template. Using these makes the fabrication of the model's I-beam wing ribs a snap.



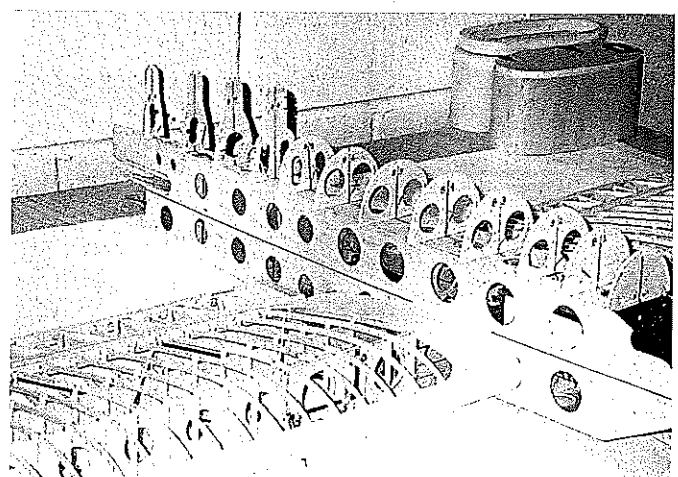
The wing is built in halves on a flat wing frame. Note the diagonal bracing and the rib-support spar. It's intricate!



The fuselage inner structure during construction. According to Jeff, using a fixture would make this job simpler!



The wing halves have been attached accurately to the model's fuselage structure. Notice the lightening holes.



With the top bulkheads installed, the model begins to take shape. Notice the cowling molds in the background.

# Gee Bee Model Z

**Type:** CL semiscale Stunt

**Wingspan:** 52 inches

**Engine:** .35-.40 two-stroke

**Flying weight:** 43 ounces

**Construction:** Built-up balsa

**Covering/finish:** Heat-shrink film

At this point you can attach the horizontal stabilizer to the fuselage. Fasten all linkages in permanently.

It's time to box in the fuselage for strength. Use  $\frac{1}{16}$  balsa cross-grain sheeting top and bottom.

Draw a centerline on the sheeting from the nose to the tail for bulkhead alignment. Install top bulkheads 1 through 12 and the  $\frac{1}{8}$ -inch firewall. Mark centerlines and stringer locations.

Notches in the formers can be made by gluing 120-grit sandpaper on the edge of a  $\frac{1}{16}$  balsa sheet and adding a depth stop for stringer width on the sides. Install stringers on the top bulkhead, and do the same for the sides and the bottom.

Now form the top and bottom decks. Make a mold from blue foam, using the firewall and bulkheads 1 through 7 for reference. Join two A-grain balsa sheets edge to edge lengthwise with medium CyA. You will have to notch the front and rear slightly so it will pull down on the form.

Soak the sheeting in hot ammonia water for a couple hours, and then, starting in the center, wrap to one end and then the other. Let this assembly dry for at least a day.

The lower deck and cowling are formed the same way. If molding balsa is new to you, give it a try; I think you will like the results. The weight savings compared to a carved block is worth the effort.

One more option is the planking method. I won't go into detail because I've never done it, but it may be worth considering.

To avoid putting a hole in the top of the cowling for glow-plug access, a remote was chosen and was located on the lower right side of the cowling. Mount the connector on the right lower doubler, and align the hole in the cowling for remote access.

Wheel-pants construction is straightforward as per the plans; relieve the  $\frac{1}{4}$ -inch sides approximately  $\frac{3}{32}$  inch to allow free wheel movement.

**Finishing:** Construction of the wings and fuselage are meant to accommodate heat-shrink film. No matter how tight you get the film, it will give and flex considerably.

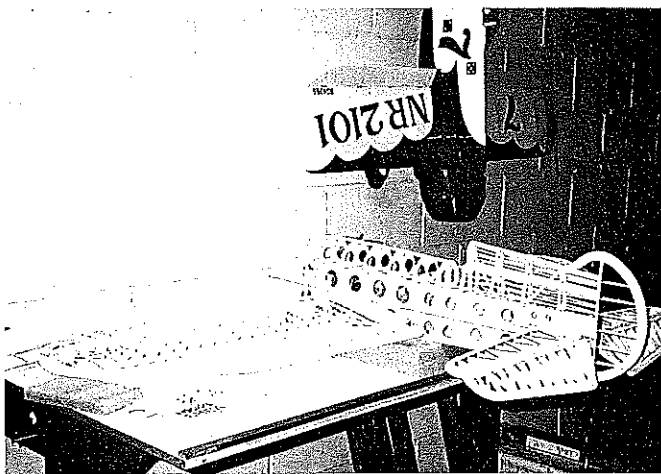
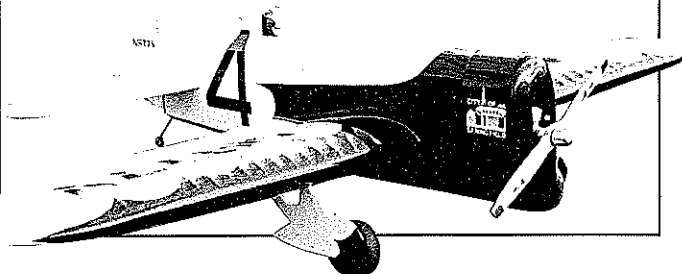
To fly a precision Stunt airplane and Pattern, flexing surfaces are a no-no! The wing crossbracing and inner-fuselage box structure help eliminate that problem.

I chose Carl Goldberg UltraCote® for the yellow, and the black is TopFlite® LustreKote™ spray. Use adhesive shelf paper to mask off to spray the black.

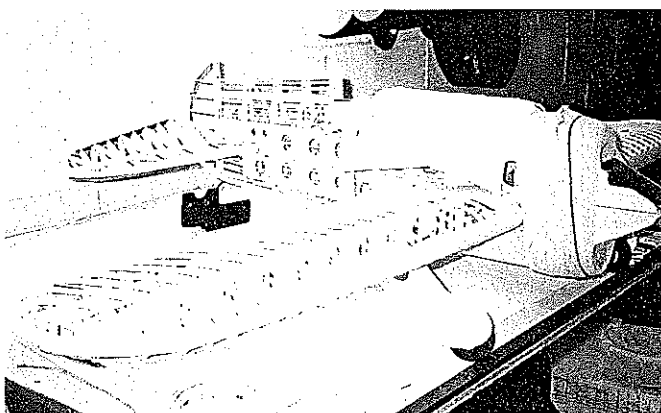
The best advice when using heat-shrink film is what Allen Goff shared with me: *take your time!*

**Final Preparations:** The tank box will hold a tank as large as five ounces. The O.S. .35 is consuming slightly more than four ounces to finish the pattern.

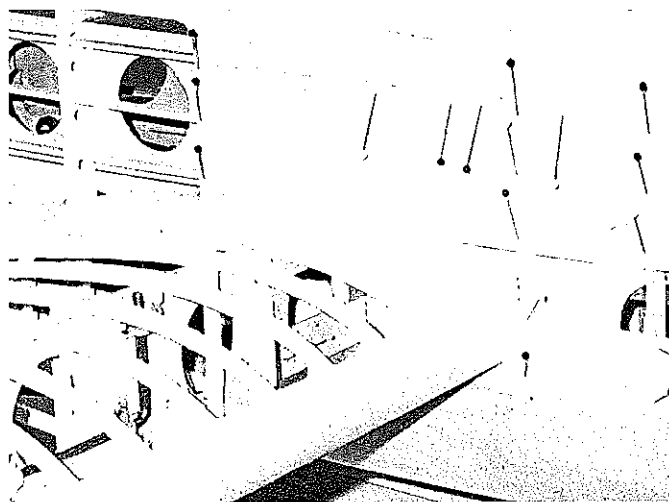
The best tank setup for the "Z" is a nonpressure uniflow. You



At this point in construction, the stabilizer, fin, and rudder have been added. Many stringers are in place too!



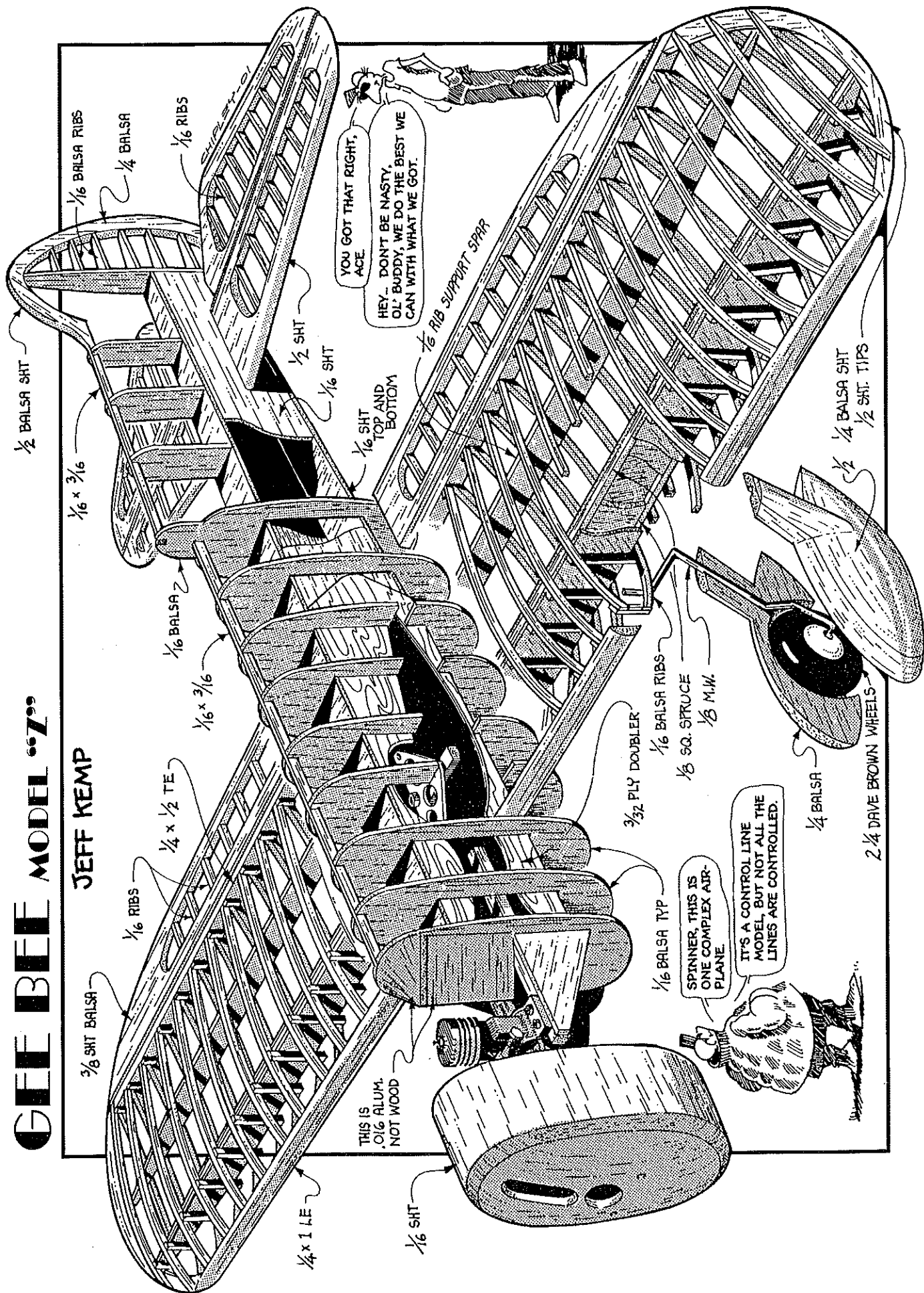
The molded top deck is held in place until the epoxy sets. The bottom sheeting is applied in a similar manner.



Hand me some more pins! The side sheeting is held in place as shown. A great deal of open structure means low weight.

# GEE BEE MODEL "Z"

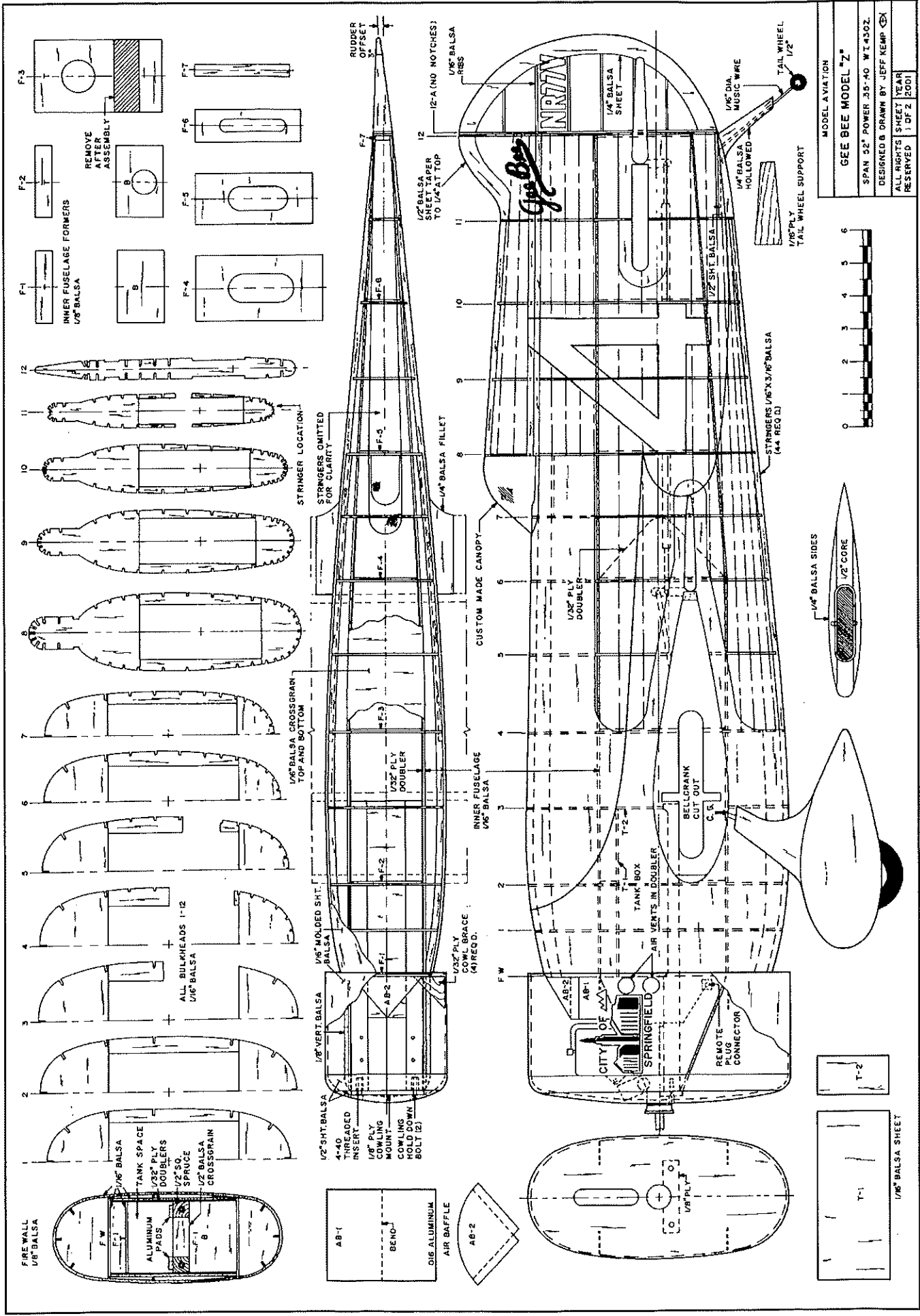
JEFF KEMP



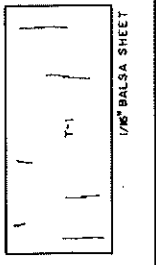
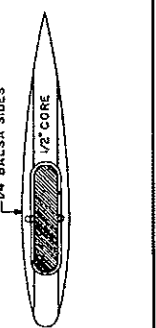
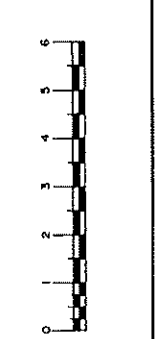
YOU GOT THAT RIGHT, ACE.  
HEY... DON'T BE NASTY, OL' BUDDY, WE DO THE BEST WE CAN WITH WHAT WE GOT.

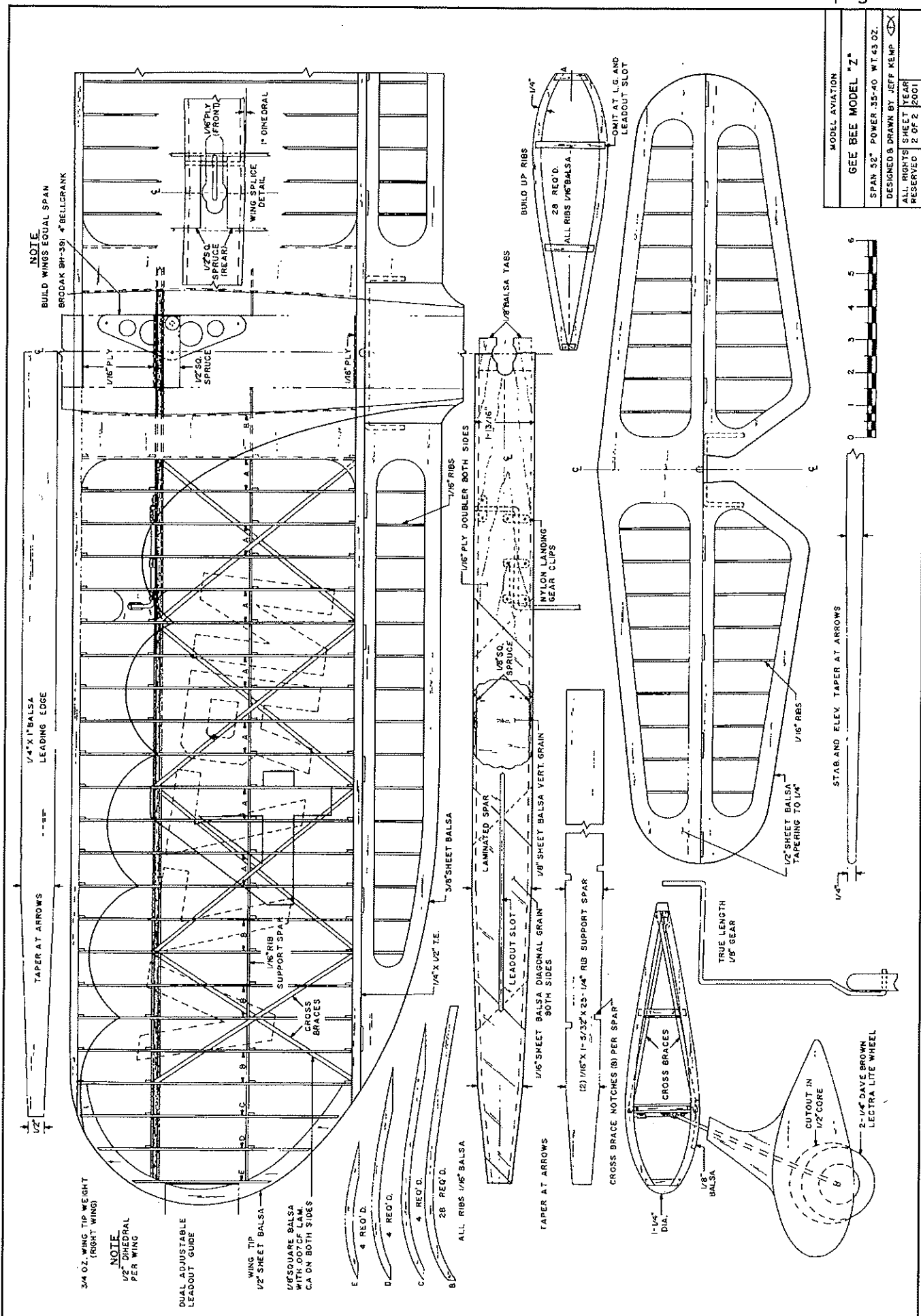
SPINNER, THIS IS ONE COMPLEX AIR-PLANE. IT'S A CONTROL LINE MODEL, BUT NOT ALL THE LINES ARE CONTROLLED.

THIS IS .016 ALUM. NOT WOOD.

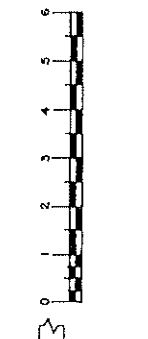


MODEL AVIATION	
GEE BEE MODEL Z*	
SPAN 52" POWER 35-40 W.T. #302.	
DESIGNED & DRAWN BY JEFF NEAMP (EN)	
ALL RIGHTS RESERVED	SHEET #YEAR
RESERVED	1 OF 2





MODEL AVIATION	
GEE BEE MODEL "Z"	
SPAN 52"	POWER .35-40 WT.43 OZ.
DESIGNED & DRAWN BY JEFF KEMP	ALL RIGHTS RESERVED
SHEET YEAR	2 OF 2 2001



3/4 OZ. WING TIP WEIGHT  
(RIGHT WING)

**NOTE**  
1/2" DIHEDRAL  
PER WING

DUAL ADJUSTABLE  
LEADOUT GUIDE

WING TIP  
1/2" SHEET Balsa

1/8" SQUARE Balsa  
WITH .0007" LAM.  
C.A. ON BOTH SIDES

E 4 REQ'D.  
D 4 REQ'D.  
C 4 REQ'D.  
B 28 REQ'D.  
ALL RIBS 1/8" Balsa

1/4" x 1/2" T.E.

1/8" SHEET Balsa

LAMINATED SPAR

LEADOUT SLOT

1/8" SHEET Balsa DIAGONAL GRAIN  
BOTH SIDES

(2) 1/8" x 1-5/32" x 25-1/4" RIB SUPPORT SPAR

CROSS BRACE NOTCHES (8) PER SPAR

1-1/4" DIA.  
1/8" Balsa

CROSS BRACES

TRUE LENGTH  
1/8" GEAR

CUTOUT IN  
1/2" CORE

2-1/4" DAVE BROWN  
LECTRA LITE WHEEL

1/8" Ribs

1/2" SHEET Balsa  
TAPERING TO 1/4"

NYLON LANDING  
GEAR CLIPS

1/8" Balsa TABS

1/2" PLY DOUBLER BOTH SIDES

1/8" PLY

1/2" SO. SPRUCE

1/8" PLY

1/8" PLY

1/2" SO. SPRUCE

1/8" PLY FRONT

1/2" SO. SPRUCE

WING SPLICE  
DETAIL

1" ONE DRAL

BROOKLYN 8H-391 BELL CRANK

1/4" x 1" Balsa  
LEADING EDGE

TAPER AT ARROWS

1/2"

1/4"

TAPER AT ARROWS

1/8" Ribs

BUILD UP RIBS  
28 REQ'D.  
ALL RIBS 1/8" Balsa

OMIT AT L.G. AND  
LEADOUT SLOT

STAB AND ELEV. TAPER AT ARROWS

1/4"

If you can dream it, you can do it...

## Lifestyle with altitude



Some call it a sport, others call it a hobby – whatever you call Radio Controlled Model Flying, you'll feel right at home when you become a "model resident" at Colonnades On Top Of The World.

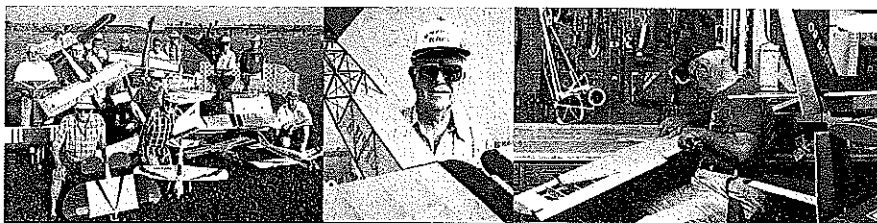
Radio Controlled Flying has taken on a whole new meaning at Colonnades in beautiful Ocala, Florida. If you're a veteran R/C Pilot a "vista of blue sky" invites you to perform those special aerobatic maneuvers, year 'round. Or, if you're ready to make your first solo you can get some pointers from a friendly instructor.



*Colonnades*  
ON TOP OF THE WORLD/OCALA

Home and lifestyle from 80's to 200's  
1-800-421-4162 or (352) 854-0805 [www.colonnadesfl.com](http://www.colonnadesfl.com)

The complete offering terms for the On Top Of The World Owner's Association, Inc. are in the offering plan available from the sponsor, On Top Of The World-Central, 8447 SW 93rd Street Road, Ocala, FL 34408. NY#H67-0002



everything's possible!

will need to extend the uniflow tube to the front of the engine, protruding slightly from the cowling intake.

You will also need to relocate the overflow on the tank. Close off the bottom and relocate it at the upper corner, and extend the tubing through a hole in the front cowling and plug it off after fueling.

The balance point is shown on the plans. It finished ready to fly in the CG department! I couldn't do that again if I tried.

However, if it hangs slightly tail-heavy, add some weight to the nose; a short, stubby airplane does not need to be tail-heavy!

I use 63 feet of .012-inch-diameter solid lines and shoot for 5.1 to 5.2 seconds per lap.

Before you start construction, set a goal for your aircraft's finished weight. If Stunt contesting is in your plans, think light all over. Use only four- to six-pound-per-cubic-foot balsa, and use lightening holes in the structure.

The plans don't show the cutouts to save weight, but the photos should prove helpful in this respect.

If you would like to save time and effort, you can order the molded deck, canopy, and extended tongue muffler; just contact me.

This project is the result of many great, skilled modelers' efforts. A big thank you to the Capital City Control Liners. The members of this fine club were my on-the-spot troubleshooters; great minds flock together.

I showed up at the AMA Nationals with the first outline of the Gee Bee Z on paper, and the following fine individuals helped sort out my mistakes and offered some much-needed advice. Thanks to Bob Hunt, Ted Fancher, Windy Urtnowski, John and Jack Sunderland, Bob McDonald, Jim Lee, and Joe Reinhard.

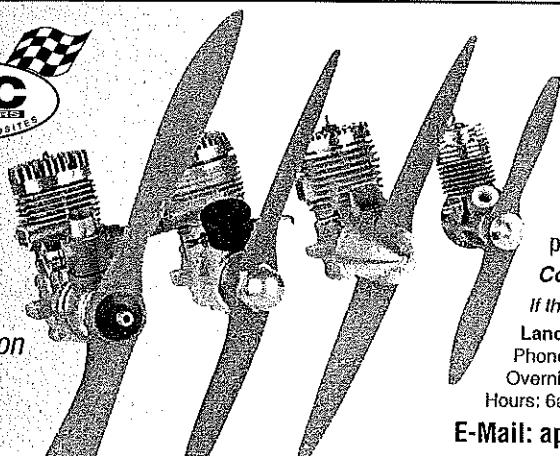
And thanks, especially, to Sharon for the coffee and encouragement.

Go build this air-racing classic, and enjoy the thrill of watching the yellow-and-black City of Springfield fill the sky! MA

Jeff Kemp  
4822 Gratiot Rd.  
Newark OH 43055



The  
**No. 1**  
**Choice**  
of Competition  
Modelers  
Worldwide!



**Competition propellers** for the intermediate and advanced sport flyer as well as the competition community. Advanced designs using modern computational methods and materials. Over 300 pitch / diameters available ranging from slow-flyer electric to High performance Giant Scale Unlimited Racers.

**Visit the APC Prop Website** for detailed information on product design and current product availability

**Contact your local hobby dealer first.**

If they don't have what you need, order direct from:

**Landing Products** 1222 Harter Ave., Woodland, CA 95776

Phone (530) 661-0399 or visit our convenient web site.

Overnight delivery is available and all props are in stock.

Hours: 6am – 2pm PST



E-Mail: [apcprop@aol.com](mailto:apcprop@aol.com) • Home Page: [www.apcprop.com/](http://www.apcprop.com/)