

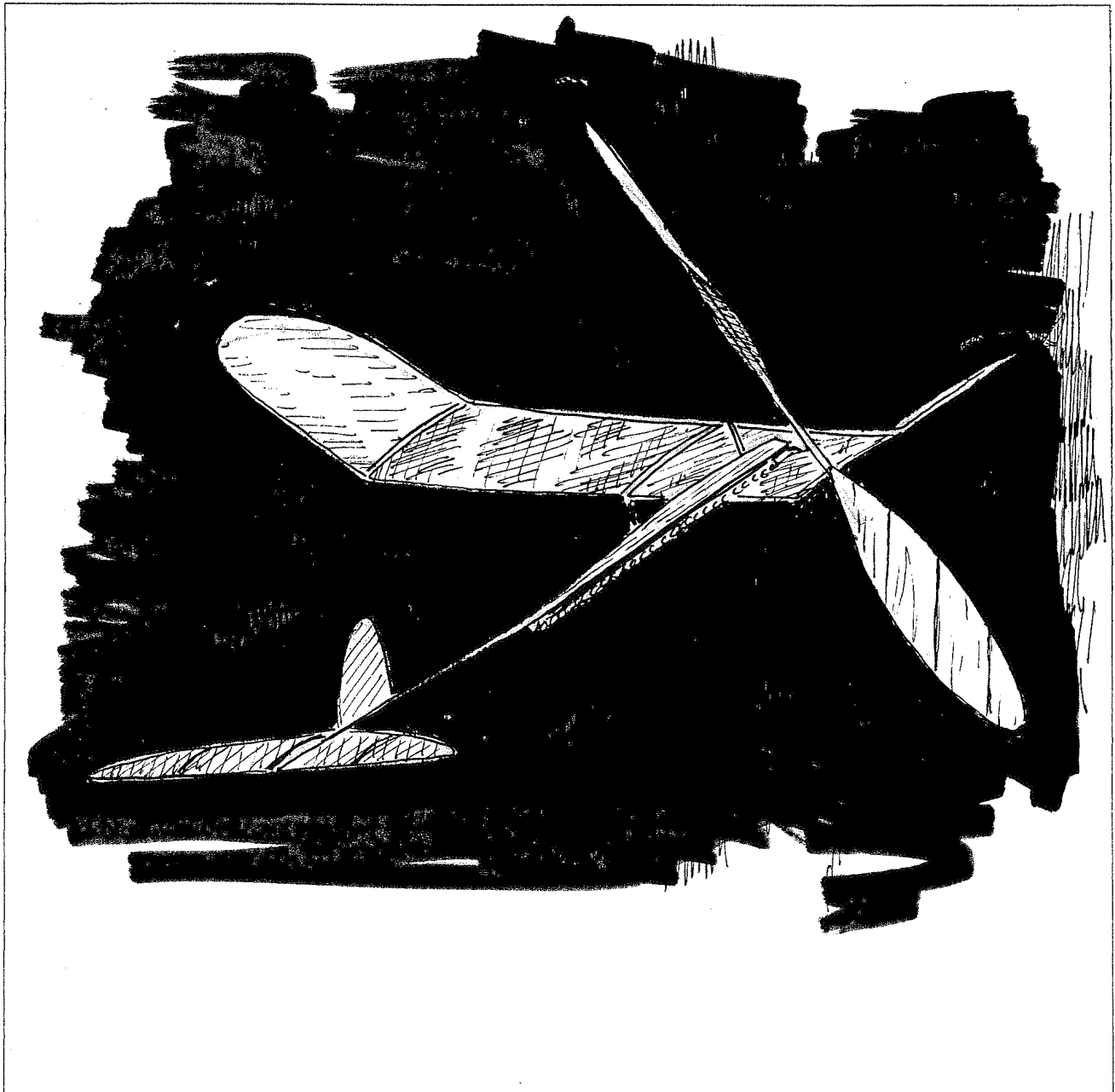
Issue 107 2002

Micro-B EZB Class

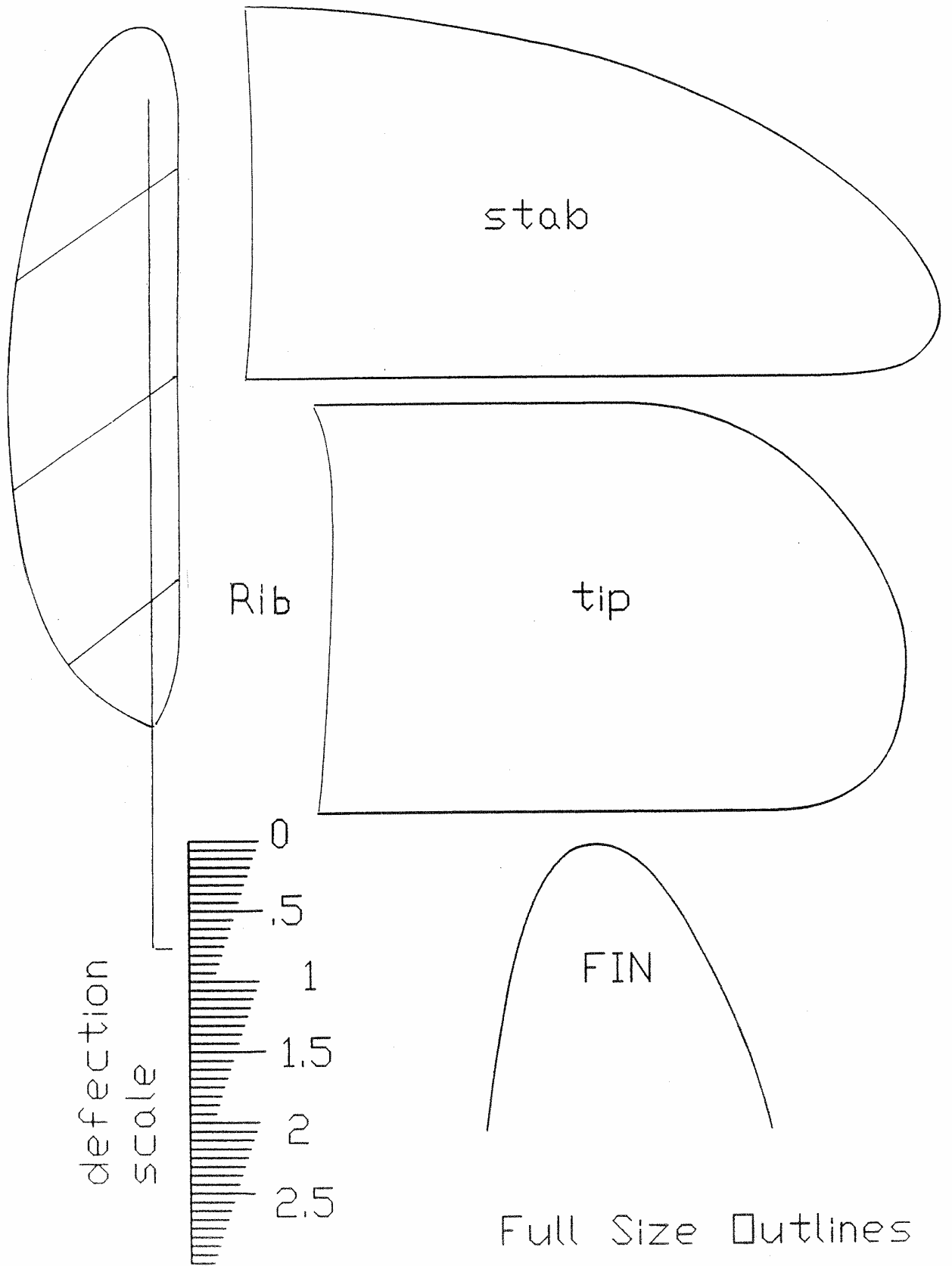
By Larry Coslick

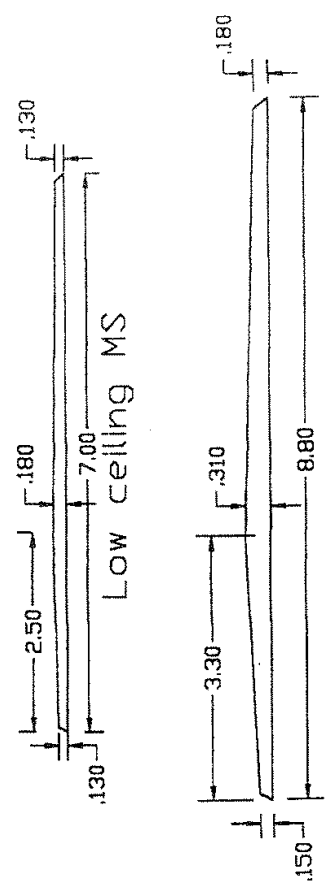
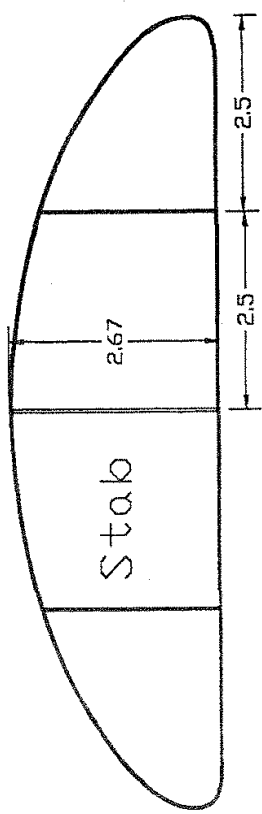
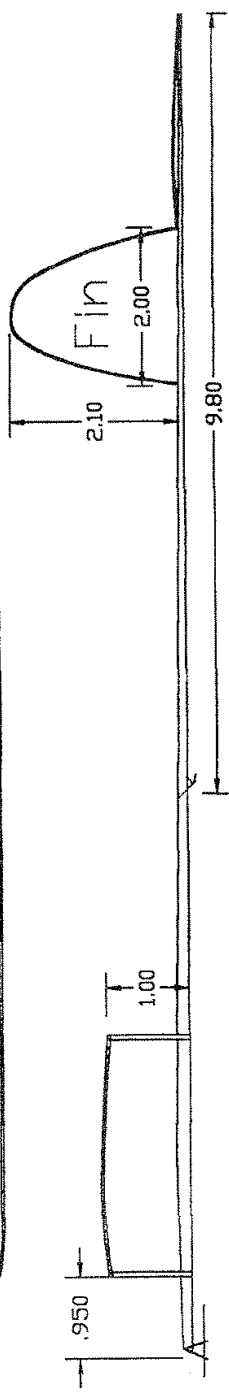
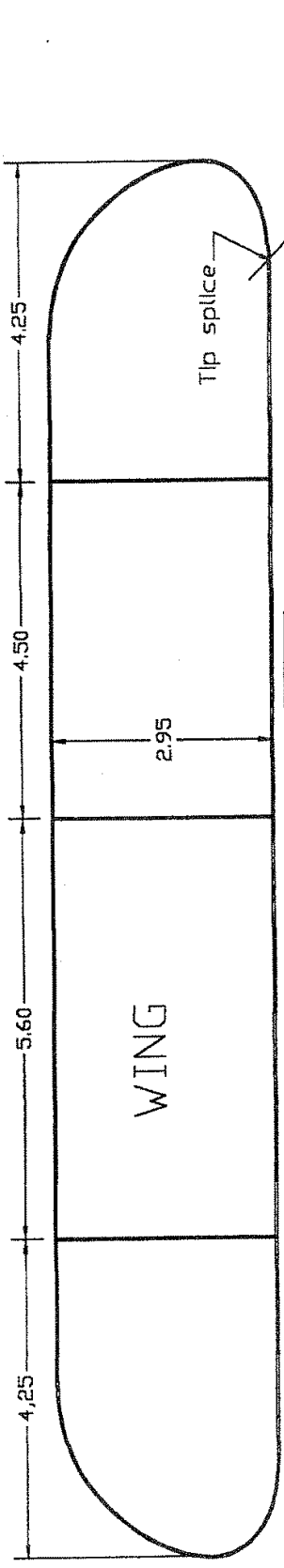
Drawings By Steve Gardner

There are a lot of indoor modelers that don't go to Johnson City or fly for records in sites such as Akron or Lakehurst. If you fly an EZB for fun or competition in sites up to 60 feet that have dirty ceilings, you might want to build this micro light EZB. This model uses a 7" motor stick and by carefully selecting light stiff wood it can be built under 0.4 grams. The models light wing loading allows it to post no touch flights up to 17 minutes, in a 35 foot ceiling and over 24 minutes in a 60 foot site. With a good flaring prop and the right rubber combination, the prop RPM's are in the low 60's. It's like flying a miniature FID

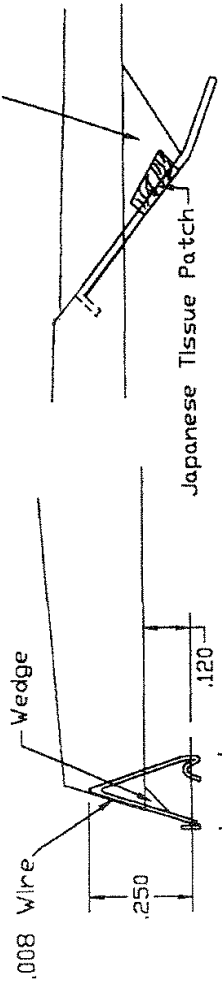


Akron Light & Micro-B





.030 balsa gusset



MICRO-B

Designed by Larry Coslick
 Drawn by Steve Gardner
 3-11-02

Wood sizes and Dimension Micro-B and Akron Light

		MicroB	Akron Light
MOTOR STICK	SIZE	.095 x .130 to .095 x .180 to .095 x .130 x 7"	.101 x .150 to .101 x .310 to .101 x .180 x 8.8"
	DENSITY	3.9#	4.3#
	WEIGHT	.102 gram	.187 gram
TAIL BOOM	SIZE	.055 x .070 to .025 x .025 x 9.8"	.075 x .090 to .030 x .035 x 10"
	WEIGHT	.032 gram	.038 gram
	DEFLECTION	.75 With a .27 gm weight at the end of the boom	5/8 with a .27 gm weight at the end of the boom
L/E WING SPAR	SIZE	.025 x .067 x 10.5" Only taper last 1" each end	.025 x .070 x 10.5" Only taper last 1" of each end to .06
	DENSITY	4.8 # Unreal stiff	4.8# Unreal Stiff
	WEIGHT	.025 gram before cutting to final length	.028 gram before cutting to final length
	DEFLECTION	7/16" with a .34 gram weight at 5"	5/16" with a .34 gram weight at 5"
T/E WING SPAR	SIZE	.025 x .061 x 16.5"	.025 x .065 x 16.5"
	DENSITY	4.8#	4.8#
	WEIGHT	.032 gram before taper and cutting to final length	.036 gram before taper and cutting to final length
	DEFLECTION	7/8" with a .2 gram weight at 8"	3/4" with a .2 gram weight at 8"
WING TIPS	SIZE	.025 x .060 to .025 x .035 x 8.5"	.025 x .060 to .025 x .035 x 8"
	DENSITY	3.4#	3.6#
	WEIGHT	.018 gram for 2 No deflection test on tips	.021 gram for 2 No deflection test on tips
WING RIBS	SIZE	.018 X .055	.018 X .055
	DENSITY	4.5#	4.5#
	WEIGHT	.01 gram for 3	.01 gram for 3
WING POSTS	SIZE	.032 x .058 x 1"	.032 x .058 x 1"
	DENSITY	8 to 9#	8 to 9#
	WEIGHT	.01 gram	.01 gram
STAB SPARS	SIZE	.023 x .027 x 18"	.023 x .027 x 18"
	DENSITY	4# Unreal Stiff	4# Unreal Stiff
	WEIGHT	.020 gram for 2	.025 gram for 2
STAB RIBS	SIZE	.008 X .030"	.008 X .030"
	DENSITY	4.5#	4.5#
	WEIGHT	Under .003 gram for 3	Under .003 gram for 3
FIN	SIZE	Same as stab spar	Same as stab spar
PROP BLADES	SIZE	.006 C Grain See plan	.006 C Grain Same outline as Micro-B
	DENSITY	3.8# .006 x 1.2 x 18" Sheet weight .13 gm	4.3# .006 x 18 x 1.2 Sheet Weight .15 gm
	WEIGHT	.06 gram for 2	.075 gram for 2
PROP SPAR	SIZE	.035 x .058 to .025 x .030 x 6.2" 2 Dbl tapered spars	.040 x .060 to .025 x .025 x 6.2" 2 Dbl tapered spars
	DENSITY	4.6#	5#
	WEIGHT	.02 gram finished weight cut to 12.25"	.03 gram
	DEFLECTION	.4" at 4.5" with a .2 gram weight	1/4" at 4.5" with a .2 gram weight
PROP SHAFT	SIZE	.008"	.009"
	WEIGHT	.005 gram	.007 gram

Weight of Component Parts

	MicroB	Akron Light
WING DRY	.080 GRAM	.090 GRAM
WING COVERED WITH Y2-K2 AND DIHEDRAL	0.100	0.110
WING COMPLETE WITH POSTS	0.110	0.120
STAB DRY	0.013	0.018
STAB COVERED	0.02	0.026
FIN DRY	0.003	0.003
FIN COVERED	0.005	0.005
MOTOR STICK 7"	0.102	0.187
M/S WITH THRUST BEARING AND REAR HOOK	0.113	0.204
M/S WITH BOOM 10"	0.146	0.243
M/S WITH WEDGE AND TISSUE	0.149	0.246
M/S WITH CONDENSER PAPER TUBES	0.153	0.251
M/S COMPLETE WITH STAB AND FIN	0.180	0.285
PROP SPAR CUT AND GLUED 12"	0.020	0.030
PROP SPAR WITH .008 M/W SHAFT	0.026	0.040
PROP SPAR WITH BLADES ATTACHED	0.092	0.120
WING AND POSTS	.110 GRAM	.120 GRAM
FUSELAGE AND TAIL ASSEMBLY	0.180	0.285
PROP 13.25X25P	0.092	0.120
TOTAL	0.382	0.525

Y2-K2 Film weighs approximately .00033 gm/sq in and Super77 spray weighs about .004gm on an EZB wing depending how it is applied

Motor stick side deflection was made with the penny test using the new 7.9 gm load weight. 7" Micro-B M/S passed the test by clearing the dime.

8.8" Akron Light M/S cleared the base by .020".

Motor stick torsion test was made using a 11.34" balance beam.

Micro-B M/S used a 0.4 gm weight to simulate .08 in/oz launch torque. Deflection was .6" Akron Light M/S used a 0.5 gm weight to simulate .1 in/oz launch torque. Deflection was .55"

MICRO-B AND AKRON LIGHT WOOD SOURCES

I used balsa from three sources to build both models. Wood for the prop, tail boom, ribs and wing tips came from Indoor Model Supply. Wing and stab wood was ordered from Tim Goldstein and the motor stick and wing post wood came from Sig Mfg. I will only cover the items in this article that I consider helpful in building the Micro B. INAV has back issues of the Hobby shopper article that covers everything that is needed to build the Micro B and Akron light EZB. Issue 90 is also available on the INAV Archive CD. All you have to do is to substitute the wood sizes to build both models.

For the new EZB flier, don't be too concerned about building a model under .7 or .8 grams. It's much more important to build a model where all the component parts work together in unison than to build it light. After some time and experience the two will come together and the magic will begin.

MICRO-B WOOD SELECTION

If you decide to build the Micro-B or Akron Light, wood selection is much more important now. There are going to be differences in the weight and stiffness of wing spars in any sheet of balsa. Indoor wood is no exception. Even though these variations may be slight, they can make a difference in the weight and stiffness of the model. Because of these differences, it's best to use the wood sizes and densities on my plan only as a guide. The wood weights for individual parts are included in this article, but it might be necessary to adjust the wood densities and sizes of your wood to match the required weight and stiffness of individual model parts. An example of these variations occurred while cutting spars for the stab. Two spars were stripped from a .023" sheet and weighed. From past experiences I knew that they should weigh about .02 gram but they weighed .025 gram for the pair. The sheet was turned over and two more spars were stripped from the other side. The second set weighed .02 gram and met my projected weight for the stab spars. A 20% savings over the first set. Sometimes it's necessary to cut spars or booms from four or five different sheets of wood to come up with just the right one.

I have built several of these 7" M/S EZB's under .4 gram using Indoor Model Supply wood with the lightest being .37 gram. That model was covered with the heavier poly-micro film.

I wanted to try Tim Goldstein's wood, which he calls Tru-Weight Indoor Balsa. He weighs each sheet to determine its density and makes a stiffness test on most sheets. I calculated the density on the sheets that were ordered and they were right on the money. I couldn't test the sheets for stiffness the way that he does but the cut spars exceeded my requirements for stiffness using my deflection jig. I really like the way that he grades his wood. It takes a lot of the guess work out of ordering balsa. Tim has a web site WWW.F1D.BIZ. The site lists the sheets that he has cut with its thickness, grain, density, width, length and stiffness on sheets over .019". It also tells of the wood is saw cut or surface ground.

WING SPARS

I ordered 2 sheets of A grain wing spar wood (3.9# .025) & (4.8# .025) unreal stiff. A wing was built from each sheet but the spars were cut about .003" shorter in height for the 4.8# wing. Both wings were usable, but the 4.8# wing was stiffer and weighed the same as the 3.9#wing. In the past few years I have found out that it's a good idea to have 2 wings for each EZB. Even though they appear to be set up the same, one will work better.

T/E WING SPAR

Taper the ends of the spar to .035". First, place a mark on one side of the spar to indicate the top. Put the spar on a flat surface and trap it between 2 wider strips of balsa, then tape it to the surface. Use a

straight edge as a guide & cut the 3" taper to .035". If the spar is not trapped, it will wander & you could possibly ruin the spar.

WING POSTS

Do not use soft wood for wing posts. I used 9# wood for both models. A strip .032 X .058 X 8" deflected .7" with a .2 gram weight. The difference between 6 & 9 # wood was about .003 gram for the pair.

STAB RIBS

I use 4.5# .008 C grain ribs on all of my new EZB's stabs. Reverse the airfoil so that the high point of the rib is closer to the T/E. The model will recover better if it tail slides. It's difficult to keep these thin ribs straight. So don't get frustrated if they are a little crooked.

MOTOR STICK – MICRO-B 7"

It takes 3.9# wood to get a M/S to weight close to .1 gram. Make sure to bend the cut M/S off to one side to see if it will spring back to it's original shape. If it doesn't, don't use it. I cut 6 M/S's from three different sheets and they were tested for the side bending test with the new 7.9 gram weight. All but 1 of the M/S's passed the test without moving the dime. The torsional twist test was made with a .4 gram weight to represent .08 in. oz. of winding torque and registered a .6" deflection. This is a new test and I do know that a .6" reading is good on an 8.5" M/S.

TAIL BOOM 9.8"

The boom that I used for the prototype might be a little stiff for the model weight. A boom that deflects 1" would be good for ceilings up to 50 feet, because the launch torque will be much lower.

THRUST BEARING .008" MUSIC WIRE

Make the T/B .250" high and .175" from the front to the rear of the pigtail. Insert the bearing in the M/S so that the prop shaft is no more than .12" below the bottom of the M/S. See hobby shopper article for bearing installation.

PROP SHAFT .008" MUSIC WIRE

Make the hook small because there is very little clearance under the M/S.

REAR HOOK

I call this a cheater hook because it adds .1" to the length of the M/S. Use .007 wire and make it as shown on the plan.

PROP SPAR DOUBLE TAPERED

For this model cut the spar at the hub higher than the width for a better flair. The finished spar should not weigh any more than .02 gram and .025 gram with the .008 M/W hook.

PROP BLADES

To build a prop that weights under .1 gram you will need a sheet of .006" C grain that weights .13 gram or under. Don't cut down on the blade area to make the prop lighter. It needs the area and flair to keep the light model out of the ceiling. The finished prop is 13.25" X 25P. The Hobby Shopper article goes into great detail on EZB prop construction. It's a good idea to build 2 or 3 props for the model. Make one with the spar mounted .1" from the blade T/E and the other .2" away. The third could be built with the blade mounted right at the T/E. If the spar should be too stiff or too soft the blades can be removed and replaced on another spar without any weight gain. Soak the whole prop in slightly warm water for at least 30 minutes. Rotate the spar gently while the prop is in the water and if the glue is soft enough the blades will fall off the spar. If not, re-soak for a while longer. Take a soft tooth brush and gently go over each spot that looks white until all of the glue is removed. Don't rub hard or the balsa will tear. Rinse well and re-pitch the blades. With some care, you can use the same blades over and over again. The cover picture shows a EZB with a symmetrical blade prop. Don't use this type prop blade in low ceilings. The pitch has to be set too high to control the launch torque and the high pitch won't utilize the cruse torque as well as a flaring prop.

SET UP AND TRIM

Follow the procedures in the Hobby Shopper Article, except for rubber sizes and torque readings. Always make a low power first flight to check the models circle and nose high flight attitude.

RUBBER AND TORQUE RANGES

Depending on ceiling heights and air quality you can expect to use loops from 6.5" to 8" in length and .025 to .030" wide. The shorter loops use the wider cross sections to keep the torque up in low sites. In a 60 foot site a loop .025" X 8" would be better. You will have to do a lot of test flying to come up with the right prop rubber combinations. Torque ranges will be around .04 to .05 in ceilings to 50 feet and .07 for higher ceilings.

DEFLECTION JIG FROM HOBBY SHOPPER ARTICLE

If you plan on building the jig, use the full size deflection scale that is included in this article. The distance between the two dowels of the test piece holder was not shown on the drawing of the deflection gauge. That distance is 1.6" from the left side of the first dowel, to the 0 mark on the larger dowel. Also, it's best to place a music wire stand off along the L/E of the deflection scale support. It keeps the spar from flexing away from the scale face.

NO TOUCH CONTEST

The Micro B was originally designed for no touch flying, so it's perfect for this kind of contest. The contest is flown in rounds with a minimum and maximum flight time for each round. If the model touches the ceiling during any round it's out of the contest. Depending on the flying skills of the group, the first round could be set at 7 minutes with a maximum of 9 minutes. The next round might be 9 minutes and so on. The more experienced fliers could be handicapped with a higher flight time per round. This type of flying really improves your skills in selecting the correct rubber size, prop pitch and torque requirements for each flight. This kind of event can be used with any type of indoor model.

GOOD LUCK
Larry Coslick