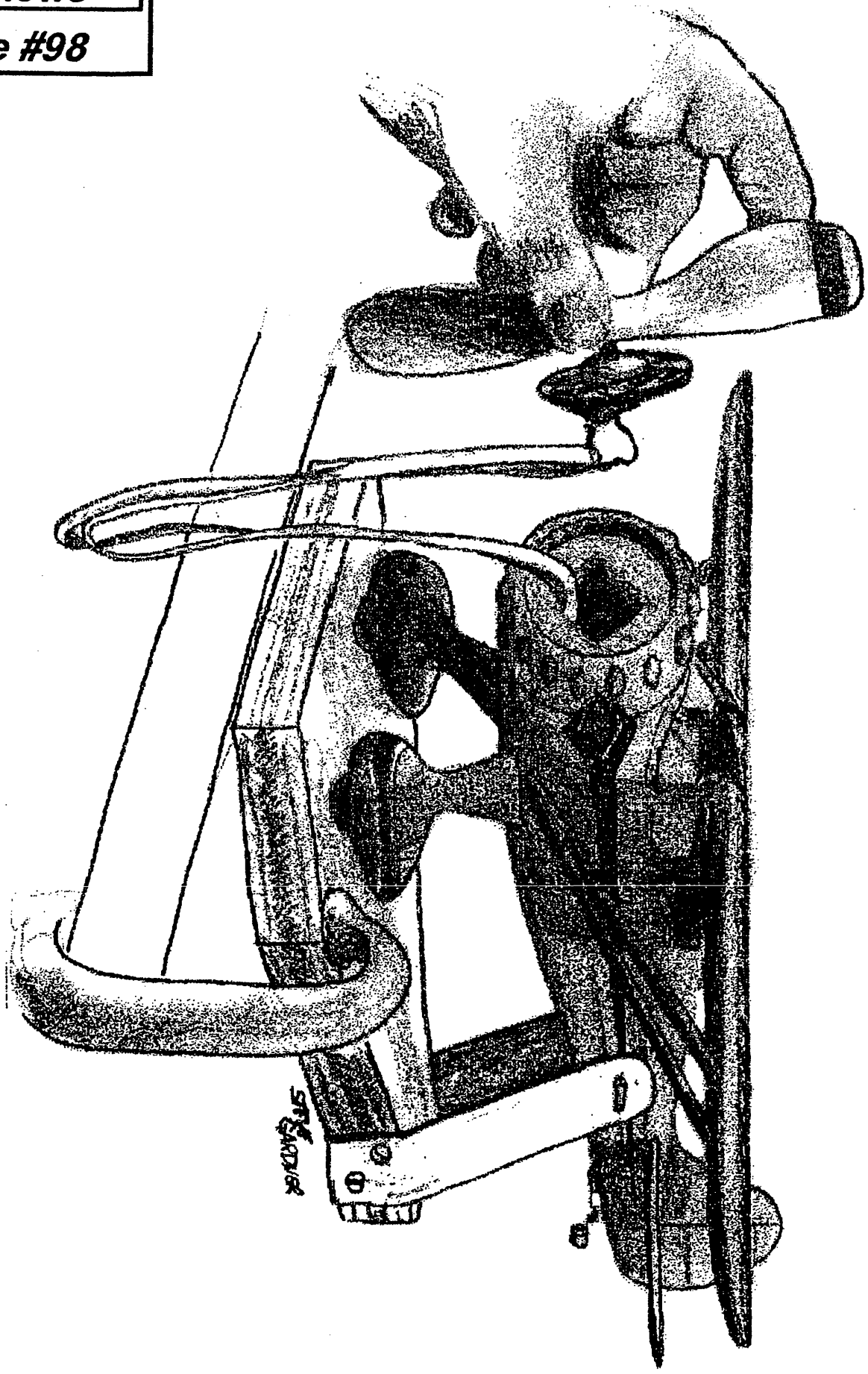
Indoor News and Views

Issue #98



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THE PRODUCERS ARE LOOKING FOR VOLUNTEERS TO TAKE OVER PUBLICATION OF INAV. ANYONE INTERESTED SHOULD CONTACT HOWARD HENDERSON.

Editorial

By Steve Gardner

I have been asked by Larry Coslick to take over as editor of INAV. Larry is in need of more time to apply to his other commitments such as his spot on the World F1D team and as well as his renewed interest in outdoor free flight. The indoor community has profited for the past few years from the commitment and pure hard work of Larry Coslick. As the sparkplug and co-editor of INAV Larry has brought the quality level of the INAV newsletter up to a nearly professional level. Few people understand the effort and time he has given up to this newsletter. While the contribution of his indoor expertise and innovations is obvious in the many articles he has written for us, the pure work in just getting the letter out is not so easily seen. Along with Roy White, Howard Henderson, and Gene Joshu the INAV group collects, edits, prints, addresses, and mails almost 80,000 pages of indoor info each year. Larry and the rest of the group do this newsletter as a service to the indoor community and we are very proud of the response this newsletter generates. I hope to manage as well as Larry has with the newsletter, but he has certainly set a very high mark for me to shoot for. Larry will still help publish the letter as well as contribute his super articles on the technical aspects of indoor competition.

This change in editorship means other changes as well. I now have the added work of compiling the letter along with all the drawing, drafting, and writing I did before. This means I need your help. If you do not send me enough material for a 40-page newsletter every ten weeks then INAV will shrink. YOU have to send in your ideas and plans, your methods and tricks and everything else you so enjoy seeing in the letter. This change in editorship along with some health problems has delayed this issue of INAV several weeks. One of the delays involves the lack of contributions. Larry has a very extensive network of people who he asked to contribute to INAV. He often would solicit contributions to fill out the newsletter when we failed to get enough material to make up an issue. I am not the people calling, letter writing, bug them until they send something kind of guy. There are over 400 subscribers and a single page of info from each of you every TWO YEARS would make the letter. There is plenty of neat stuff out there, and I am ready to put it into the letter if you will just send it. Also, I will not have the time to re-draft each plan or sketch or re-type each article, so make the contributions as neat and publishable as you can. Mike Palrang has been a great help in the drafting department and deserves many thanks, but he and I just do not have time to re-draw all of the plans that appear in INAV. It sounds corny, but it is YOUR newsletter, so contribute to it.

A change that may help get more input for the letter will be a broadening of the coverage of indoor flying. More sport flying, scale , electric, co2, and beginner level models will be covered in future issues. The pure endurance models will still be featured prominently, along with the tech articles aimed at better flight times, but we will have more variety such as the Bostonian stuff in this issue. Heads up you scale guys, we need you input!

Building
Better
Bostonians
By Steve Gardner

I love Bostonians. I think they are the perfect blend of scale and endurance. They look pretty and are more interesting in design than most endurance models. They fly long enough to be satisfying and they are beautiful to watch in flight. For those of us who do not compete regularly they are very nice sport models for the moderate size sites, places a bit too small for scale models. They are great demonstration models since they look like real airplanes and fly very much like them too. They have the color and variety that the typical endurance model lacks.

Bostonians can be difficult to build well. They are not so easily built to weight and they can be a bit fragile. The very long motors needed for competitive flight times often cause problems with bunching and balance. While they are easy to get to fly they can be tricky to trim for best performance. I have been collecting all kinds of hints and tips about Bostonians over the past four years and I am going to toss some of them out to any of you guys who are interested. There will be many good tips and techniques not included, if you have any nice ones send them to me and Ill get them into INAV.

Design:

The best Bostonians have several design features in common. All of the best do not have all of these features, but they all have many of them.

They all have very large stabilizers with camber. The limit is 50% of the wing area (24 square inches) not including the area occluded by the fuselage. This is important for several reasons; it lowers the total area loading, it allows the CG to be much further back than smaller stabbed models, and it makes the models more tolerant of shifts in the CG from motor bunching. The best stabs are very high aspect ratio, that is they have large spans and narrow chords. The higher aspect stabs are generally more efficient, and they also get the stab area as far back as possible, which helps stability. A gentle taper is OK, but a stab that is too sharply tapered will have too small a tip chord and will suffer.

The motor should run the entire length of the model. Some of the best models are using 38-inch motors and it is bad enough getting such motors to work with a 13 inch or so hook to peg distance. Having the peg forward of the model's tail will make matters even worse. It is best to get the peg as far from the hook as the rules allow.

Make the fuse large enough for the motor. These long motors will make huge clots of knots which need room to thrash around. At least .75" clearance all the way back to the peg is about the lower limit. Narrow noses and tails are just good places for knots to hang up and ruin the flight. Make sure the noseplug is large enough so that the nose

opening will accept a blast tube big enough for the motor. Make the tail cross section large enough to allow this tube all the way back to the peg, too.

Stability is important. The faster a disturbed model finds its trimmed speed and attitude again, the longer it will fly. Low winged model can work, but they will need a great deal of dihedral, and this is not good for endurance. Shoulder or high wing models are much better and even they should have a moderate amount of dihedral to ensure their recovery abilities. It is also best to avoid any excessive amounts of washout or other warps in any of the flight surfaces. Washout is a performance robber that is very over rated as an aid to stability. The fin should be large enough to prevent any wandering flight, but not so large as to induce any spiraling problems. Models with insufficient dihedral will be very picky about the fin size and they may not circle well tightly enough for the smaller sites. Bostonians use very little fin offset to get the right hand circling flight pattern. A 1/16" offset at the fin trailing edge is plenty for most models.

Since the rubber motor is distributed over the entire length of the model the CG will tend to be very far back. To balance the model without needing ballast you should mount the wing so that the leading edge is at least 3" behind the noseplug. The farther back you put the wing the better the stability will be, but the poorer the efficiency of the model, so too far back is bad, too. Putting the wing back beyond 4" or so will just give performance away and gain more stability than the model needs. If you fly in a very gusty site you might tend to the more rearward wing locations.

Stay away from wing taper, it just gives away area. Make sure your model is legal, but also make sure it is not too short of the limits set by the rules. A 15" span model built that way to make sure it is under 16" gives away around 7% of its wing area. A wing 1/4" narrower than the 3" allowed gives away almost 9%.

Mount the landing gear as far forward as is possible. This increases stability with no efficiency penalty at all.

Use a thin airfoil. At the RN our models fly at the airfoils are not very critical in shape, but the thickness should be at or under 6% and the leading edge should be very sharp. Same thing on the stab for the same reasons. Sharp trailing edges are probably a good idea too, although there is some variation in thought here.

Weight:

At seven grams a Bostonian is not the lightest indoor model you will be building, but you still have to plan ahead to get them down to weight and not need to add nose weight. There are also things you can do to make them less fragile to handle and still light.

Chose very light covering material. Not counting the prop and noseplug, almost half the weight of a well-built Bostonian is covering! Gampi paper is very nice in this case, with good Esaki tissue a nice second (Glen Campble's stuff is very good tissue). Condenser paper is a possible choice, but it is really a bit to brittle for Bostonian use, and it is not too

attractive in color or texture. I have had wonderful success using ink jet printers to add color to white tissue without adding weight. In any case do not use any heavy paints or multiple layers of colored tissue since this will add weight very quickly.

Pick you balsa with great care. Use very hard balsa (#10) for the lead edges of the wings; medium hard balsa (#7-#8) for the wing trailing edge, longerons, and uprights in the nose area; and firm, light balsa (#5-#6) for everything else. Use the good wood!

The stock sizes are important to building lightly. Do not use 1/16" longerons, they are far too big and heavy. The wing spars are the only 1/16" wood in the whole model. Longerons are fine at .050" square, as are the stab spars and the basic fuselage structure. Ribs are OK made from .032" sheet or so and the fin can be very lightly built since it takes almost no loads at all.

The wheels, wire and prop are big weight problems. I make my wheels from blue foam turned on a Dremel tool and painted with artist's acrylic paints. It is a very light way to make wheels and they look great. Be sure to make them not too much over the 3/4" minimum diameter and no thicker than say 3/16". I use .012 wire for my landing gear, this saves 36% of the weight of .015" wire. The gear is soft and bouncy, but it works just great. Props made from carved balsa can be very heavy so be sure you get the blades thin enough. The prop used by Mike Thomas has been the type that Larry Coslick and I have adapted as the best answer to prop efficiency and weight. It is made from a wooden dowel or aluminum hub and balsa sheet blades formed over a can and it is much lighter than a carved prop.

There has been a good deal of talk over the weight of various adhesives. CA glue is very heavy and dense when cured, ambroid or water based glues are much lighter. While this is true, it makes very little difference since the weight of the adhesive is around .5% of the model's finished weight. The weight difference between CA and the lightest cement is around 20 milligrams on a Bostonian. You can, however, easily use two or three times as much glue as you really need. Over gluing will make a much greater difference than choice of adhesives, plus it will make hard spots that will sand poorly and make covering the model a harder job to do neatly.

Strength:

Bostonians get mashed, squashed, crushed, and otherwise damaged much more often than they should. Far and away the greatest cause of damage is in handling the model. Wings and tail groups are not too bad to get broken, but the fuselage gets beaten up pretty good in most cases. The longerons are very easily broken between the uprights and crosspieces. The uprights and crosspieces themselves are pretty easily broken too by just a bit too much of a squeeze. The major reason is that these pieces are already under stress from the tissue and the motor tensions. The tissue pulls sideways on the thin balsa sticks while the motor tension tries to collapse them. Your finger then comes along and pushes in the same direction the tissue does and you feel the wood crack. Using larger wood sizes for the longerons can help keep them from getting broken, but this easily can

result in the weight getting way over the seven gram minimum. Harder wood for the longerons is a pretty good idea too, but has the same problem of weight. Before you go to larger than recommended wood sizes or weights, try using the method that is used to handle real aircraft. Real aircraft have hard points built into them to allow safe handling without structural damage. The skin is reinforced where it is to be walked on, and there are handles mounted where the aircraft is to be pushed when moving it on the ground. There are strengthened points designed to allow the aircraft to be lifted and where it is to be tied down in the wind. To do this with your Bostonian you just have to figure out where you need to handle the model and add a bit of wood right there only. I make sure that the front of the model is firm where I handle it to attach the nose plug after winding. This is also a good area to use for landing gear wire attachment. I make the crosspieces out of larger wood sizes and space them much closer between the lower longerons right under the wing trailing edge because this is where I hold the model when I launch it. Once this area is strengthened it becomes the preferred area to hold the model whenever you are handling it. The final area to strengthen is the rear rubber peg mount. Once there is the extra strength in these areas that you can use then you reduce the strength and weight everywhere else. Everywhere is the key word here. Since the reason you get breakage is from handling, and you have strengthened the area you have to handle, reduce the weight of all the other structure until it is adequate for the loads of flying the model and the winding loads. These loads are much lower than those of handling the model and you can easily use very small, light wood sizes and so save a great deal of weight. When Larry Coslick and I compare our earlier models to our newest ones it is striking how much stronger the new ones are, and it is so nice not to have to make a longeron repair for a couple of seasons running. The models look better for much longer as well and this is important due to the charisma judging even though the judges are supposed to overlook the repairs.

Trimming

Bostonians are not too tricky to get flying well, but there are some things you need to work with to get the most out of them. The more rubber you carry (up to around 1.5 times the model weight) the longer the model will fly, all other things being equal. To get the times needed for a competitive Bostonian, about six minutes, you need to have a slow turning prop with lots and lots of turns to use up. The prop diameter limit of six inches forces you to use a pitch to diameter ratio of around 2 to get the RPM down and make the turns last. While you need these high pitched props it is very easy to get just the least bit too much pitch in a given prop and so make it a real dog. Before you give up on a prop try twisting just the least touch of pitch out of it and see if makes a large difference.

While it is important to have enough rubber in the model it is easy to waste the power and so lose the benefit of the extra rubber. Poor props, draggy designs, unwanted warps, and extra weight will rob time from you if you let them. Motors should be sized just as other indoor models motors are, to run out of turns just after touchdown. Start with too long a motor of moderate cross section, say .090", and test fly the model. Shorten this motor until the model is using almost all of the turns. If the model starts to hit a very high

ceiling before you have shortened the motor to this point you have too large a cross section. Go down about .010 in rubber size and start again. This method will only work for very high ceilings that allow a full power climb. For lower ceilings you will have to experiment with backing off turns to allow the climb to be less while retaining the cruise portion of the flight. For very low ceilings you may even have to increase rubber cross section and/or shorten the motor to extend the cruise portion as much as possible. Be sure that you use good lube on the motors and blast tubes so that you can get the energy into and out of the rubber. Good prop bearings are also important with Teflon washers and brass tubing or Peck Polymers nosebreaings for the noseplug. Make sure that all of the little tatters of tissue are pasted down well to make the model as clean as possible. Pick your batch of rubber very carefully with the fragility and vulnerability of Bostonians in mind. The super rubber batch 7-97 that has set so many new records is a really poor choice for Bostonians due to its breakage rate. My best times are with 10-97 or 12-97 rubber which is not as good as the 7-97, but is much tougher and safer for Bostonians. When winding make sure that the rubber is in the middle of the rear peg when you start so that it will clear the rear fuse structure to reduce bunching. Watch the knots form when winding and do what you can to even the build-up of the huge clumps of rubber these very long motors feature.

I hope that some of this stuff is useful to the flyers out there who enjoy this wonderful facet of indoor flying. If you have any ideas or techniques that serve you well please write them up and let us see them. After all somebody is going to have a seven-minute Bostonian in the next couple of years and it may be your input that makes the difference.

Moffett Hangar Annual August 21-22 1999

(kibby dome annual format) CDs Herb Robbins and Mike Palrang
408 356 8659

Easy Bee

Joe Foster	28:47			
Mike Palrang	27:27	28:37		
Andrew Tagliafico	22:06	24:12	27:15	
John Lenderman	24:35	26:14		
Chris Borland	17:11	18:04	19:41	
Paul Allen	10:55	10:50		

LIMITED PENNY PLANE

John Lenderman	17:24			
Joe Foster	16:18			
John Petrek	11:20	11:40	12:23	14:10
Mike Palrang	14:09			
George Xenakis	9:23	10:43	13:36	
Chris Borland	10:21	12:37		
Jerry Powell	12:34			
Ernie Johnson	12:10	12:22		
Richard Geer	9:36	11:27		
Herb Robbins	10:33	10:28		
Stuart Bennett	9:36	9:27		
Ding Zerate	5:19			
Allyn Johnson	4:16	5:19	4:50	

OPEN PENNYPLANE

John Lenderman	17:55

CATAPULT GLIDER (best two flight total)

Chris Borland	:32	:31	:32	:34	:41	:45	:41	:29	:47	(:92)
Jim Lane	:35	:40	:38	(:78)						
Herb Robbins	:32	:34	(:66)							
Don Manro	:29	:24	:23	(53)						

MINI STICK

Joe Foster	4:47	13:00
John Lenderman	11:25	
Andrew Tagliafico	11:23	
Mike Palrang	11:12	
Chuck Dorsett	11:08	9:33

Jerry Powell 11:07

INTERMEDIATE STICK

Mike Palrang 31:14
Earl Hoffman 31:13
Chuck Dorsett 21:00
John Petrek 11:00 13:37
Paul Allen DNF

A 6

John Lenderman 9:10 (USA record) cat IV
Jerry Powell 6:25 7:06 7:26 7:56
Chris Borland 5:49 6:34
Andrew Tagliafico DNF

NO-CAL Scale

Mike Palrang 5:37 5:32 3:03
Herb Robbins 2:48

PEANUT SCALE

Sherm Gillespie
Stuart Bennett
Al Johnson
J. Hendry

AMA SCALE

Sherm Gillespie
Jose Pinto
Bob Hodes

BOSTONIAN MASS LAUNCH

Stuart Bennett
Sherm Gillespie
Bob Hodes
Al Johnson
Ray Armstrong

It was nice to arrive at the dome to find everything in order--tables and chairs on site, and the necessary plastic sheets to go under the tables. The speakers this year were covered in black plastic and tied shut on the bottom. The speakers appeared higher this year, and I didn't notice any models having problems with them during the three days of flying. The nets also did not snare as many models, probably because everyone has learned to try and stay below them while flying. There were, however, those who challenged the tiles and nets and paid the price. Gordon Dona, flying his good Limited Penny, hit one of the wires supporting the net, and slid down, resting on the net. His prop twisted around the wire, and after the net was lowered, the model was damaged in trying to dislodge the prop from the wire. He was able to repair the model, but on the third day , after a strong climb, his model went over the tiles into never-never land. He had earlier posted a personal best in Limited Penny with an excellent time of 15:08. Wally Miller lost a Mini-stick and new A-ROG model to the tiles, and put a good flying EZB on top of the huge flag at the East end of the dome. He and Gil Coughlin worked quite a while trying to balloon it down, but only succeeded in getting some parts of the model back. The A-ROG was new and beautifully constructed, covered with microfilm and had a braced wing. Wally brought eight models in a carrying box, which fit into the luggage compartment of a commercial jetliner. When I went to the dome on Friday to get the table set up, and store my model boxes, I noticed a modeler flying hand launched gliders. Hadn't met him before, so went over to introduce myself, and to find out who he was. His name is David Ramsey, and he is from Denver--flies with the Magnificent Mountain Men group. Found out he know Doc Dona from way back, and that he had been in Moscow 3 days. He said he flew in the dome each day with his gliders, and had one which he said was 23 years old. David said afterwards that he had a good time in Moscow, and was impressed with how friendly everyone was. Also met Orville Olm, and his wife, Marcia Green, and George Merkel, all from Saskatoon, Saskatchewan, Canada. They brought lots of models, and flew quite a bit. Orville is starting a cottage industry for model building supplies, and hopes to advertise soon in some of the state-side publications. Watch for his ads. Noticed Steve Brown, our current F1D World Champion, testing his new rule F1D, with the 55cm span. It looked good. Edmund Liem flew his new F1M, the F1D beginners event. It will be interesting to see if this becomes popular or not.

The flying was continuous for all three days, with many remaining until the 8 P.M. closing of the dome. The Limited Pennyplane event produced 13 entries, with everyone having good flight times. Gordon Dona pushed the designer of the Thrush, forcing him to challenge the tiles and net, and putting up a site record time of 16:22. As mentioned previously, Gordon Dona had a personal best time of 15:08, and in third place was his brother, Steve, with an excellent time of 14:06. It was interesting to note the different approaches to Limited Penny. Several had stabs suspended below the tail boom, and prop designs were quite varied,-although most had lots of blade area. The rubber of choice seemed to be 7/97 or 12/97. Some still had the 8/93,but it appears to be getting more brittle as it ages. EZB also had 13 entries, with most of the good times being posted on the first day. The air conditions changed frequently, with some long periods of dead spots during the day. The drift on top was not as bad as last year, but it did change directions, sometimes in the course of a flight. Again, those who flew just up to the net rods didn't seem to drift very much. Mike Palrang showed his win a couple of years ago wasn't just luck. He put in an early flight 27:32 to win the EZB event. Mike tells us he is still using the 4/95 rubber, and doesn't plan to change. Bruce Kimball flew well with his hobby shop wood model designed by Larry Coslick. He flew quite steadily, and had a great time of 26:48. His lowest time out of 5 posted flights was 24:49, which showed his consistency. Third was Daryl Stevens, not far behind Bruce with a flight of 26:35. His lowest time of 4 posted flights was 25:20, which again shows he knows what he is doing. In 4th place was Ed Berray, flying a brand new model to a time of 23:37. Ed has improved his building and flying, and is one of the top winners. We were again

disappointed that nobody topped 12 minutes in the mini-stick event, although nine contestants really gave it a good try. Most stated that their models just didn't have the bouyancy that produced good times. The winner, flying his Mini-Thrush, posted a time of 11:32, and he didn't feel that would hold up in the final results. However, that topped Mike Palrang, who flew a 11:19 time with his model. Third was a former Category 11 record holder, Ed Berray, with a 10:57. He complained that no matter what he did, his model just never stayed up in the dead air. The A-6 event produced some surprises. There were three flyers that flew over 8 minutes, and the winning model had a time of 8:46.5. That was Bob Landhuis, who had cut off his wing tips and part of the stabilizer to lighten the model. Bob said his model flew even better with those parts removed! Both he and the second place winner kept trying for the magic 9 minute flight, but were frustrated with lots of broken motors, rubber bunches on prop shafts and rear hooks, and running out of turns 20 feet in the air. The second place time was 8:38, and Jerry Powell with an outstanding effort, posted his personal best of 8:11. This event is getting more popular, as they are easy to build, and they fly good. Hand launched glider was a closely contested event. with only about 4 seconds separating the first 3 winners! Bruce Kimball, always inovative, won the event with a 2 flight total of :88.7. Ed Berray was second with a very good time of :86.0, and Jonathon Sayre was third posting a :84.47, with a large, lightweight model. The ROG stick event produced some fine models, But Fred Hollingsworth, the Canadian record holder, from Vancouver, B.C., showed how to do it with a nice flight of 14:33. Fred builds lots of models, and really enjoys himself flying them. Second place was Wally Miller with his beautifully constructed model that ended up over the tiles. That model had lots more potential than the posted time of 13:07. Wally said he was going to build another one just like the one he lost. Third place was Ed Berray with a 12:18 time. Let me tell you about the 4th place contestant; Jonathon Sayre. He didn't bring an A-ROG, but during the contest, after flying his Mini-stick, he asked what the rules were for theA-ROG event. After reading the rule book, he went to his work area, and in about 45 minutes, after adding a landing gear and wheels, he came out to test his Mini-stick converted to an A-ROG. It flew better as an A-ROG than it did as a Mini-stick. Jonathom had a ball flying that model, and did a respectable 4:33 with his pride and joy. We need more modelers like him. Jonathon is a senior flyer, and quite talented. In Standard Catapult glider, Bruce Kimball, flying his own design, won with consistent flights of 1:15 for a two flight total of 2:30. Close behind was Ed Berray at 2:23, and Jerry Powell was third with 1:59. This was Jerry's first contest in a Category 1V building with his glider. Open Catapult was won again by Bruce with a total of 2:31. Herb Robbins was second with 1:39. Bostonian had 3 entries, and Jerry Powell, flying his own design, the Yrekan, won the event with a nice flight of 3:36. His model flies so smoothly. John Lenderman, flying a modified Stalick Boxtonian, was second with 3:09. Gordon Dona, flying what appeared to be an Aronstein Ultimate Lifting Machine, was 3rd with 3:05. The FlD event had 3 entries flying some very nice models. Herb Robbins topped Andrew Tagliafico with a 2 flight total of 77:19. Andrew, who was determined to get into the 40 minute club, had to settle for a 74:13. On a later attempt, with a good chance at that elusive 40 minute mark, Andrew had his model hit the edge of one of the tiles with his prop, and watched as the prop slowly turned, lifting the model up and onto the tile. What a disappointment! There were 3 ornithopters, and the current Category 11 senior record holder, Jonathon Sayre, won with a nice flight of 7:44. Herb Robbins was 2nd with 4:07, and Gil Coughlin was third with 3:05. We really missed Anita Taylor and Warren Williams in this event, as they always fly so well. Pro 20 brought out 2 elegant models, and Wally Miller topped Fred Hollingsworth with a flight of 19:15. Fred could only coaz a 6:47 from his model. Regular Pennyplane had only two entries--could be modelers don't like to build two wings and everything to go with them. The winner, flying his Thrush plus 10, (a one winger), recorded a 15:08 early the first day. It seems that the lack of suitable buildings to fly may be causing the decline of this event. Will the new 55cm FlD and Beginners FlD catch on? Only time will tell.

Here are the complete results.

LIMITED PENNYPLANE

1. John Lenderman * 16:22
2. Gordon Dona 15:08
3. Steve Dona 14:06

* Site record

A-6

1. Robert Landhuis * 8:46.5
2. John Lenderman 8:38
3. Jerry Powell 8:11

CATAPULT GLIDER
(2 flights)

1. Bruce Kimball 2:30
2. Ed Berray 2:23
3. Jerry Powell 1:59

P-24

1. John Lenderman 6:58
2. Ed Berray 6:13
3. David Ramsey 2:29

FEDERATION ROG

1. Gil Coughlin 5:25
2. Marcia Green 2:53

ORNITHOPTER

1. Jonathon Sayre 7:44
2. Herb Robbins 4:07
3. Gil Coughlin 3:05

MANHATTEN

1. Fred Hollingsworth 5:49

EZB

1. Mike Palrang 27:32
2. Bruce Kimball 26:48
3. Darryl Stevens 26:35

HAND LAUNCH GLIDER
(2 flights)

1. Bruce Kimball :88.7
2. Ed Berray :86
3. Jonathon Sayre :84.7

OPEN CATAPULT
(2 flights)

1. Bruce Kimball 2:31
2. Herb Robbins 1:39

PRO 20

1. Wally Miller 19:15
2. Fred Hollingsworth 6:47

INTERMEDIATE STICK

1. David Hagen 22:10
2. Chuck Dorsett 20:05

HELICOPTER

1. Herb Robbins 4:29

FlM FlD BEGINNER

1. Edmund Liem — 15:21 *

MINI-STICK

1. John Lenderman 11:32
2. Mike Palrang 11:19
3. Ed Berray 10:57

ROG STICK

1. Fred Hollingsworth 14:33
2. Wally Miller 13:07
3. Ed Berray 12:18

FlD 65cm
(2 flights)

1. Herb Robbins 77:19
2. Andrew Tagliafico 74:13
3. Edmund Liem 34:04

BOSTONIAN

1. Jerry Powell 3:36 *
2. John Lenderman 3:09
3. Gordon Dona 3:05

PENNYPLANE

1. John Lenderman 15:08
2. Bruce Kimball 12:50

FlD 55cm
(2 flights)

1. Mike Palrang 44:17 *

* Site record

Reported by John Lenderman

RUBBER LUBE and KNOT TYING

Rubber lube along with tying good knots is an important part of indoor flying. Over the past five years I have learned several ways to improve the reliability of rubber. A lot of us use Son-OF-A Gun as a rubber lube and it can be improved without using any additives. This procedure makes the lube slicker and very little lube is needed and it won't splatter.

Larry Calliau told me how to recondition Son-Of-A-Gun. He does his in a oven under very low heat, but I set mine out on a counter top until all the emulsifiers have evaporated, which will take from three to fours days.

I started out by taking a sheet of tin foil about two feet long and rolling up the edges to form a shallow pan. Smooth out the bottom so that it is flat as possible. Shake up the container of SON-OF-A-Gun and pour just enough to cover the bottom of the foil. (About 1/16" deep). If you put in more lube, it will take longer to clear up. As it thickens it will become clearer in color and will look like light sewing machine oil. If you air-dry the lube, it would be a good idea to make a tent to keep dust from collecting on the lube.

After the lube has cleared, scrape the liquid into a low, wide mouthed jar such as a pimento jar. I use the lube by touching, it with my index finger and wiping off the excess on the edge of the jar. It just takes a small amount to lube a motor, place the lube in the palm of one hand and then rub the lube into the motor with both hands. After the motor is lubed, I clean off my hands with Wet Ones, a moisturized towel purchased from most grocery stores. Once again, don't over lube the motor and it does not need to be relubed during any one flying session, even if it's wound ten times. There is no need to wash a motor with this lube when putting the motor away.
KNOTS-- Double Overhand Pull-up. This has to be one of the best knots for tying up a loop of rubber. You don't need thread, CA and the rubber is lightly lubed before tying the knot. John Linderman showed me the knot several years ago and I haven't used anything since. My addition to the knot is lubing the rubber before its tied. This prevents chaffing when the knot is pulled tight.

After you have selected the rubber to be tied up, take a very small amount of modified lube and spread it out in the palm of your hand. You want just enough to make a light sheen. Rub the rubber where the knot is to go into the lube. Tie an overhand knot in the area where the length of the loop is to be. Pull up the knot but not too tight. Tie up another overhand knot in front of the first knot toward the loop end of the rubber. The second knot should be within 1/2" of the first knot. Now, pull

the second knot into the first one, and then tighten up on the first knot. Trim the rubber about 1/16" and the knot is finished.

When loops of rubber are tied up over .070" and too much tube is placed on the rubber, the first knot might spring back. If this happens, place saliva between your thumb and forefinger and rub them until they start to drag. Rub your fingers over the knot to remove some of the tube. Use less lube on larger rubber sizes. Since straight Son-Of-A-gun is not as slick as the modified lube, you could use the straight for larger rubber sizes. IMPORTANT do not pull the rubber apart near the knot to see if it will hold. I could come apart but will NOT come apart when placed on the torque meter.

Rule changes to be voted on soon

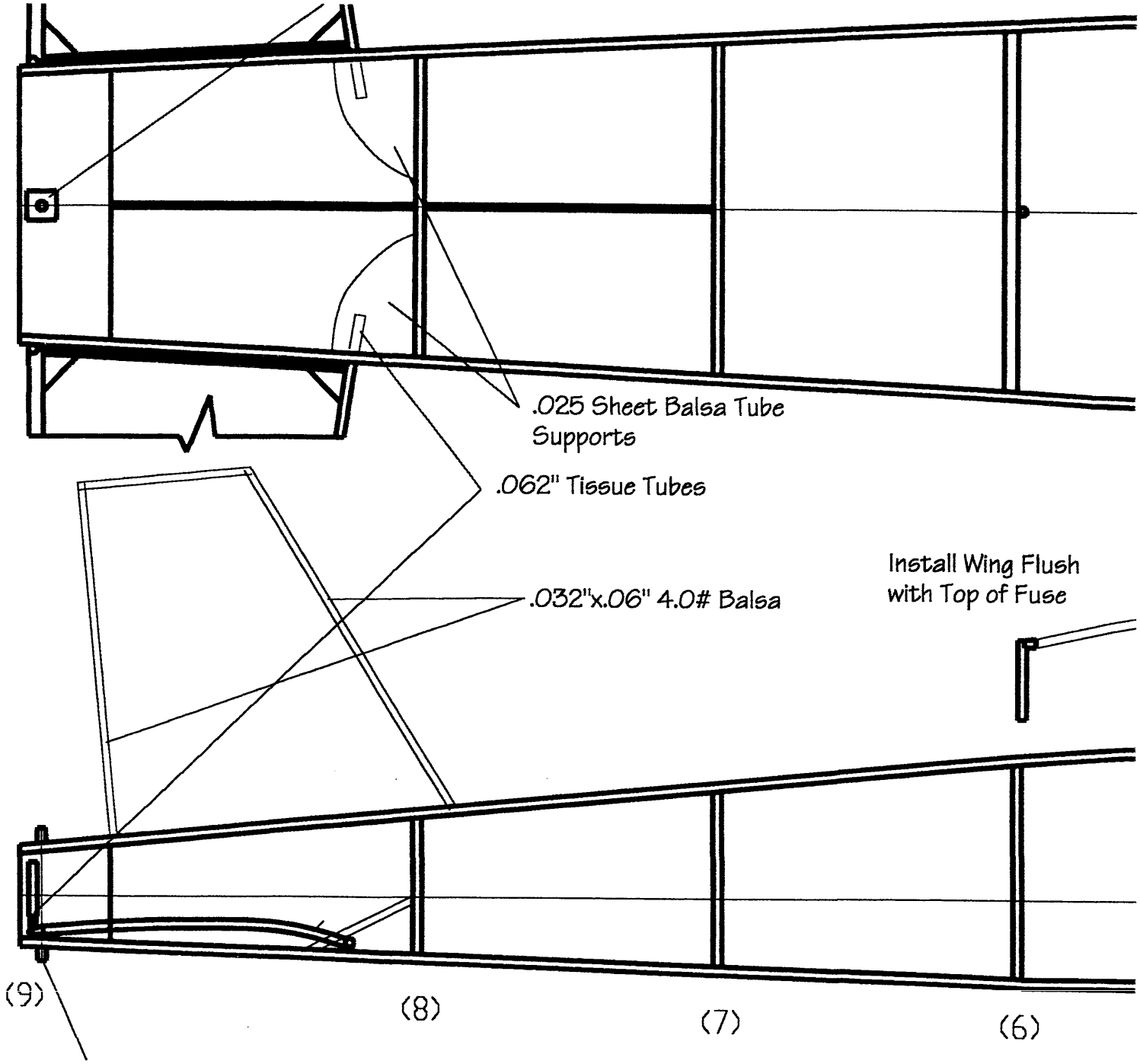
There are several proposed rule changes coming up for voting by the indoor board. Most prominent are the rules involving the use of microfilm in EZB and other events where it is currently not used. It is very important that you take the time to contact the board members and other flyers and make your wished known. We at INAV are very interested in seeing the indoor competition community direct its own fate. Unless we get involved rules may not reflect the way the average flyer wants them to. Speak up!

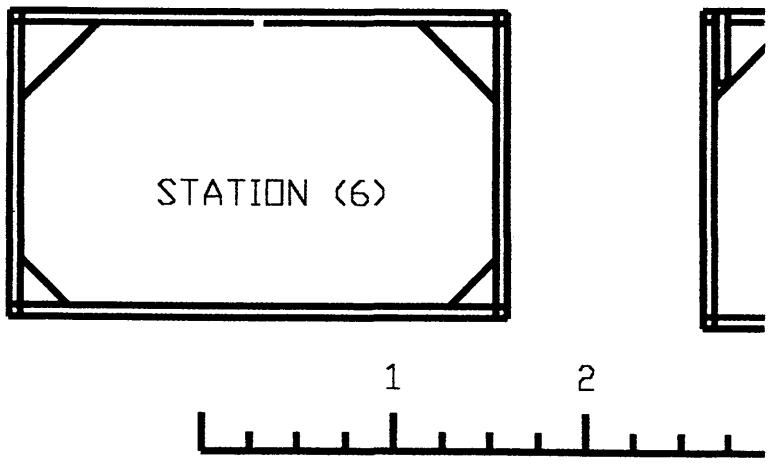
USA F1d Team Selection

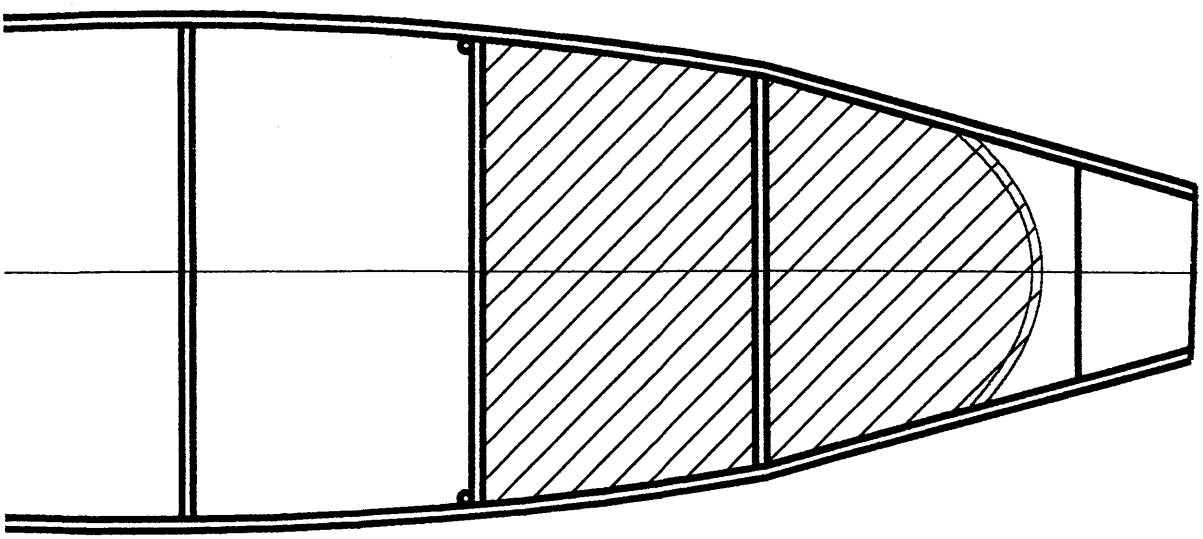
Lockheed Martin Airdock, Akron, Ohio September 4-6, 1999 AMA Sanction 92076

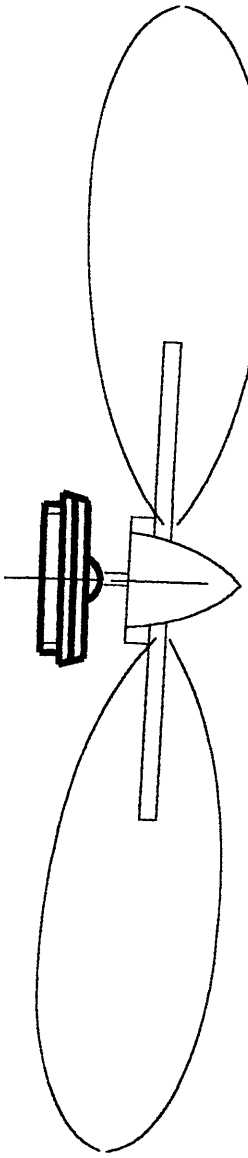
	Contestant	AMA #	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9	Best	2nd Best	Total	Finals Points	Regional Points	Total Points
1	KAGAN, John	469254	DNF	49:50	ATT	36:33	45:27	49:49	51:11	DNF	DNF	51:11	49:50	1:41:02	1000.00	100.00	1100.00
2	COSLICK, Larry	4652	04:48	44:33	45:18	45:04	47:09	46:05	44:49	44:44	52:04	52:04	47:09	1:39:13	982.09	100.00	1082.09
3	RICHMOND, Jim	4936	16:32	50:12	45:52	41:01	20:19	02:36	19:48	17:40	DNF	50:12	45:52	1:36:04	950.87	100.00	1050.87
4	SLUSARCZYK, Don	5490	41:33	47:35	47:06	43:45	47:54	01:41	DNF	DNF	DNF	47:54	47:35	1:35:29	945.22	98.51	1043.73
5	BANKS, Cezar	8310	DNF	44:21	45:51	06:03	05:09	09:55	44:03	39:15	13:58	45:51	44:21	1:30:12	892.79	100.00	992.79
6	DOIG, Rich	5392	24:50	34:03	35:48	DNF	41:56	38:15	38:04	DNF	DNF	41:56	38:15	1:20:11	793.68	88.36	882.04
7	LEONARD, Nick Sr	469461	DNF	DNF	DNF	DNF	ATT	31:51	ATT	35:43	41:50	41:50	35:43	1:17:33	767.63	87.26	854.89
8	LEONARD, Nick Jr	469460	16:05	DNF	ATT	37:08	ATT	ATT	36:13	36:46	38:54	38:54	37:08	1:16:02	752.63	89.63	842.26
9	HULBERT, Bill	1317	DNF	37:55	22:05	20:04	21:15	33:40	ATT	DNF	DNF	37:55	33:40	1:11:35	708.62	100.00	808.62
10	VALLEE, Tom	1126	DNF	21:06	34:21	22:46	DNF	DNF	25:37	32:51	34:29	34:29	34:21	1:08:50	681.39	100.00	781.39
11	MZIK, Larry	3687	26:28	23:09	32:46	10:54	32:49	30:47	30:33	31:35	35:02	35:02	32:49	1:07:51	671.61	75.24	746.85
12	LOUCKA, Larry	1210	DNF	DNF	38:22	DNF	DNF	DNF	DNF	DNF	DNF	38:22	00:00	0:38:22	379.84	99.12	478.96

Stephen Brown
AMA 128759
Contest Director


.025 Sheet Balsa Tube Supports
.062" Tissue Tubes
.032"x.06" 4.0# Balsa
Install Wing Flush with Top of Fuse
(9)
(8)
(7)
(6)
Aluminum Tubing .062" Dia. Motor Peg


STATION (6)
1
2



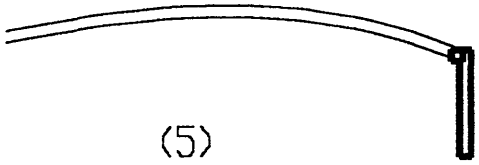


PECK-POLYMERS
NOSE PLUG

Very Thin Plastic
Windshield Covering

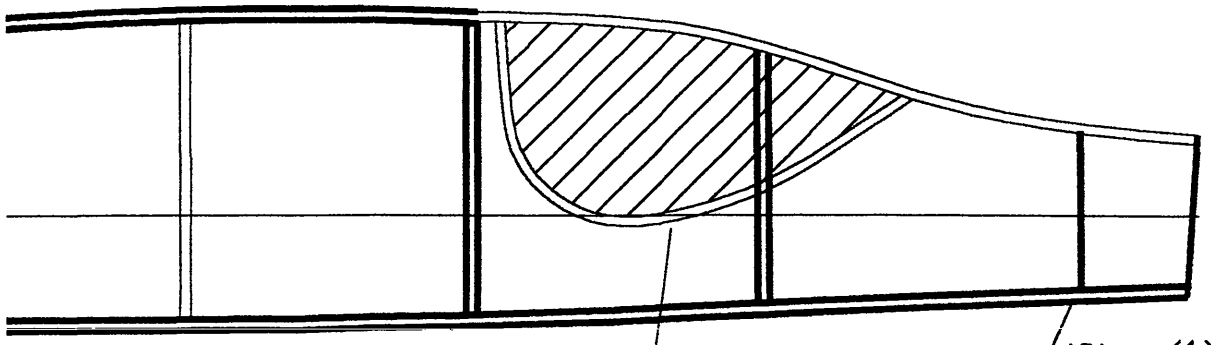
Reverse "S" Hook Propshaft
.032" M.W.

Plug Key Built from
.10"x.05" Hard Balsa



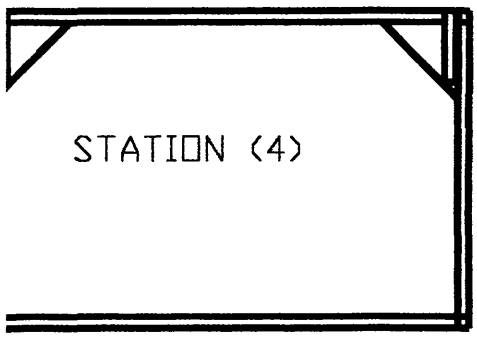
(5)

Longerons are .055" 6.6# Balsa
Uprights are .055" 5.0# Balsa



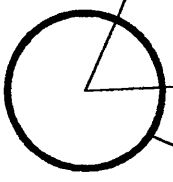
(4) (3) (2) (1)

Window Outlines
Laminated from
.025"x.055" Balsa



STATION (4)

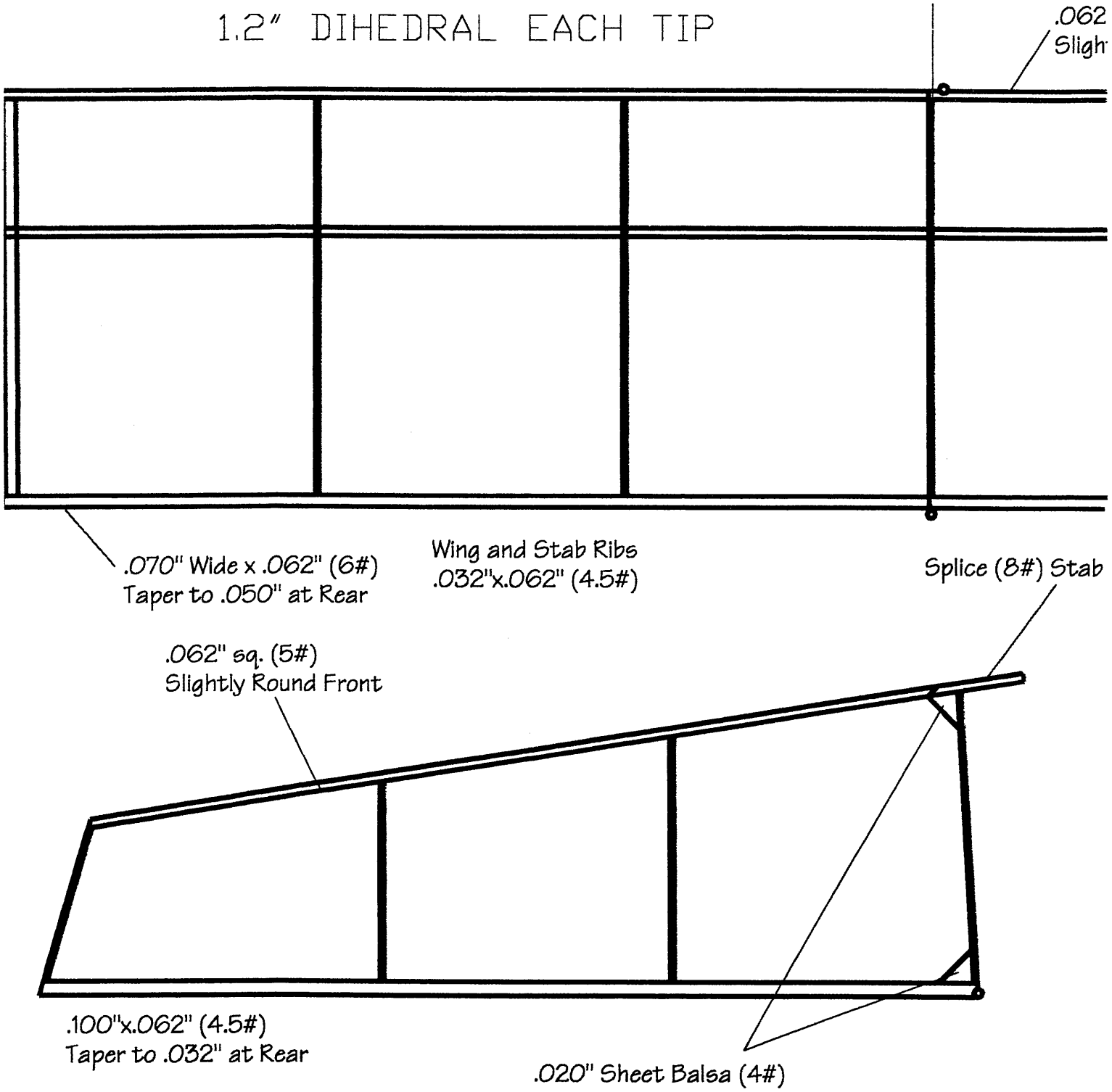
2^RIGHT
2^DOWN
} AS SHOWN

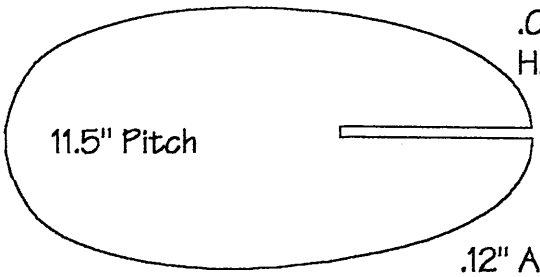


.016 I.D. Hypo Tube from
Small Parts INC.

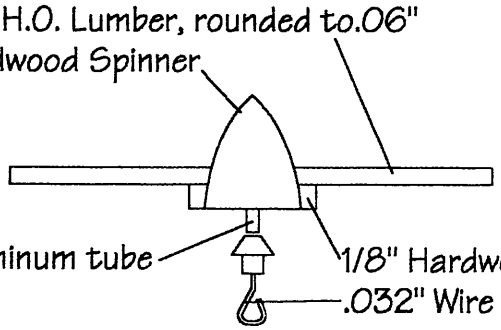
.032" Balsa Sheet

NOTE: DOPE FUSE FLOOR
CROSSPIECES ONLY. DO
NOT DOPE FUSE.

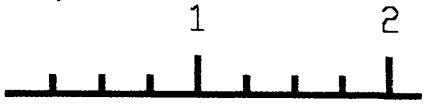




Mike Thomas Style
Prop



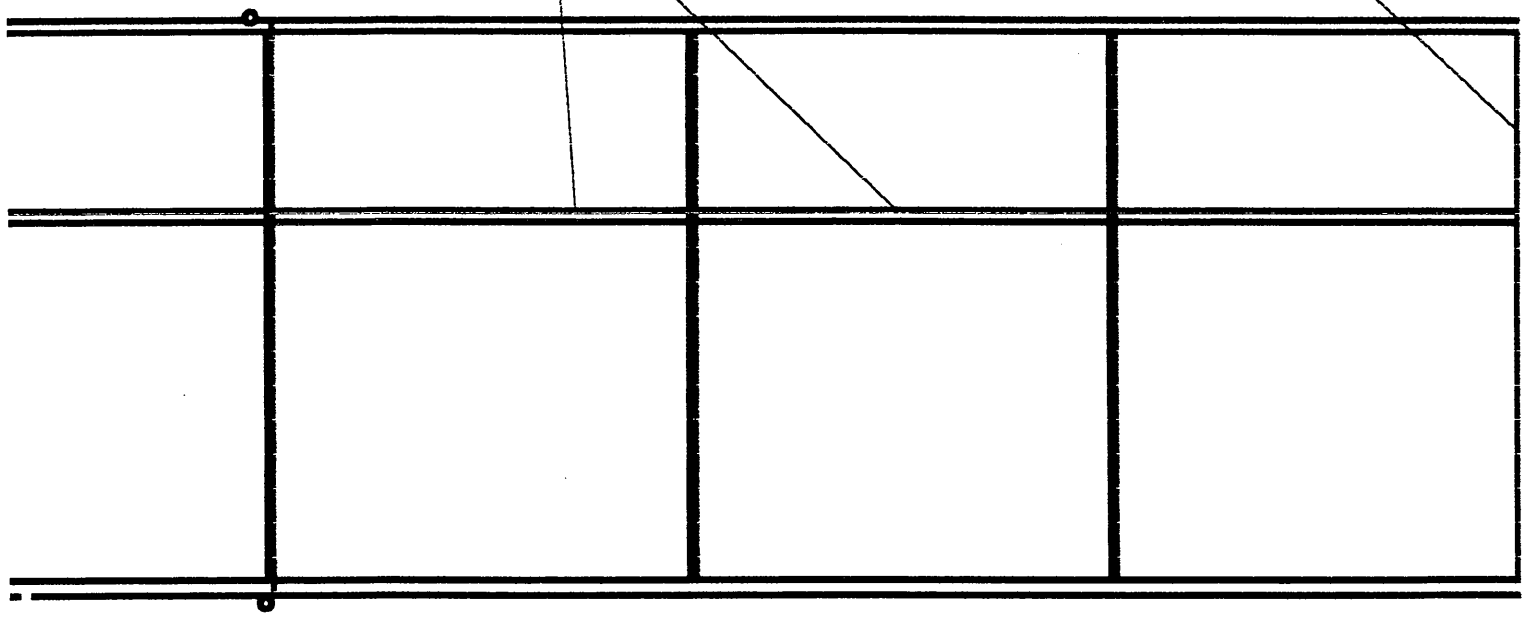
WING DRY .62
FUSELAGE DRY
STAB DRY .20
RUDDER DRY .
PROP W/ NOSE



2" (7.5#)
htly Rounded

.062" (5.5#)
Inserted Between Ribs

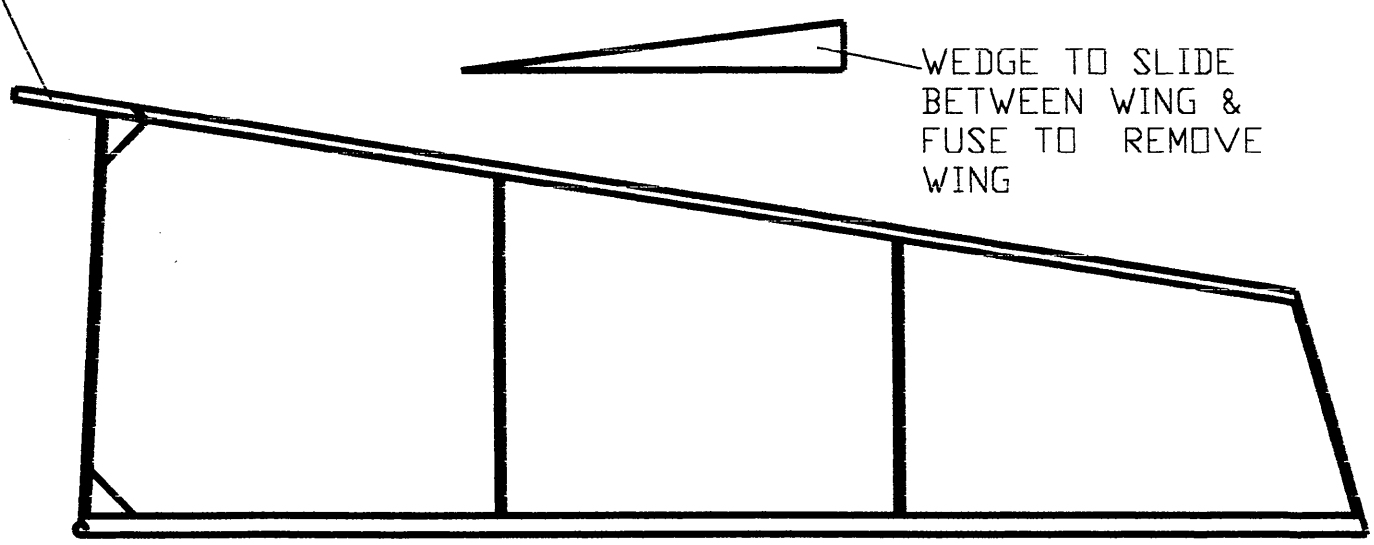
.020" Sheet Tips (4#)



? Mouning Posts

.032 WASH-IN ON RIGHT WING PANEL
MODEL FLIES TO RIGHT

WEDGE TO SLIDE BETWEEN WING & FUSE TO REMOVE WING



RUBBER .075 X 38" LOOP TAN II
5000 TURNS

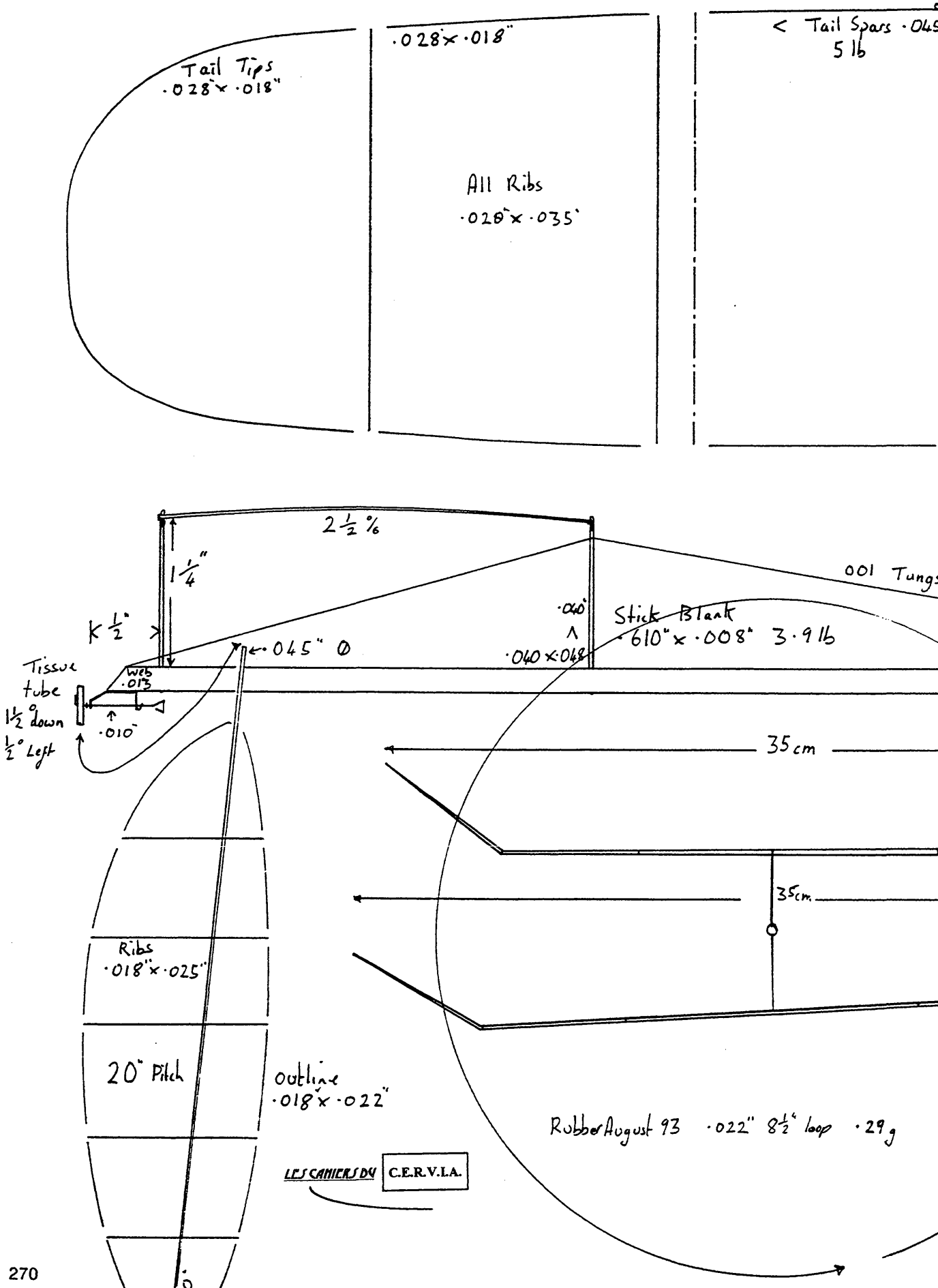
WEIGHTS

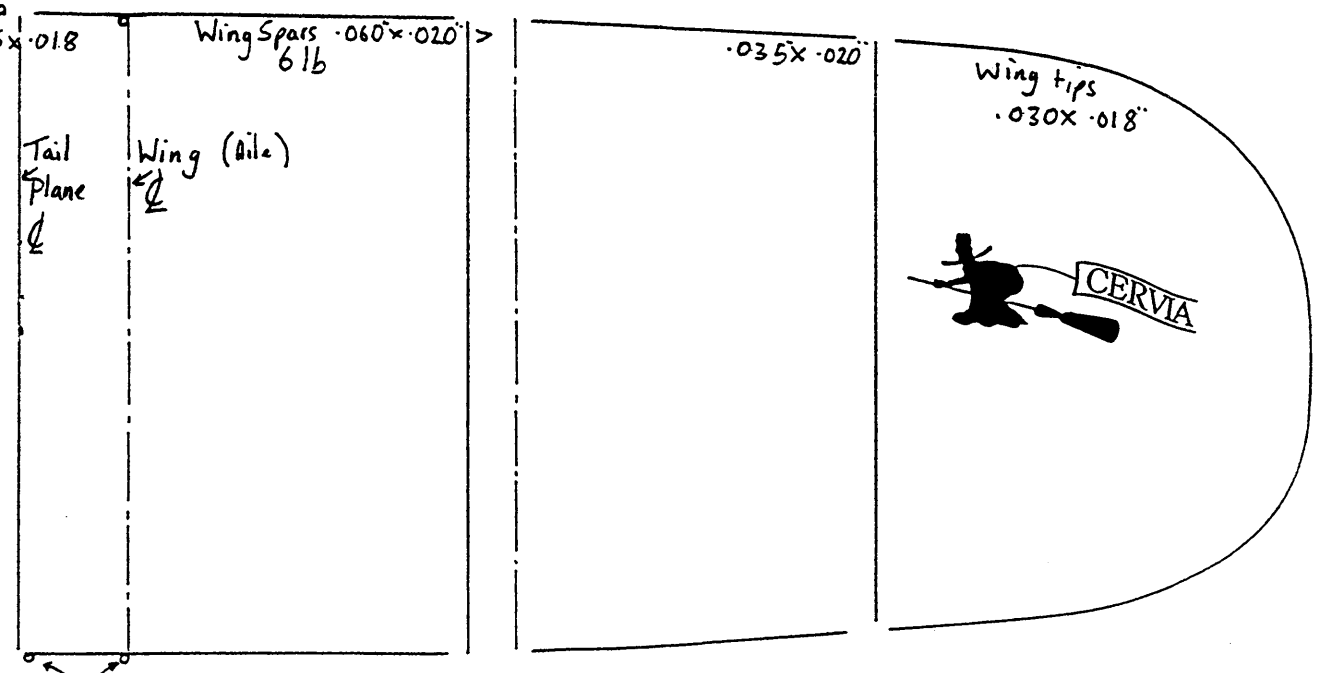
2 GRAM
Y 1.0 GRAM-COVERED W/ GEAR 2.3 GRAM
) GRAM
.045 GRAM- COVERED .15 GRAM
SE BLOCK 1.85 GRAM

BOSTONIAN PATRIOT

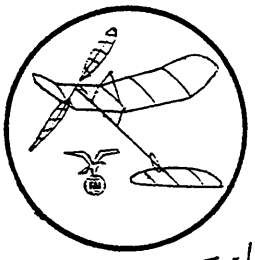
USIC 99 Version
1st Place

DESIGNED BY: L.COSLICK
DRAWN BY: M.PALRANG

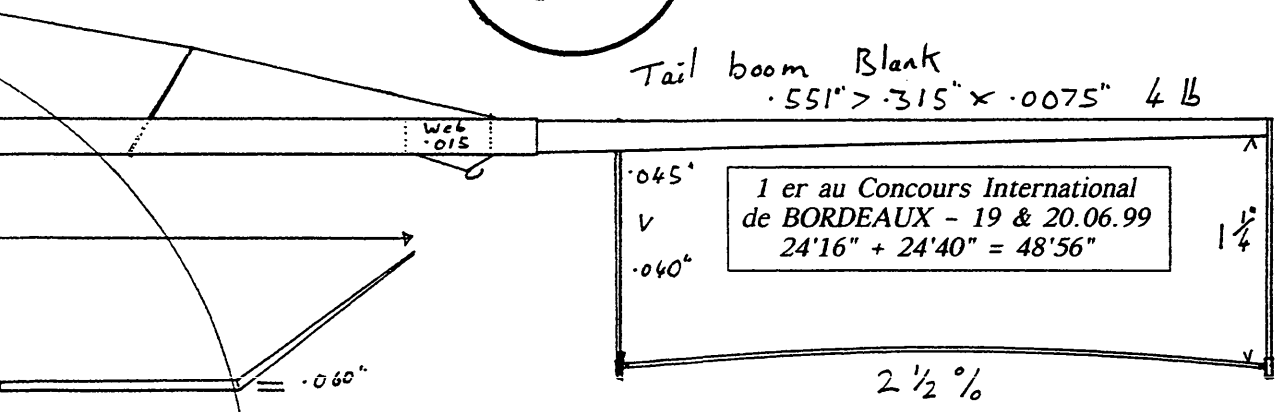

Tail Tips
·028" x ·018"
·028" x ·018"
All Ribs
·028" x ·035"
< Tail Spars ·045
5 lb
2 ½ %
1 ¼"
001 Tungs
K ½"
·045" Ø
·040
·040 x ·048
Stick Blank
·610" x ·008" 3·9 lb
Tissue tube
Web ·013
·010"
1½° down
½° Left
35 cm
35cm
Ribs
·018" x ·025"
20" Pitch
Outline
·018" x ·022"
·020"
Rubber August 93 ·022" 8½" loop ·29 g
LES CAHIERS DU C.E.R.V.I.A.



·040" Tissue tubes
(note offset on Tail plane)



F1D
Indoor Supplies



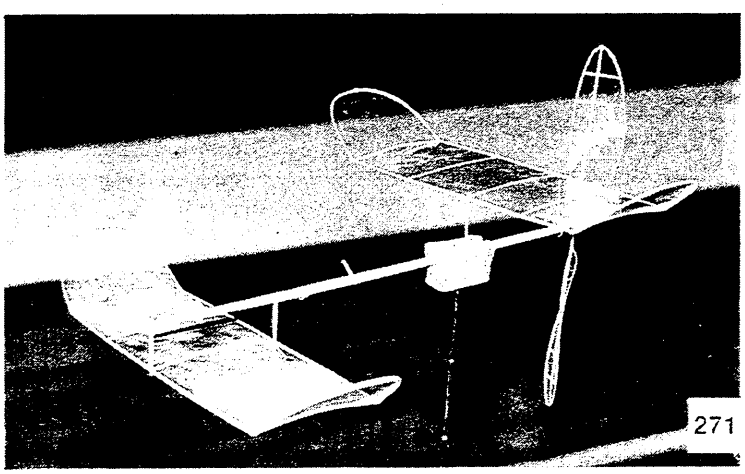
de JOHN KEVIN TIPPER

35cm*Tandem

— adjust tilt for best trim

Weights

Wing	·055 g
Tail	·051 g
Stick	·091 g
Boom	·027 g
Prop	·051 g
Total	·275 g

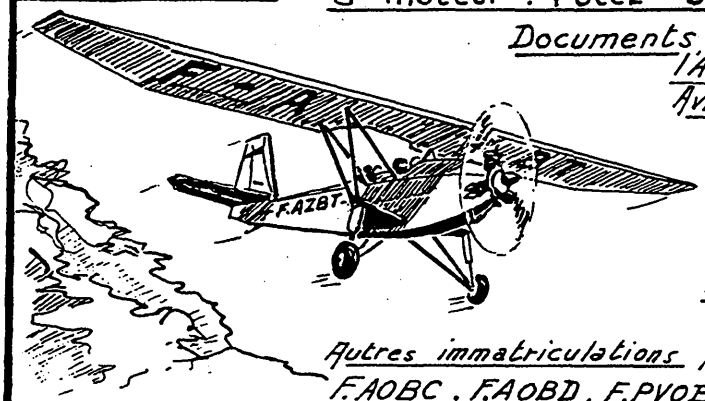


The French Arachide

La Sauterelle

avion école **POTEZ 60**

à moteur . Potez 3.B

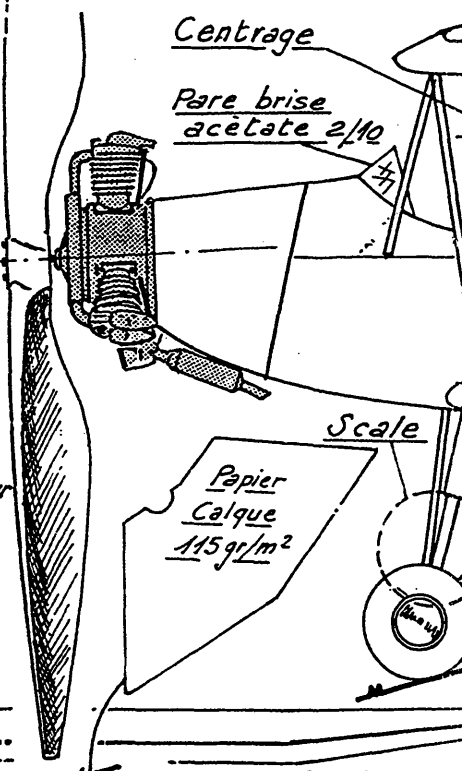


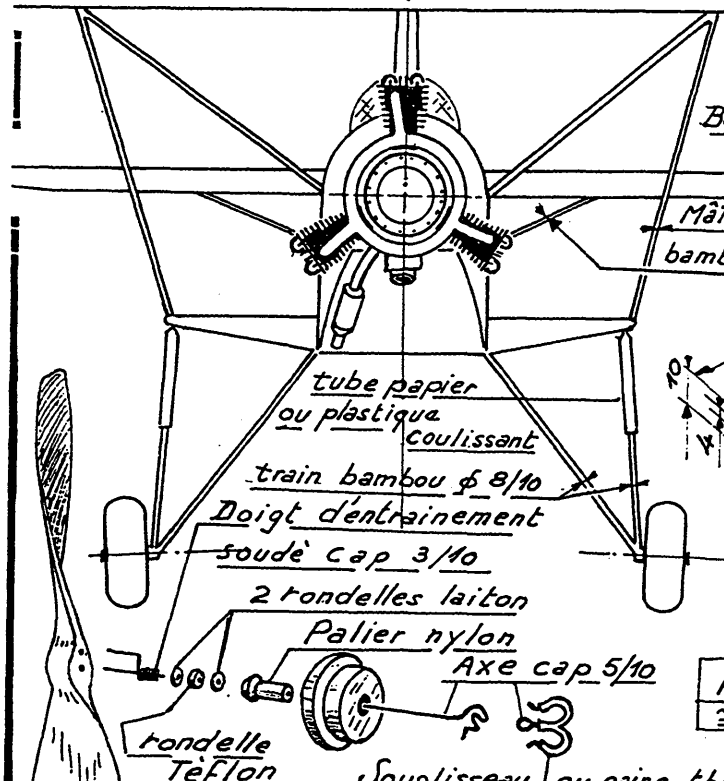
Documents : les Ailes
l'Air pour les Jeunes
Aviation Magazine
le MRA
Cons^t de Maquette
de F. Bernard
Aviation pour tous
Notice constructeur

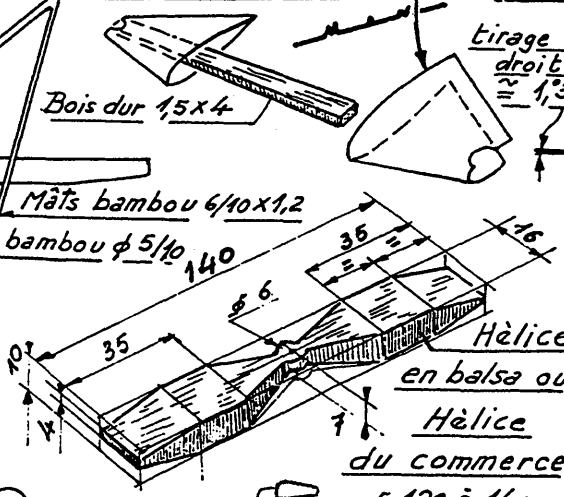
Autres immatriculations possibles
F.AOBC . F.AOBD . F.PVOB

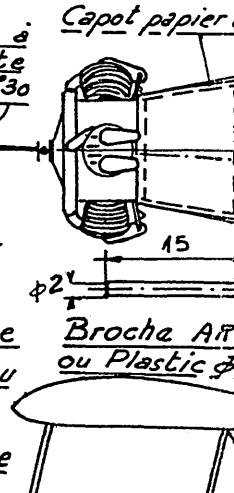
Recouvrement général
papier Japon léger

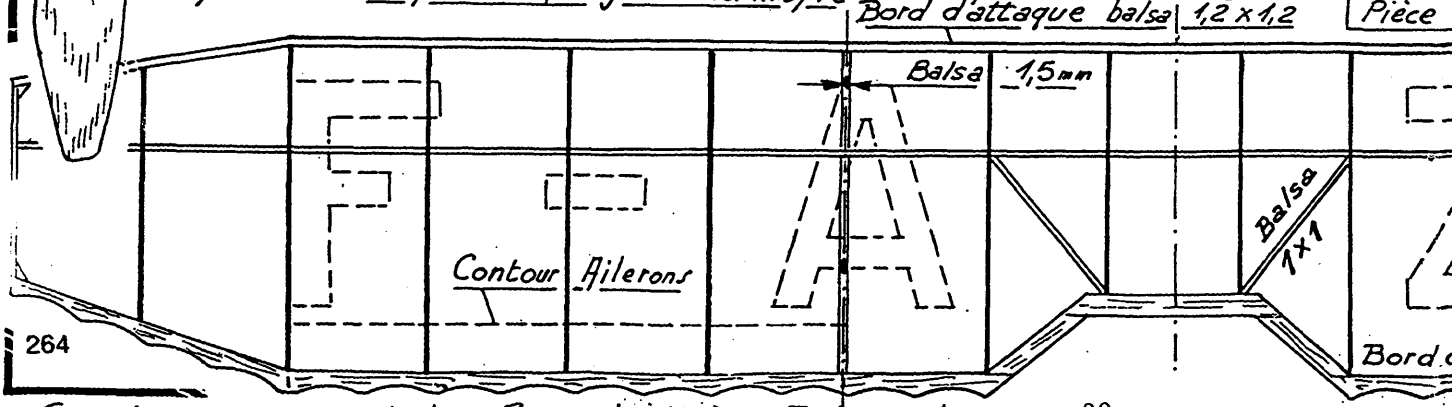
Moteur caoutchouc 1 boucle
de 300 mm poids 2 à 3,5 gr











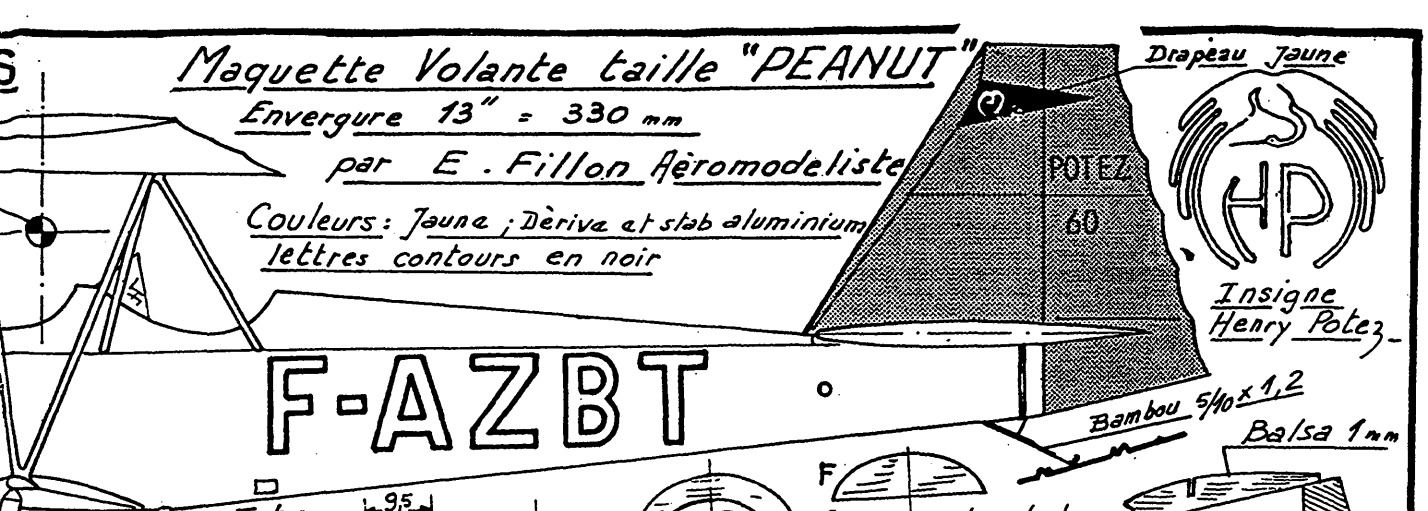
264

Maquette Volante taille "PEANUT"

Envergure 13" = 330 mm

par E. Fillon Aéromodeliste

Couleurs : Jaune ; Dèrive et stab aluminium
lettres contours en noir



Drapeau Jaune

Insigne Henry Potez

F-AZBT

Bambou 5/10 x 1,2

Balsa 1 mm

Tube en PVC ϕ 10x14

9,5

Roues balsa ϕ 16 forme Super ballon

Balsa 1 mm

faux couples balsa 6/10

tableau de bord

Nervures balsa 6/10

S5

S4

S3

S2

S1

balsa 1 mm

calque 115 g/m²

Recouvrement balsa 4/10 sur faux couples ou Styrofoam èvidé

ϕ 3

tube alu 1x2 et 2x3

Bord d'attaque balsa 1,2 x 1,2

Scale

Mâts de cabane bambou ϕ 8/10

Bord de fuite balsa 1x3 profilé

Longeron balsa 8/10 x 1,2

toutes les Balsa

baguettes 1x1

balsa 1x5

Balsa 1 mm

R1

R2

R3

R4

balsa 6/10

Balsa 1

Balsa 1 mm

Longeron balsa 8/10 x 2

Balsa 1 x 3

Scale

Balsa 1,2 x 1,2

Enlever les talons de nervures après construction

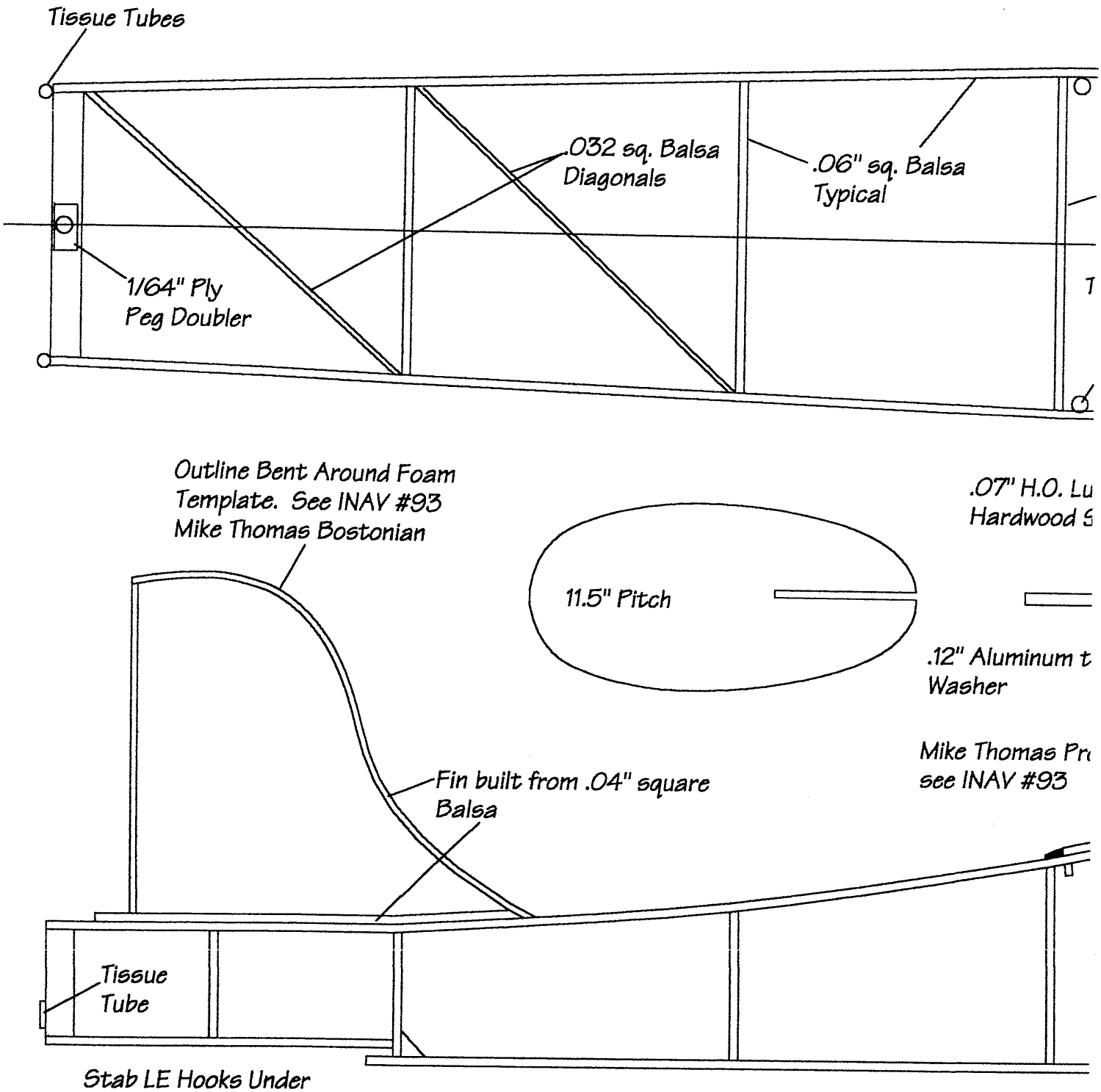
de fuite

balsa 1x3 profilé

277

E 84

Echelle 1/30,303



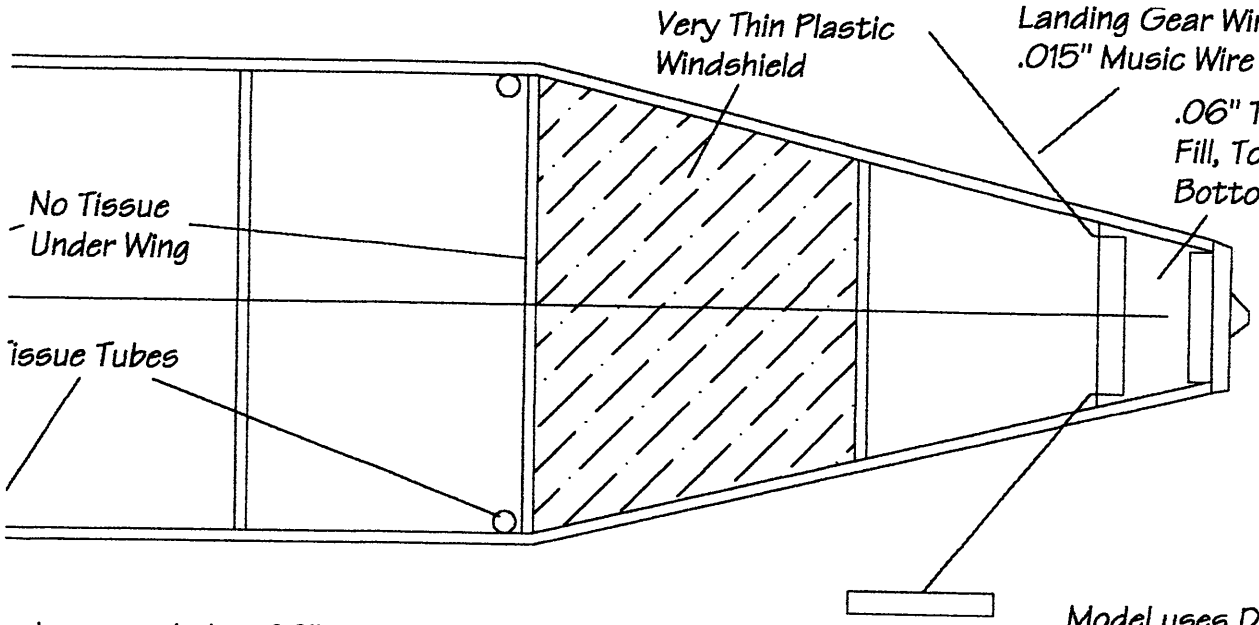
Longerons are #6.5 Balsa
Matched for Strength and Stiffness
Uprights are #4.7 Balsa

Drawn by Steve Gardner

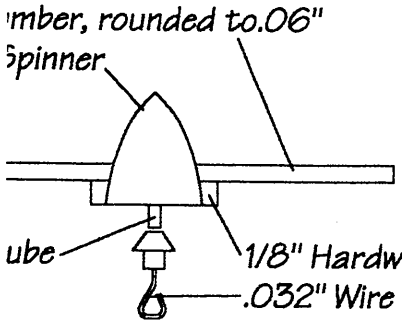
CONTENDER

Bostonian
Designed by Emil Shutzel
Best Time 5:13 @ 1998 USIC
Charisma score 1.18

Rubber Motor .083"X38" Loop 10/97 Tan II
4200 Turns



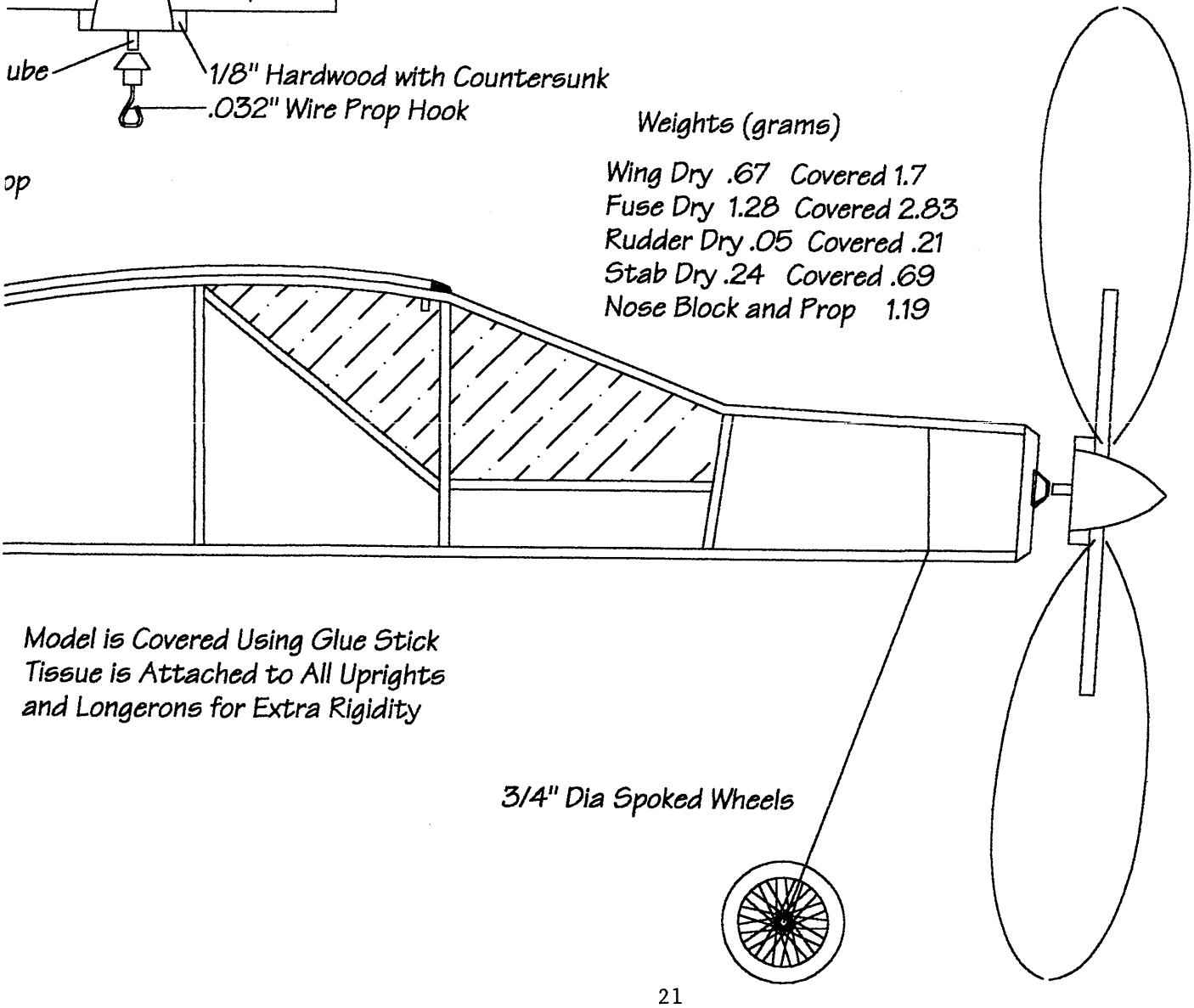
Model uses Down and Right thrust in Flight Trimming



op

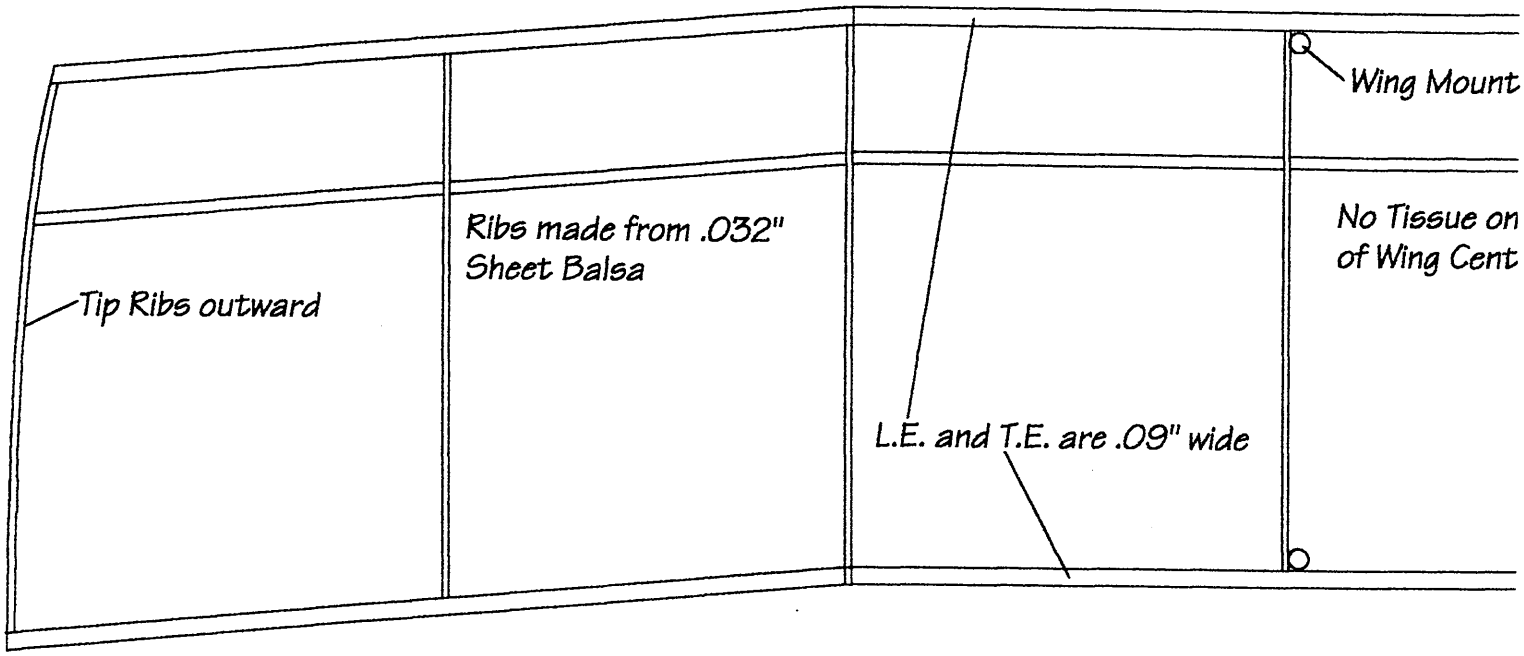
Weights (grams)

Wing Dry .67 Covered 1.7
Fuse Dry 1.28 Covered 2.83
Rudder Dry .05 Covered .21
Stab Dry .24 Covered .69
Nose Block and Prop 1.19



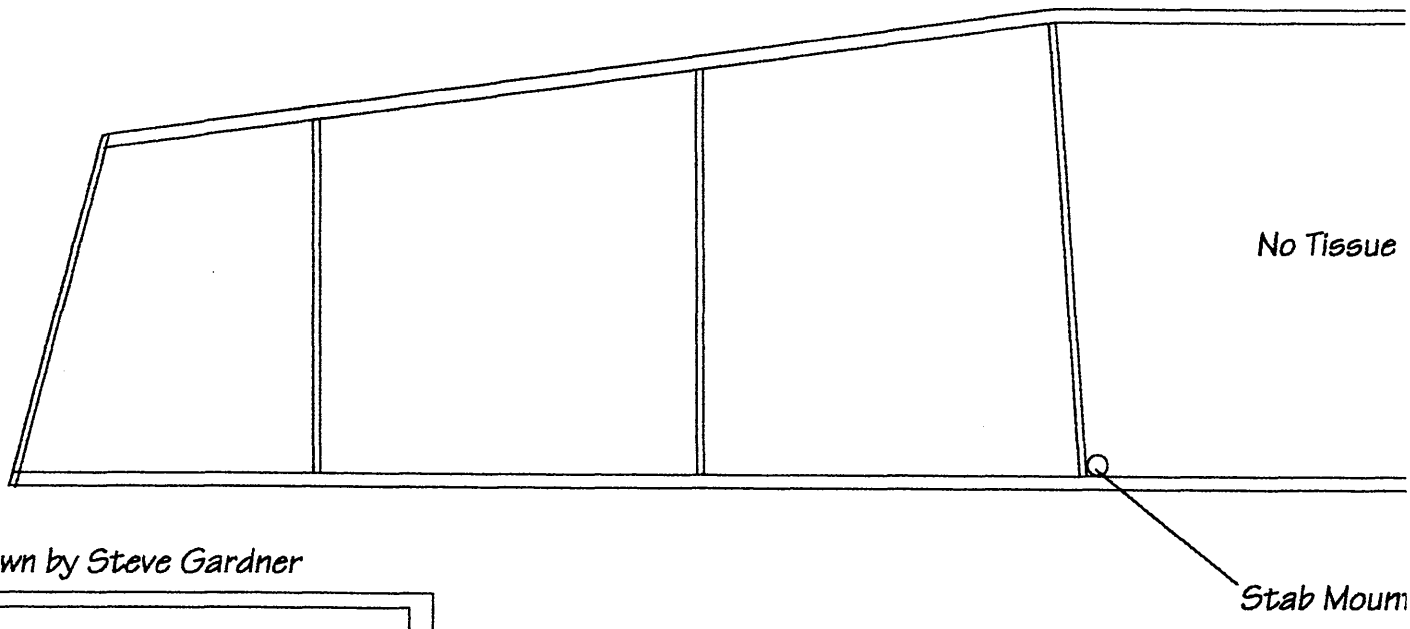
Model is Covered Using Glue Stick Tissue is Attached to All Uprights and Longerons for Extra Rigidity

3/4" Dia Spoked Wheels



Bevel L.E. to sharp point

Make sure span is under 16"
and Chord is under 3"



Drawn by Steve Gardner

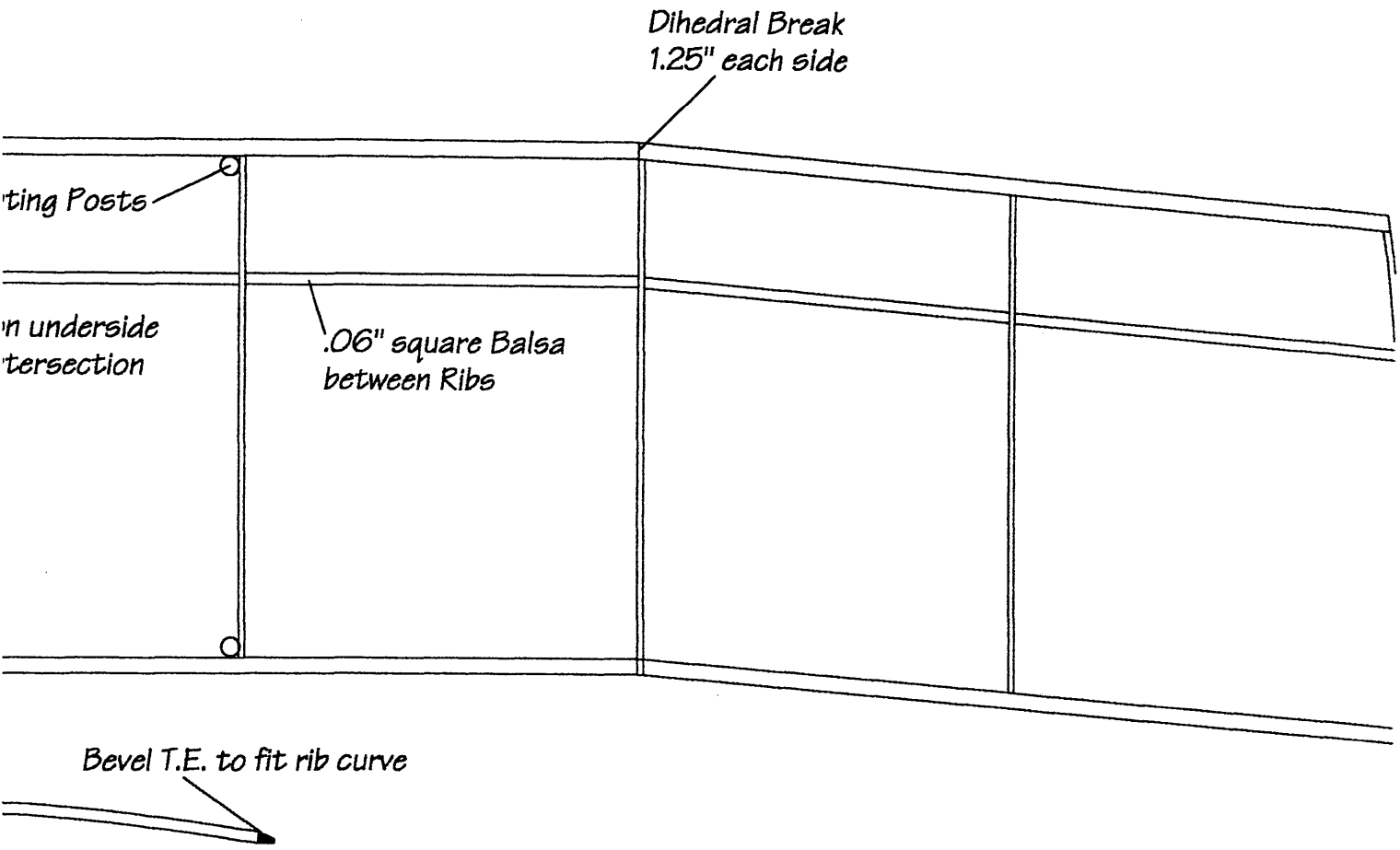
CONTENDER

Bostonian

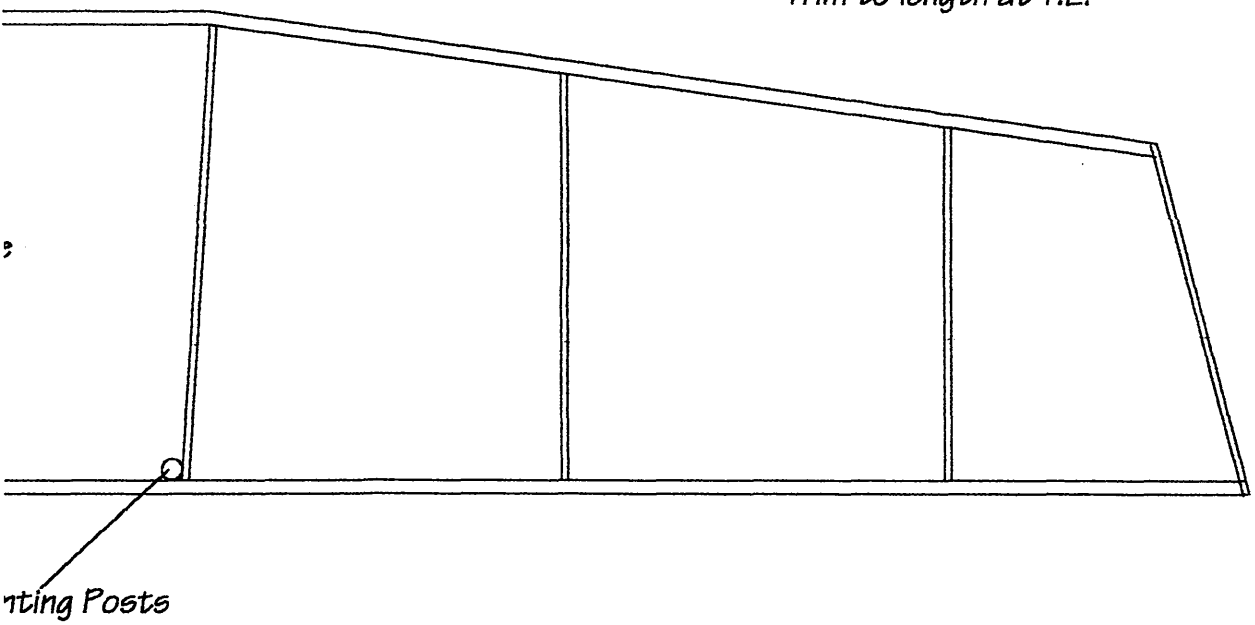
Designed by Emil Shutzel

Best Time 5:13 @ 1998 USIC

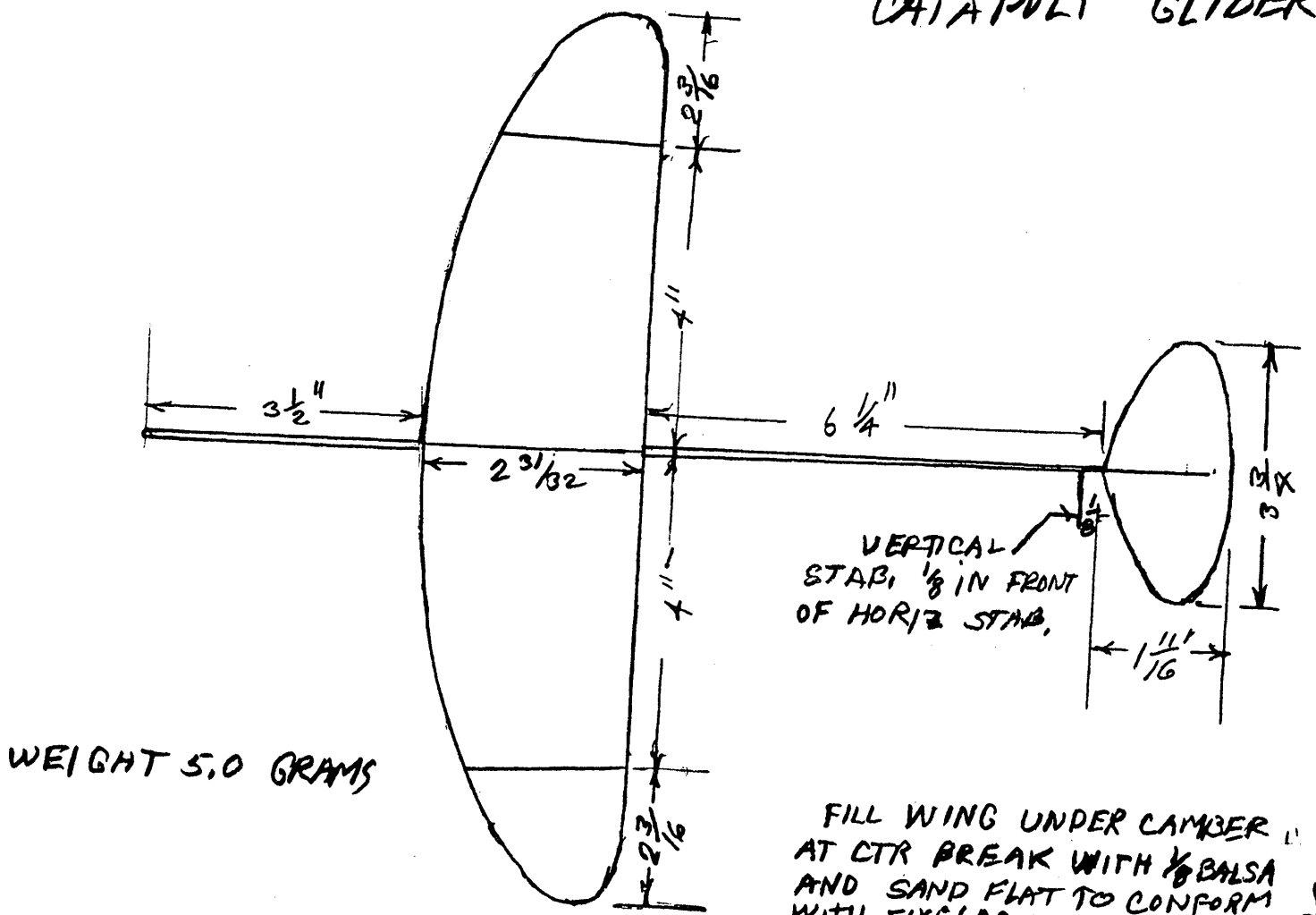
Charisma score 1.18

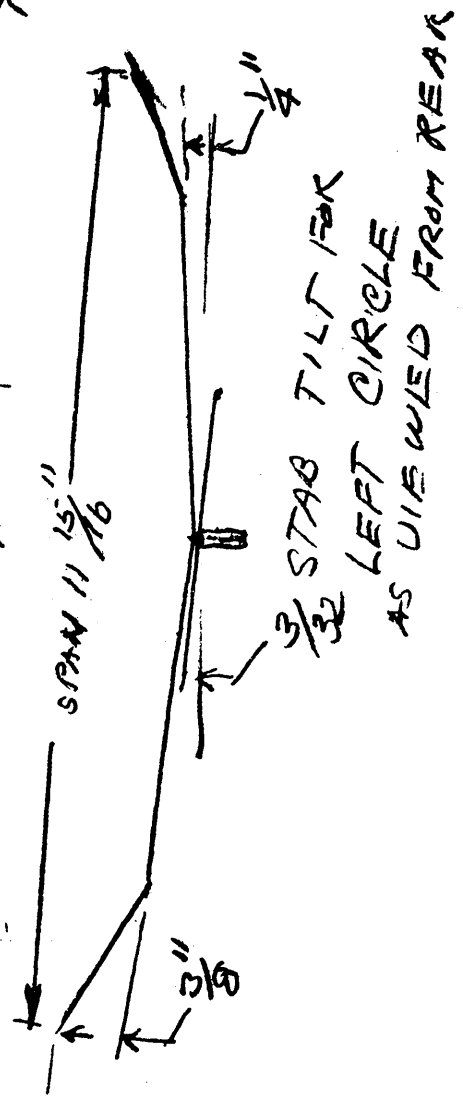

Dihedral Break
1.25" each side
ting Posts
n underside
tersection
.06" square Balsa
between Ribs

Bevel T.E. to fit rib curve

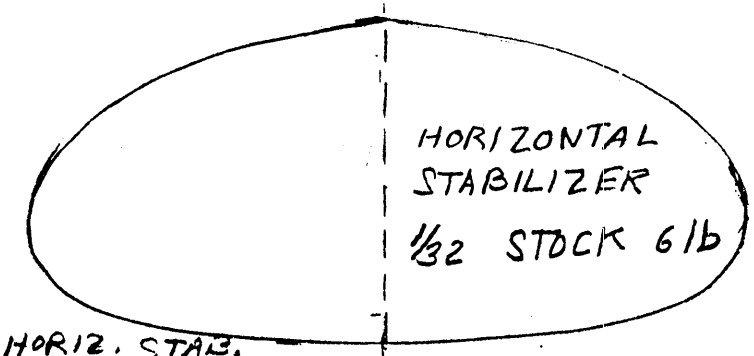

Stab Ribs same as Wing Ribs
Trim to length at T.E.
nting Posts

"INSIDE SLING"
CAT. III STD. CLASS
CATAPULT GLIDER

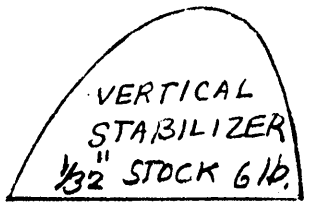




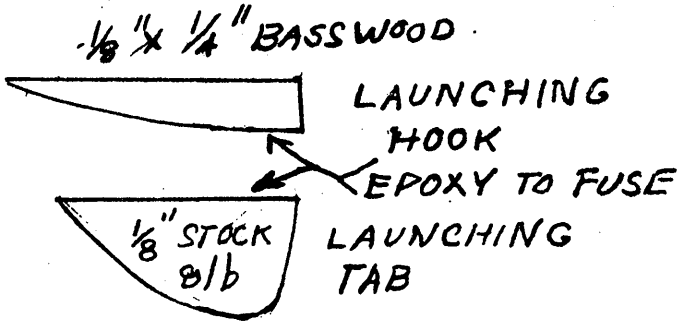
FUSLAGE 1/8" x 3/8" x 14 5/16"
8S/6 STOCK

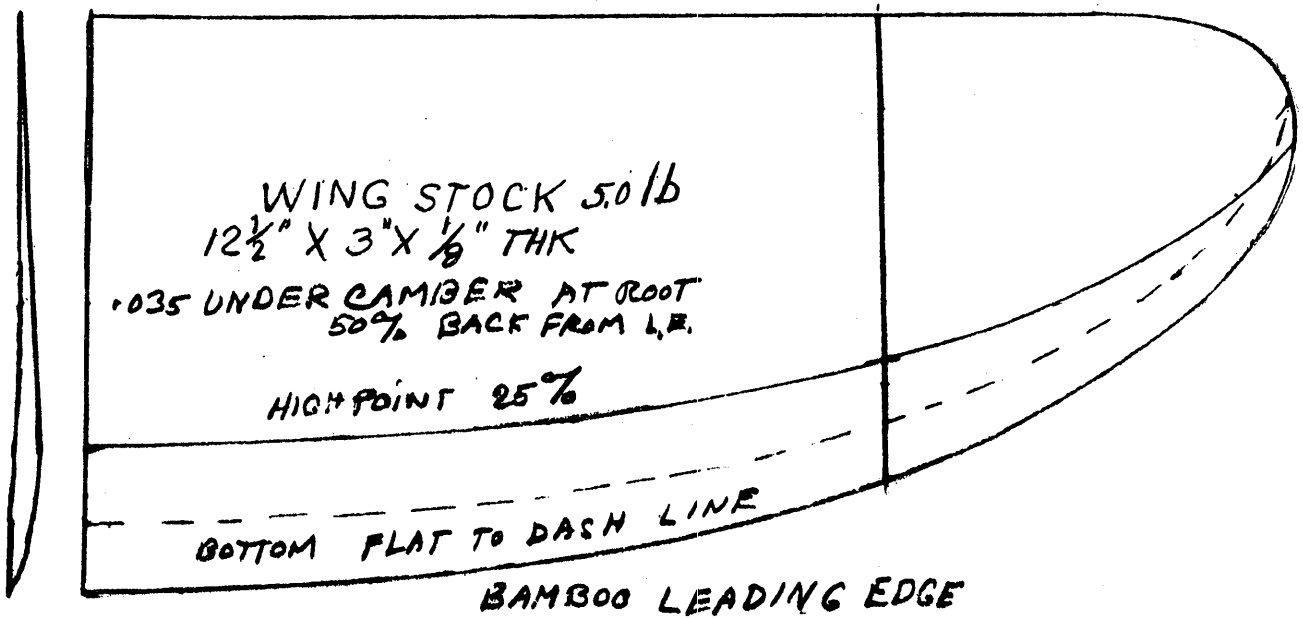


HORIZ. STAB.
FLAT BOTTOM LIFTING SECTION
HIGH POINT 1/3 BACK FROM L.E.



SEMETRICAL SECTION

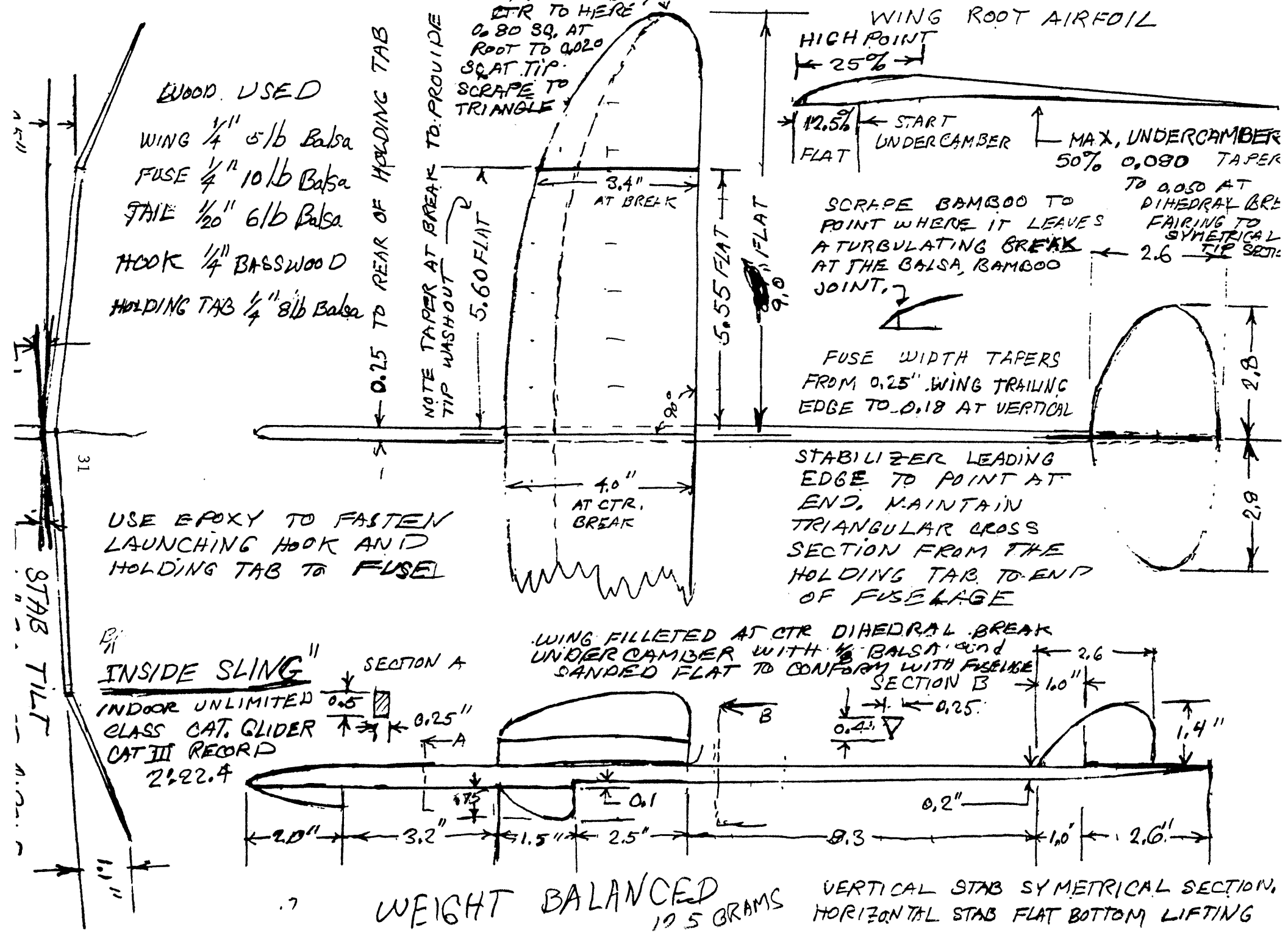


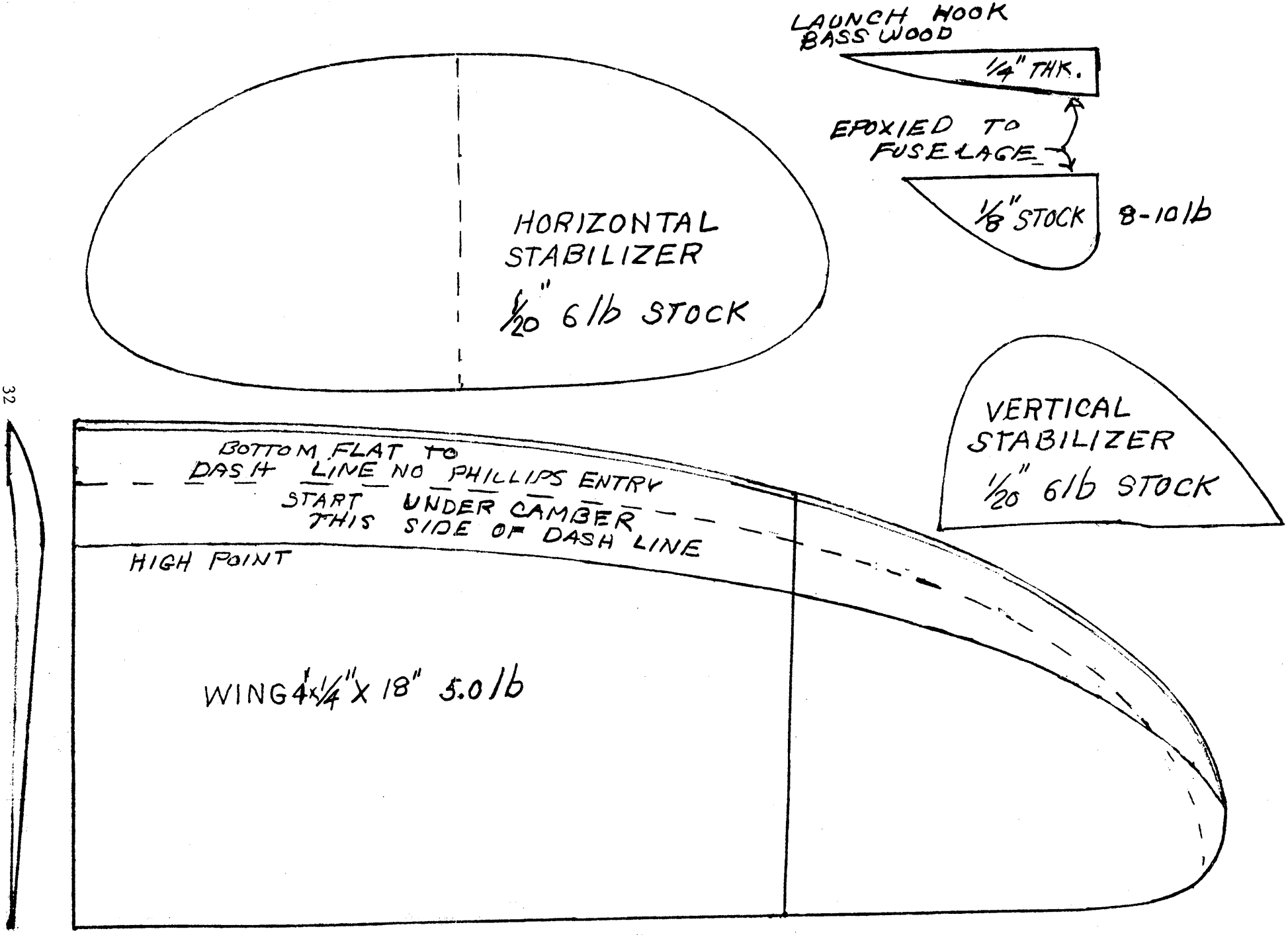


UNDER CAMBER TAPERS
FROM .035 AT ROOT TO
.025 AT DIHEDRALE BREAK
TO ZERO AT TIP.

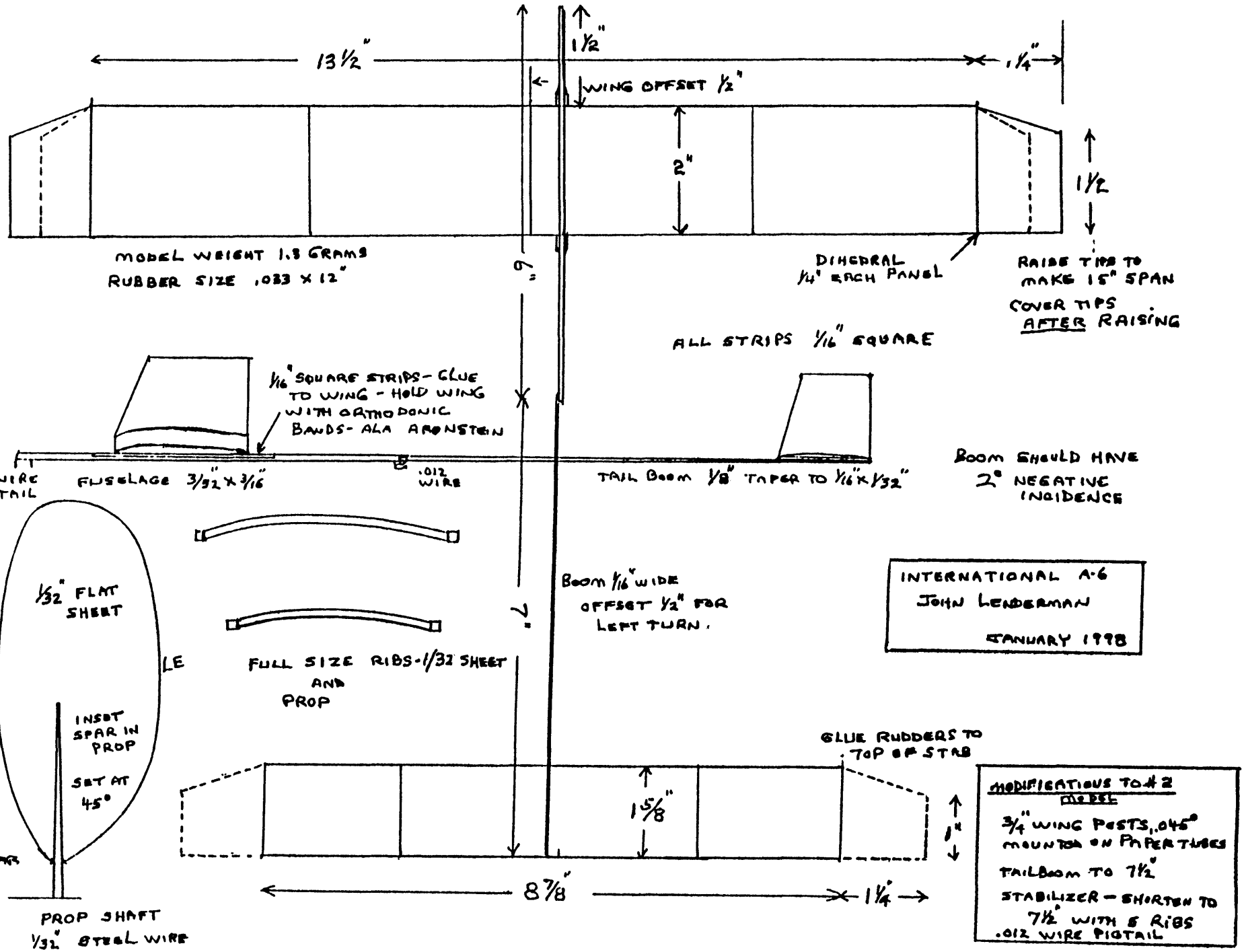
BAMBOO LEADING EDGE
.050 AT ROOT TAPERED TO .015 AT TIP.

"INSIDE SLING"
STD CLASS CAT. GLIDER
TIME 2:11.1 CAT. III
RECORD PENDING


WOOD USED
WING 1/4" 5 lb Balsa
FUSE 1/4" 10 lb Balsa
TAIL 1/20" 6 lb Balsa
HOOK 1/4" BASSWOOD
HOLDING TAB 1/4" 8 lb Balsa
USE EPOXY TO FASTEN LAUNCHING HOOK AND HOLDING TAB TO FUSEL
0.25 TO REAR OF HOLDING TAB
NOTE TAPER AT BREAK TO PROVIDE TIP WASHOUT
5.60 FLAT
3.4" AT BREAK
4.0" AT CTR. BREAK
5.55 FLAT
9.0
90°
CTR TO HERE
0.80 SQ. AT ROOT TO 0.020 SQ AT TIP. SCRAPE TO TRIANGLE
WING ROOT AIRFOIL
HIGH POINT
25%
12.5% FLAT
START UNDERCAMBER
MAX. UNDERCAMBER 50% 0.080 TAPER TO 0.050 AT DIHEDRAL BRE
FAIRING TO SYMETRICAL TIP SECTI
2.6
SCRAPE BAMBOO TO POINT WHERE IT LEAVES A TURBULATING BREAK AT THE BALSA, BAMBOO JOINT.
FUSE WIDTH TAPERS FROM 0.25" WING TRAILING EDGE TO 0.18 AT VERTICAL
2.8
2.9
STABILIZER LEADING EDGE TO POINT AT END. MAINTAIN TRIANGULAR CROSS SECTION FROM THE HOLDING TAB TO END OF FUSELAGE
STAB TILT
11"
11"
INSIDE SLING"
INDOOR UNLIMITED CLASS CAT. GLIDER
CAT III RECORD
2:22.4
SECTION A
0.5
0.25"
A
B
WING FILLETED AT CTR DIHEDRAL BREAK WITH 1/8 BALSA and UNDERCAMBER WITH 1/8 BALSA and SANDED FLAT TO CONFORM WITH FUSELAGE
SECTION B
0.25
0.4
2.6
1.0"
1.4"
0.1
0.2"
2.0"
3.2"
1.5"
2.5"
8.3
1.0"
2.6"
WEIGHT BALANCED
105 GRAMS
VERTICAL STAB SYMETRICAL SECTION.
HORIZONTAL STAB FLAT BOTTOM LIFTING



"INSIDE SLING" (TEMPLATES) SEE SKETCH FOR FUSELAGE AND ASSEMLY DIMENSIONS

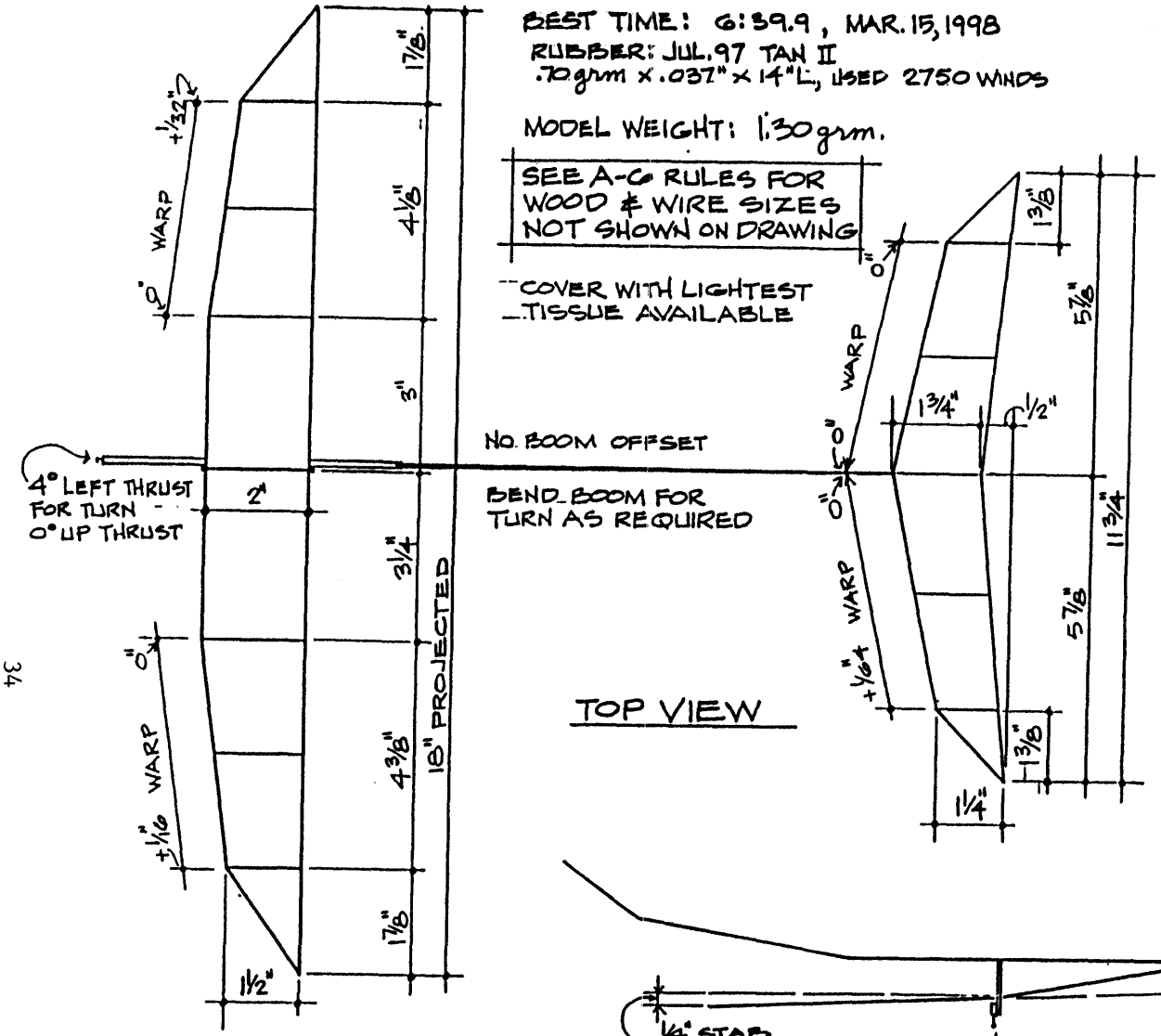

13½"
1½"
1¼"
WING OFFSET ½"
2"
1½
MODEL WEIGHT 1.8 GRAMS
RUBBER SIZE .033 X 12"
DIHEDRAL ¼" EACH PANEL
RAISE TIPS TO MAKE 15" SPAN
COVER TIPS AFTER RAISING
ALL STRIPS 1/16" SQUARE
1/16" SQUARE STRIPS - GLUE TO WING - HOLD WING WITH ORTHODONIC BANDS - ALA ARONSTEIN
.015 WIRE PIGTAIL
FUSELAGE 3/32" X 3/16"
.012 WIRE
TAIL BOOM 1/8" TAPER TO 1/16" X 1/32"
BOOM SHOULD HAVE 2° NEGATIVE INCIDENCE
2° LEFT THRUST
1/32" FLAT SHEET
TE
LE
INSET SPAR IN PROP
SET AT 45°
SPAR 3/32° TO 1/32°
PROP SHAFT 1/32" STEEL WIRE
FULL SIZE RIBS - 1/32 SHEET
AND
PROP
Boom 1/16" WIDE
OFFSET ½" FOR
LEFT TURN.
INTERNATIONAL A-6
JOHN LENDERMAN
JANUARY 1998
GLUE RUDDERS TO TOP OF STAB
1 5/8"
1"
8 7/8"
1¼"
MODIFICATIONS TO #2
3/4" WING POSTS, .045° MOUNTED ON PAPER TUBES
TAILBOOM TO 7½"
STABILIZER - SHORTEN TO 7½" WITH 5 RIBS
.012 WIRE PIGTAIL

BEST TIME: 6:59.9, MAR. 15, 1998
RUBBER: JUL. 97 TAN II
.70grm x .037" x 14"L., USED 2750 WINDS

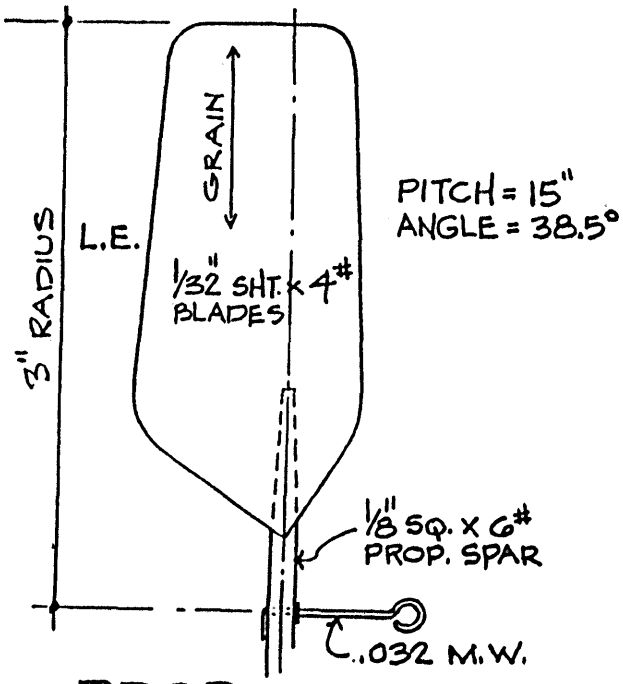
MODEL WEIGHT: 1.30grm.

SEE A-6 RULES FOR WOOD & WIRE SIZES NOT SHOWN ON DRAWING

COVER WITH LIGHTEST TISSUE AVAILABLE

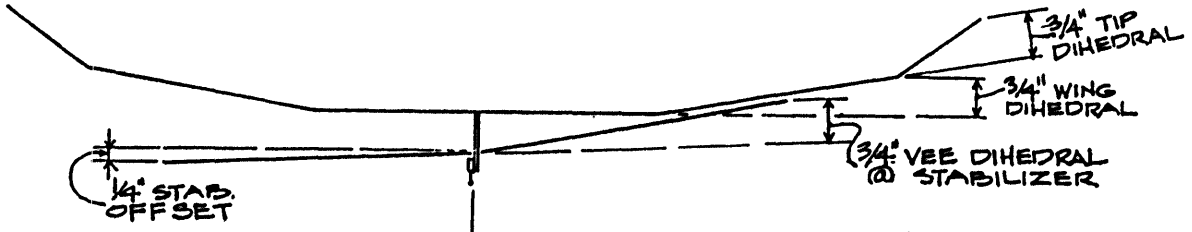


TOP VIEW

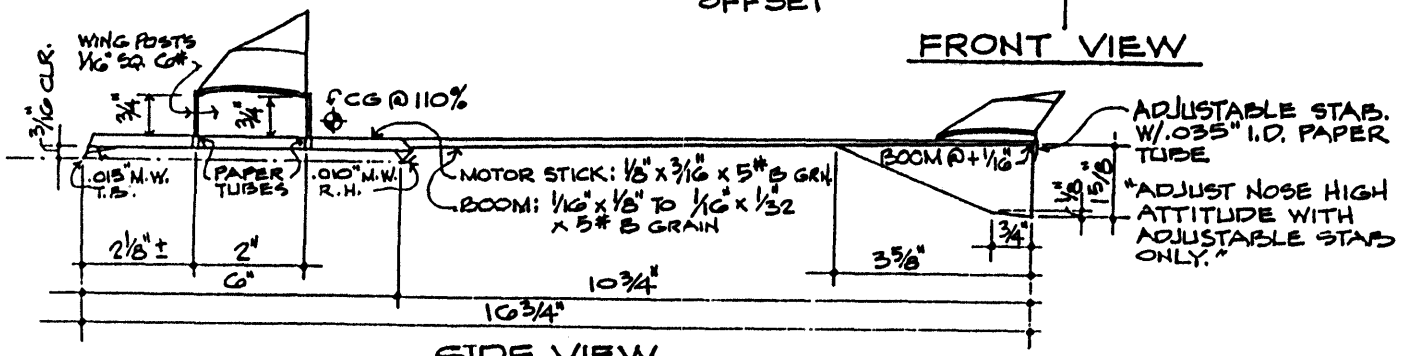


PROP. • Full Size

AIRFOIL • Full Size
FOR WING & STAB.



FRONT VIEW

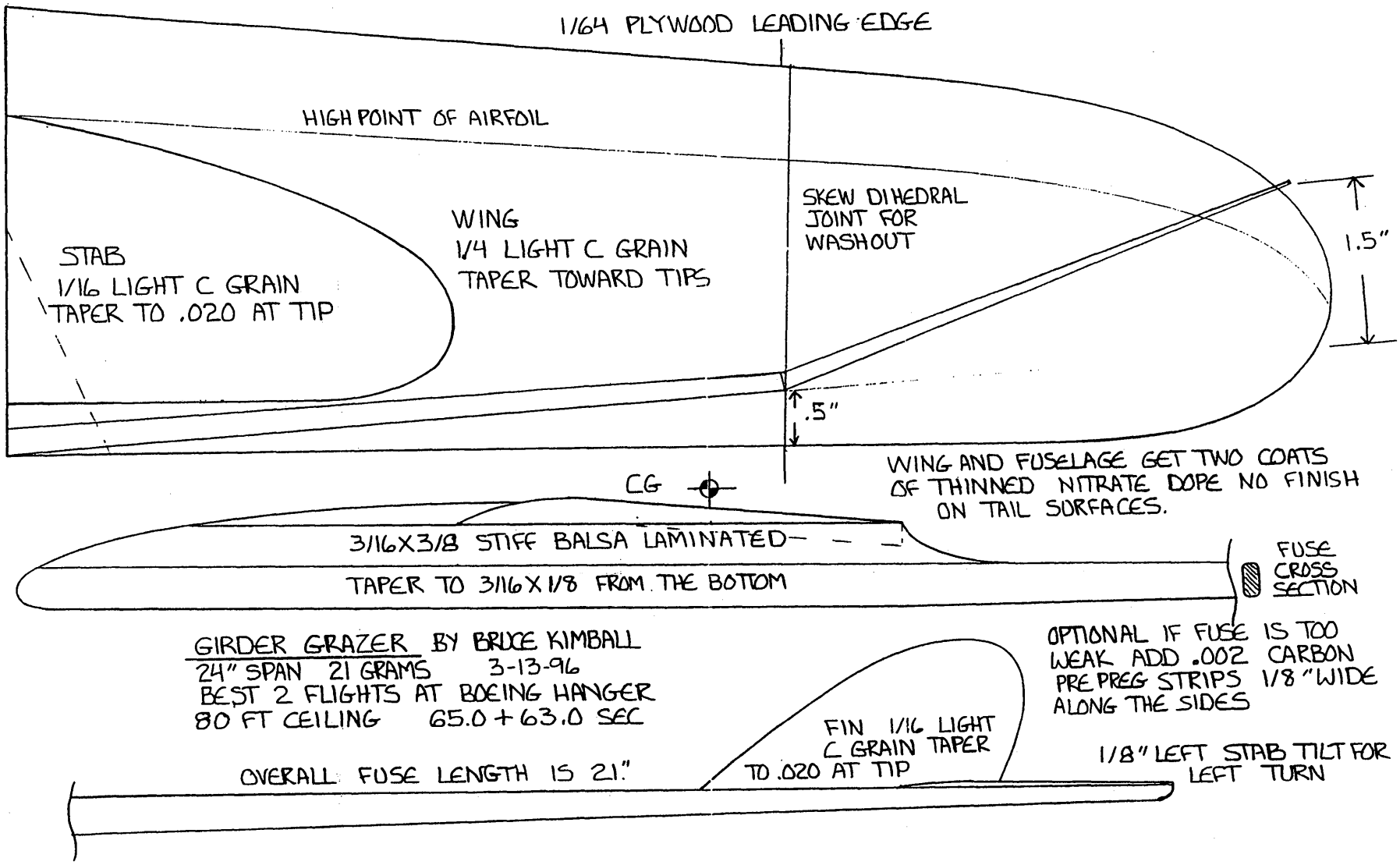


SIDE VIEW

"SLUGGER"

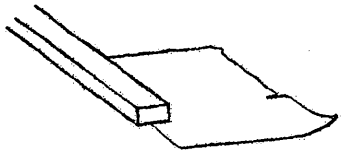
A-6 DESIGN BY:
ANDREW TAGLIAFICO

DRAWN MARCH 22, 1998
AT



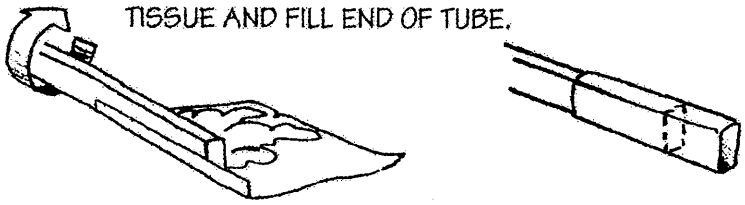
I built one of these - flies great.
Outdoor ~ 40 gm (plan reduced 73%)

GLUE TISSUE TO FORM, LATER GLUE APPLICATION WILL SOFTEN THIS GLUE TO ALLOW REMOVAL

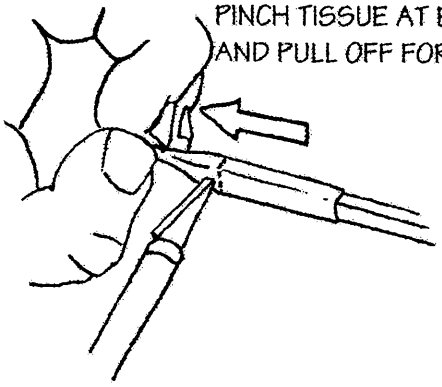


NOTE TISSUE OVERHANG

APPLY LIBERAL AMOUNT OF GLUE AND WRAP TISSUE TIGHTLY. GLUE WILL SOAK TISSUE AND FILL END OF TUBE.

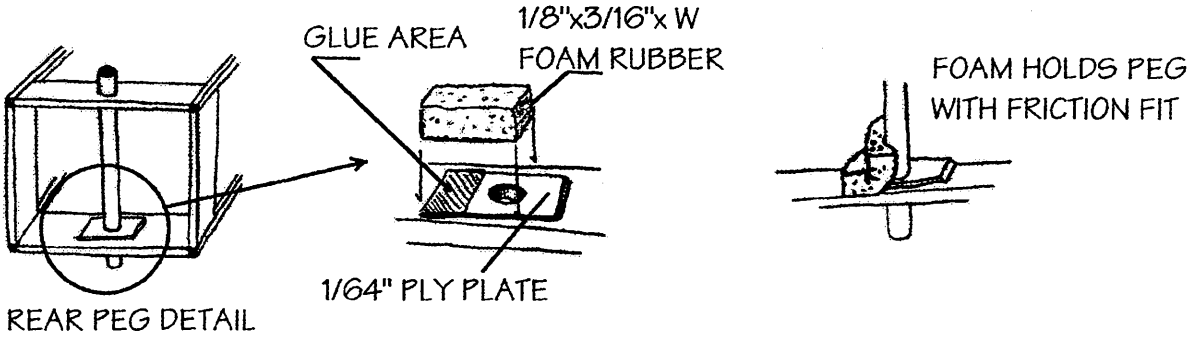


MAKING PAPER TUBES

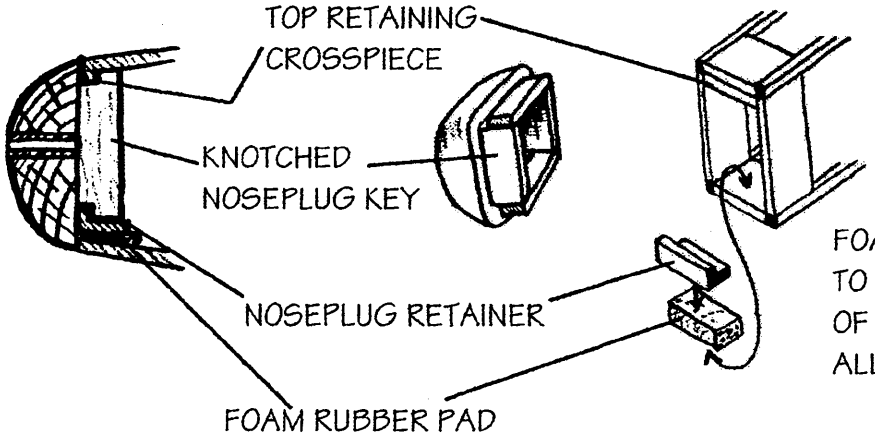


CUT HOLE FOR AIR ENTRY

Square or rectangular paper tubes are best for holding adjustments. These style tubes are easy and quick to make with this method. A brass form of the exact post dimentions is used as a mandrel. The tissue is glued to the form with Ambroid style cement to allow easy wrapping. A large amount of cement is applied to the tissue and the tube is wrapped. The surplus glue will ooze out and must be wiped off. A hole must be cut to allow air into the tube so that it can be pulled off of the form. Two or three layers is plenty of tissue for most applications.



BOSTONIAN REAR PEG RETAINER



FOAM RUBBER IS GLUED TO INSIDE OF NOSE. COMPRESSION OF RUBBER RETAINS PLUG AND ALLOWS ITS INSERTION.

NOSEPLUG RETAINING SYSTEM

Rubber Testing - Bob Gibbs

One of the important characteristics of all rubber is the energy (E) contained in a given batch in ft-lbs. per unit weight. Another characteristic is that E is not constant between batches (as we all know) and unfortunately E is quite variable within the same batch. A single one pound box may vary as much as 250 ft-lbs throughout its length. An average of at least ten test loops taken from different boxes from the same batch will provide a reasonable "talking" value for the energy for that batch. Rubber is also quite sensitive to temperature and since all tests are not run at the same room temperature adjustments must be made to the energy test results (E_T) to a base temperature. I have used 70 degrees Fahrenheit as a base for some 20 years (E_{70}). Any (E) estimate without knowing the temperature is of doubtful value.

The variations discussed above may be traced to the vulcanization process including the growing season of the crude rubber utilized. Like wine, some years are better than others for rubber.

Other characteristics of "good" rubber besides its (E) value includes the turns per inch a motor will take before it breaks and any tendency for motors to break in mid-flight. The final test of course is the performance of the model, its propeller, the flying techniques used and the rubber batch being used. When you get good results (high times) stick with that combination. Your best performance may not be achieved by the highest (E) value rubber you have but it probably will, all else being equal.

Many different test techniques have been utilized by different people to determine the energy content of various batches of rubber. The procedure described herein is time consuming and in my opinion is reasonably accurate and repeatable. The procedure provides the information used to calculate the area under a curve of force (in pounds) vs stretch (in inches) for the weight of the test loop from which data the test loops energy may be obtained. Since the rubber in a one pound box may vary as much as 250 foot pounds, a single test is not sufficient to establish an average energy for an entire batch of Tan II. At least 8 to 10 samples should be tested, preferably from separate boxes of the same batch. The average of these readings will approach the correct value of energy in ft-lbs/pound of rubber for a given batch. Each test loop must be adjusted to 70 degrees Fahrenheit before averaging.

Terms used and the procedures involved are:

$\mathbf{L_0}$ = the length of the test loop to the nearest .01 inches in length. This should be in the range of 6.5 to 7.0 inches in length. The rubber should be unused and unstretched except for tying the knot.

W = the loop weight minus the knot weight (we are not testing for the energy of the knot). The cross section of the test loop should be such that W=.020 to .022 oz. Knot weights are in the range of .0005 to .0009 oz.

F_1 = 1,278.28 (W/L_0) a force in pounds.

L_1 = the test loop stretch in inches (to two decimal places) required to reach the reaction for force F_1. Return the test loop to zero load.

F_2 = 12,214.69 (W/L_1) a force in pounds.

T = temperature in degrees Fahrenheit at the same level above the floor as the test loop.

By this point you have achieved a means of measuring stretch and force (reference L_1). It must also be capable of providing force readings at three-inch increments in the following procedure. For manual recording purposes I use a two-column "form" for length and force entries. My test setup will be briefly described later (you may have a better technique).

L_2 = the loop length (stretch) required to reach a force equal to F_2. These two values (L_2 and F_2) are recorded on the first line of the "form" above. Proceed to relax the force until L_2 minus three inches is reached. Record both the length and force values on line two of the "form". Continue to relax the loop tension at three-inch intervals recording each length and force value pair until zero force is reached.

x = the sum of the F's minus F_2 (Add all of the numbers in the "form" column for force and subtract F_2)

$y = (2x + F_2) / 2$ (lbs)

$E_T = (4y / W)$ (ft-lbs of energy per lb of rubber at the test temperature)

E_{70} = the test loop energy at 70 degrees Fahrenheit in ft-lbs/lb. Temperature effects on energy are assumed to vary with the square of the ratio of two temperatures in degrees Kelvin. For example, at a test temperature of 75 degrees F assume that E_T = 4000. The conversion to $E_{70} = E_{75} \times .98138 = 3925.5$ ft-lbs/lb. If E_{70} = 4000 the energy at 75 degrees = 4000 x 1.01898 = 4075.9 ft-lbs/lb. This is a gain of 1.9 percent in energy for a 5 degree Fahrenheit increase in temperature over the E_{70} value base temperature. An energy estimate not associated with a temperature is close to meaningless.

S = the ratio of the maximum stretch required to perform the test (L_2) divided by (L_0).

The test device used by the author is mounted on a piece of wood, one inch x 4 inches x 8 feet long. A 16 foot power tape is used for length measurements. A coil spring about 2.0 inches long, 0.36 inches OD and wire size diameter of .035 inches is used for force measurements. This spring is close wound with about 55 turns. It provides for a maximum force measurement of 5 lbs at 1.25 inch travel per pound of force (linear). The

test loop is mounted on one end of a traveler (#1) made of rigid plastic pieces which rides on a piece of aluminum angle. The other end of traveler (#1) is attached to an end of the coil spring. A second traveler (#2) rides along the board surface as the rope pulls it away from and later toward the no force position. The rope of course is positioned by "hands on". The end of the test loop and the 16 foot tape are attached to this traveler (#2). The rigid plastic traveler (#1) also provides markers to permit reading length and force values for the three inch increments at which readings are required and recorded for each position.

Photos are included of the test device for information. The device may be modified from the above so long as the same results are achieved. The constants used for calculating F_1 and F_2 will accommodate variations in loop length (L_0) and loop weight (W). If the loop is too long you may need a 10 or 12 foot long board and if its weight is too great you may need a different scale. If two adjacent loops from a batch are tested the results should be within 10 or 15 ft-lbs of each other at 70 degrees F.

For Tan II (5/99) my estimate is: E_{70} = 4,110 ft-lbs per pound of rubber. This is the average of 19 test loops and is slightly higher than Tan II (7/97) with an E_{70} = 4,093 which is the average of 37 test loops. If you test a single loop from a one pound box and arrive at a low figure do not give up. I recently tested an end-of-box loop from (5/99) and had a result of E_{70} = 3950. A second test loop from about 125 feet into the box yielded an E_{70} = 4,225 ft-lbs per pound result. By coincidence, these two locations from the same one pound box must be close to the high and low limits for the (5/99) batch. None of the other 17 samples tested exceeded these values.

If you have any suggestions, corrections or questions please contact the author (especially if you have a simpler way of achieving the same E_{70} results!).

Y2K INTERNATIONAL INDOOR POSTAL CONTEST MINISTICK, A-6 & EZ-B

The Virginia Brainbusters are proud to announce that for the year 2000, they will host the Ministick, A-6 and EZ-B Postal Contests. All three events will be flown between 1 Jan 2000 and 31 Mar 2000. Individuals may fly as many times as they like, in as many sites as they can, but only their highest score will count in each event. All scores will be mailed to the address listed below. There will be no Web site this year and no dividing the flyers into different groups. Scores will be published in February, March and April within the Brainbusters Club Newsletter, with the final scores being mailed to all participants or groups. Prizes will only be awarded in the Ministick competition

All scores must be on the offical score sheet, attached to this notice. The scores must be postmarked prior to 10 April 2000.

The rules for each event are listed below.

Ministick

The contest is open to indoor models that comply with the AMA Ministick rules.

All contest flights to be timed by someone other than the flyer

Best single flight time wins, after the the flight time has been corrected for different ceiling heights. Ceiling height to be measured as per FAI rules, but with a five meter diameter circle. The correction factor is 627 divided by (167 plus 46 times the square root of the ceiling height in feet.) The time in seconds will be multiplied by this to give the corrected time.

Send your results to:

Brainbusters
112 Tillerson Dr
Newport News, Va
23602

24. Mini-Stick. *For event 220.*

24.1. The intent of this proposal is to make Mini-Stick an official event to allow including the event in AMA contests, to increase participation, and to allow records to be more easily kept.

24.2. The Mini-Stick model shall be a monoplane covered with any commercially available material sold in sheet form. Microfilm is not allowed.

24.3. The maximum projected wingspan shall be seven (7") inches.

24.4. The maximum wing chord shall be two and one-half (2-1/2") inches.

24.5. The maximum length (from front of nose bearing to front of rear motor hook) shall be five (5") inches.

24.6. The maximum length from front of nose bearing to rear most part of model shall be ten (10") inches.

24.7. The projected area of the stabilizer shall not exceed 50 percent of the projected area of the wing.

24.8. The maximum diameter of the propeller shall be seven (7") inches. The propeller shall be constructed of wood. Wire shafts are permitted. Hubs that allow blade replacement and/or manual pitch adjustment are allowed. Mechanisms that cause variable pitch and/or variable diameter of propellers while in flight shall not be allowed. (Natural flexing and flaring of wooden blades is allowed.)

24.9. The minimum overall weight of the model (without motor) shall be 0.015 ounce.

24.10. Construction is to be primarily wood, with adheisives used only for joining. Tissue and/or thread is permitted for wrapping bearings, hooks, and for making sockets, if desired. Boron, carbon fiber, Kevlar, and fine wire bracing are not permitted.

24.11. Mechanisms that restrict the torque available to the propeller are not allowed.

A-6

1. The contest is open to indoor models that comply with the A-6 rules.

2. All contest flights to be timed by someone other than the flyer.

3. Best single flight time wins, after the flight time has been corrected for the 70 ft factor. Ceiling height will be determined by the AMA/FAI measurement method. Flight times will be normalized against times from the highest site entered according to the following formula:
* The normalized flight time = 2/3 (Highest Ceiling Height) - (Local Ceiling Height) + (Local Time)
*Highest ceiling height will be established as 70 ft until an entry from a higher site is recieved.
* Example:

Highest ceiling entered = 70 ft
Local ceiling = 22 ft
Local time = 97 sec
Normalized time = 129 sec
2/3 (70-22)+97 = 129.0

*Note That the offical normalized times will not be available until the contest is completed

Mail results to:

Brainbusters
112 Tillerson Dr
Newport News, Va
23602
USA

A-6 MODEL RULES.

1. 30 sq in max wing area.
2. 1/32 max prop shaft diameter
3. 6 in max prop diameter. The blades are to be flat, no chamber. Blades may be made of balsa or unlightened plastic, no foam. 1/32 in thick or 1 mm
4. 6 in max motor stick length as measured from the prop thrust bearing to the rear hook. Tail boom length unlimited.
5. All strip wood construction is to be a minimum of 1/16X1/16 or 1.5X1.5mm where only metric sizes available. The strip wood may not be sanded to any shape other than a square.
6. All sheet wood construction, prop blades,wing and stab ribs are to be a minimum of 1/32or 1mm thick. Prop blade edges will not be rounded.
7. All wing and stab ribs will be 1/32 X1/16 or 1.5mmX1mm minimum cross section.
8. Covering materials are limited to: Jap tissue, condenser or Gampi paper.
9. Only wood,wire,adhesives and allowed covering materials can be used for construction with the exception of the prop shaft support and bearing which may be wire, aluminum or plastic. No special indoor material may be used.
10. Rubber power only.
11. The use of metric size wood is restricted to those that normally cannot get other size wood.
12. The model must weigh a minimum of 1.2 grams

EZ-B

The contest is open to indoor models that comply with the AMA EZ-B Rules.

All contest flights to be timed by someone other than the flyer.

Ceiling height must not exceed eight meters,approx 28 ft 2 in.

There is no correction factor.

Best single flight time wins.

19. Easy B. *For event 206.*

19.1. General. Except for the specific rules which apply directly to Easy B, the rules for Free Flight Indoor Rubber, Hand-Launched Stick Model, shall apply.

19.2. Characteristics.

19.2.1. The Easy B model shall be a monoplane covered with any commercially available material sold in sheet form. Microfilm is not allowed.

19.2.2. The maximum projected wingspan is 18 inches (45.72 centimeters).

19.2.3. The maximum wing chord allowed is three (3) inches (7.62 centimeters).

19.2.4. The motor stick shall be solid and made from a single piece of wood. The tail boom shall either be an extension of the motor stick or a separate piece of solid wood. It is permissible to use splints of wood less than 3/8 inch (0.953 centimeters) long, attached directly to the original wood, to repair structural damage to the tail boom and motor stick.

19.2.5. There are no restrictions on model length.

19.2.6. There shall be no minimum weight restrictions on the model.

19.2.7. Stabilizer area shall not exceed 50 percent of the projected wing area.

19.2.8. There shall be no bracing on the model except that which consists entirely of solid wood. The use of any material except wood for bracing on Easy B models shall not be acceptable. The intent of the Easy B rules is that all structures shall be constructed entirely from wood, using adhesives solely to assemble the structure.

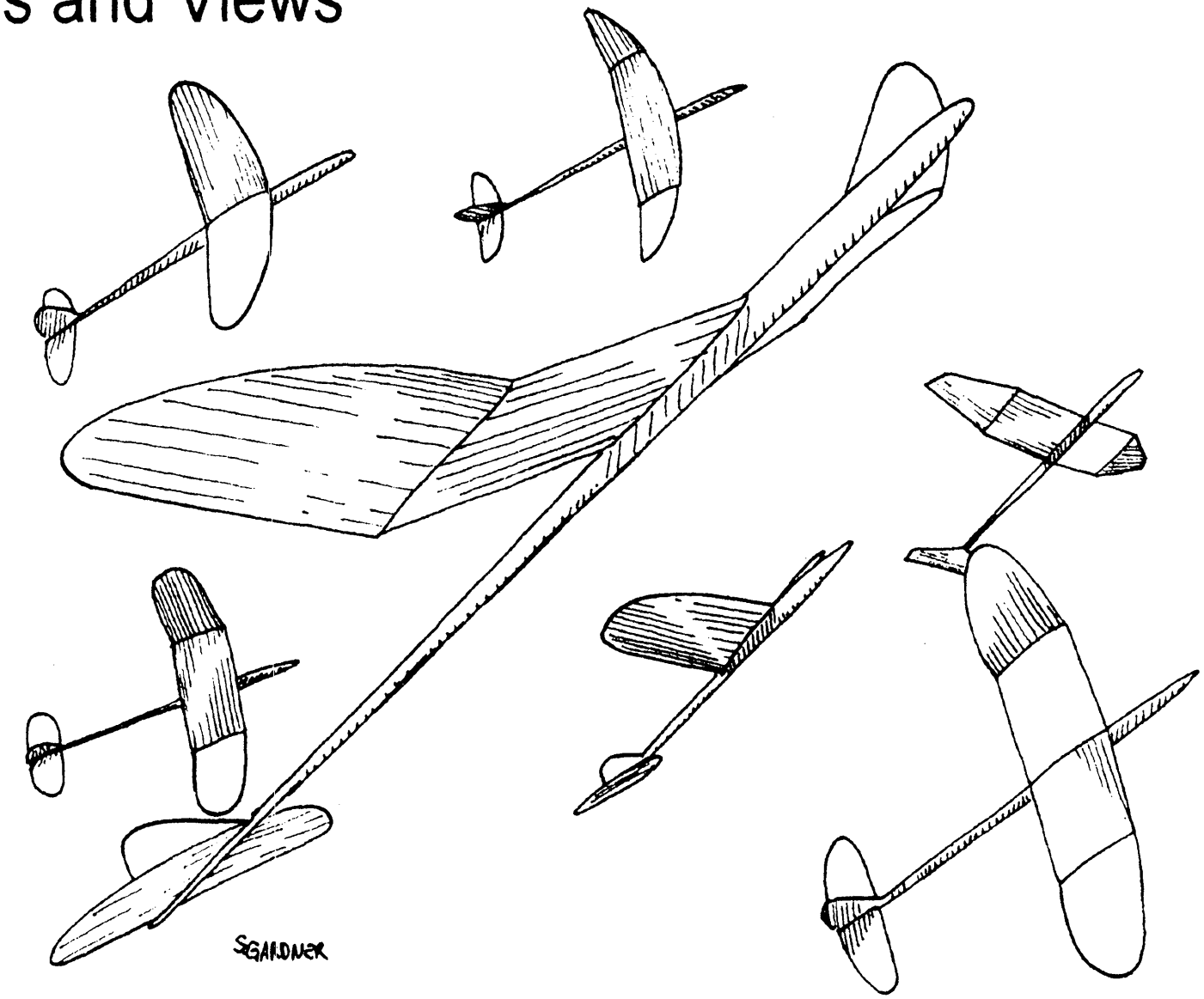
19.2.9. Propeller. The propeller blades shall be constructed entirely from wood, with the following exception: Special novice or beginner events can be set up for local competition by permitting the use of plastic commercial propellers, provided advance notice is given in contest announcements. It is not acceptable to use any material other than wood for the propeller blades and spars, one (1) wire for the propeller shaft, and adhesive for assembly. No gadgets of any kind (such as variable pitch or variable diameter mechanisms) are permitted as part of the propeller. Propeller hubs which permit blade replacement and manual pitch adjustment are acceptable.

19.2.10. The structural framework of the Easy B model shall be entirely of wood with adhesive for assembly only. Reinforcement utilizing boron, carbon fiber, Kevlar™, or any other non-wood substance is not allowed. Tissue or thread wrap at the thrust bearing and rear hook is acceptable.

19.2.11. It is prohibited to use any scheme, device, or mechanism which affects the rate of energy release from the rubber motor, except for propeller blade flare or deformation.

Indoor News and Views

Issue #99
August, 2000



INDOOR NEWS AND VIEWS (INAV) IS PRODUCED
IN ST LOUIS BY LARRY COSLICK, GENE JOSHU,
HOWARD HENDERSON, BILL MARTIN,
STEVE GARDNER, AND ROY WHITE

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THE PRODUCERS ARE LOOKING FOR VOLUNTEERS TO TAKE OVER PUBLICATION OF INAV. ANYONE INTERESTED SHOULD CONTACT HOWARD HENDERSON.

A Junior's Analysis of the Junior Problem
By: Nick Leonard, Jr.

One growing problem that has for years been looming is the lack of juniors flying indoor. Juniors have not completely disappeared from the scene. There is a group of them from the town of Smyrna that flies at Johnson City every year. This is a great program that has really brought much good to USIC. However, outside of this group there are perhaps five juniors in the US actively flying indoor. From what I have heard, at one point many years ago, hundreds of people (and many juniors) would attend the indoor Nationals. What has happened to these hoards?

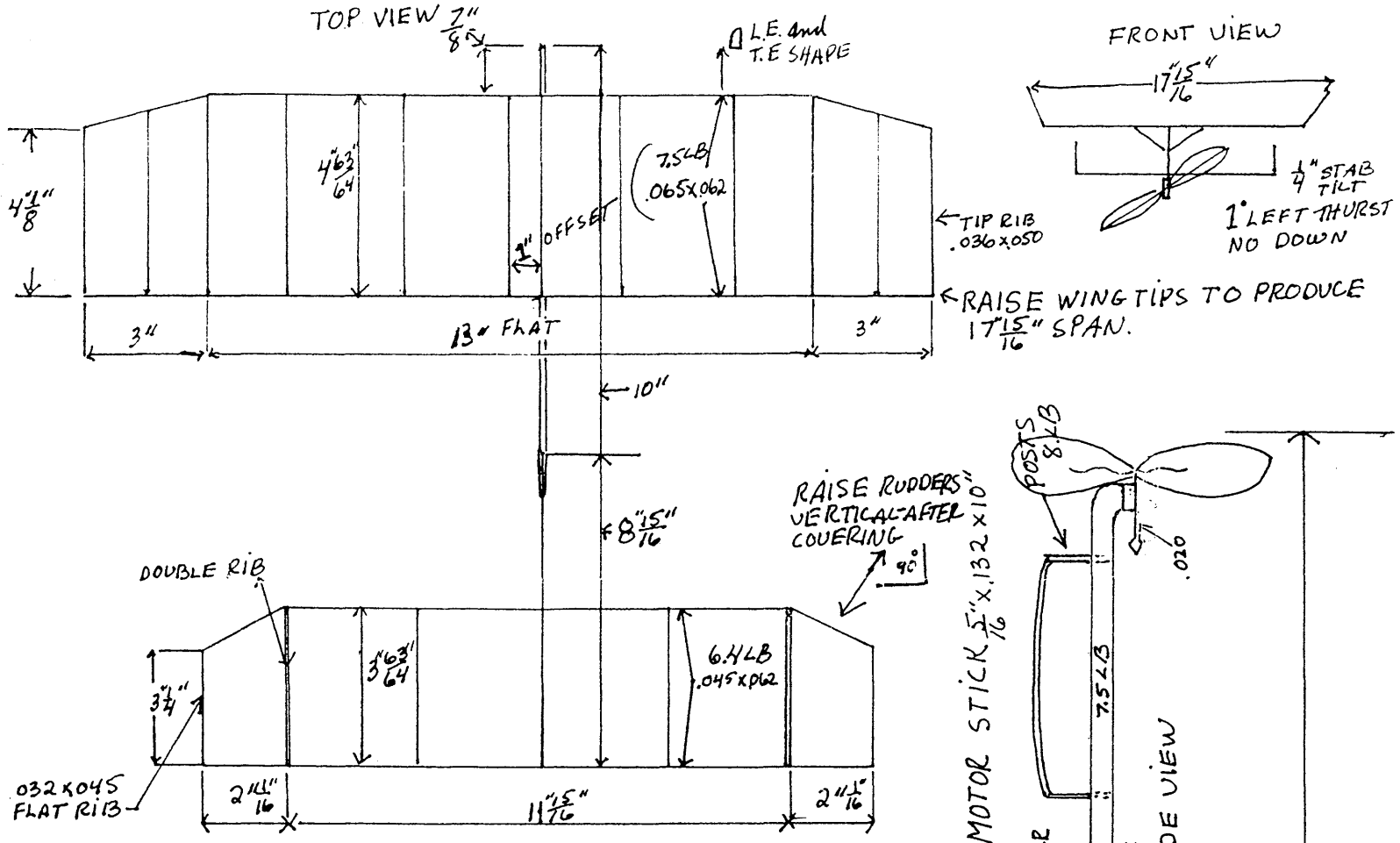
I have much first hand experience with those in my age group. In fact, I live with nearly forty of them during the school year. This contact has answered the question above very clearly. To answer it within a reasonable length, we should first define what an indoor flyer has, rather than doesn't have. Now, I will use F1D as the example here because I know more about them than other classes. Also, F1D is indoor carried out to the farthest point; the most extreme and therefore the best for illustrating my point. **Personal properties:** An F1D flyer needs to have his wits about him. He needs to have extreme motor control in the hands. He must be accurate and motivated. He needs to be a bit of a perfectionist. He must be very patient. He must have a fairly long-term view of things; a long interest span firmly on building and flying. I believe he must enjoy what he does. This is a moderately long list of requirements, but some of these are developed over time.

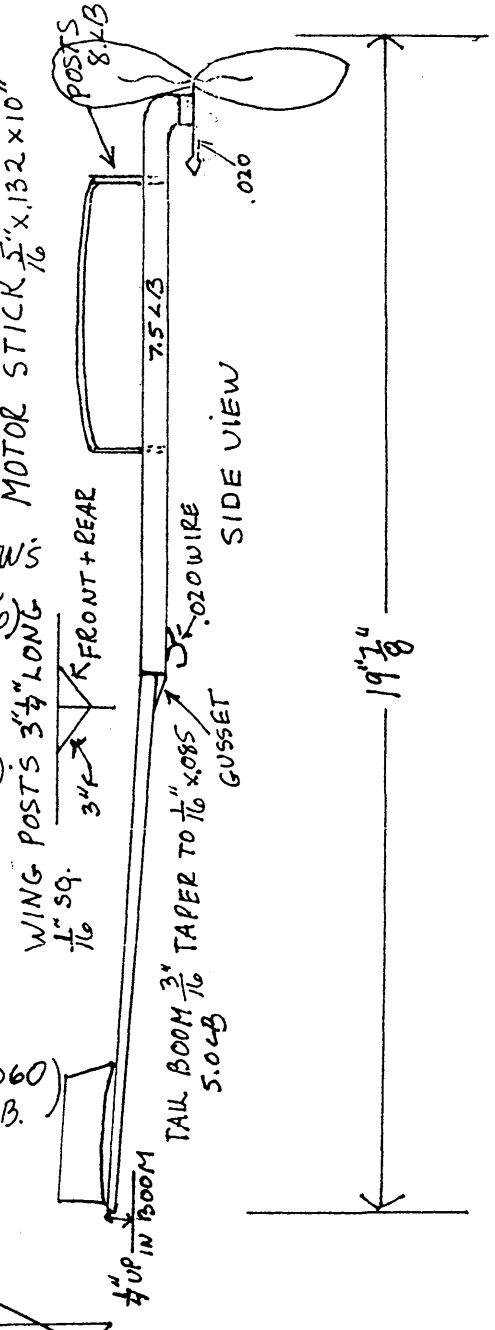
This is where my observations bring the problem to light. Most American male teenagers are by nature rebellious. Many are more destructive than constructive. Laziness, lethargy, and video games plague nearly all. They generally have short-term goals and constantly need action or some sort of 'interest booster'. Many despise school and thinking in general. Noise is a must. I had the "privilege" of attending my first 'dance party' this last year, and it was truly gruesome. An oppressively hot and humid atmosphere in the dark with bright lights flashing everywhere, all while being serenaded by what I can only describe as a sickening screeching excuse for music. But no one else thought this was bad. In fact, many rated it among the best they had attended. If this is a good time, then you have to admit, that taking the RPM of an F1D prop at 100' inside the silent ETSU Mini-dome while discussing a balance problem between the blades of your prop is worse than death.

There is some evidence that the above characteristics are a large part of the cause. Teens of third world countries cannot share in the luxuries of their American counterparts. They may have a clearer idea of the value of actions. They certainly are not plagued by the curse of Nintendo. That may account for the fact in the last World Champs there was one junior from west of Poland and why Romania has a full team of juniors competing for the three spots on their world team.

However, there are still some American candidates left in the running. "Nerds" like myself mostly. In the development of a junior flyer, there is a large random element as well. These candidates have to be introduced to indoor. They must be interested enough to pursue it. However, This is where the real problem arises. It is extremely difficult for a lone junior to accomplish much at all. A supporter, preferably a model builder, needs to be present. Whether it is a father, a friend, or a local flyer, this position is critical. Indoor is not intuitive at all- a person needs to be shown the ropes, or at least have some one to muddle them out with. This is where we may lose almost all. Nearly all advanced juniors have some 'partner' that flies with them. I am extremely fortunate to have my father. The point is, a junior needs to have a person (or people) to consult and fly with.

By answering the above question I have only defined the problem. Logically, one would next ask, "How can we solve this problem?" This I cannot claim to have the answer to. In reality I do not even know if there is a solution to it. Indoor, and F1D in particular, is so difficult and time consuming that it takes a very rare combination of traits and chance. American junior F1D flying may be perpetually limited to very few, very remarkable juniors.





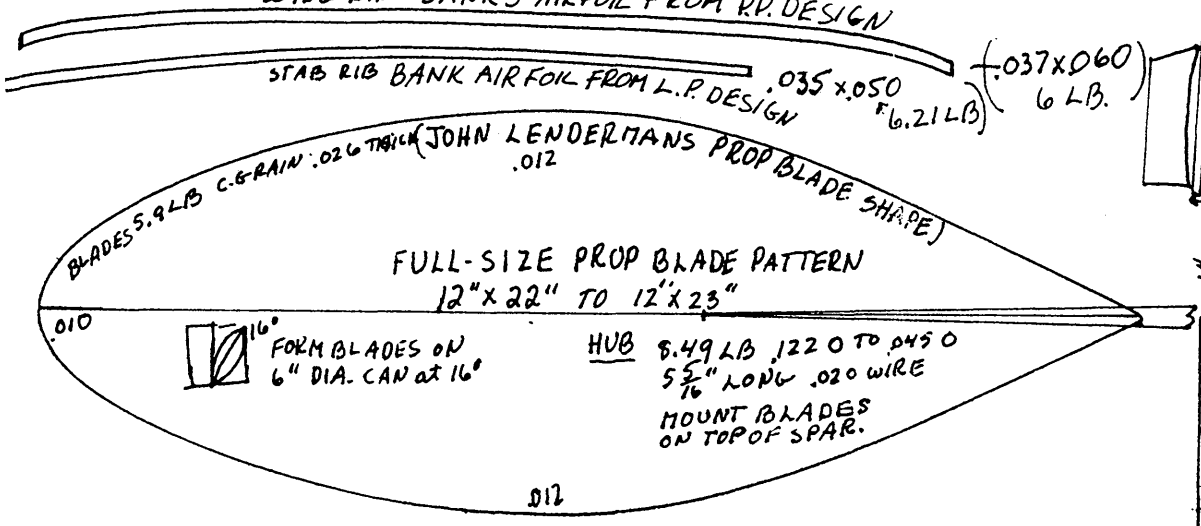
"PIECES" FEATURES MODIFIED BANK'S WING, JOHN LENDERMAN'S PROP, BOB MEUSER'S NO-NON-CENTS MOTOR STICK, BOB ERERLE TAIL BOOM. (COVERING POLY MICRO) BANK'S AIR FOIL

LIMITED PENNY PLANE

OPEN CAT IV (18:14) FLIGHT PROP 12"x22" PITCH NO TOUCH

RUBBER 2 1/2 GRAM WT .074 x 20" loop (8/93 BATCH)

MODEL WT. 3.13 GRAMS



"PIECES"
LIMITED PENNY PLANE DESIGNED AND DRAWN BY WALTER P. VAN GORDER.
CAT. IV 18.14 7-6-96
CAT. III 13.27.33 1-2-2000
CAT.
CAT.
CAT.

FORTY MINUTE CLUB

JANUARY 2000

NAME	COUNTRY	TIME	1*	2*	YEAR	SITE
BROWN, STEVE	USA	63:54	X		1996	SANTA ANA
RICHMOND, JIM	USA	56:35	X		1996	AKRON
RANDOLPH, BOB	USA	55:06	X		1993	SANTA ANA
BROWN, STEVE	USA	53:45		X	1997	SANTA ANA
ASLETT, BERNARD	UK	52:22	X		1983	CARDINGTON
COSLICK, LARRY	USA	52:04		X	1999	AKRON
UNDERWOOD, GARY	USA	51:58		X	1996	LAKEHURST
GIBBS, BOB	USA	51:53	X		1999	SANTA ANA
ROBBINS, HERB	USA	51:36	X		1998	SANTA ANA
KAGAN, JOHN	USA	51:11		X	1999	AKRON
KOWALSKI, DICK	USA	50:41	X		1976	AKRON
DOIG, RICH	USA	50:41		X	1995	AKRON
RICHMOND, JIM	USA	50:12		X	1999	AKRON
BANKS, CEZAR	USA	49:50		X	1996	MOSCOW, IDAHO
ROMAK, BUD	USA	49:35		X	1991	LAKEHURST
RANDOLPH, BOB	USA	49:31		X	1995	AKRON
BARR, LAURIE	UK	49:29		X	1996	CARDINGTON
HUNT, BERNARD	UK	49:07		X	1997	CARDINGTON
SLUSARCZYK, DON	USA	48:10		X	1995	AKRON
BUTTY, RENE	SWI	48:01		X	1996	MOSCOW, IDAHO
ROHRBAUGH, AL	USA	47:40	X		1997	AKRON
HARLAN, RAY	USA	47:13		X	1980	AKRON
GIBBS, BOB	USA	47:03		X	1998	SANTA ANA
TIPPER, JOHN	UK	46:45		X	1996	CARDINGTON
DOIG, RICH	USA	46:24	X		1983	AKRON
OTA, KENICHI	JPN	46:16	X		1996	MATUMOTO CITY
LOUCKA, LARRY	USA	46:14		X	1995	AKRON
CHILTON, STAN	USA	46:10		X	1994	AKRON
McGILLIVRAY, JACK	CAN	45:57		X	1996	MOSCOW, IDAHO
RODEMSKY, ERV	USA	45:50	X		1974	SANTA ANA
RIEKE, K. H.	GER	45:40	X		1962	CARDINGTON
MERKT, THOMAS	GER	45:27		X	1996	MOSCOW, IDAHO
REDLIN, CARL	USA	45:17	X		1962	CARDINGTON
REE, ANDRAS	HUN	45:13		X	1998	SLANIC PRAHOVA
ANDREWS, PETE	USA	44:59		X	1979	AKRON
ENOMOTO, HIDEYO	JPN	44:55		X	1998	MATUMOTO CITY
MATHER, CLARENCE	USA	44:44	X		1974	SANTA ANA
ASLETT, BERNARD	UK	44:37		X	1985	CARDINGTON
DE BATTY, BOB	USA	44:35		X	1996	SANTA ANA
NICOARA, VASILE	ROM	44:30		X	1996	MOSCOW, IDAHO
HULBERT, BILL	USA	44:27		X	1994	AKRON
HACKLINGER, MAX	GER	44:20	X		1961	CARDINGTON
NORE, PENTTI	FIN	44:01		X	1986	CARDINGTON
ANDRE, THEDO	NED	44:01		X	1986	CARDINGTON
ORSOVAI, DEZSO	HUN	44:00		X	1998	DEBRECEN
KOPECKY, ERNIE	USA	43:42	X		1963	SANTA ANA
ROBBINS, HERB	USA	43:39		X	1995	SANTA ANA
ALLEN, PAUL	USA	43:36	X		1974	SANTA ANA
KUJAWA, SYLWESTER	POL	43:35		X	1992	WROCLAW
MANGALEA, CORNELIU	ROM	43:30		X	1996	MOSCOW, IDAHO
CUMMINGS, FRANK	USA	43:28	X		1963	SANTA ANA
ATWOOD, BILL	USA	43:17	X		1963	SANTA ANA
THOMAS, MIKE	CAN	43:01		X	1996	MOSCOW, IDAHO
PLOTZKE, RON	USA	42:53	X		1969	LAKEHURST
FOSTER, JOE	USA	42:44		X	1987	SANTA ANA
SIEBENMANN, DIETER	SWI	42:33		X	1986	CARDINGTON
KELLER, PETER	SWI	42:30		X	1999	BORDEAUX
CAILLIAU, LARRY	USA	42:29		X	1985	AKRON
BAILEY, BOB	UK	42:28		X	1998	SLANIC PRAHOVA
DOMINA, DAN	USA	42:25		X	1979	AKRON
CANNIZZO, SAL	USA	42:20		X	1983	LAKEHURST
PYMM, DAVE	UK	42:03		X	1986	CARDINGTON
ROMAK, BUD	USA	42:01	X		1965	MOFFETT NAS
LEONARD, NICK SR.	USA	41:50		X	1999	AKRON
OBARSKI, DICK	USA	41:30		X	1981	AKRON
FINCH, TOM	USA	41:27	X		1963	SANTA ANA
KINOSHITA, SATOSHI	JPN	41:24		X	1993	TACHIKAWA CITY
CHAMPINE, BOB	USA	41:23	X		1963	SANTA ANA
RODEMSKY, ERV	USA	41:23		X	1979	AKRON
STOLL, ED	USA	41:21	X		1963	SANTA ANA
HOFFMAN, EARL	USA	41:13		X	1987	SANTA ANA
BAKOS, FERENC	HUN	41:10		X	1999	DEBRECEN
KIHARA, KAZUMASA	JPN	41:06		X	1998	MATUMOTO CITY
ROMBLAD, JONAS	SWE	41:02		X	1999	LAKEHURST
MATHER, CLARENCE	USA	40:54		X	1974	SANTA ANA
GANSER, RON	USA	40:53	X		1996	AKRON
DRAPER, RON	UK	40:44	X		1962	CARDINGTON
POPA, AUREL	ROM	40:42		X	1996	MOSCOW, IDAHO
RICHARDS, DEREK	UK	40:38		X	1999	CARDINGTON
BILGRI, JOE	USA	40:37	X		1965	SANTA ANA
NONAKA, SIGEYOSI	JPN	40:36		X	1978	CARDINGTON
STEVENS, DARRYL	USA	40:35		X	1986	SANTA ANA
SHEPHERD, JESSE	USA	40:33		X	1995	AKRON
DIHM, JAN	POL	40:21		X	1997	SLANIC PRAHOVA
LOTZ, RAINER	GER	40:20		X	1996	MOSCOW, IDAHO
GITLOW, LEW	USA	40:15		X	1987	SANTA ANA
MOSKALEV, VASILI	UKR	40:15		X	1996	MOSCOW, IDAHO
KALINA, JIRI	CZE	40:11		X	1975	CARDINGTON
RODENBURG, OTTO	NED	40:11		X	1986	CARDINGTON
TRIOLO, JOHN	USA	40:06	X		1974	LAKEHURST
MZIK, LARRY	USA	40:01		X	1995	AKRON

*CLASS 1 – Over 65 cm CLASS 2 – FAI 65 cm – 1 gram

Official and unofficial flights included (best effort only, by individual, by class is shown).

For additions, corrections, etc. send details to:

STEVE BROWN 297 Hartman Ct., San Dimas, CA 91773 USA

MODEL WEBSITES TO CHECK OUT

INDOOR

Indoor RC	www.homefly.com/
	www.toddsmodels.com/
Don Slusarc	http://members.stratos.net/dslusarc/
Don Vetter	www.dvetter.com/ff/
	http://people.ne.mediaone.net/indoor/
	http://ln-lemma.com/index.html/
SkyHooks	www.indoorrc.com/

CLUBS

Alamo Squadron	www.battlecreek.net/volare/alamo/
AMA	www.modelaircraft.org/
D.C. Maxecuters	www.his.com/~tschmitt/
Electric Fliers of San Diego	www.sefsd.org/
Ezone Newsletter	www.ezonemag.com/
Los Pilotos Locos	www.netropolis.net/chill/index.htm/
NFFS	www.mmb.com/nffs/
Ozone	www.modelflight.com/
S.A.M. 59, Carl Bakay	www.sd-la.com/bakay/
S.A.M. International	www.antiquemodeler.org/

KITS, PLANS, SUPPLIES

Astroflight	www.astroflight.com/
Aveox Electric Supply	www.aveox.com/index.html
Al Lidberg Model Plan Serv.	http://members.aol.com/aalmps/
BMJR Models	www.bmjrmodels.com/
Dumas Products	www.dumasproducts.com
Easybuilt Models	www.easybuiltmodels.com
Fourmost Products	www.fourmost.com
Paul K. Guillow	www.guillow.com
Bob Holman	www.angelfire.com/ct/bhplans
Hannan's Runway	http://pages.prodigy.com/runway/runwayhtm
Herr Engineering	www.iflyherr.com/
Hobby Club	www.hobbyclub.com/
Hobby Horse	www.hobbyhorse.com/
Hobby Lobby	www.hobby-lobby.com/
Hobby Supply South	www.fly-hss.com/
Meteor Publishing	http://members.xoom.com/meteorpub/
Penn Valley Hobby Center	www.pennvalleyhobbycenter.com/
Sig Manufacturing	www.sigmfg.com/
Volare Products	www.battlecreek.net/volare/
Indoor Model Supply	http://members.aol.com/indoorms/

A review of five kits

Science Olympiad Kits

By Dave "VTO" Linstrum, Digest scale contributing editor

The intent of this review of currently available Science Olympiad Propellor Propulsion kits is to make potential NFFS (and other) mentors aware of resources so they can be more effective coaches at local levels. Feel free to copy this article for students and principals.

1999-2000 Rules for Middle School events:

No ROG; hand launch only
Airframe Mass w/o rubber — 8gm
Max Wingspan 50 cm (19.68")
Max Wing Chord 12 cm (4.72")
Max Stab Span 35 cm (13.77")
Plastic Prop Max D 20 cm (7.87")
Max Mass single loop rubber 2 gm

For High School events, add unassisted ROG with two 3/4" wheels spaced a minum of 3.35" apart. Landing must be appropriate (no tip dragging).

Three Gurus 4U

1. Tom Sanders, Midwest Models. Phone: 1-800-348-3497. E-mail: tom@midwestproducts.com
2. Art Ellis, Eli Whitney Museum, 915 Whitney Ave., Hamden, CT 06517. Work (203) 777-1833, home (203) 453-1850. E-mail: ae@eliwhitney.org
3. Rocco Ferrario, 2471 Solano Ave., #204, Napa, CA 94558. E-mail: siouxzq@community.net

Design and trim variables for endurance

How long your model flies depends on several adjustable factors, though some are limited by rules. However try changing (one at a time) prop size or type, pitch (blades bend), airfoil (rib camber), the center of gravity (CG), rubber size/length. Lube well and wind to the max!

The above from Clarence Mather, Indoor Ace, in Model Airplane News 7/72. Still good advice!

The models

Sci-Oly 1 Indoor Model Supply, a Lew Gitlow design

Indoor National Champ and kitmaker Gitlow has asked us not to discuss his current kit -- so send $ 2 for current catalog to: Indoor Model Supply, Box 2020, Florence, OR 97439. Phone mentoring is available and kit is in catalog.

Hawk P-18 (Similar to Mace P-24 Condor)

Mace Models, 359 S 119 E Ave, Tulsa, OK 74128. E-mail: Macemap@worldnet.att.net. Builds one model (more if bulk packed). $12 pp.

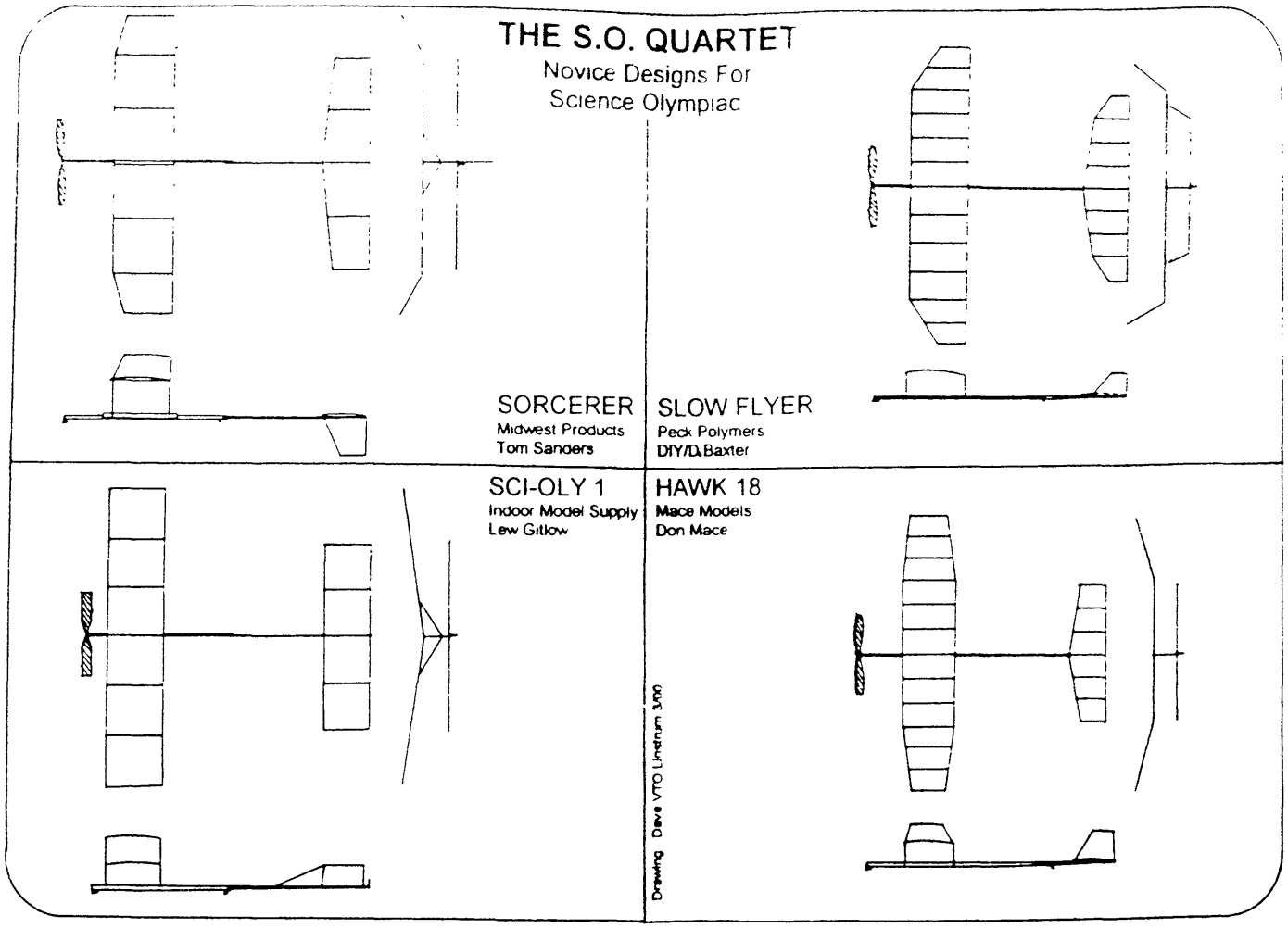
This proven design (flown as "The Condor" at Air Force Academy). It has all the right stuff: wood strip, Esaki Japanese tissue, 1/16. FAI Tan rubber, 18" x 24" detailed plan, covering hints, flying advice. The wing pylon is on an adjustable mount to change CG. Shrunk from the Condor, with formed gear, it is an excellent, simple model. Those USAFA cadets know.

Sorcerer

A Tom Sanders design. Midwest Products, 400 S Indiana St., Hobart, IN 46432. $29.95 + $5 p&h Intx Designer. E-mail: tom@midwestproducts.com Tom was the CD for the Spokane SO Nats in May.

A very well engineered kit, it builds two models (one can be a biplane) with these innovations: laser-cut cambered ribs, spoke wheels, two types of prop (black Tern Aero style, Peck silver), formed gear, shafts and a superb plan by Andy Biggs. *Four* sheets of detailed instructions!! Stripwood, Superfine Japanese tissue, 1/16 FAI Tan rubber. Plenty of Build & Fly advice from an expert. From standpoint of completeness, engineering and quality,

This is a Best Buy.



Peck Slow Flyer Designer Kit. (Builds 8 to 10 models)

Dick Baxter or your own design. Peck Polymers, Box 710399-MA, Santee, CA 92072-0399. Phone (619) 448-1818, Fax (619) 488-1833. E-mail: PPModels@aol.com $40+ $5 p&h Local CA tax.

This is a great concept – using Dick Baxter Quick Reference Design & Build advice (very complete). *You design your own slow flyer! Wow!* Your reviewer did this, basing the design on his 1997 P-24 built for the Kibbie Dome: The Son of CyberBeaver (a joke about online model flyers who chat not build), with a strong influence in airframe design by Indoor Ace Cezar Banks of the San Diego Orbiteers (same club as Clarence Mather).

Using the experimental method, we chopped down a 9.5" Peck silver prop to fit SO rule. Kit contains enough materials to build *ten* models or variants!! You get ten props of three types (Peck), formed prop shafts, a dozen wheels, plenty of 1/16 and 3/32 FAI Tan rubber, unformed gear wire, and lotsa Esaki Japanese tissue. A sample plan is provided for a baseline, but follow Baxter sage advice. This box of SO goodies will inspire your creativity!!

Bambino

Ray Harlan design $15.95 + $2 P&H. Ray Harlan, 15 Happy Hollow Rd., Wayland, MA 01778 (508) 358-4013 E-mail: rbharlan@mindspring.com

This is a brand new, superb kit designed by a national champion, which is complete with many innovations: four sizes of FAI Tan II rubber (.073, .076, .079, .095), "O" rings for motors, ply, dual, rib-slicing template, laser cut wheels, blue P-30 prop (must cut to

(Con't on next page)

Cheap Tricks by VTO

If you wonder about "VTO," that was the name of the monthly free flight column I wrote for Model Airplane News from 1967-1984 until it went RC — VTO means Vertical Take Off, a gas model launch alternative to hand launch. Do not try with low power rubber models!

Here are some modeling hints that will enhance your SO flying at little or no cost. These simple tricks may help you win. They are in no particular order – try them as you build & fly SO Quintet kits. Fine tune your models and *fly smart*. Your mentor will have many additional tricks up his sleeve.

Kits do not contain glue for balsa or covering tissue. Go to K-Mart or WalMart to get a green tube (not a bottle) of Duco Household Cement for balsa/metal joints and a bottle of Elmer's white glue – thin it 1/3 with water and brush on to cover. You can also use a glue stick – dip your brush in rubbing alcohol, drag over stick to apply a thin coat of glue to balsa – then cover and rub paper onto glued area. Pick up edge and add more thinned glue under paper at loose spots. A glue stick may crush delicate balsa.

Kits do not have cutting tools – so get a knife with X-Acto #11 blade and a single edge, non-stainless, stiff razor blade for cutting balsa. Use scissors for tissue.

Speaking of tissue, apply it loose and baggy to avoid warps. (Ed. note: Model tissue tends to shrink. If you apply it tight, and it shrinks, it will pull the balsa wood framework out

(Con't on next page)

Science Olympiad Kits con't

size), a sheet of Esaki tissue, CAD plans and a 10 page instruction booklet with a full list of tools and a resource list of indoor suppliers, including Harlan. It comes in a bulletproof 24" mailing tube so materials will survive snailmail.

At press time, we cannot provide a line drawing, but Bambino is a conventional monoplane with wing posts. It is squarish but looks like it has great performance potential. Kit builds one model but with additional supplies, more variants can be built. Overall it looks like a 50 cm span Easy B, a mis-named AMA indoor class.

Harlan also offers a tool that is essential to serious indoor flying, even if you are a novice -- a scale. Wood weights are important. Ray designed a spring scale with two hooks, one for wood and another for rubber. With this, you can build right down to the 8 gm minimum plus you can weigh those 2 gm motors instead of guessing. Order scale for $27 +$2 P&H from Harlan at address above. If you wish, combine order but P&H is seperate.

Like the Midwest Sorcerer, the Harlan Bambino is a Best Buy for Propellor Propulsion. It has all the Right Stuff for experimentation to achieve long flights. The instructions have detailed trimming advice.

NFFS Free Flight article reference & an Index

If you are an NFFS member, look up "Free Flight Goes to School" in the Aug/Sept 1999 issue of the *Digest*. Written by Tom Sanders, it includes a great section on "The Benefits of Mentoring." That is a two-way street, for the student and mentor. As Yoda says, "May the Force be with you."

From Bud Tenny: All you ever wanted to know about Science Olympiad, but were afraid to ask! Actually, the Science Olympiad index is at http://www.k12.de.us/science/olympiad

***

On facing page...

"UFO"

A Mini Stick by Stan Chilton

Wt: Wing	.100 gm
Body & tail	.225 gm
Prop	.110 gm
Total	.445 gm

Stan set a new Cat. II record of of 11:00 min. with this model, Mar. 26, 2000, in the Tampa Armory (34' ceiling).

Plan taken from the April issue of *The Hangar Pilot*, the newsletter of the Miami Indoor Aircraft Model Association (MIAMI), April 2000 issue, Doc Martin, editor.

Cheap Tricks con't

of alignment.) One proven method is to use Stan Chilton Crinkle Tissue (named after the indoor champion).

Cut your tissue slightly oversize for each part. To do this, lay the tissue over plan, mark with pencil, then cut it out, allowing about 1/2" excess all around, with a straight edge for dihedral joint overlap. Now the awful part (close your eyes!) is where you crumple the tissue into a little ball, then undo and smooth it out. This breaks the tissue fibers, preventing warps -- it has no strength any more and crinkle allows some flex. Tight smooth paper may warp parts like a pretzel. Cover as usual. If you're criticized, say that you covered with alligator paper.

Cut the balsa parts on a piece of artist's mat board. The board can be gotten from a frame shop -- get the free scraps. Beggars can be choosers -- ask for a dark color to contrast with balsa for visibility.

Rubber motors need lube for max turns. A truly mess-free way to lube is to put motor in a plastic sandwich bag with a few drops of lube. Massage the motor without touching lube, remove and wind it up. One bag lasts all day. You may use any of the dedicated rubber lubes, but automotive vinyl protectants, like Son-of-a-Gun, will work, as does Johnson's Baby Shampoo. Just keep the lube in bag, not on your hands. A small dry washcloth will help in wiping your hands after winding.

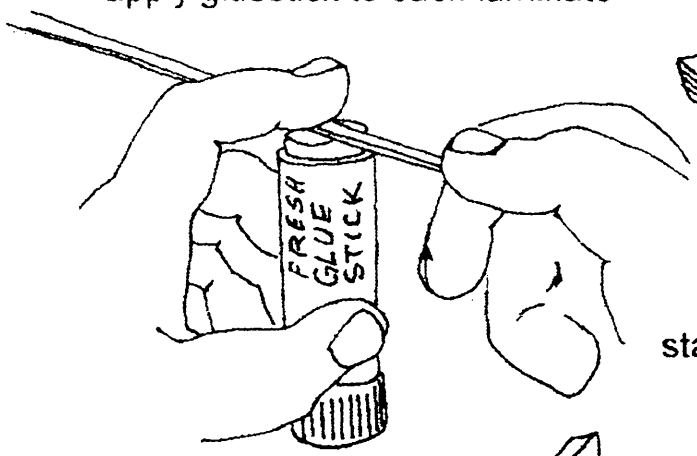
Wings: SO designs should climb to left, so to keep that left wing up in turn, try making the left wing about 1.5 cm longer for added lift (do not violate 50 cm span limit). Simply cut your wing posts loose (on finished model) or place them off center to right by 1.5 cm when building. Note posts should attach to the vertical outside face of leading edge and the trailing edge -- this gives more glue area. You can even make them over length and trim excess at top. You can also use following alternative to glued-on posts.

Wing posts need sockets to plug into for adjustable incidence. Conventional wisdom since 1935, (when Chicago Aeronuts started flying indoors), has been to place sockets in or on the balsa motor stick.

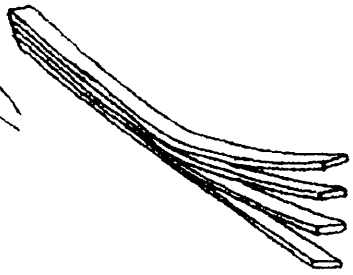
(Con't on page 23)

Science Olympiad news from Northern Ohio.
See page 19.

apply gluestick to each laminate

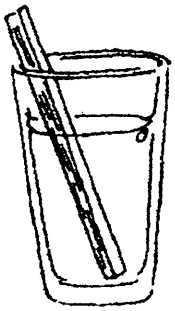


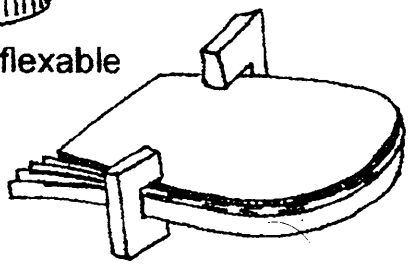
you can make these up ahead of time



stack layers and align carefully

when ready to use soak until flexable



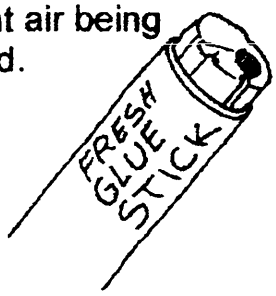


wrap around form and fix with wedge clamps dry with heatgun

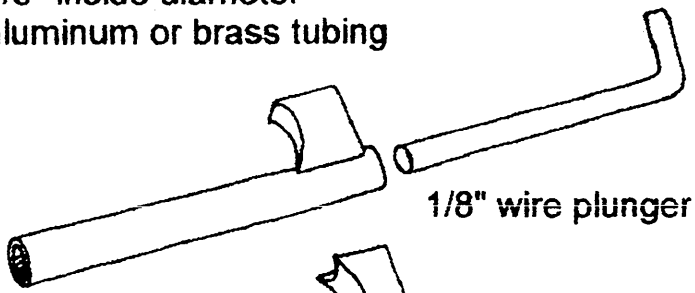
Super easy laminated wingtips

Mini Glue Stick

Push tubing into end of glue stick to fill, plunger must be in place to prevent air being trapped.

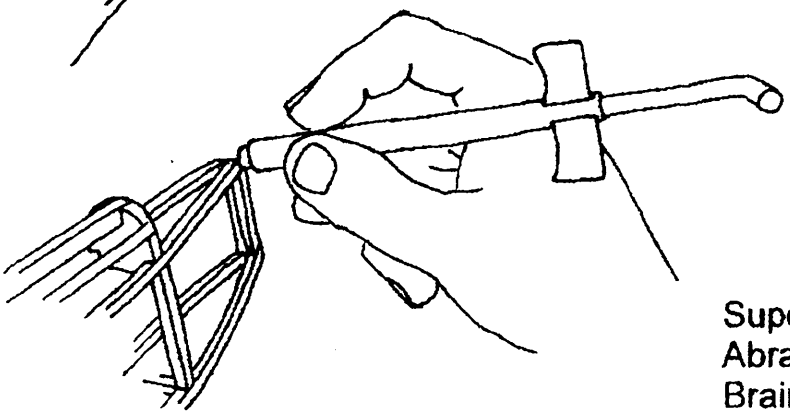


1/8" inside diameter aluminum or brass tubing



1/8" wire plunger

1/4" plywood finger grips epoxy into place



Super idea from Abram Van Dover of the Brainbusters

PLUMCAKE Micro 35

Jean Francis Frugoli
M.A.C. Marseille

This model which follows Micro 35 already described in the No. 6 of the publication CERVIA follows the technique used on the FID, to wit, with one wing in an arrow position favoring the spiral flight with the left wing used as a brake and the right one as an accelerator.
The basic theory supports this and it seems that it is working.
But a shaft of the leading edge moves back the aerodynamic center in relation to the socket thus a tendency toward a negative torsion.
This must be taken into account.
This is why the cabin (?) is not centered so that the wind brace be able to hold the B.A. straight up.
Even when the torsion of the skein motor reverberates on the flying surface through the masts (poles?), the outside wing must remain neuter.
Another peculiarity: the tail unit.
Model 98 had the tail unit positioned upon the "boom" and the drift forward. Model 99 follows the fashion. The stabilizer is fixed on the poles under the girder and its angle of incidence can be easily adjusted with small rice paper tubes glued on the side girders with the desired slope to insure the tilt.
The lee-board (drift?) will be put back easily in its normal position on the tail with a very slight push to the left.
In small locals, if the axis (axle?), the spin and the drift are not sufficient, the required corkscrew spin will be obtained by off-setting the "boom" with a displacement of the front and back wings attachment tube.
The propeller, similar to the one on Micro35 96 but with a slightly larger base pitch -540-, uses an old system.
It is an old torsion rod anglo-canadian system.
The torque of the twisted skein spins the axle shaft since the blades are connected (?)(could be: fixed (?) thus tilting the lever which in turn operates the actuators in its movement thereby increasing the launching angle which returns to its first position on the pitch limitators as the torque of the speed motor decreases. WHAO....

Plumcake Micro 35 (cont'd)

This is a rustic system which must be seen as a slowing down system of the rotation speed in the beginning of the operation rather than as a true adjustable mechanical device regulating precisely the speed of the propeller, but it is easy to make.
The distance between the fixed point on the central tubing and the lever (carefully welded to the minimum) determines the resistance to the required torsion.
It is recommended that testing in the workshop area be performed first.
If this system does not work, the fixed base pitch (speed?) will do very well with the advantage of being light (0,085/0,09 gr.).
In this case, the wing must be positioned at 28mm from the front line shaft instead of 25mm as indicated on the draft. To consider also if the rear part is a bit too heavy.
The measurements on the sketch are very approximative.
If one uses wood provided by Anglo-Americans, they have to be translated into inches.
And one must not forget that two similar models are not identical and that the personal touch is of primary importance.
Have a taste of Plumcake. It is a good cake, just a little heavy but it will be worth sampling.
Have a good flight.

J.F. Grugoli

1999 FID Team Selection

Akron Ohio

Larry Coslick

Flying FID's at Akron has always been a frustration for me. My 1/4 & 1/2 motor flights rarely equate to the actual full motor flights. Also high ceiling temperatures seem to increase the duration of the climb, making it difficult to determine the correct launch torque. For the past several years drift has been a real problem and there was a lot of drift at the 1999 team selection. I had several flights that drifted close to 600 feet.

During the first practice session, a balloon burst above one of my models and a piece of rubber took out a panel of film on the stab. On a 1/4 motor flight the motor exploded causing three tears in the motor stick. The first round hadn't started and I had two models out of commission.

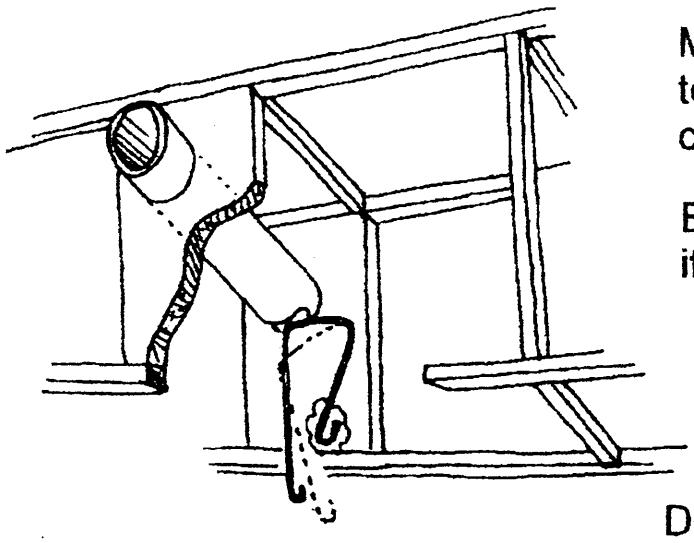
Round 1 started at noon but it seemed as though everyone waited until the end of the round to put up their first flight. The first round ended at 3:03 PM and I had my model loaded and ready to go at 2:45. For some reason I turned to fast and folded the wing. To make it worse, the rubber motor
caught in the wing bracing wire and damaged the wing. I had a back up model ready to go and got the flight off five minutes before the round ended. The model drifted toward the side of the building and had to be steered. During the steer I noticed that the leading edge of the wing had raised several inches. The flight was doomed and was aborted at 4:48. I didn't have a good glue joint at the outer wire bracing post and the wire slipped through the post. Rounds 3 & 4 were actually full motor test flights and I didn't like what I saw. The model had a tight circle and the V/P prop was not adjusted properly. I was running out of turns at 45:00.

Round 5 started to show some improvement. I switched to a longer loop of 5/99, 17" instead of 16" and posted a flight of 47:09. I needed another prop adjustment to use up the full row of knots that I came down with in round 5. Round 6 started out fine, but it hit some bad air, did a tail slide, got up- side down and headed straight for the floor. The model recovered about 30 feet off the floor and started off toward the ceiling. Unfortunately it lost a lot of power and altitude but did manage to climb about 3/4 of the way to the ceiling. With that flight I was in fourth place behind Don Slusarczyk and needed 2:16 for a third place finish even if Don didn't improve his

time. There were other fliers in a position to move up with good flights. I was pretty optimistic about the last 3 rounds.

Rounds 7 & 8 were a real disappointment. Two flights of 44:00 each did not improve my position. I tried several flights using 1/4 motors with a fixed pitch prop and it did the same time as the V/P prop. In round 8, the model had well over a row of knots left, but I was running out of ideas. I decided to close the pitch up some and increase the pitch and go for broke. The model was launched with .55 torque and the wing was under a lot of strain, but everything held and it was off to the races. About half way through the climb, Nick Leonard Jr's model and mine had a mid-air. My wing folded and there was a lot of film damage. It was starting to get late in the day and I needed to use another model or find a replacement wing. I elected to replace the wing. The first wing had the wrong warps, but the second wing looked good. I had to make at least one test flight on a 1/4 motor. The new wing was a real match. This combination really worked and it did 13:11 on the first flight. The models circle increased and the V/P prop used up all the turns. By this time a thunderstorm was starting to build and the building was starting to darken. From flying there in the past, a severe storm can make the ceiling impossible to see. Also, I needed to make up another motor or use the same one that I had used for the last three flights. The old motor looked good, so I decided to use it for the fourth flight of the day.

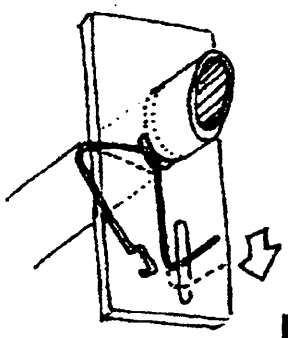
Round 9: I wound in 2360 turns and backed off 20 to a launch torque of .5. The motor weight was 1.84 Gram. This time the model climbed out in a much larger circle and really looked good. At around 120 feet it was rather close to the east side of the building but it was getting to dark for a safe steer. As the model continued to climb, it slowly started to work its way toward the center. At ¾ of the way up, it was obvious that the model was going to out climb the ceiling. At about 16 minutes it was at the eastern edge of the 80-foot wide center ceiling section. At 17 minutes it made its first contact with the ceiling. (180') This wasn't good because ceiling bumps cause my V/P prop to start low pitch sooner and my model has a good second climb. It was still touching the ceiling at 27 minutes and drifting toward a large overhead crane. By this time my mouth felt as though it was full of cotton and my nerves were about shot. Most of the models that come in contact with the
crane get hung up. The model did come in contact with the large flat side section, walked down a few feet and then cleared. By the next circle it was under the crane. Now, would the much used motor hold for the decent. It did and dead sticked from about 30 feet and landed on top of a table at 52:04. With out the mid-air with Nick's model, I would not have made the last 65 CM FID team.



Make from .008" wire
to fit the .03" slot
cut into the rear peg

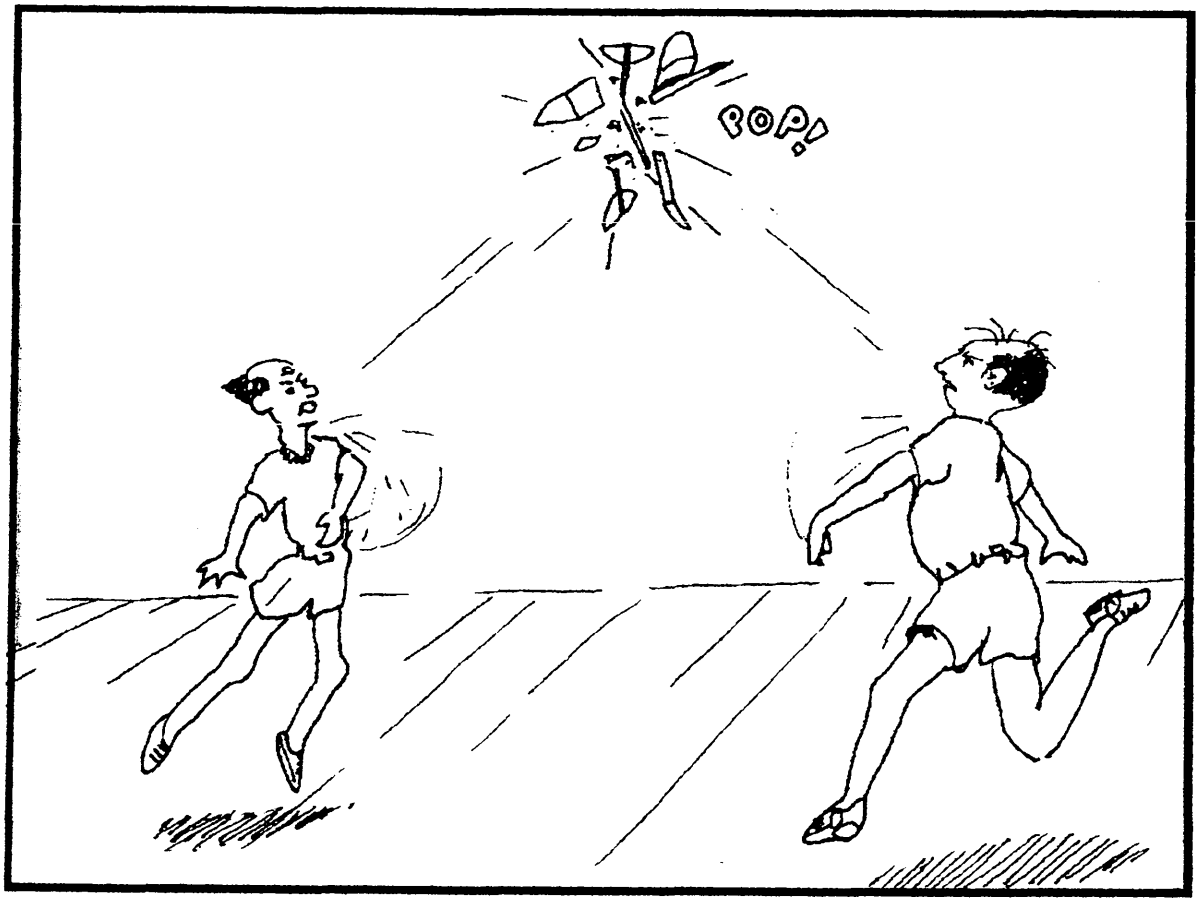
Bend clip so that
it clears stooge wire

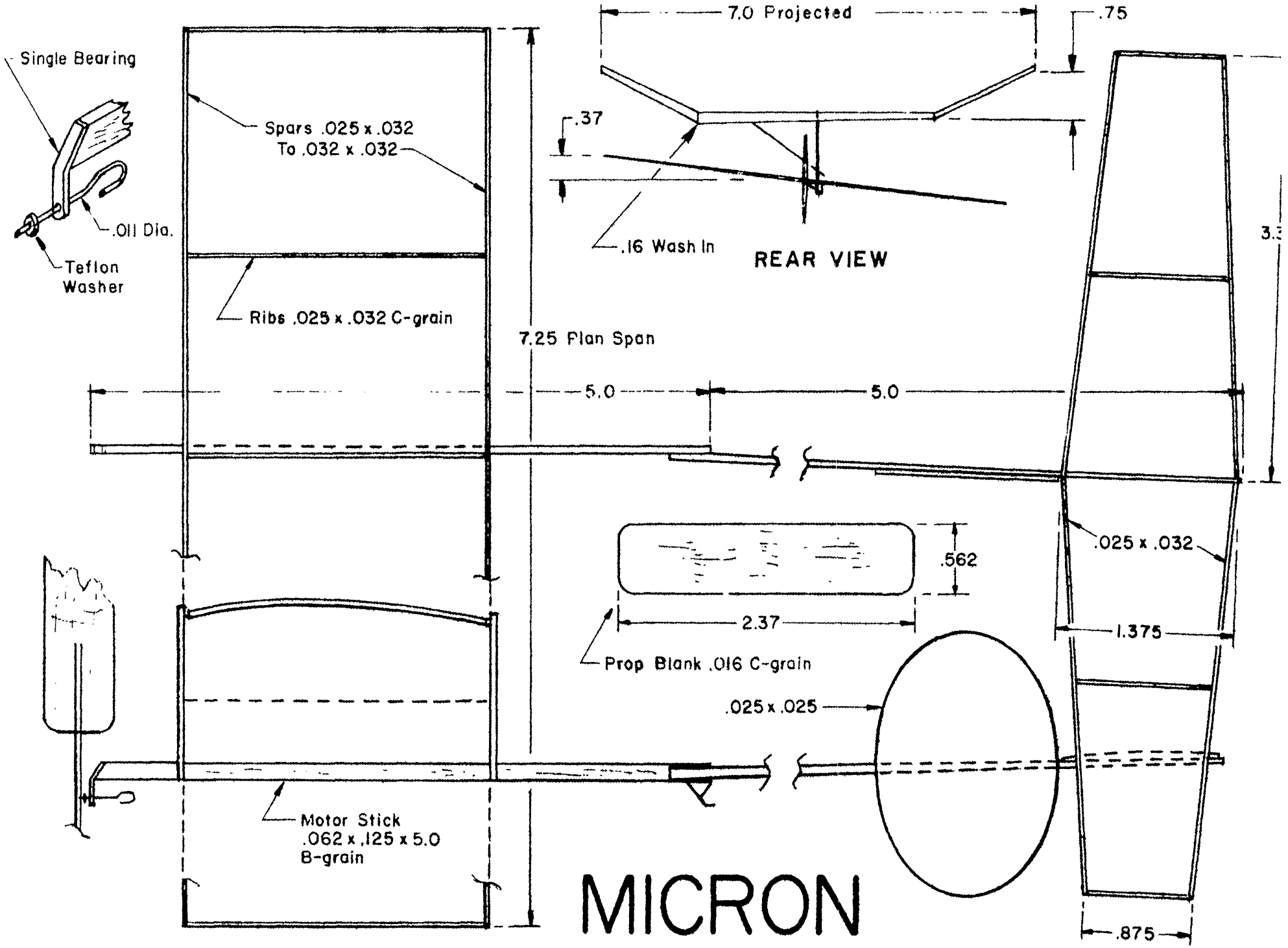
Dotted image shows clip
pulled to remove peg



Note the beveled end
on the rear peg tube
which pushed the clip
aside when peg is
inserted

Rear peg retaining clip




Single Bearing
.011 Dia.
Teflon Washer
Spars .025 x .032 To .032 x .032
Ribs .025 x .032 C-grain
7.25 Plan Span
7.0 Projected
.75
.37
.16 Wash In
REAR VIEW
5.0
5.0
.562
2.37
Prop Blank .016 C-grain
.025 x .025
.025 x .032
1.375
.875
Motor Stick .062 x .125 x 5.0 B-grain
MICRON
Mini Stick By Tom Vallee

THE ORIGINS OF MINI STICK / LRS

Steve asked me to supply plans for my Micron Mini Stick and the story behind it. As we all know Mini Stick has become one of the more popular indoor events. The Micron has a very special distinction. It was literally the very first Mini Stick. Properly adjusted the Micron Flies reasonably well. its best official time was about 10:30, quite respectable in its time, but there are a number of better models out there now. What will make the Micron interesting to some of you is that the fact that the Micron really was the very first Mini Stick.

It all started about twelve years ago when we had a group of about eight flyers who flew indoor with me at the Goddard Space Flight Center in Greenbelt Marlyand. Prominent among the Goddard flyers were Pete Staehling, Dan Belieff, Randy Kleinert , Tex Baird, Warren Baker and myself. The sessions were a lot of fun.

Every year we would have an indoor bull session at my house. We would sit down to home cooked baked beans, with baked ham, beef, kosher dills and deli rye for sandwiches and plenty of good beer. When we were finished eating, we would sit down to a good indoor bull session where we would discuss and demonstrate indoor building techniques, set up group buys of hard to get indoor materials and show off our latest models. The sessions were a lot of fun.

In early 1988 Pete Staehling suggested that we should liven up the next indoor bull session by creating a club model and having a little contest for this class at the next bull session. The idea was quite popular with the group so Pete and I went to work on creating a specification for a fun model for our informal contest.

Our first idea was inspired by the match box models built by Bill Bigge some years earlier. This was a very small model, which would fit in a box of diamond brand household matches. We got a matchbox and calculated the maximum size, simple, one piece model, which would fit in it. Pete pointed out that while such a model would be fun it would be very difficult to build and adjust for our novice flyers. We decided that a larger and more easy to handle, but still small model was needed. We then looked at Bud Tenny's Parlor Mite design and decided it was a tad too large. Based on our discussions I wrote up the original Mini Stick specification and passed it back to Pete for review. He pointed out problems I had missed and sent it back to me for correction.

We ended up with what were essentially the current rules for Mini Stick in the AMA rulebook. The main difference was our winding in the kitchen only rule and special steering rules for living room flying. We called the event Living Room Stick aka Mini Stick. LRS when flying in living rooms and Mini Stick when flying in larger rooms. I drew up the first rough plans for the Micron Mini Stick to demonstrate what kind of model was allowed under the rules. Copies of this plan and LRS / Mini Stick rules were distributed to club members.

The very first Mini Stick contest was held in my living room at the next bull session. We had six contestants. If I remember correctly, Pete Staehling was first, I was second and Dan Belieff was third. The winning time was about three minutes. Fun was had by all. Pete and I liked the way the little models flew and put up demonstration flights on trips to Lakehurst and the USIC. The regulars at Lakehurst laughed when they first saw the little models. However, a little later when we were bouncing our Mini Sticks off the bottom of the catwalk they took another look and their reaction became quite positive.

I saw the possible advantages of Mini Stick as an ideal introductory indoor model for the flyer that wanted to try indoor models but did not have a flying site or support of a local indoor club. With Mini Stick if you had a living room, you had a flying site. I began to promote Mini Stick on this basis. Plans and copies of the rules were sent to Bud Tenny and various news letter editors with my thoughts on the value of Mini Stick as an introductory indoor model. The response was positive. Bud gave Mini Stick a great plug in his indoor column as did Doc Martin, Burr Stanton and others. The word started to get around that Mini Sticks were fun little models to build and fly.

At the 1990 USIC / FAI World Champs I struck up a friendship with Mike Colling from the Uk. I showed him Mini Stick models, plans and rules. He was quite taken with the event. I suggested that we organize a Mini Stick postal contest between our two clubs. He accepted. Burr Stanton was a very big Mini stick booster. He plugged Mini Stick in his Indoor newsletter. He ran Mini Stick contests for his local indoor club and introduced the Mini Stick mass launch. It was the enthusiastic support of a whole group of people that put Mini Stick over the top. Mike Colling turned our little club contest into the International Mini Stick Postal Contest and popularized Mini Stick in Europe under its alternate name of Living Room Stick. Burr Stanton's vigorous promotion of Mini Stick resulted in his organizing (with the help of Doc Martin and others) the first Mini Stick competition at the USIC. I soon began to see copies of Mini Stick Plans from modelers like Laurie Barr in England and other flyers as far away as Japan. Mini Stick was on its way.

Burr Stanton and his wife Alice were two very nice people who were fixtures at the USIC contest for many years. We were all saddened by his untimely death before the second year of Mini Stick competition at the USIC. His friends donated a perpetual trophy in his name. Every time I see it I think of him. It was the enthusiastic support of folks like Burr Stanton, Mike Colling and many others that put Mini Stick over the top.

So, that's the story of how Mini Stick got its start. It all started with a beer party and took off from there. I hope you enjoyed the tale. The model as shown in the plan is exactly as designed and built for the very first Mini Stick contest.

As for building the model, I would not suggest you build the Micron if you wish to set a national record or place first at the NATS there are many more advanced designs by folks like Larry Coslick. I would suggest you emulate one of those models for serious competition. However if you want a very simple, easy to build model for fun flying I can recommend the Micron without reservation.

If you do build a Micron remember the prop is rather small. I always tried to use the thinnest rubber which would do the job when flying my Micron. Also, if you do build the Micro (or any other Mini Stick) a good idea is to build several props for each model for different ceilng heights and air conditions. Good luck and have fun.

Tom Vallee

Robert Earl Oppegard
Dec.15,1925 - Feb.25,2000

IN MEMORIAM

Iridescent wings pause in their stately,measured dance
to gather a new spirit.

He can fly forever now, unconcerned about scudding clouds,
freshening winds or cluttered ceilings.
All is warm,green and gentle.
Angels nod approvingly as he becomes one with his
frail gossamer craft. Sail on.Bob.

The free-flight community is saddened by the loss of Bob Oppegard, designer and distributor of the "Norskiver" rubber stripper so essential to indoor modelers. This contribution was cited last year as the "1999 NFFS gadget of the year"in the 32nd Annual Symposium.

Bob passed away in Glendale,Arizona where he and wife,Ruth had resided for two years. Prior to his residence in Arizona,Bob lived in a northern suburb of Minneapolis,where he was a decades long member of the Minneapolis Model Aero Club and a former club president.Born in Fargo,North Dakota, Bob served his country in WW II in the U.S. Coast Guard.

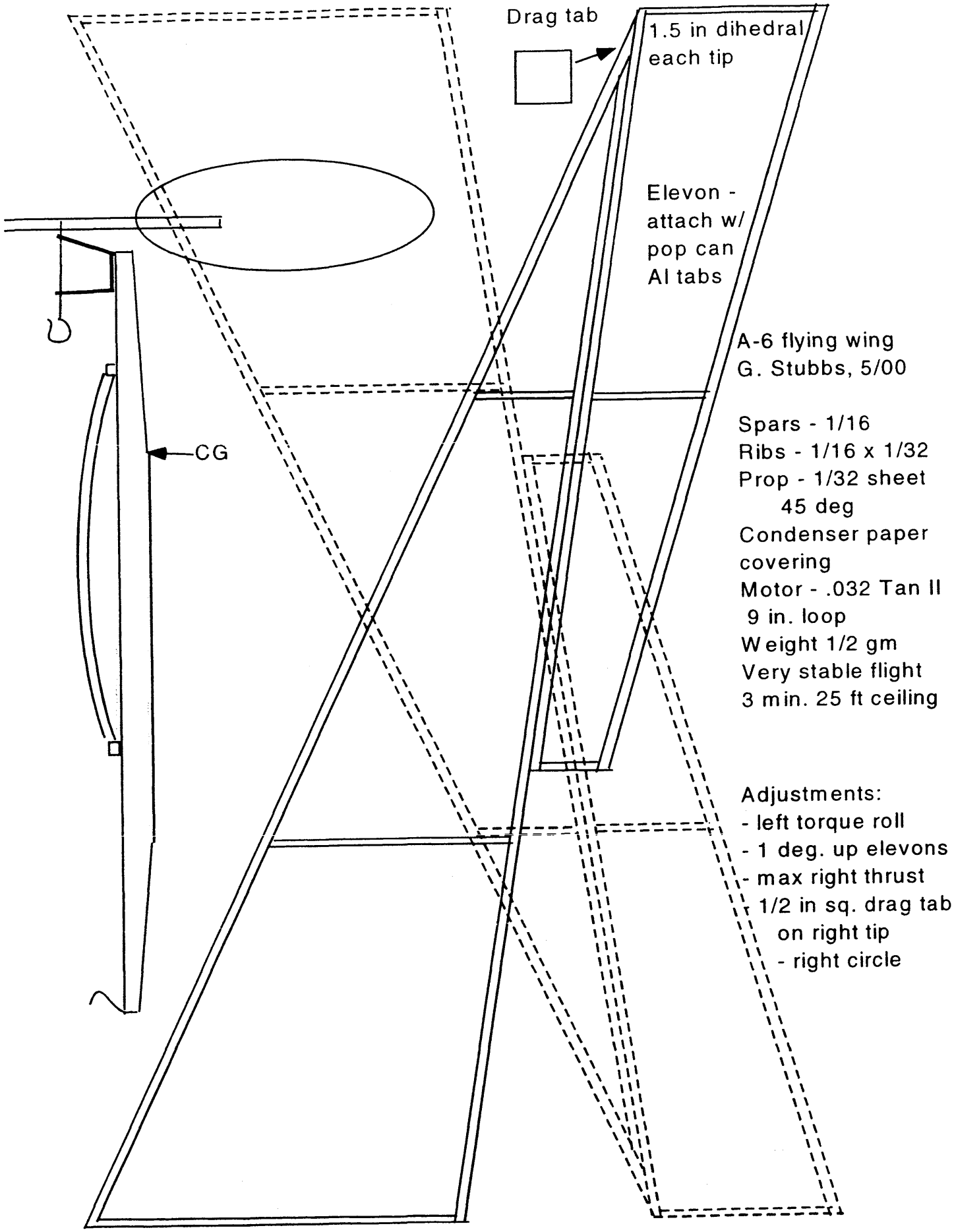
Oppy(one of Bob's nicknames)was the consummate craftsman. He loved to build things. He and his close friend,Donny Block built and operated a slot car racing complex before it became a national craze. Bob built race cars,grandfather clocks,TV sets and his most challenging accomplishment, an EAA award winning biplane,the Stolp "Star Duster Too", a project which was a seven year commitment.

Bob's first love,however,was model aviation. He flirted with control line and RC models but returned to the challenge of free-flight. His special interests in the outdoor arena were the 1/2A and A power events and the EZB and Pennyplane indoor events. Consistent with his nature, Bob designed his own models and was a frequent competitor on a national level.He and wife,Ruth were fixtures at the Johnson City Indoor Nats and their "fifth wheel"mobile home traveled to all the free-flight meccas: Lost Hills,Taft,West Baden,Lawrenceville,the Kibbe Dome,Bong and Muncie.

Bob was a quiet,introspective,creative man. He served the free-flight community well.In his recent years of declining health, Bob did his damndest to fill orders for his "Norskiver" rubber stripper. He had many,many friends.

In Bob's honor,the Minneapolis Model Aero Club has initiated the Oppegard Trophy to be awarded annually for the single best official time,irrespective of age, in the Pennyplane event at the A.M.A. Indoor Nationals.It is proposed that the trophy remain on display at the A.M.A. Musuem in Muncie where each winner's name will be added annually while the individual award plaque will carry the designation ,The Oppegard Trophy. This trophy will be presented for the first time, at the upcoming Year 2000 Indoor Nats at Johnson City.

John P. O'Leary
Minneapolis Model Aero Club
March 3,2000


Drag tab
1.5 in dihedral each tip
Elevon - attach w/ pop can Al tabs
CG
A-6 flying wing
G. Stubbs, 5/00
Spars - 1/16
Ribs - 1/16 x 1/32
Prop - 1/32 sheet
45 deg
Condenser paper covering
Motor - .032 Tan II
9 in. loop
Weight 1/2 gm
Very stable flight
3 min. 25 ft ceiling
Adjustments:
- left torque roll
- 1 deg. up elevons
- max right thrust
- 1/2 in sq. drag tab on right tip
- right circle

MILLENNIUM
INTERNATIONAL ORNITHOPTER POSTAL CONTEST

This year, for the first time in almost two decades, builders of flapping-wing aircraft will have an opportunity to compete internationally. In fact, the Millennium Ornithopter Postal Contest allows you to compete with people around the world without leaving your own town. Entries will be flown locally and their flight times will be sent by mail. Typically, contestants will fly their models at a local or national indoor contest and have the local contest director sign the entry form to verify the flight times, but other forms of evidence may be accepted at our discretion. There is an Open category for any flapper-propelled aircraft and a special Flapper Lift category for aircraft that meet certain restrictions on fixed wings. We wish you luck in this exciting and unique competition.

GENERAL RULES

- There is no entry fee.
- Each entry must include:

1. Entry form, completed and signed. The local contest director's signature is required unless the contestant provides other proof of flight duration (e.g., videotape) deemed suitable by OS postal contest director Nathan Chronister.
2. A scale 3-view drawing or clear 3-view photos of the model, with pertinent dimensions of model and motor.

- All entries must comply with the Design Requirements.
- The OS contest director has final authority to decide on compliance with rules.
- Flights must be made in the year 2000 and entries *received* by 15 Feb 2001. Send to Nathan Chronister, PO Box 376, Arkville NY 12406 USA.

SECTION 1: TO BE COMPLETED BY CONTESTANT

Name: _____
Address: _____
Name and date of local event: _____
Organization sponsoring local event: _____
Name of local contest director: _____

☐ Category A (open) ☐ Category B (flapper lift)

SECTION 2: TO BE COMPLETED BY LOCAL CONTEST DIRECTOR

I certify that the contestant named above flew an ornithopter (flapping-wing aircraft) for a duration of ____ minutes and ____ seconds, and that the same ornithopter met the Design Requirements below. Signature: _____ Date: _____

DESIGN REQUIREMENTS

- An eligible model is propelled solely by flapping wings or small flapping fins.
- Models must be flown indoors and launched by hand within two meters of the floor.
- Power must be provided by a rubber motor.
- If the entry is for *Category B*, the following *additional requirements* must be met:
  - All non-flapping lifting or stabilizer surfaces must be aft of the rear motor hook. This applies to stabilizers, fixed wings, fixed portions of flapping wings, fuselage structures that could produce significant lift, etc.
  - All wings must have the same flapping rate and roughly the same range of motion.

WILLAMETTE MODELERS TWO DAY INDOOR MEET
ALBANY, OREGON - APRIL 29,30, 2000
Reported by John Lenderman, Contest Director

When we arrived to open the door to the gymnasium, there was a group of about fifteen modelers waiting to get in and start flying. As soon as the doors were opened, they immediately selected their favorite spot, set up the tables, and got ready to fly. We again had a good number of flyers from out of the area, with Gordon Dona, of Minnesota coming the furtherest away. Jerry Powell, Chris Borland, and Herb Robbins drove up from California, Fred Hollingsworth came down from British Columbia, and a good number from Washington state. Again this year we missed some of our regulars, not being able to make if for one reason or another. Wally Miller, Tom Stalick, Bruce Kimball, Len Alderson, Lew Gitlow, and Kurt Schuler were missed not only because of their friendship, but also for the excellent flying they produce from their models. We are happy to report that there were three new national records set, one Canadian record, and four site records produced at this competition. Jonathon Sayre had record flights for category III in the ornithopter class, EZB class, and hand launched glider class. He will soon be an open class flyer, and wanted to make these record flights while he was still a senior modeler. Fred Hollingsworth flew his A-ROG for a Canadian record, was seen continiously launching models all during the competition. He does a lot of building, and at this contest brought a model box, with a plexiglass lid, displaying four new Manhattan models, none of them having any test flights! He said he left two other Manhattan models at home. Site records were made by Jerry Powell, flying his Yrekan in the Bostonian event, Jonathon Sayre with his ornithopter, and the CD, flying his Thrush in the Limited Pennyplane event, and the new 1.2 gram A-6 event. It is believed that this was the first seven minute flight of an A-6 under the new weight rule. Flying continued the rest of the afternoon, with all types of models filling the air. We noted how courteous the modelers were, taking particular care to launch where they would not interfere with a model in flight. Many times they would stand with a fully wound motor for quite a while, waiting for a model in the air to clear the space so it could land. During the entire competition, I noted only two midair collisions, which shows the regard the flyers have for each other. The flying stopped at 5 P.M. for supper, and we met again at the gym around 6:15 for the symposium. Ed Berray started the demonstrations by showing some of his building forms, and telling of how he makes tapered spars with the Jones balsa stripper. There was some general discussion of the methods used in making these tapered spars, and these ranged from using the Harlan stripper, with the micrometer adjustments, to eyeballing the straightedge on the sheet to be stripped. There was also some talk about how to strip straight spars from sheet wood. John Lenderman showed a balsa stripper he purchased from Gene Dubois about 30 years ago. It is made of plywood, and has six grooves with various widths and depths, and each groove having a single-edged razor blade held in place with short plywood pieces. John has been using this stripper all during these years, and has never replaced the razor blades, They still produce a nice, clean cut. The sheet wood is pushed through the grooves, and you can make them the entire length of the sheet. Next we had Mark Allison, who gave us an interesting discourse on how to make lighter No Cal and Peanut models, and how to make them fly longer. This information gave us a greater insight on these challenging events, and how wood selection can make a significant increase in flight times. He also pointed out that using clear dope for covering NO-Cals is like putting a coat of lead on the model. He used either 3M spray, or white glue, (20%) and water (80%), to keep the models lighter. Motor stick length is also important on the No-Cals, as it is used to keep the CG at the proper place, without adding clay or lead, which increases the weight. A thoroughly interesting presentation. Next, Andrew Tagliafico demonstrated an EZB propellor testing rig, designed by Wally Miller. It consists of a camera tripod, with a whirling arm mounted on a roller bearing, with the arm projecting straight out about 5 feet, and on the end of the arm, a place to attach an EZB motor stick. With the prop and

a wound motor on the motor stick, the unit is placed on the end of the whirling arm and released. By timing the number of revolutions, and using the same number of turns in the motor, and the same torque, it can be determined which prop is more efficient. Wally is convinced that prop blade flare, and prop spar flare are the secrets of longer flights. He has built a number of new EZB props, and by evaluating the results of the tests, he can pick the prop that will give the greatest potential for higher times. We will look for the proof at the Kibbey Dome in Moscow in July. After Andrew had demonstrated the whirling arm, there was some spirited discussion about the testing, and the possible need for some form of drag to simulate the drag of the EZB model. After the symposium, the flying resumed, and as the evening wore on, some flyers left, but a few remained, continually testing their models. Finally, at about 11:15 P.M., these few called it a night, and went off to retire, and dream about the next day. The Saturday flying was not regulated, but on Sunday, we began the usual routine of heavy models in the morning, and the lighter models in the afternoon. At the noon break, we had the Jetco ROG mass launch, with suspense growing as the models all staying in air, and landing within a few seconds of each other. Mark Allison won this event with a time of 3:29. We will report on all the flying, starting with the events that had the greatest number of entrees, down to the lowest. There were 10 flyers in the Limited Pennyplane event--these are flown with 1/4 motors. The winner, with a new site record was the CD, flying his own design Thrush, with a time of 4:36. We noticed that the conditions changed during the day, and also the drift. There were some hangups, but most were retrieved with no damage. A good number ended up on the folding stairs, and were gotten down with the ladder thoughtfully provided by the Willamette Modelers. In second place was Steve Dona, with a good time of 4:02. Brother Gordon had a new model, and though he tried hard through the day, was not able to get it performing as he would have liked. Jerry Powell, also flying a Thrush, was third with 3:37. It was good to see Jerry here, as he was recovering from recent surgery. He did very well with his flying. Of note was Aaron Dona, Steves son. He is only a junior, but placed fourth with a very good flight of 3:18. The Mini-stick event was a hard fought competition, with a lot of good flying. Fred Hollingsworth was the victor, winning over two flyers who had national records in this challenging class. His time was a very good 9:27. Andrew Tagliafico was second 9:00.38, and Ed Berray was third with 8:55. The Mini-stick models, with full motors, spend a lot of time up at the ceiling, with lights, wire, basketball basket supports, and of course, the wrestling light. It seems that they are always hanging up on something, and are difficult to retrieve, being so small. The A-6 event is getting more popular, with many good flying models. With the new rules calling for a 1.2 gram limit, minimum weight, the times are not as good as last year, when there was no minimum weight limit. The flyers are adjusting to this however, and by varying the rubber size and length, they are coaxing good times out of their models. The winner, flying his Mini-Thrush, posted a site record time of 7:00.54 under the new rules, and is believed to be the first seven minute flight with a 1.2 gram model. Very close behind was Andrew Tagliafico with an excellent flight of 6:52. Ed Berray was third with a total of 6.12. As in most events, there is a bit of luck involved, such as good recoveries from ceiling hits, and good bounces from the beams. We all experience both the good and bad luck during the flying. The Bostonian event is quite a challenge, and one who has mastered this challenge is Jerry Powell, who has won most of the contests this year. He keeps faultless records, and used these flight records to improve his times, getting better each time. He flew his Yrekan to a time of 3:39 to win this event. Flying a modified Stalick Boxtonian was the CD, with a time of 3:12, and third was Mark Allison, with his White Lightening, with a flight time of 2:20. The EZB event showed that Ed Berrays site record time at the last contest was no fluke. He did a great 7:05 on a quarter motor to show he has learned how to fly these models to winning times. Gordon Dona, who

built and flew his last EZB 25 years ago, came out with a new model, very light, and proceeded to put up a very good flight of 6:54 for second place. That is quite an accomplishment. Third place was the CD with a time of 6:23.6. A-ROG was won by Andrew Tagliafico flying a back up model. His brand new model was damaged while trying to steer it with a balloon. The winning time was 11:27.17. Second place was the CD, flying an older model, with a time of 11:00, and third was Fred Hollingsworth with a good time of 10:56. To show how close this event was, Ed Berry was 4th with a 10:37. Ed also won first place in hand launched glider with s 2 flight total of 64.15, with Gordon Dona second at 56.25. Third was Herb Robbins with a time of 49.98. Ed Berray shows how versatile he is by winning the Catapult glider event with 67.40 for 2 flights. Jerry Powell was close behind with a time of 65.30, and third was Bill McDow with a time of 63.67. Peanut scale was won by Mark Allison flying his pretty Falcon XP, and he also won No-Cal scale with his Heinkel 119 V.6. His great time for flying was 5:09. The Moorhead event was won again by Frank Hirleman flying his recycled parts for a score of 653.4. AMA scale winner was Mark Allison with his Habichi. Embryo winner was Jerry Powell, and Dime scale was won by Mark Allison. Ornithopter was won by Jon Sayre, setting a new national senior record of 5:11. He is quite an accomplished and gifted modeler.
We again have thank and honor the Willamette Modelers for presenting this enjoyable and challenging competition.

RESULTS

LIMITED PENNYPLANE (10)*

1. John Lenderman	4:36
2. Steve Dona	4:02
3. Jerry Powell	3:37

MINI-STICK (9)

1. Fred Hollingsworth	9:27
2. Andrew Tagliafico	9:00.38
3. Ed Berray	8:55

A-6 (9)

1. John Lenderman	7:00 .54+
2. A. Tagliafico	6:52
3. Ed Berray	6:12

BOSTONIAN (7)

1. Jerry Powell	3:39+
2. John Lenderman	3:12
3. Mark Allison	2:20

EZB (7) 1/4 MOTOR

1. Ed Berray	7:05
2. Gordon Dona	6:54
3. John Lenderman	6:23

A-ROG (6)

1. A. Tagliafico	11:27.17
2. J. Lenderman	11:00
3. F. Hollingsworth	10:56=

HAND LAUNCHED GLIDER (5)

1. Ed Berray	64.15
2. Gordon Dona	56.25
3. Herb Robbins	49.98

CATAPULT GLIDER (5)

1. Ed Berray	67.40
2. Jerry Powell	65.30
3. Bill McDow	63.67

PEANUT SCALE (5)

1. Mark Allison	149.5
2. Mark Allison	70
3. Steve Dona	18

NO-CAL SCALE (5)

1. Mark Allison	5:09
2. Gordon Dona	3:54
3. Jerry Powell	2:02

MOORHEAD EVENT (4)

1. Frank Hirleman	653.4
2. Mark Allison	473.0
3. Ed Berray	201.0

AMA SCALE (3)

1. Mark Allison	114.5
2. F. Hirleman	108
3. Al Likely	106.5

EMBRYO (3)

1. Jerry Powell	338
2. Frank Hirleman	146
3. Dick Klingenberg	136

DIME SCALE (3)

1. Mark Allison	317.8
2. Dick Klingenberg	171.11
3. Al Likely	117.4

ORNITHOPTER (2)

1. Jon Sayre	5:11+ $
2. Harry Griffen	:37.3

MASS LAUNCH JETCO ROG (5)

1. Mark Allison	3:29
2. Chris Borland	3:00
3. Herb Robbins	2:47

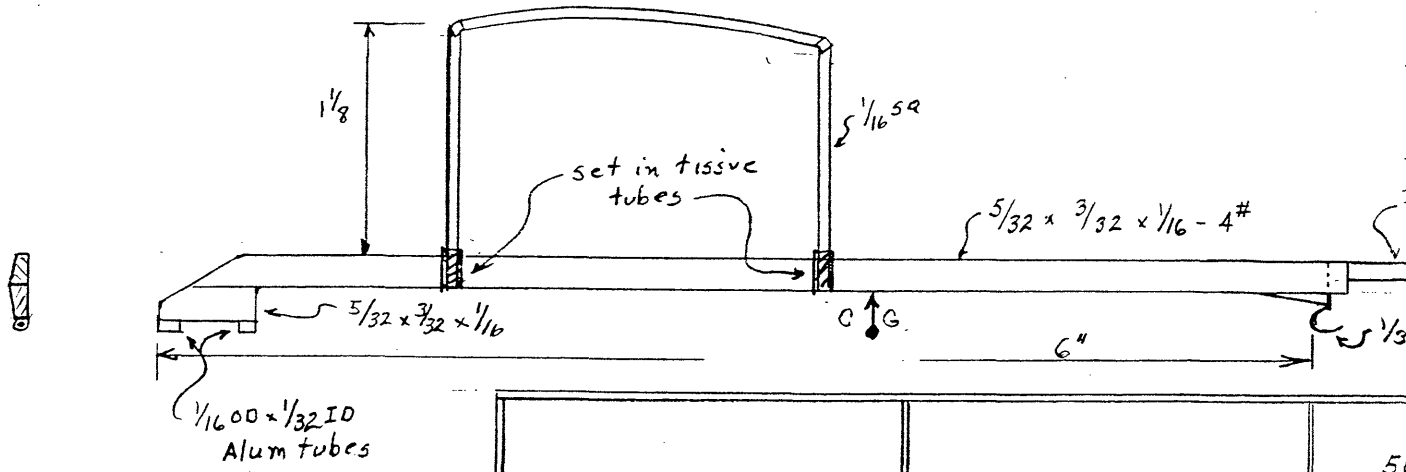
EZB Full motor

1. Jon Sayre	14:24.74 $

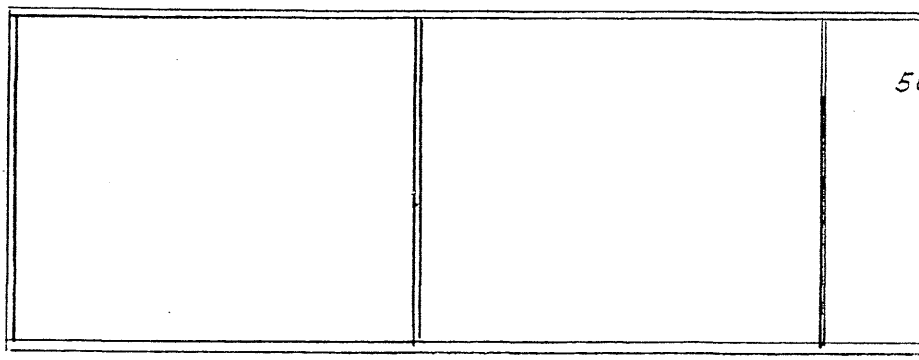
HL Glider 2 flights

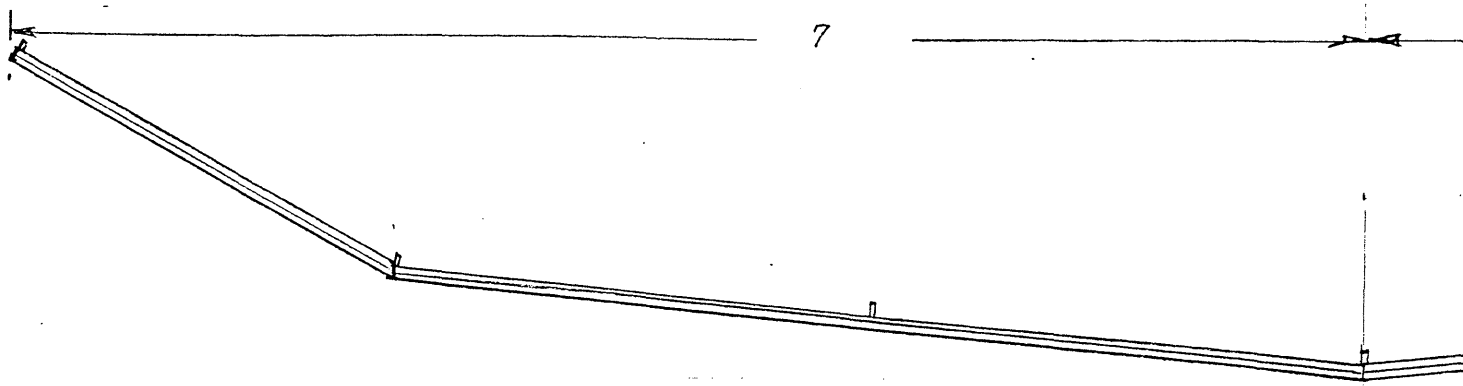
1. Jon Sayre	127.36 $

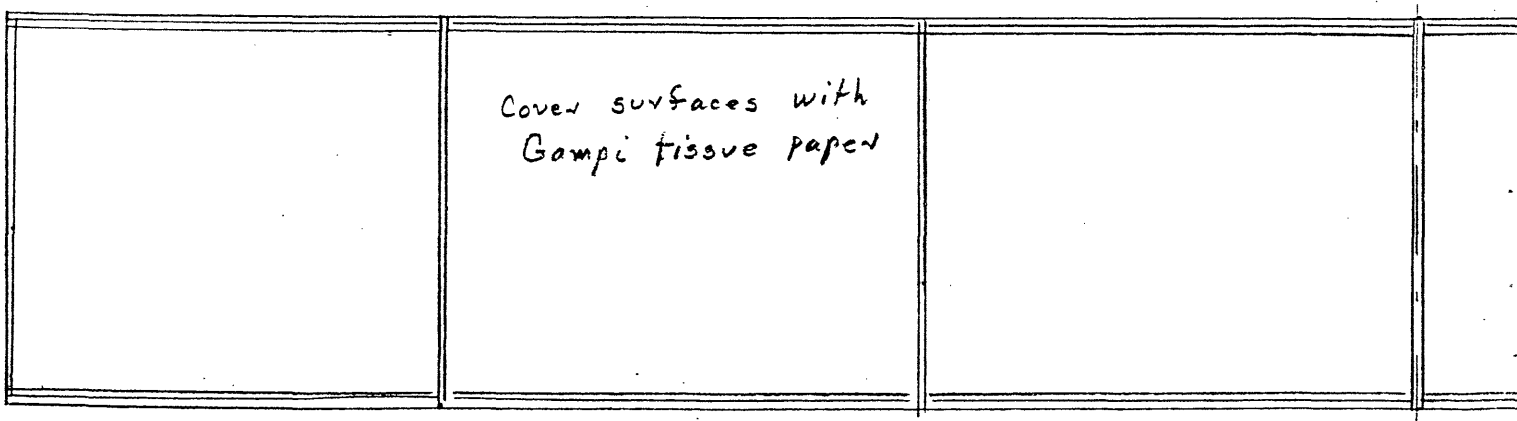
* Number of contestants
\+ New site record
$ New National record
= New Canadian record

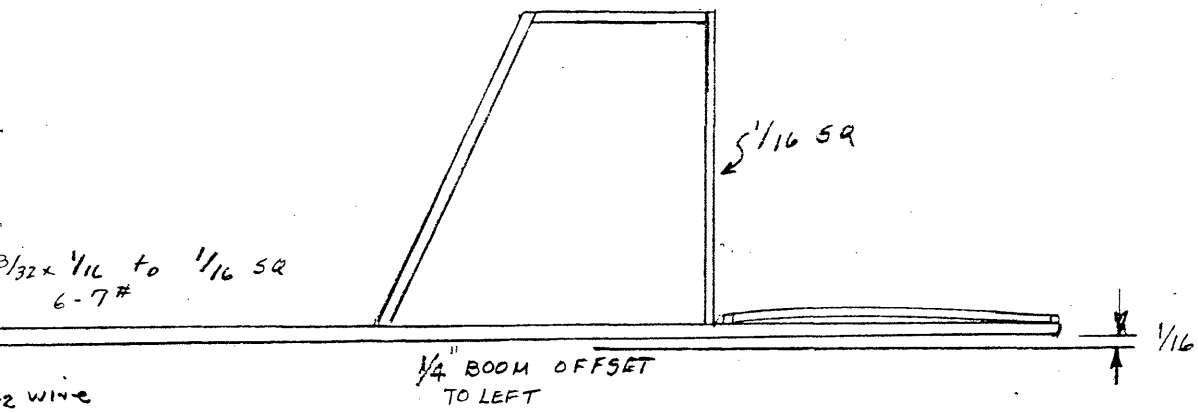


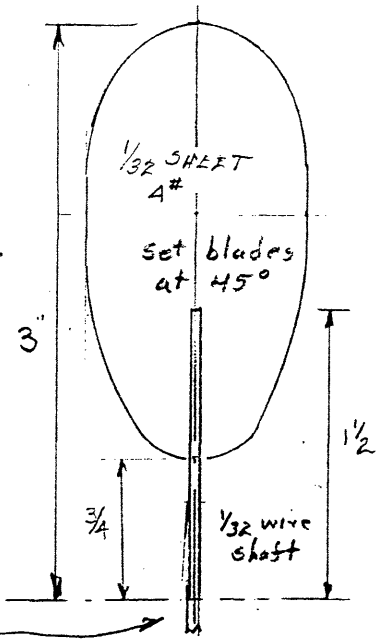
Start with .050 x 13
Tan 2 motor

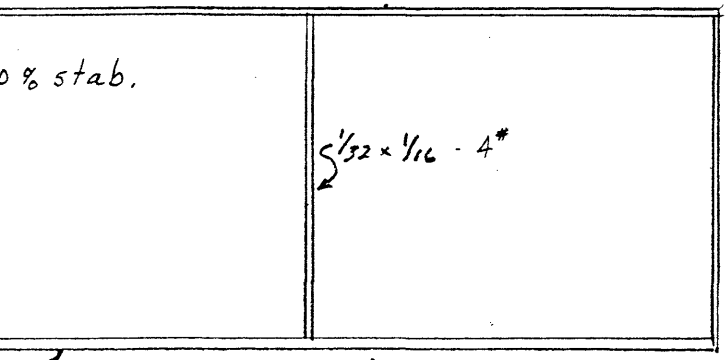








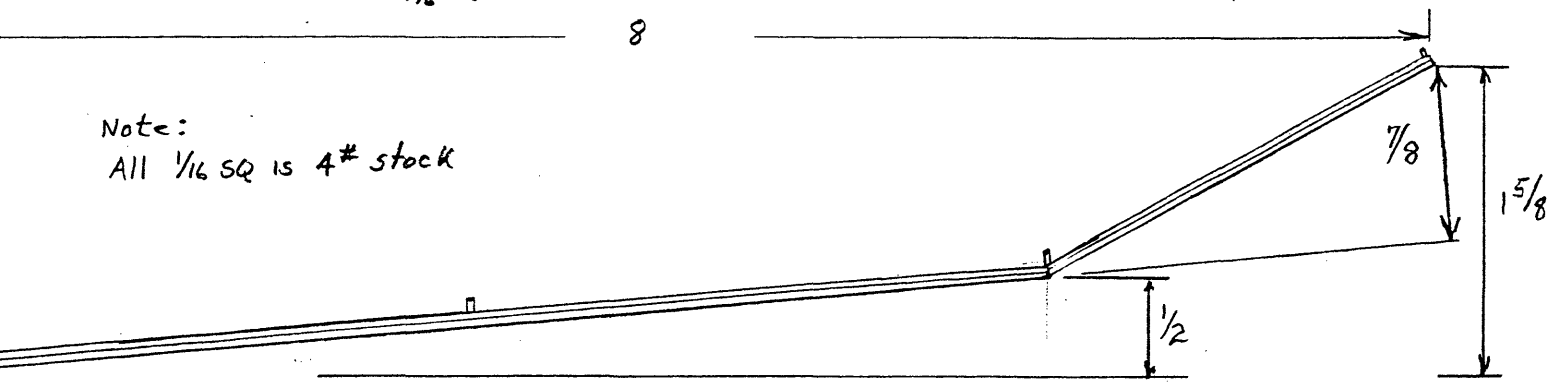


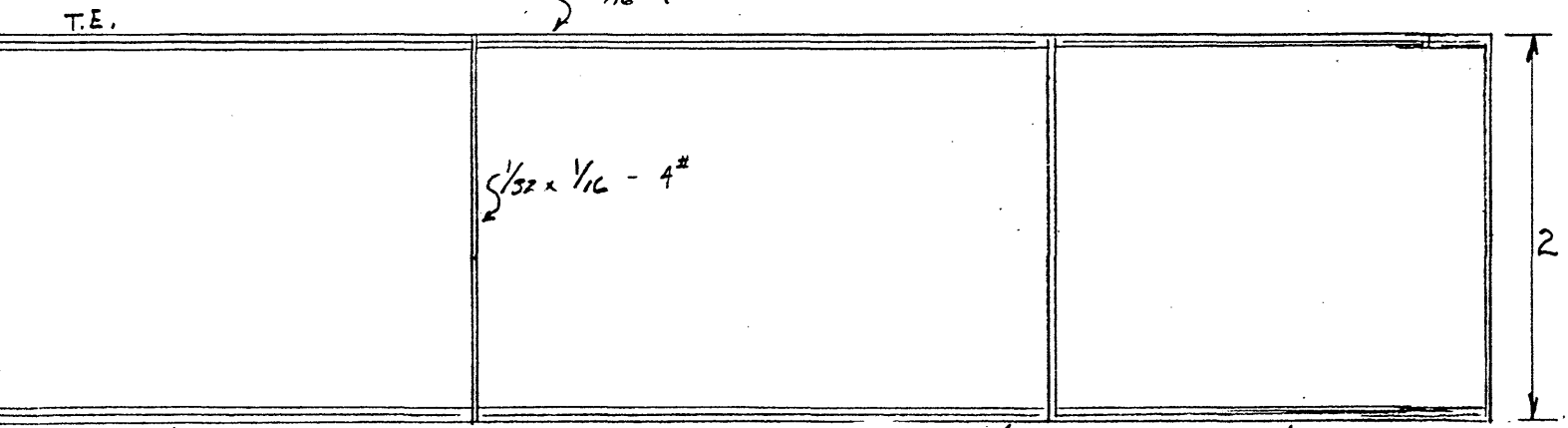


1/4" Stab tilt for left turn

8

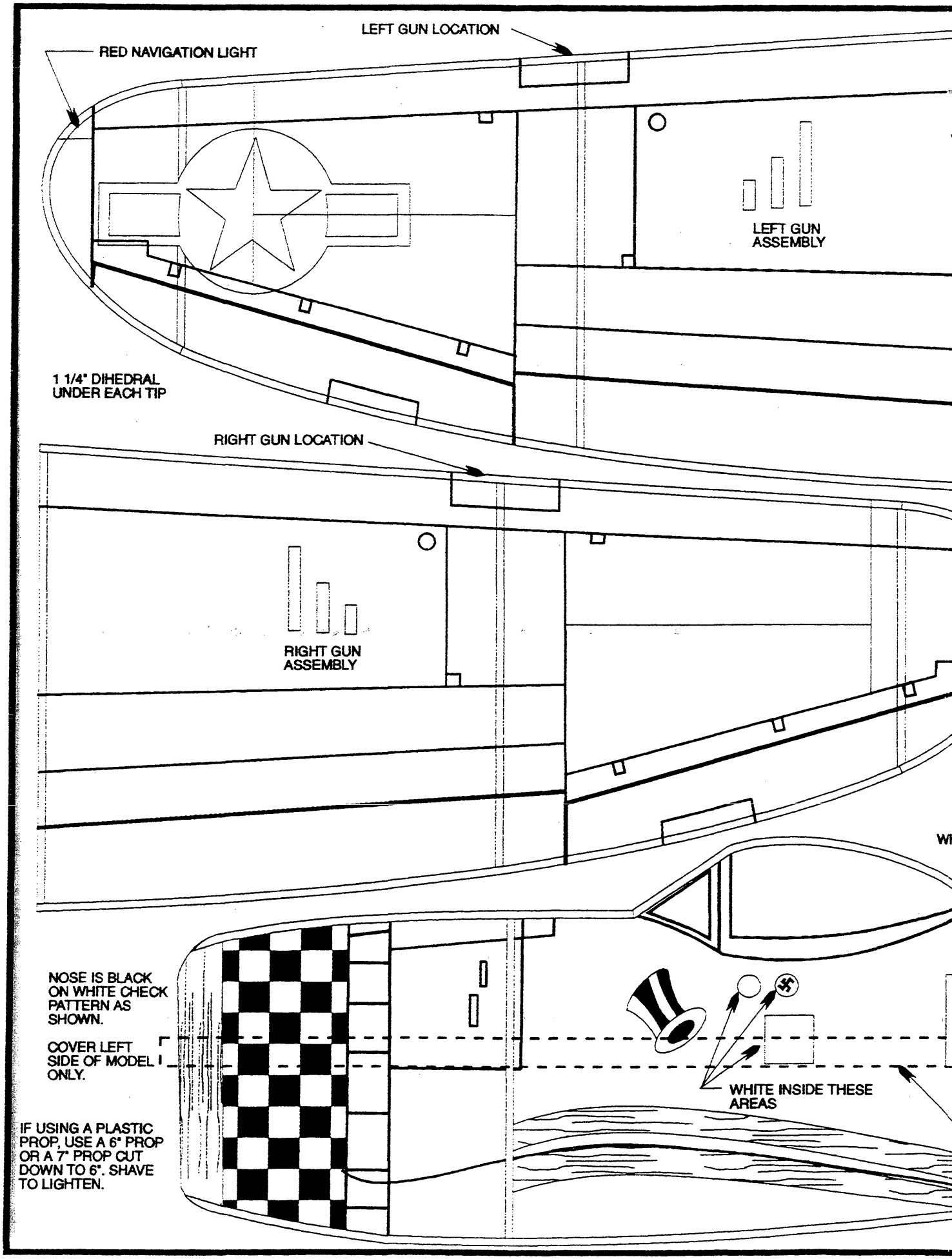
Note:
All 1/16 SQ is 4# stock





Weight w/o rubber is 1.35g
wing .45g
stab .19g
Rudder .05g

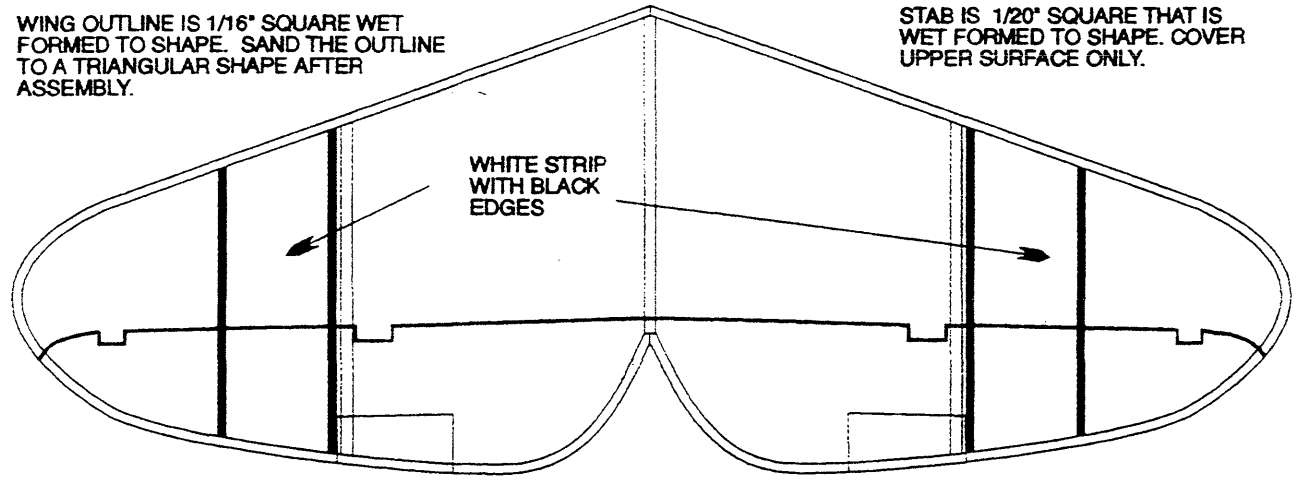
A-6 #2
Schroeder Apr. 96


LEFT GUN LOCATION
RED NAVIGATION LIGHT
LEFT GUN ASSEMBLY
1 1/4" DIHEDRAL UNDER EACH TIP
RIGHT GUN LOCATION
RIGHT GUN ASSEMBLY
NOSE IS BLACK ON WHITE CHECK PATTERN AS SHOWN.
COVER LEFT SIDE OF MODEL ONLY.
IF USING A PLASTIC PROP, USE A 6" PROP OR A 7" PROP CUT DOWN TO 6". SHAVE TO LIGHTEN.
WHITE INSIDE THESE AREAS

WING OUTLINE IS 1/16" SQUARE WET FORMED TO SHAPE. SAND THE OUTLINE TO A TRIANGULAR SHAPE AFTER ASSEMBLY.

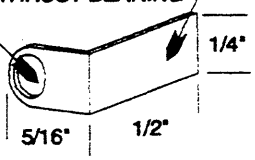
STAB IS 1/20" SQUARE THAT IS WET FORMED TO SHAPE. COVER UPPER SURFACE ONLY.

WHITE STRIP WITH BLACK EDGES



DRILL FOR PECK THRUST BEARING

1/32" ALUMINUM

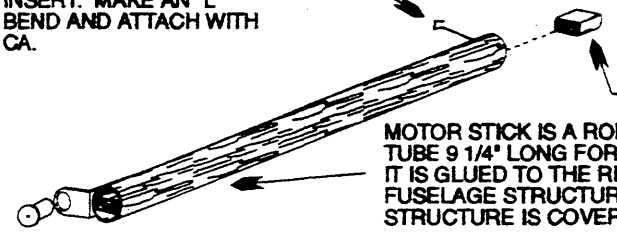


PROP HANGER DETAIL

CUT WING RIBS FROM 1/20" SHEET. TRIM TO LENGTH FROM TRAILING EDGE.

REAR HOOK IS .020 WIRE INSERTED THROUGH THE BALSA TUBE AND BLOCK INSERT. MAKE AN "L" BEND AND ATTACH WITH CA.

1/8" X 1/2" BLOCK INSERTED IN EACH END OF THE ROLLED TUBE.



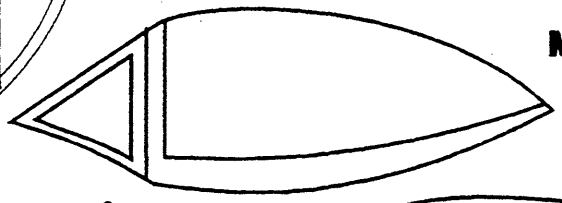
MOTOR STICK IS A ROLLED 1/32" BALSA TUBE 9 1/4" LONG FORMED ON A 1/4" DOWEL. IT IS GLUED TO THE RIGHT SIDE OF THE FUSELAGE STRUCTURE AFTER THE STRUCTURE IS COVERED.

GREEN NAVIGATION LIGHT

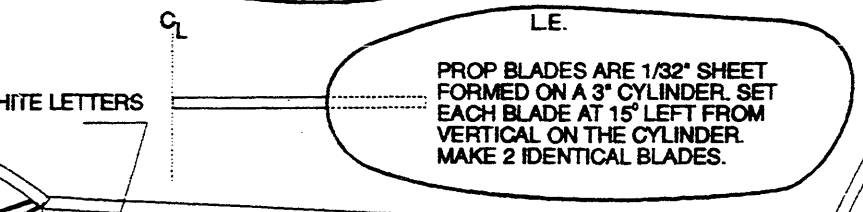
COLORING

OVERALL COLOR IS MEDIUM GREEN WITH BLACK AND WHITE STRIPS AND LIGHT GRAY UNDERSIDE AS NOTED. NATIONAL INSIGNIA IS WHITE ON A DARK BLUE SURROUND.

MOTOR STICK

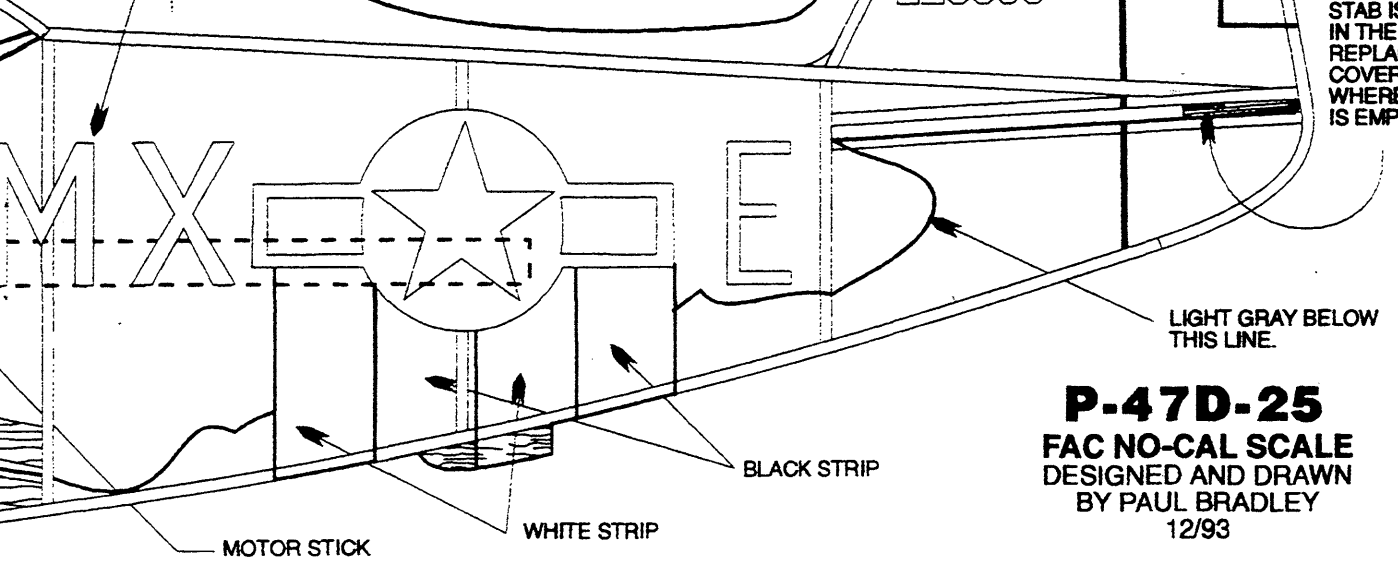


WET FORM ALL CURVED OUTLINES.



PROP BLADES ARE 1/32" SHEET FORMED ON A 3" CYLINDER. SET EACH BLADE AT 15° LEFT FROM VERTICAL ON THE CYLINDER. MAKE 2 IDENTICAL BLADES.

WHITE LETTERS



WHITE STRIP WITH BLACK EDGES.

WHITE LETTERING

INSERT THIS SPACER AFTER STAB IS PLACED IN THE SLOT. REPLACE COVERING WHERE SLOT IS EMPTY.

LIGHT GRAY BELOW THIS LINE.

BLACK STRIP

WHITE STRIP

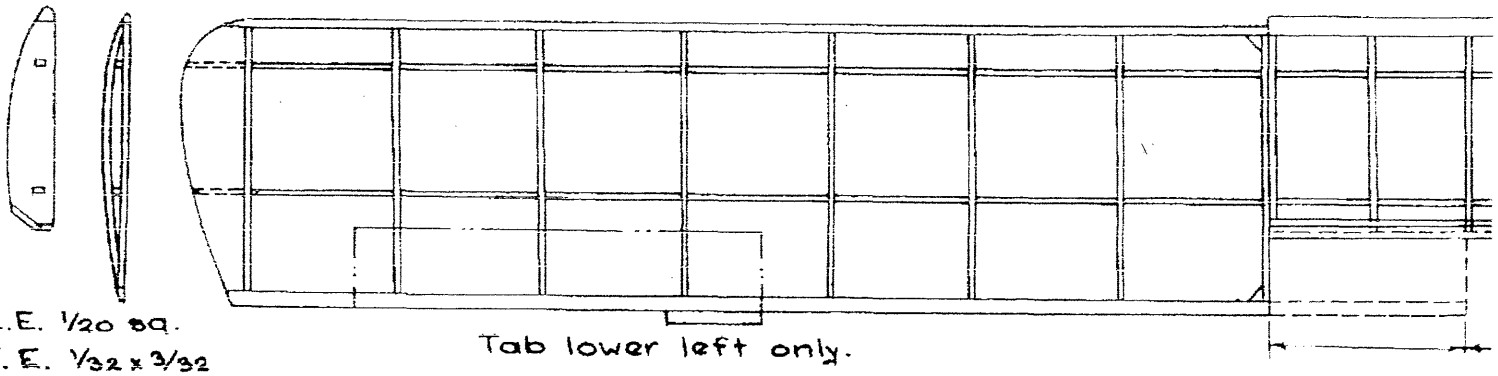
MOTOR STICK

P-47D-25

FAC NO-CAL SCALE

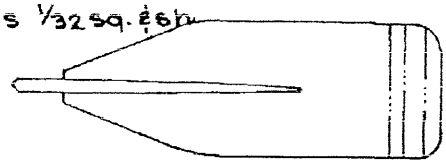
DESIGNED AND DRAWN BY PAUL BRADLEY

12/93

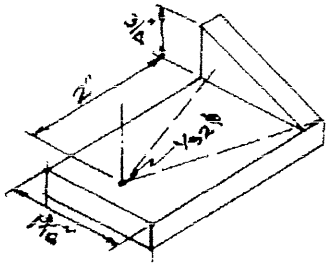


L.E. 1/20 sq.
T.E. 1/32 x 3/32
Spars 1/32 sh.
Ribs 1/32 sq. & sh.

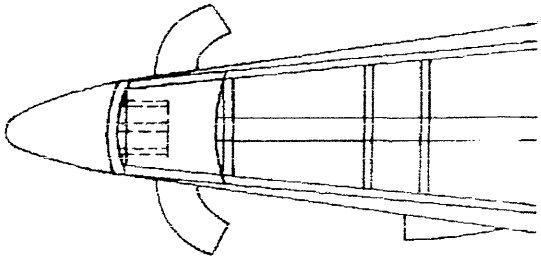
Tab lower left only.

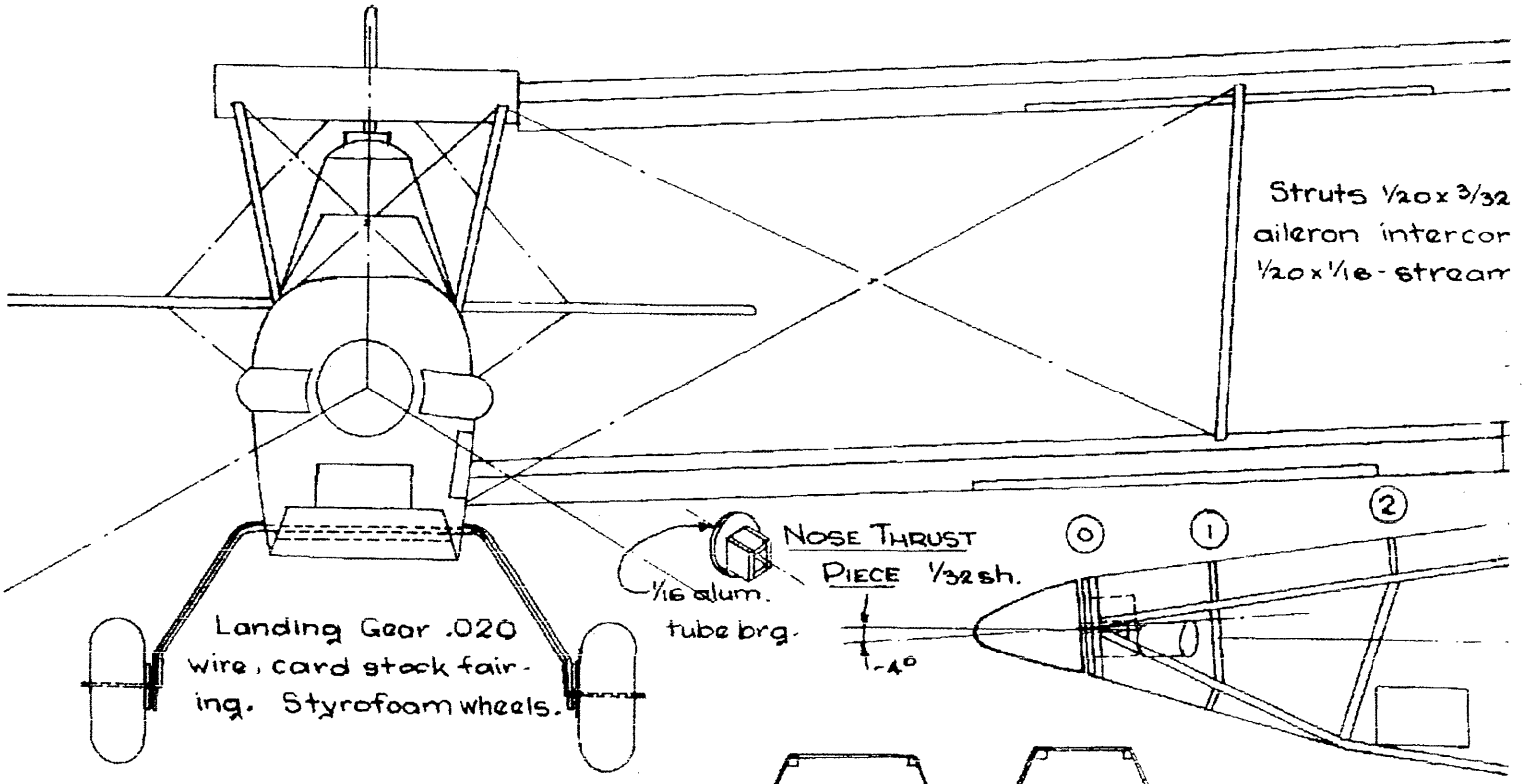


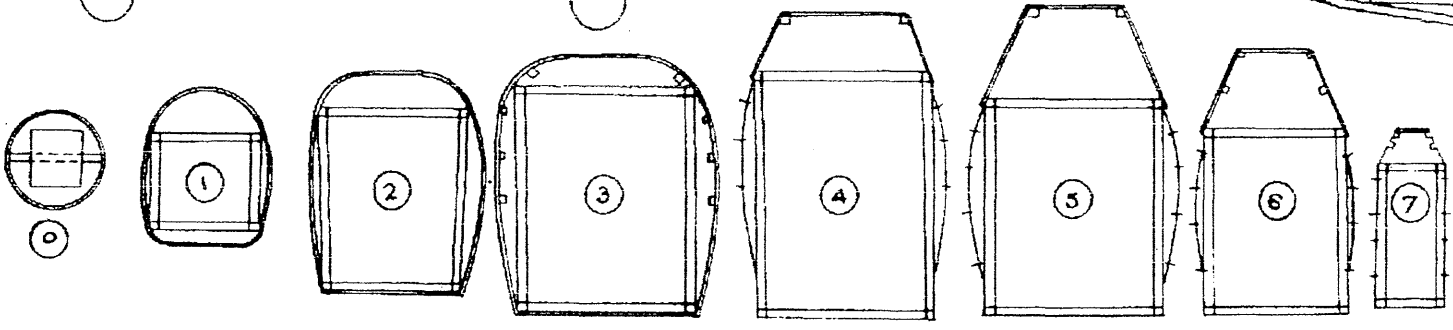
THREE-BLADE PROP
4.5D-8P
1/64 ply blades - shown true shape, toothpick hubs.

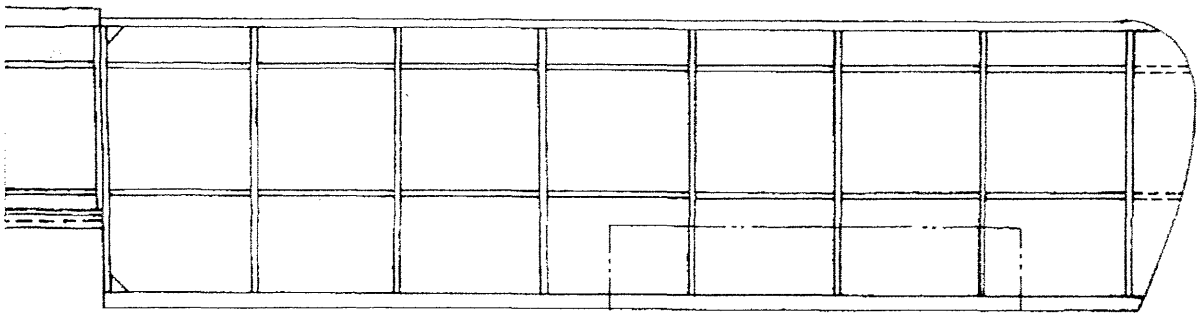


PROP PITCH JIG
8" Pitch - any dia.
all 1/4 balsa.





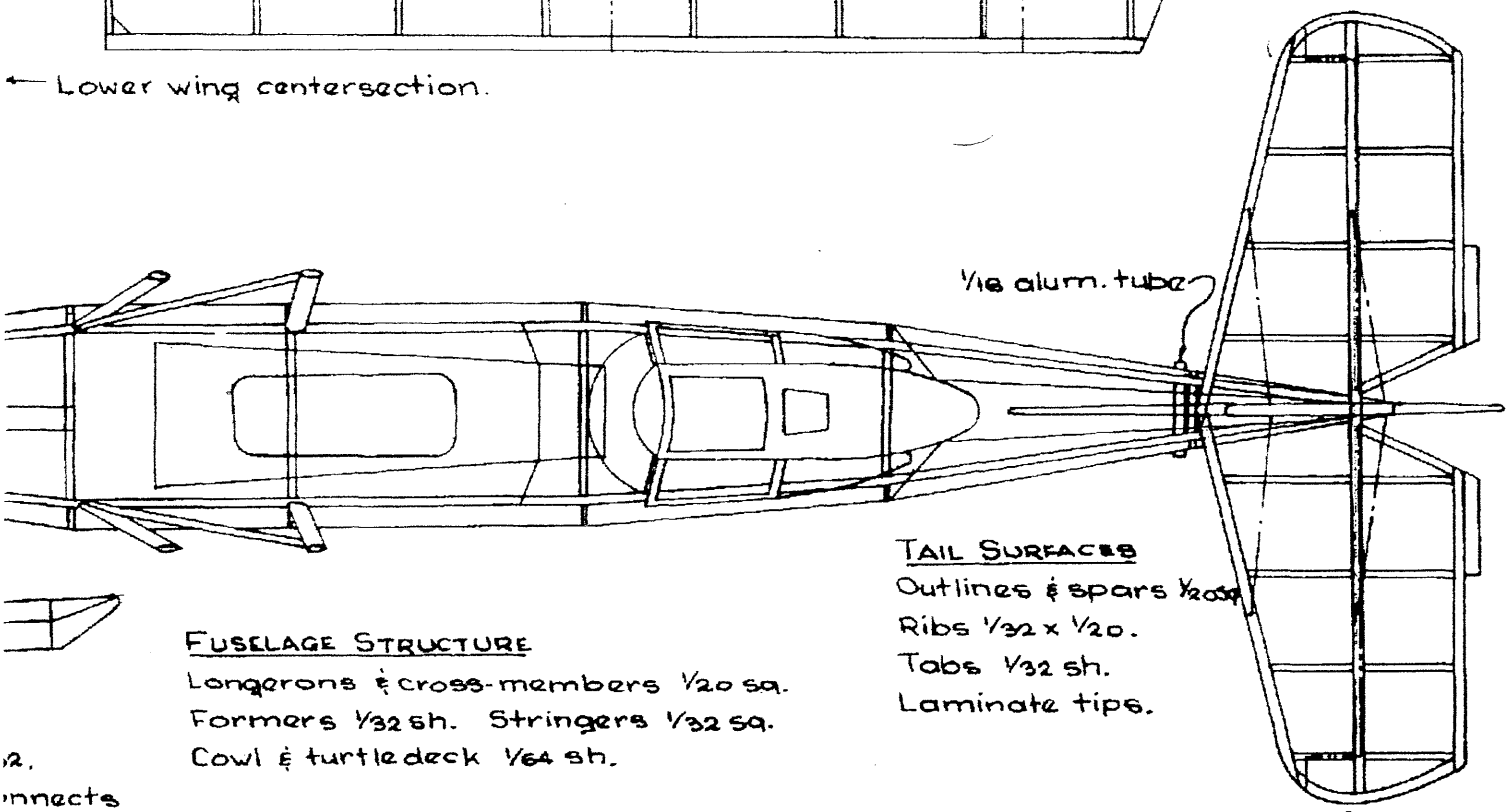




Tips 1/64 sh.

3/8" (3°) dihedral.

← Lower wing centersection.



1/16 alum. tube

TAIL SURFACES

Outlines & spars 1/20 sq.

Ribs 1/32 x 1/20.

Tabs 1/32 sh.

Laminate tips.

FUSELAGE STRUCTURE

Longerons & cross-members 1/20 sq.

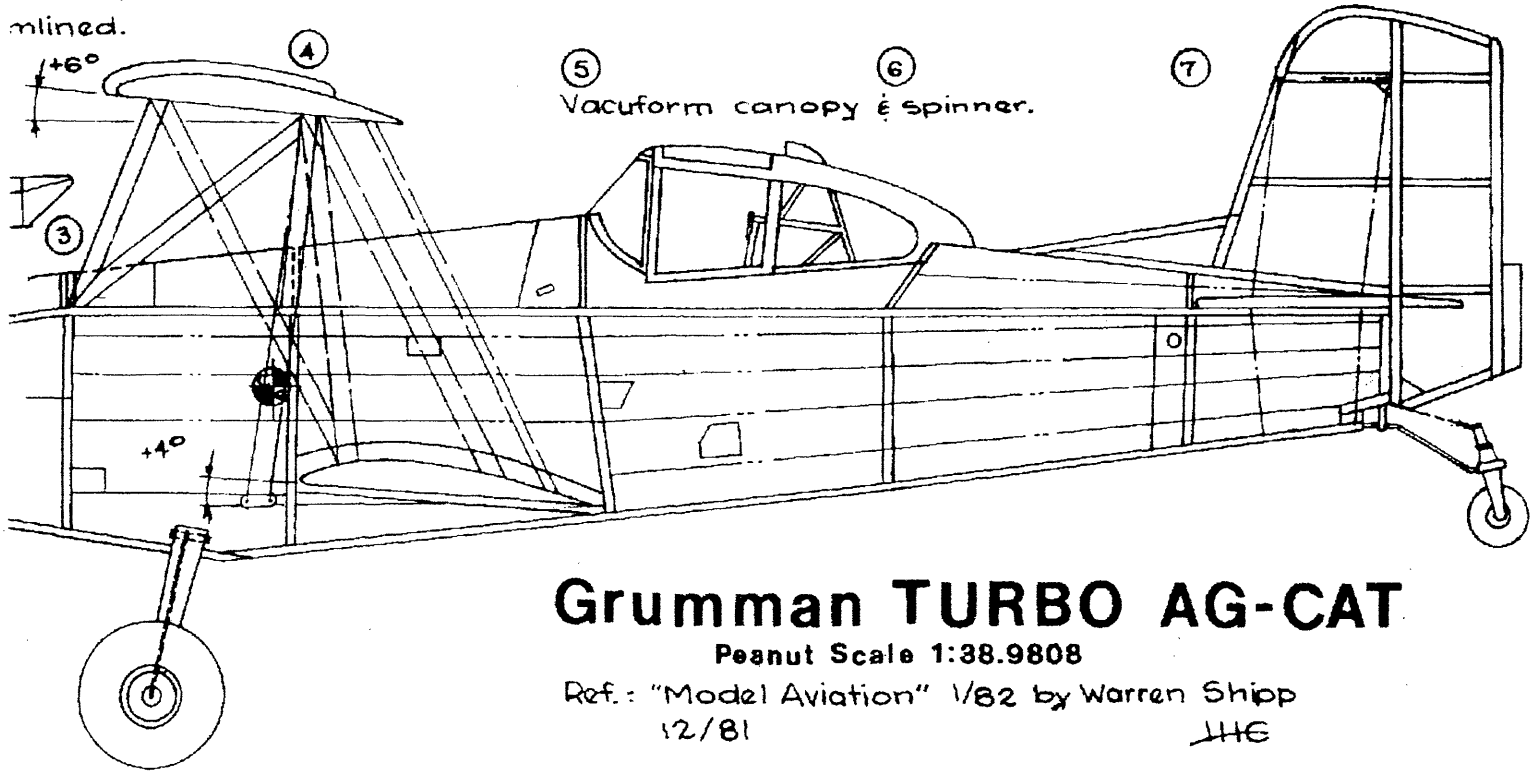
Formers 1/32 sh. Stringers 1/32 sq.

Cowl & turtledeck 1/64 sh.

2.

nnects

mlined.



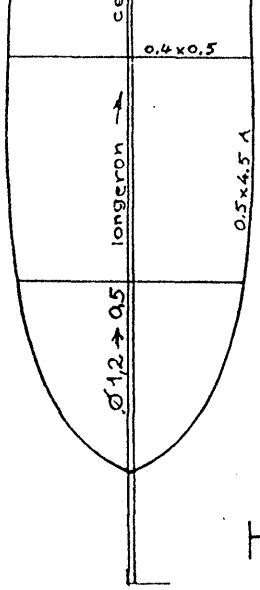
Vacuform canopy & spinner.

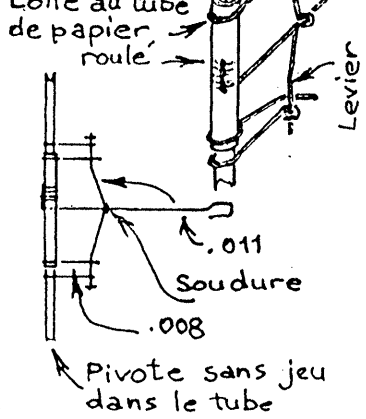
Grumman TURBO AG-CAT

Peanut Scale 1:38.9808

Ref.: "Model Aviation" 1/82 by Warren Shipp

12/81 JHE



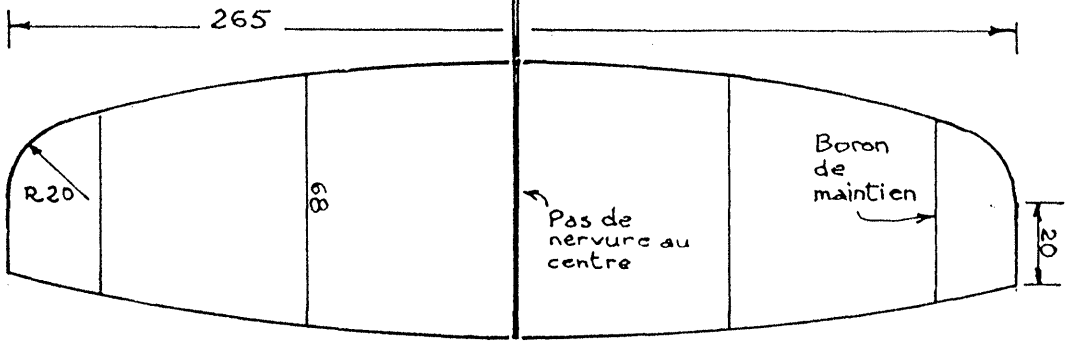


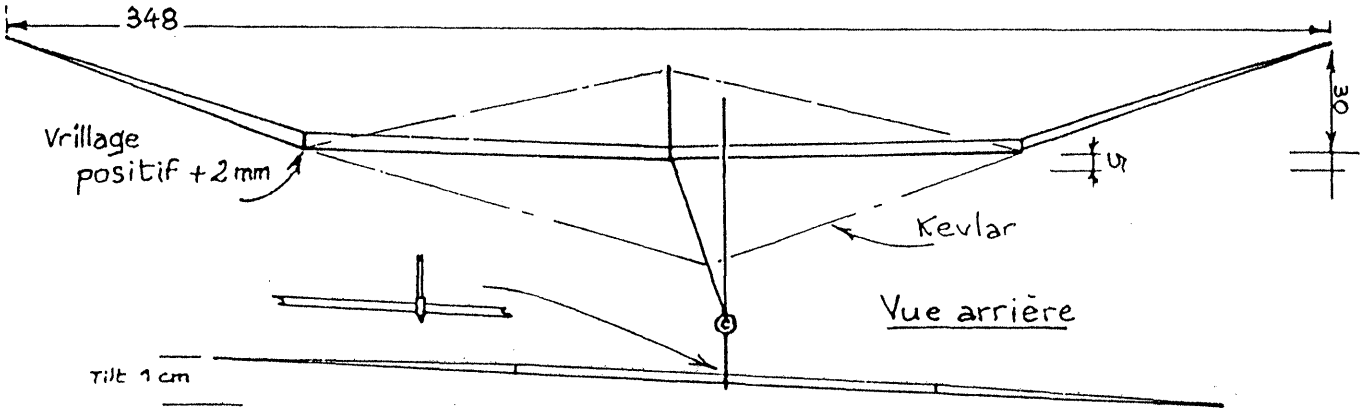
- STAB. 0,9x0,8 → 0,6x0,6 – Nervures (2) 0,6x07 A 4.8lb – Démontable et réglable par tubes de papier. Mats ∅ 1 → 0,9.
- DÉRIVE 0,8 x 0,6 A

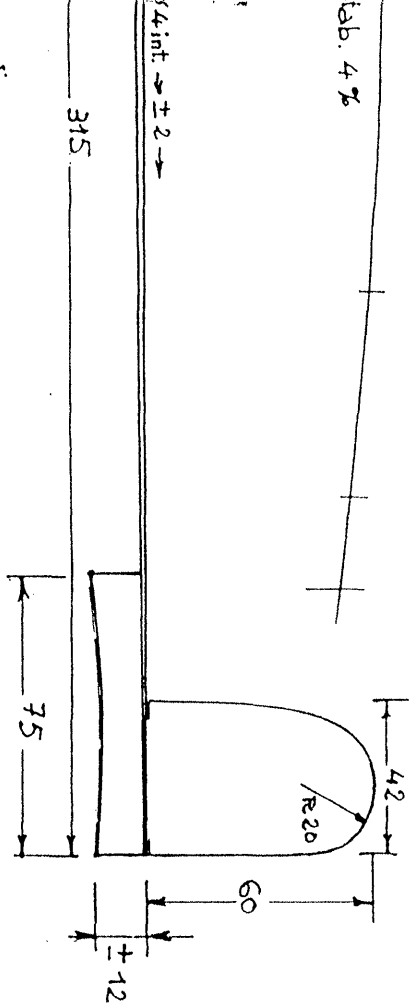
POIDS:

Poutre Av. :	0,125
Poutre Arr., stab, dérive :	0,140
Ailes :	0,125
Hélice : Variable / fixe	0,110 - 0,85
"Masse" totale :	0,500 g.

ECHEVEAU : 0,55g. sur 32 cm - Tan 2

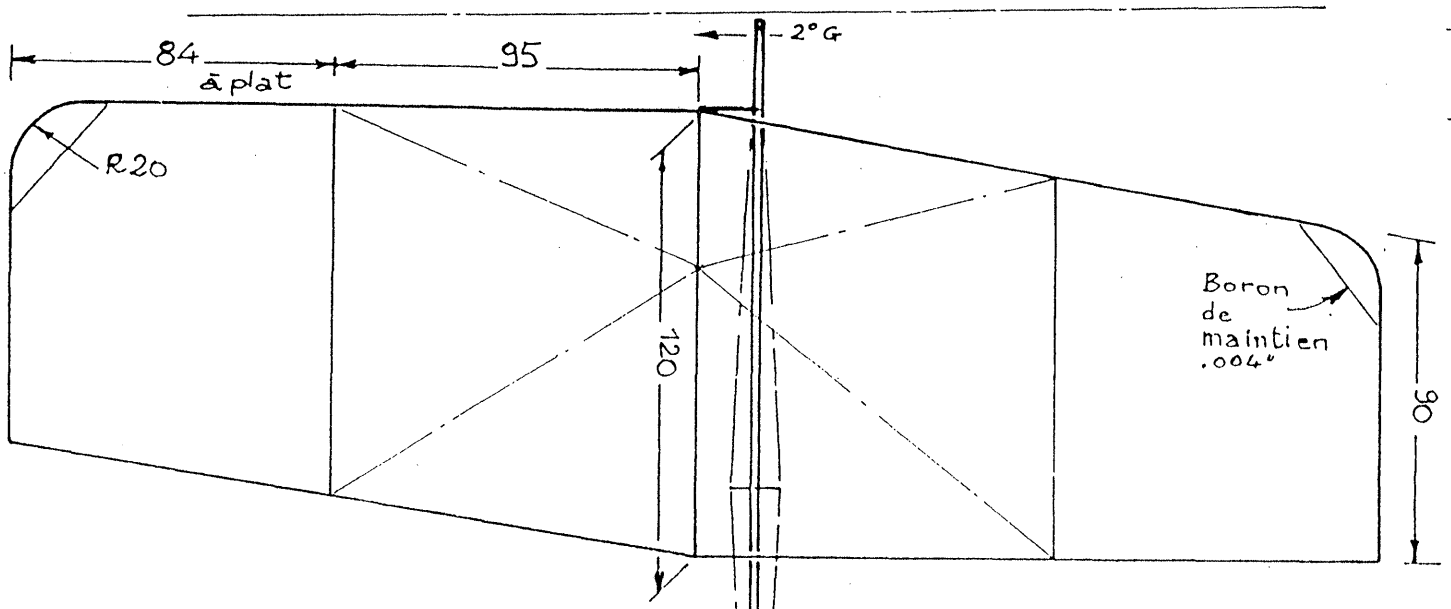


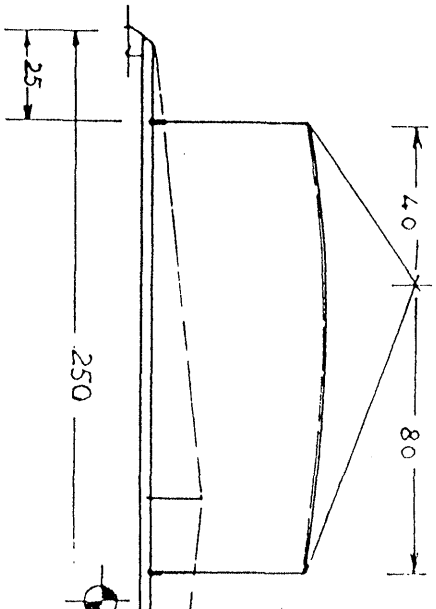




Meilleur Temps : 19'17"
1999 - Stadium de Bordeaux

M.A.C. Marseille. 7.99





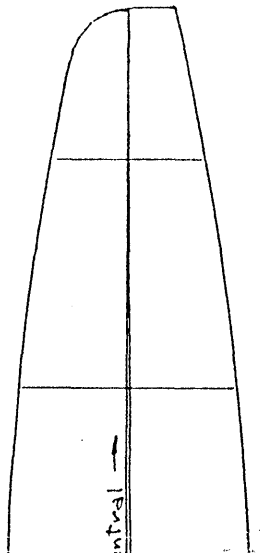
'plumcake'

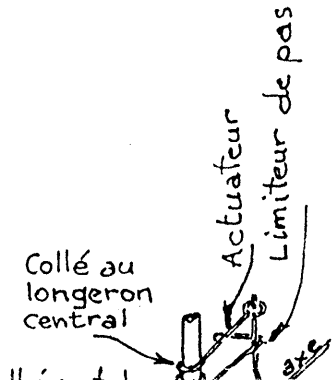
MICRO 35

de Jean Francis Frugoli

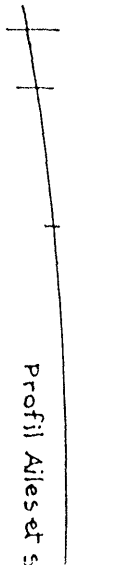
CHAMPION DE FRANCE 98·99

HÉLICE
Diamètre: 300
Pas mini: 540



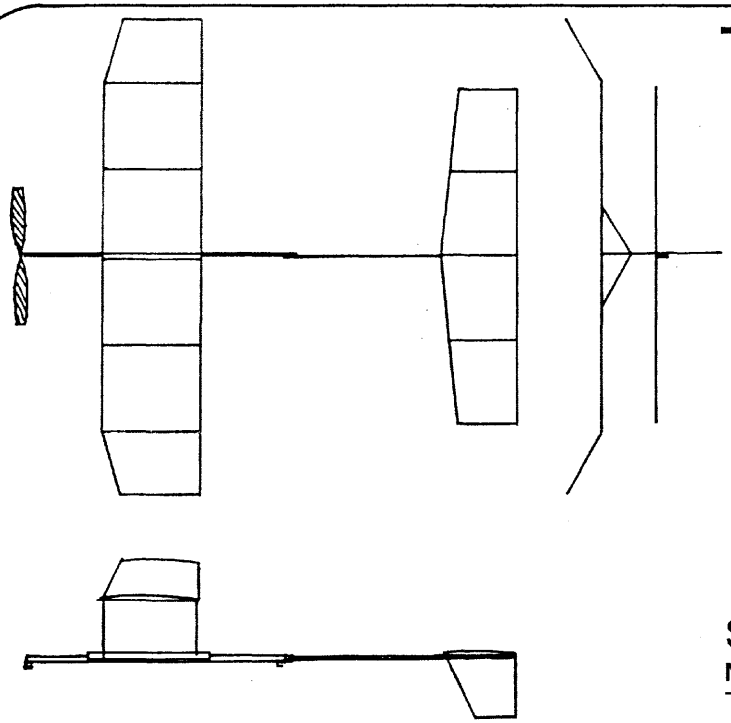


- POUTRE Av. C .012 4.2 lb. ∅int. 4mm. - Palier queue de cochon et crochet arr. 3/10°.
  POUTRE Arr. .008 C moulée sur scion de canne à pêche.
- AILES 1,2x0,8 → 0,7x0,7 4.8 lb - Nervures A ou C 0,7x0,8 - Mats 1,2x0,8 ∅ - Cabane 0,9x0,8 → 0,6x0,6 Haubanage 1 fil de Kevlar - Démontables (tubes



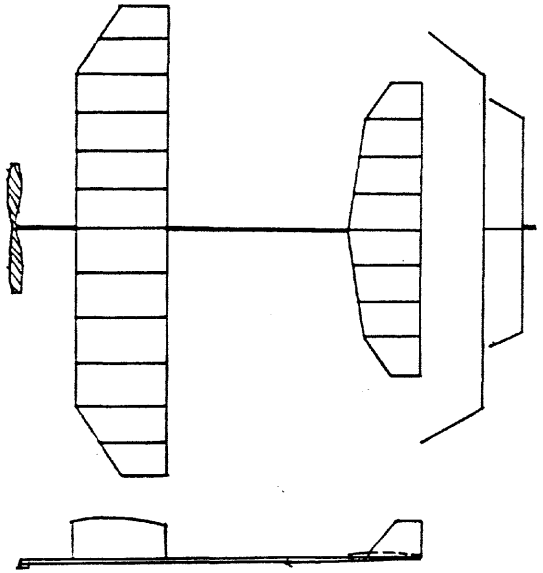
THE S.O. QUARTET

Novice Designs For
Science Olympiad



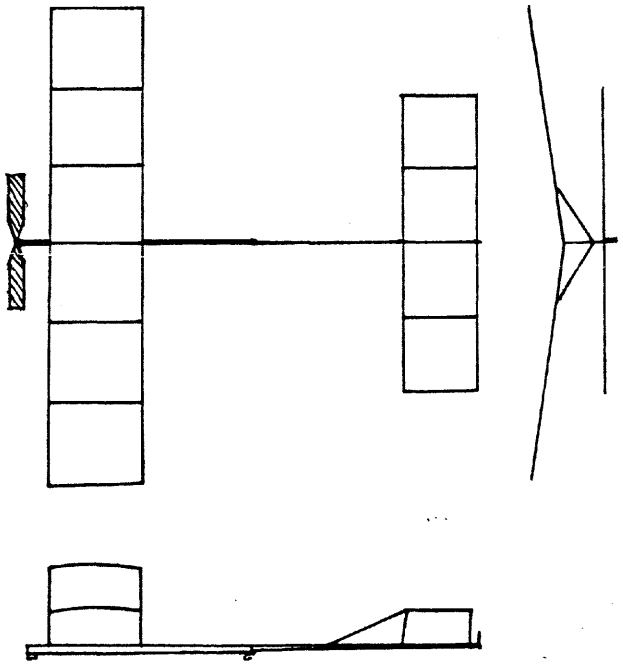
SORCERER

Midwest Products
Tom Sanders



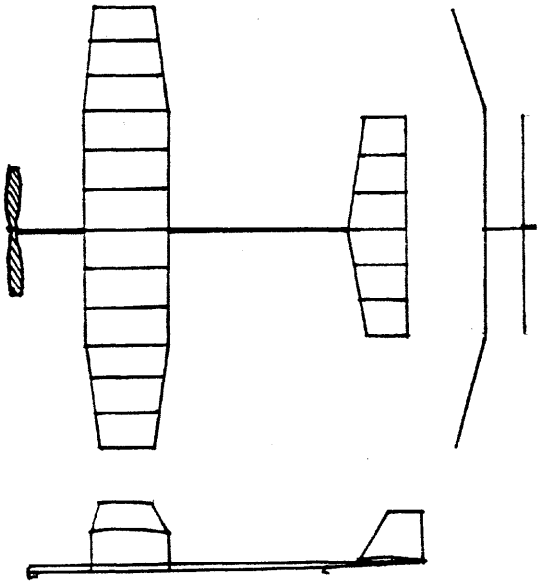
SLOW FLYER

Peck Polymers
DIY/D.Baxter



SCI-OLY 1

Indoor Model Supply
Lew Gitlow



HAWK 18

Mace Models
Don Mace

Drawing: Dave VTO Linstrum 3/00

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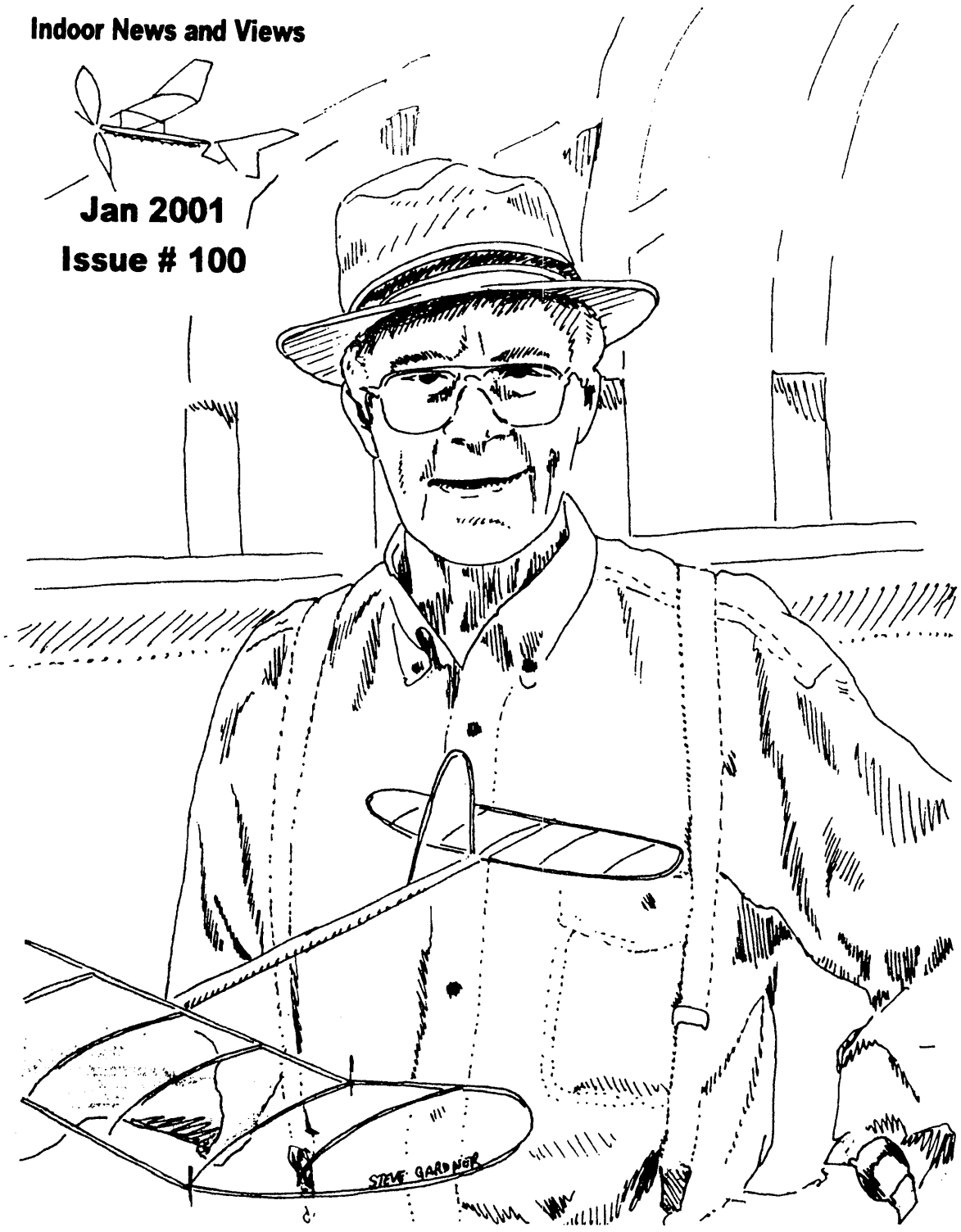
Jan 2001

Issue # 100



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THE PRODUCERS ARE LOOKING FOR VOLUNTEERS TO TAKE OVER PUBLICATION OF INAV. ANYONE INTERESTED SHOULD CONTACT HOWARD HENDERSON.

Hidden Assets

Most of you out there will not recognize the man on our cover this issue. It is not too surprising since he has not been actively building or flying indoor for several years. He has, however, given a great deal to our sport right up until today. He is Howard Henderson, the man in charge of the subscription and actual production of the huge number of newsletters that are INAV. He works to get the letter out as hard or harder than anyone even though he has decided to concentrate his modeling on outdoor free flight. He is I believe 82, plus or minus a couple years, and is an active machinist, builder of steam car replicas, model builder, computer dabbler, and general engineering reference for all the other modelers around here. He has a very strong natural talent for engineering backed by the experience of working in the engineering department of Curtiss Wright Aircraft. As knowledgeable as he is Howard is quite humble and one of the most pleasant people to be around that I know of. The local modeling community is very lucky to have his company and the readers of INAV are likewise lucky to have enjoyed his efforts for all these years. He needs more time to get his various steam projects cooking and so is turning over the mailing list and funds to Mr. Tim Goldstein of Colorado. Tim has the enthusiasm and the management abilities that we need to get INAV out to all you subscribers and with Howard's help the transition will be smooth I am sure. If you have seen Tim's magnificent indoor modeling website you will understand that the good fortune we enjoyed from Howard's help continues with Tim's help. If you find the time you might drop each of these guys a note of thanks for the past and future contributions to the sport of indoor modeling they make.

Indoor News And Views

America's Premier Indoor Flying Newsletter

3 - 6 issues per year depending upon budget and availability of material

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Howard Henderson - hpieth@aol.com

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19. Cutting "0" rings. Issue 92, page 34

Props

1. Indoor props by Larry Coslick. Issue 76, page 5
2 V/P props, rubber sizing by Jim Clem. Issue 80-82
3. V/P prop for F1D by Rene' Botty. Issue 83, page 17
4. EZB props, Hobby Shop EZB by Larry Coslick. Issue 90, page 13-15
5. F1D V/P prop drawing. Issue 92, page 28
6. Indoor model propellers by Jim Grant. Issue 94, page 3,4,5

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1. Mini Stick Postal 1994. Issue 76, page 9-11
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3. FAI World Champs 1994 Issue 80,81,82, page 8
4. EZB USA-Japan Postal 1994' Issue 83, page 11-13
5. USIC 1995. Issue 84, page 3-15
6. MiniStick Postal 1995. Issue 84, page 27 28
7. 1995 AMA Record Update. Issue 85, page
8. 1995 AMA National Contest. Issue 85, page 7 8
9. 1995 Kibbie Dome Annual. Issue 85, page 9-10
10. 1995 F1D Team Selection with photos. Issue 85, page 11
11. 1995 FID Postal. Issue 86, page 11-12
12. 1995 AMA Record Update. Issue 86, page 15
13. 1996 International Postal Contest. Issue 87, page 15-16
14. AMA Record Update. Issue 87, page 17
15. USIC 1996 with photos. Issue 88, page 4-19
16. AMA Record Update. Issue 88, page 19
17. First Sixty Minute Flight by Steve Brown. Issue 89, page 3
18. 1996 FID World Champs. Issue 89, page 6-8
19. 1996 Kibbie Dome Annual. Issue 89, page 20 24
20. 1996 Wally Miller International EZB Contest. Issue 89, page 25-26
21. AMA Record Update. Issue 89, page 30

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80-81-82		USA Sweeps F1D Championship on cover
Unmarked		Contains USIC 1994 photos/Japan vs USA on cover
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Cool Cat Comments by Jim Richmond

This plane was derived from the old faithful Catwalker in a last ditch effort to improve it for the coming battle in the cool Slanic salt mine (thus the "Cool Cat" name).It incorporates a number of modifications, most of which were beneficial. For instance the bracing was removed from the stab which then provided the "automatic pilot" effect and makes the plane more forgiving. Additionally the rudder was moved to the top of the boom to permit flat mounting against a surface of the model box. Also, by spacing the rudder forward of the stab a bit, it then becomes possible to re-cover the stab without any disassembly. The full length boom, stiffened with boron top and bottom made these alterations possible.

The fancy wing shape with the dip in the middle drew lots of comments (some rather amusing), but it was just my way of widening the chord without changing the spacing of the wing posts. My tests confirmed an improvement in the cruise with the 9" chord. I also hoped it would reduce the climb a bit, but this is still an open question. The small wood sizes used in the wing were a cause for concern, but the carefully selected wood provided adequate strength.

I liked the shape of Brown's prop blades, so I used the same area distribution in my flare prop design and it tested better than any of my other props. The spar was very small at the outer ends (another concern) but it functioned quite well, with the flare feature being improved by this, I thought.

I used aluminum front bearings for the first time on F1D's, but after having 2 of them pop off, I'll be using my old music wire type in the future (which have never failed).

The refusal to turn at launch problem I had at the '98 W. Champs was solved by using stab offset and more thrust offset (you need 2.5 degrees). This time it was my teammates who were chasing their planes with balloons after early round launches. The use of high torque motors is a big factor in this kind of problem. But then, this activity wouldn't be near as much fun if there weren't any problems to solve.

There were lots of comments about the small motor sizes I used (1.235gm as compared to Kagan's 1.9gm). In view of the close results, it appears that a broad range of rubber sizes can do the job if the overall combination is right.

Materials & Dimensions

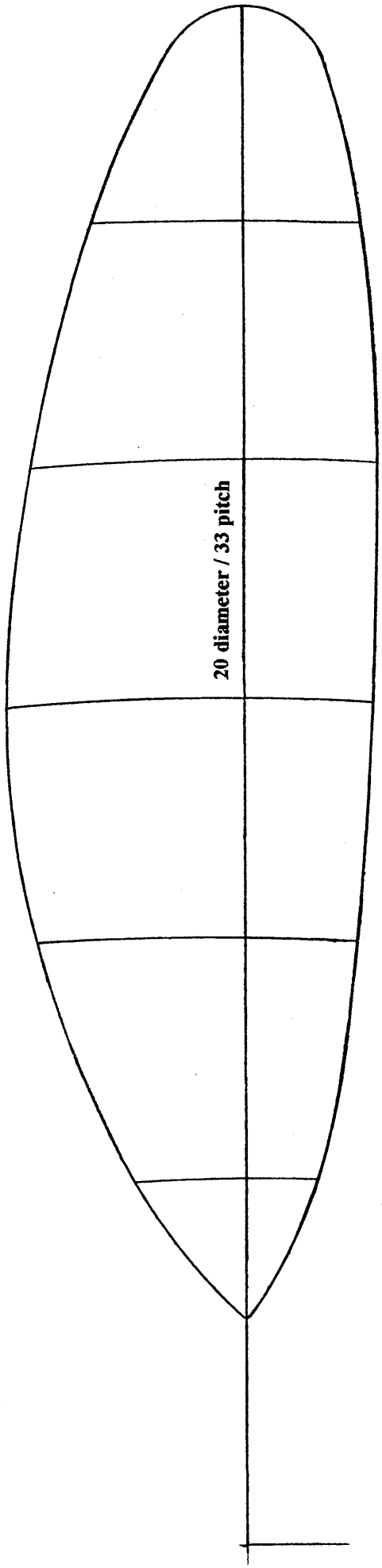
Wing	
spars	,033 x .046 - 5 lb.
middle ribs	.030 x .037
compression ribs	4.5 lb.
ends	.030 x .032
middle	.030 x .060
tips	.030 x .040 - 5 lb.
wingposts	.037 x .035 - 5 lb.
	(2) . 003 boron, full length
bracing	.0003 tungsten
airfoil	3% arc
Stabilizer	
spars	.038 x .047→.026 x .040 - 5 lb.
ribs	.023 x .039 - 4.5 lb.
airfoil	2.5%
Motor Stick	
tube	.013 -.250 id - 3.9 lb.
	(2) .003 boron, full length
webs	.020 - 4.5 lb.
rear hook	.013
bracing post-mid.	.045 x .045→.034 x .034 - 5.5lb.
bracing post-ends	(2) .040 x .040→.032 x .032 - 5.5 lb.
thrust bearing	.012 aluminum
Tail boom	.008 - 3.9 lb. - .235 od→.080 od
Fin	.025 x .025 - 5.0 lb.
Propeller	
spar	.060 x .090→.030 x .030 - 5.0 lb.
ribs	.020 x .027 - 5.4 lb.
outline	.025 x .025 - 5.0 lb.
shaft	.013
airfoil	3.5% arc

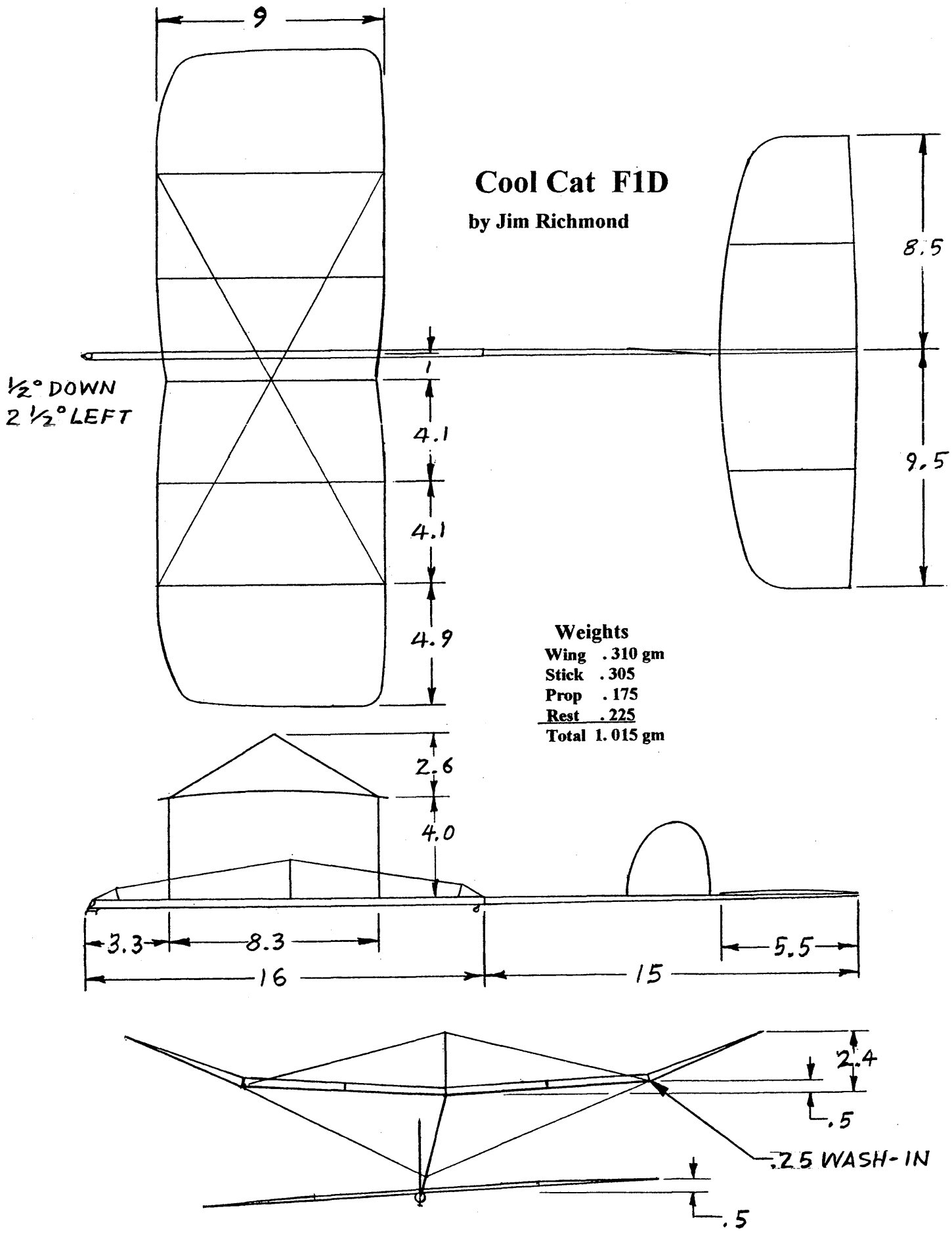
Rubber

Tan II - May 1999

.041 x .064 x 16 - 1.235 gm

2510 turns -100 back-off = 2410 at launch




9
Cool Cat F1D
by Jim Richmond
8.5
9.5
½° DOWN
2 ½° LEFT
1
4.1
4.1
4.9
Weights
Wing .310 gm
Stick .305
Prop .175
Rest .225
Total 1.015 gm
2.6
4.0
3.3
8.3
5.5
16
15
2.4
.5
.25 WASH-IN
.5

INDOOR WORLD CHAMPIONSHIPS 2000
Salt Mine, Slanic, Romania

The end of one era and the beginning of a new one.

World Champ, John Kagan: young, computer head, rock music lover, Air Jordan tennis shoes, two-day growth of beard, competent, competitive, terrific builder and flier.

This being my final Indoor World Championships as manager, I am pleased to say it was one of the best ever. This year's team was an excellent one (just look at the final record). Handling of the model boxes is the most important thing a team manager can do. This year, we had some problems -- Steve Brown's models were severely damaged, Jim Richmond and Larry Coslick had some minor damage to their models, John Kagan came out okay.

The team arrived in Bucharest on the 29th of September. The Romanian team met us at the airport. Mangalea Corneliu provided us with transportation to Slanic and also returned us to Bucharest after the end of the World Championships. We can not thank him enough.

There were 11 of us (plus model boxes and luggage): the team, myself, World Champ Steve Brown, Nick Leonard, Jr., and five USA supporters -- quite a load.

After arriving in Slanic and checking into our rooms, I was called by Aurel Popa (Romanian team flier). He said time for dinner! It was 12 o'clock midnight! They had the chef cook us dinner at midnight! What hospitality! There were numerous courtesies they extended to us but it would take many pages to write about them. All I can say, if they ever come back to the USA for our World Championships we will provide them with everything including travel and entry fees.

Now, to the World Championships and the final contest for one gram and 65 cm. models.

After three and a half days of testing, we were ready for the contest. The team started out great. John hung up but Jim and Larry really had two gold-medal flights. John's models had too large a circle and after his second flight hung, he adjusted his models, i.e., tighter circles. Once he did that, he was on his way to winning.

Jim and John went right down to the wire -- imagine, total time of the winner Kagan 92:16, Richmond 92:10, only six seconds difference. It was very exciting to watch these two duke it out in the final two rounds, it was great. Larry was in contention right up to the final round. I have seen Larry compete and he is totally competent to pull out a miracle. He tried very hard and his flights put the USA Team in first place for the Gold Medal.

We must not forget our junior flier, Nick Leonard, Jr. Steve, John, and Nick, Sr. all provided him with a lot of help. I helped Nick rebuild one of his wings. I kept saying to him, "more glue, more glue". We added a complete front and rear spars to the wing while it was in a bracing jig. We probably doubled the weight of the wing but it worked. His final flight was 29:32 and second round was 35:20 which managed to get him to sixth place. Two years ago, Nick was a junior entrant and believe me in these past two years, he has made great progress. Nick is planning on going to college now so I think his indoor building and flying will be put on the shelf for a couple of years. Good luck to you, Nick.

The salt mine is a real challenge. Most of the teams competing were used to the cold dark mine. the USA Team had two one-million candle power search lights. They were each powered by a 12-volt car battery that was moved about the salt mine floor by two-wheel carts provided to us by Aurel Morar (the 1982 FlD Indoor World Champ). We also had battery chargers that were hooked up at the end of each flying day.

Coming into this World Championships, I thought our main competition would be the Romanian Team. They all had test flights over 46 minutes, new records for the salt mine. (The new record is now held by English team flier, John Tripper, at 47:21.) Secondly, I thought the Hungarian Team would be tough to beat.

I was certain that World Champion Steve Brown would have the upper hand on everyone except Jim Richmond and Andras Ree. These three fliers are world class competitors. It was unfortunate that Steve's models were so badly damaged, i.e., broken wing spars and large microfilm holes. Steve normally has the best looking models, very conservative in construction but impeccable and beautiful and they truly fly like they look. By the way, Steve gave his models and box away after the World Championships, as did Kagan and Coslick.

Jim Richmond, 6-time World Champ, was on target for every flight, a true master of his craft, steady, confident and thorough in every aspect of flying. Jim just happened to get the salt mine jinx, i.e., slowly moving into the salt mine wall at a very high altitude. Steering in the mine at over 150 feet is a hit or miss proposition. Jim had a couple of miracle steers but on two other occasions he had his model hang on his fishing line, a real tough one for Jim.

Our team sure had some excellent support. Larry Parsons from Davis, California, helped with the search lights. Nick Leonard, Sr. helped the juniors. Dave Thompson from Cincinnati, Ohio, was our main searchlight man (Dave manned the searchlight in 1998), and did a great job. Eugene Joshu from Redbud, Illinois, was Larry Coslick's life support system and his helpfulness to everyone was much appreciated. We called him the Y2K2 man. Eugene gave many rolls of Y2K2 to various competitors and promised to send them more at no cost to the receiver. Herb Robbins from Los Gatos, California, was a time keeper. Herb did a splendid job and we thank him and all the supporters. The supporters helped the USA Team gain the victory.

The contest director, Marius Conu, has grown into this position over the years and he really ran a very smooth World Championships. The Jury was splendid. It's always good to see Mr. Chaussebourg, Martin Dilly and of course Mihail Zanciu.

In every respect, this Championships was run as smoothly as possible. The banquet was wonderful. The food, entertainment, prize ceremony and many other things were planned so well by the Romanians and carried out beautifully. Congratulations to all of them; their hard work and planning were greatly appreciated by all of us.

If the indoor World Championships for 2002 is held in America (Lakehurst, Johnson City or Moscow, Idaho), I would request that Mr. Mihail Zanciu be a member of the FAI Jury.

Respectfully submitted,

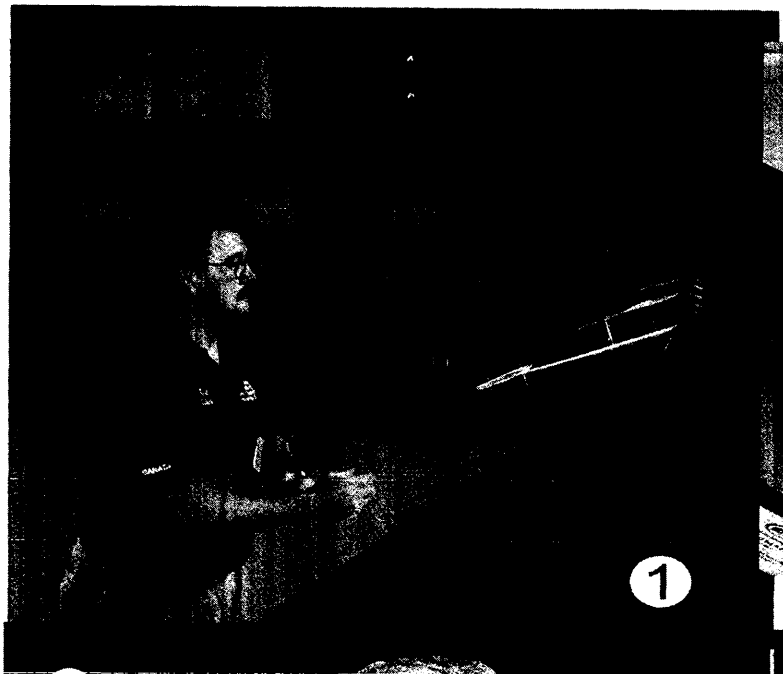
Bud Romak

Bud Romak, Team Manager, USA
Indoor World Championships 2000

PS: I hope AMA will put in a bid for the 2002 FlD Indoor Championships.

Photo Captions

1. Fred Teller flying his F1d
2. A speed model for the straight line event (unguided missile)
3. Doc Martin with his....who knows! A floatplane from WW1 featuring a retracting main float!
4. Jack McGillivray with his Junkers getting ready to fly in the mass launch event.
5. Nice Manhattan cabin model floating by.
6. Tim Lavender's super model of the Wright Flyer.
7. Roy White get help flying his next to smallest ornithopter from Tim Lavender's bunch of juniors. Roy is always active helping beginners.
8. Rich Miller's neat Zlin passes overhead.
9. Big stately Penny Plane.
10. Bob Romash brought a Condenser powered electric helicopter.
11. Billie Landrum with his Penny Plane.
12.
13. Tim Lavender helps one of his club get her Bostonian Spirit of St. Louis flying. The Smyrna gang brought whole bunch of these to the USIC.
14. Ed Riply's immaculate Pistachio Kit Fox.
15. One of the new rule beginner's f1m models.
16. Tom Sova launches his F1m
17. Peter Olshefsky and Bob Romash untangle from a mid-air.
18. Peter Olshefsky getting ready to try again after repairs.
19. John Kagan readies his F1D
20. Rich Miller being insufferably cheerful with his pretty Howard DGA 15
21. Neat little Boeing F4B4 built by Jim Grant (I think!)
22. A small part of the Romash air force.
23. Jack Boone with the foundation of free flight, the AMA Dart
24. John Blair with his Fokker D-7. Model is a very realistic mottled green.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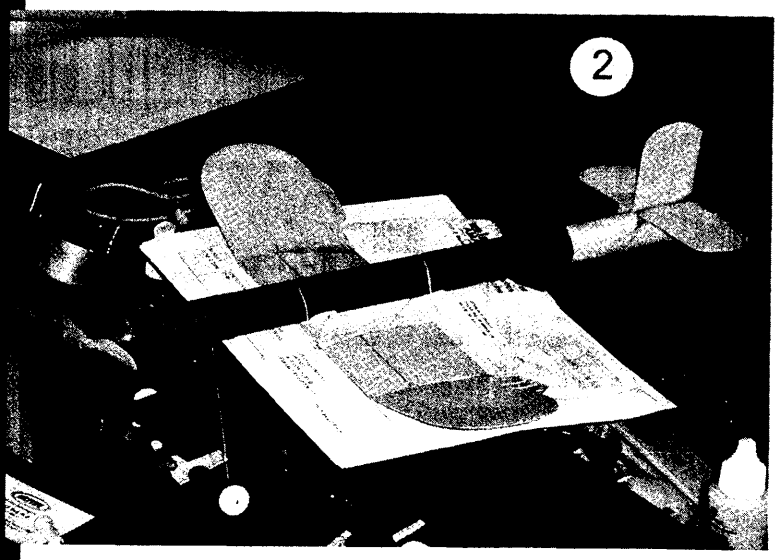
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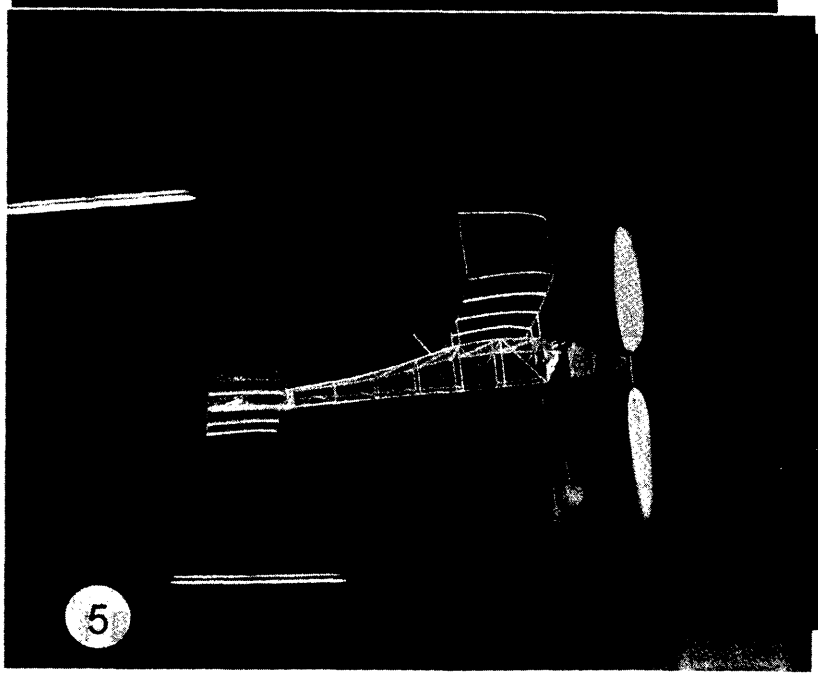
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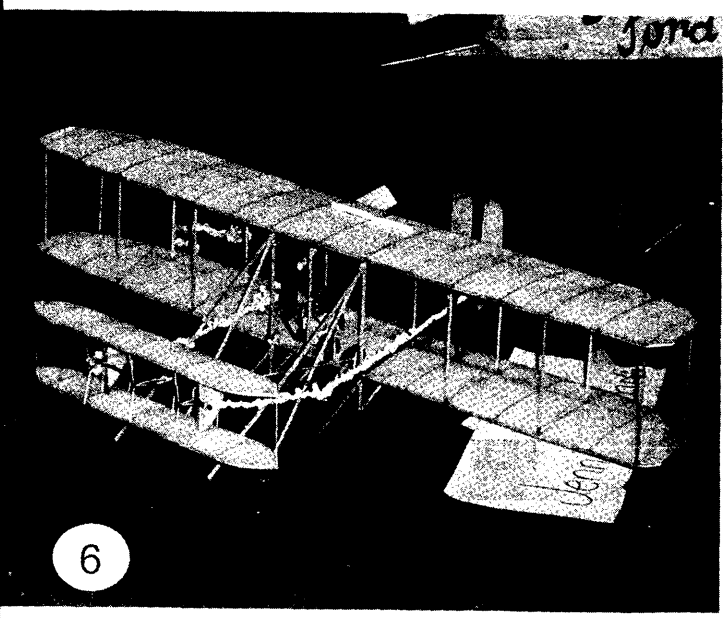
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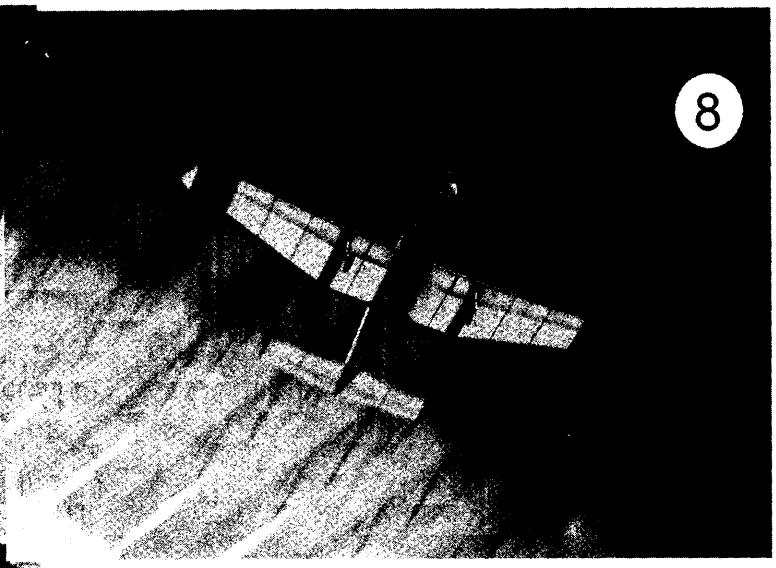
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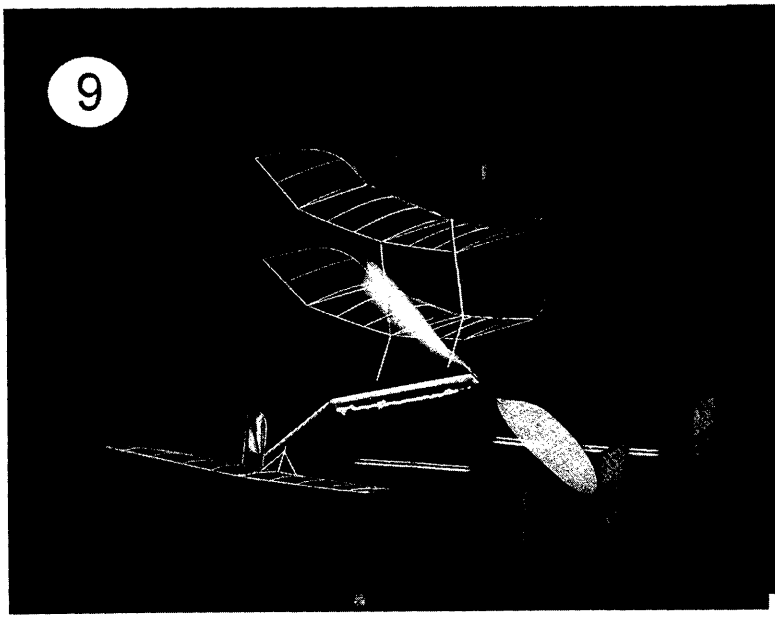
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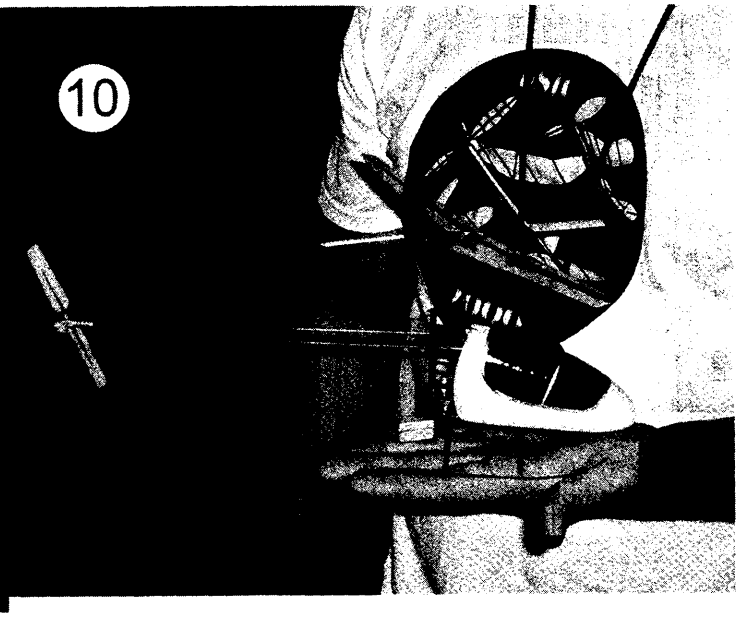
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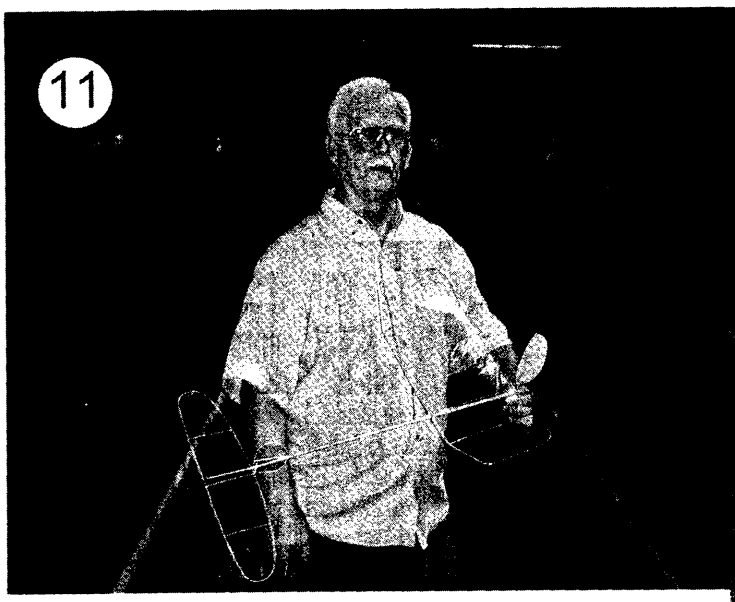
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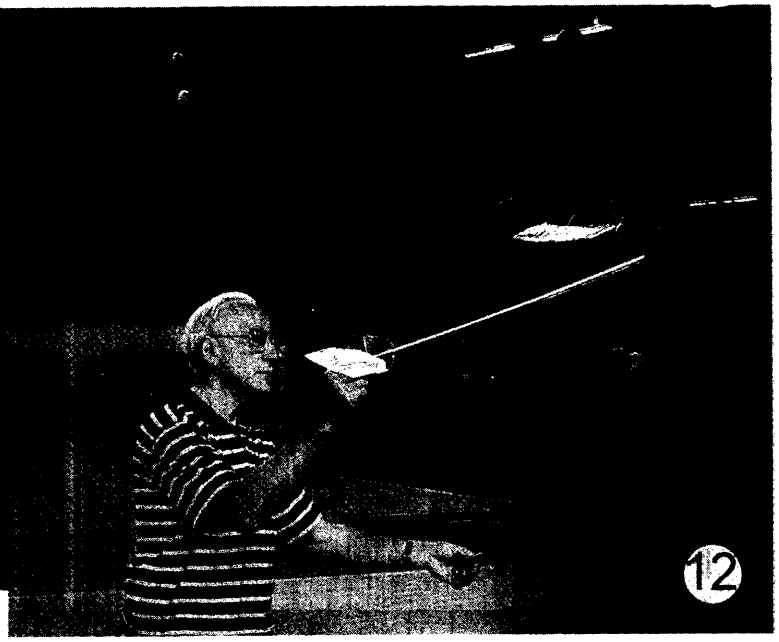
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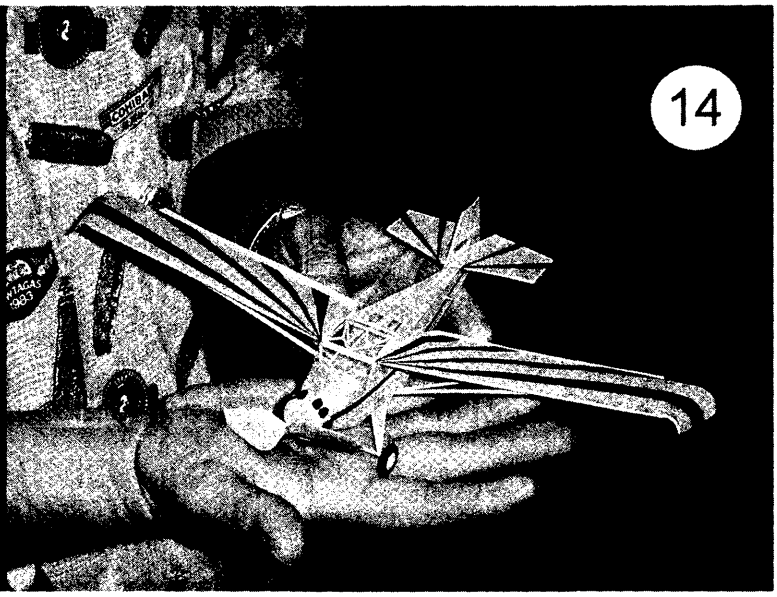
13
FLYING ACES
SMYRNA, TN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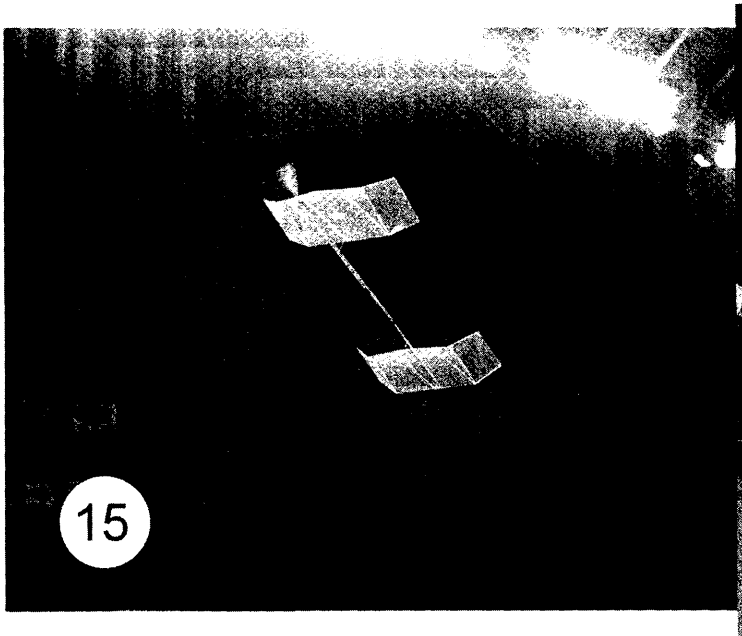
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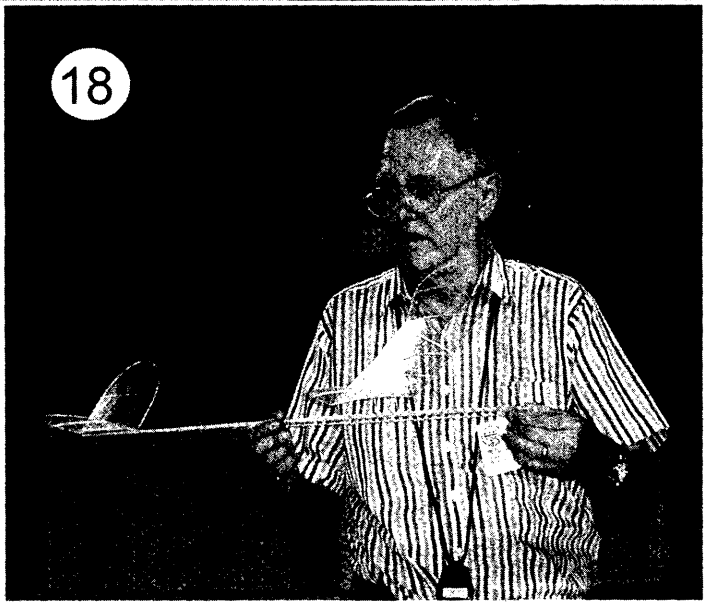
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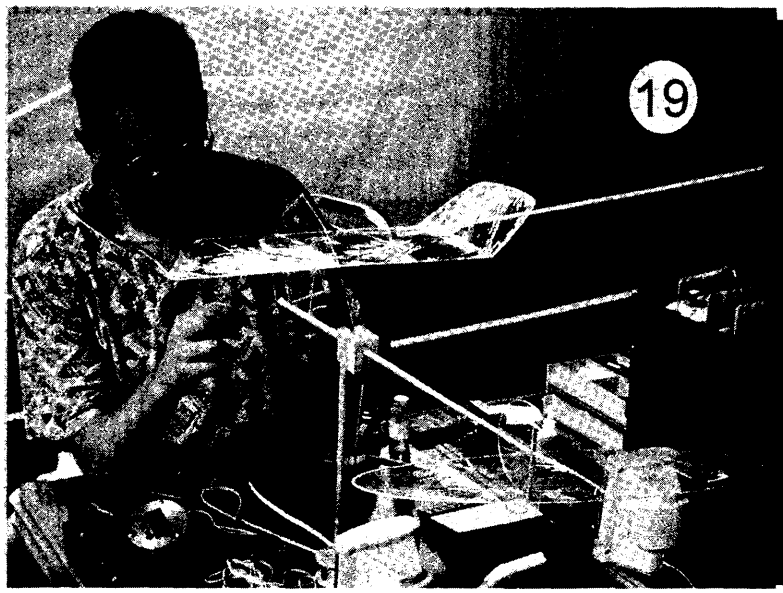
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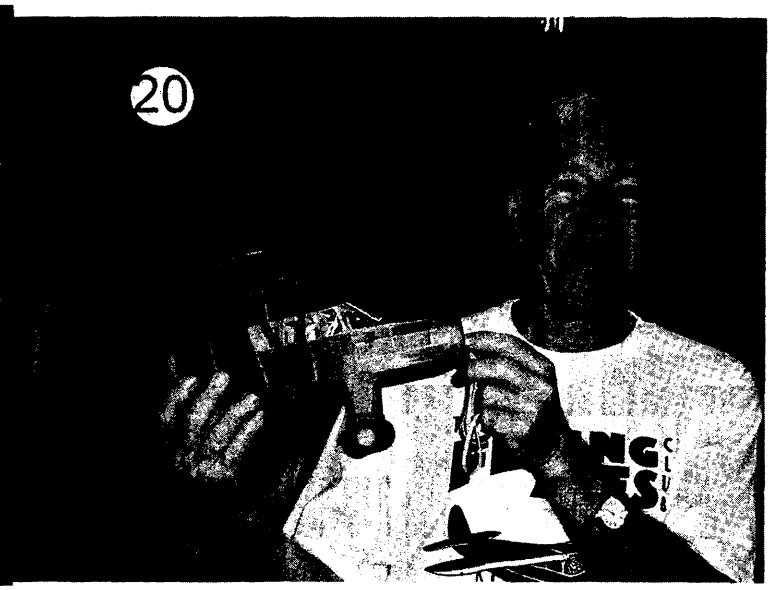
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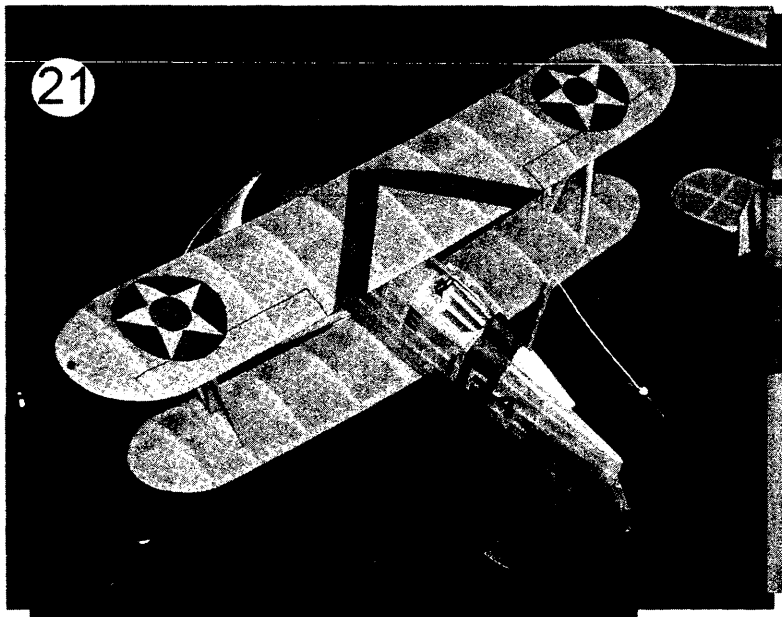
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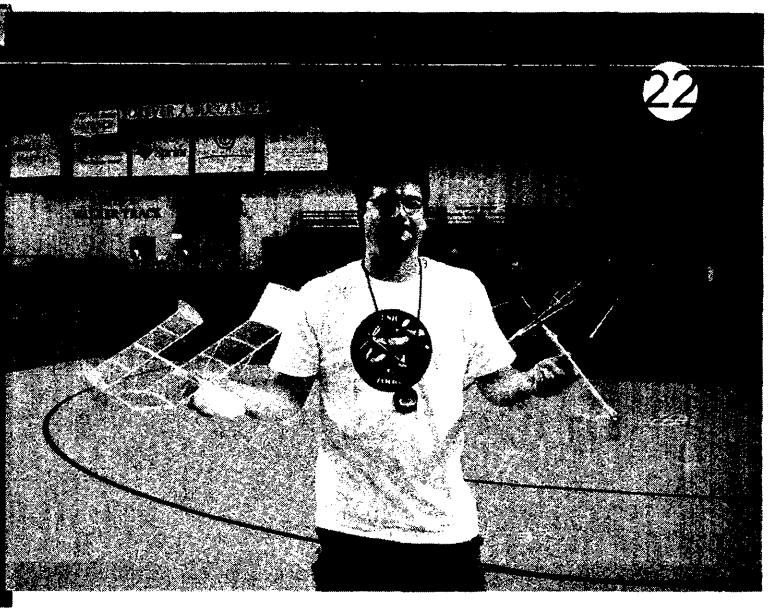
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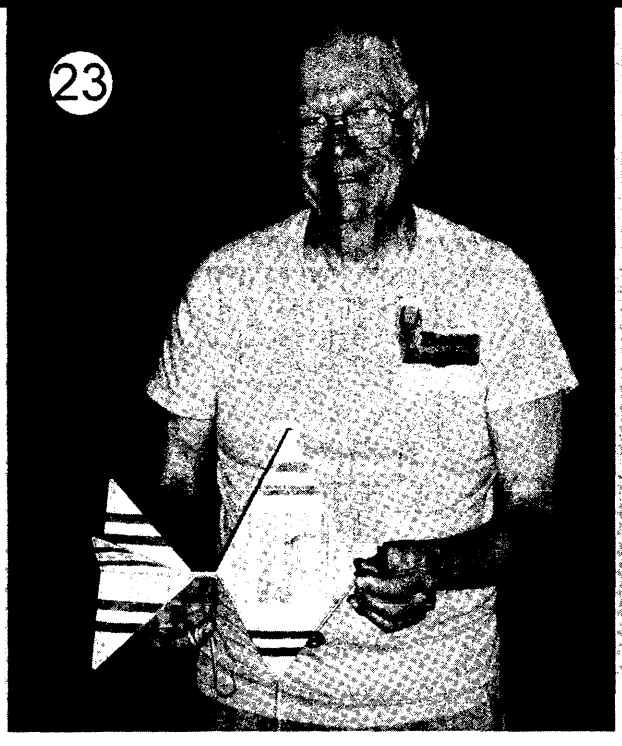
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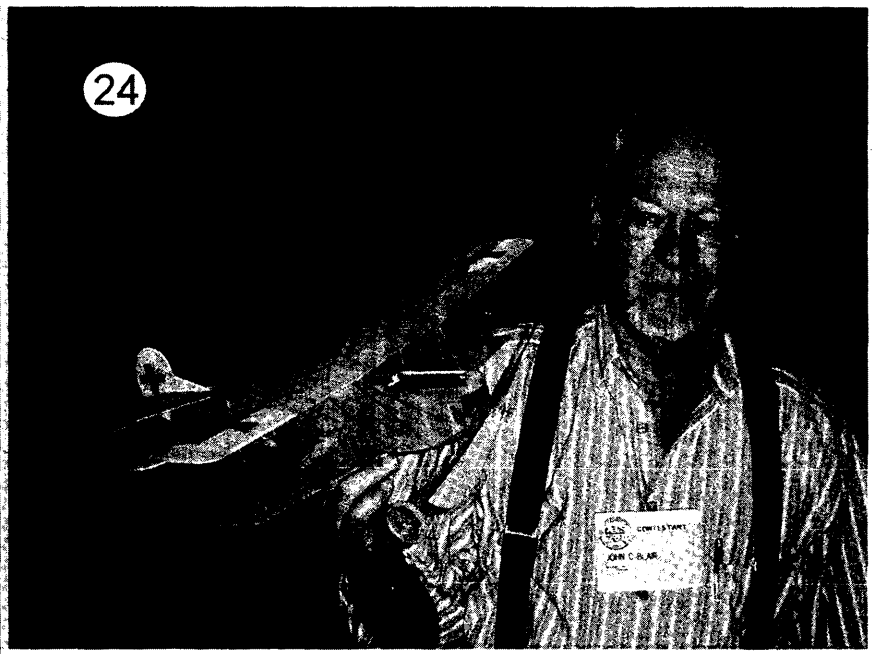
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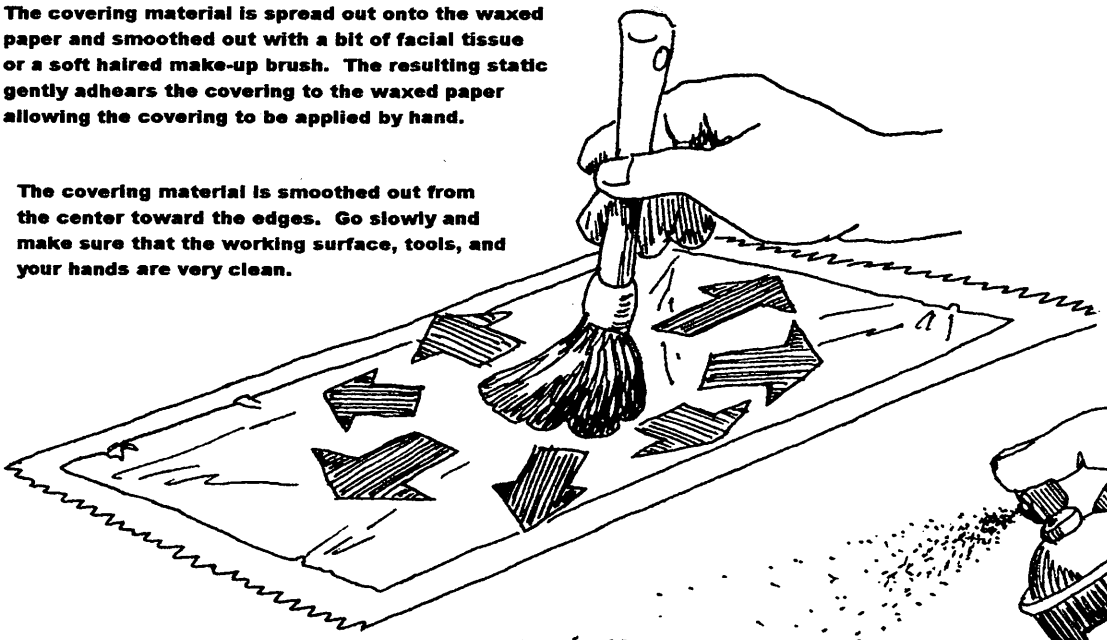
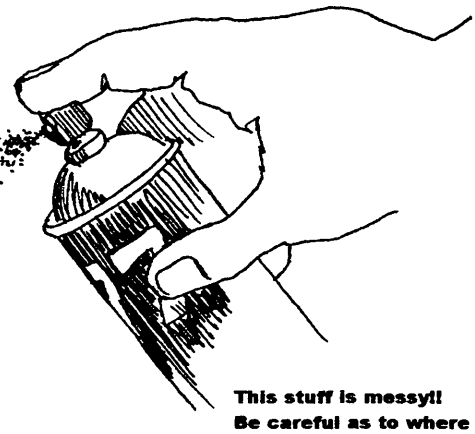
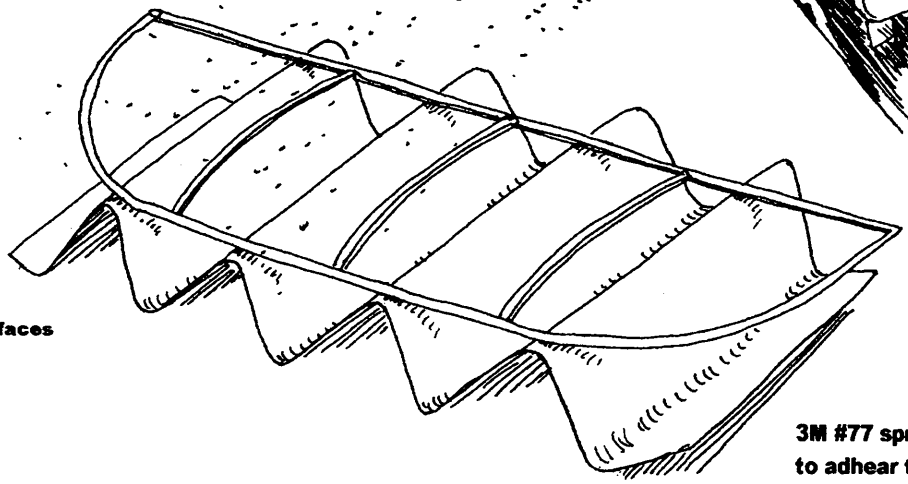
The covering material is spread out onto the waxed paper and smoothed out with a bit of facial tissue or a soft haired make-up brush. The resulting static gently adhears the covering to the waxed paper allowing the covering to be applied by hand.

The covering material is smoothed out from the center toward the edges. Go slowly and make sure that the working surface, tools, and your hands are very clean.



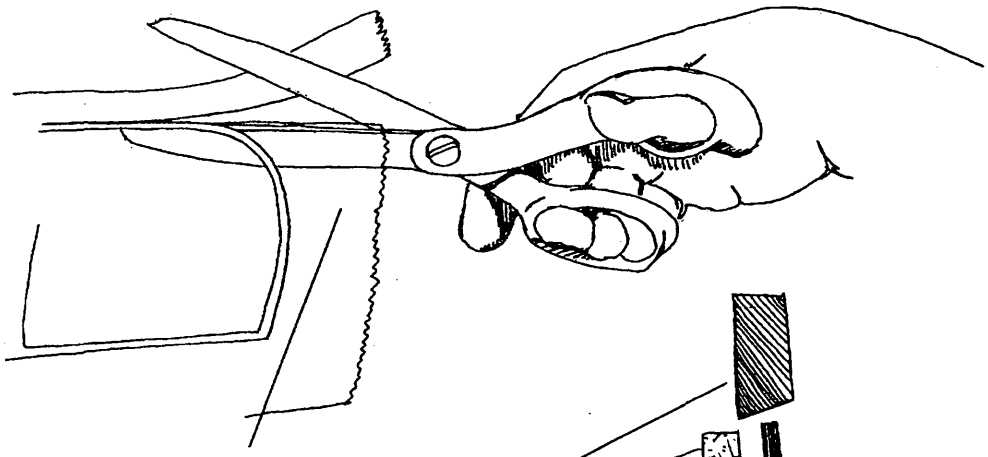


This stuff is messy!! Be careful as to where you use it.

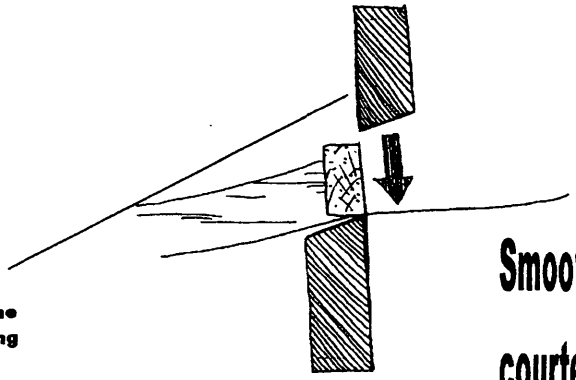


You can easily clean the glue off the tools and surfaces with Naphtha

3M #77 spray glue is used to adhear the covering material to the structure. Used just enough for proper bonding. The structure is supported for spraying by a sheet of folded paper as illustrated.



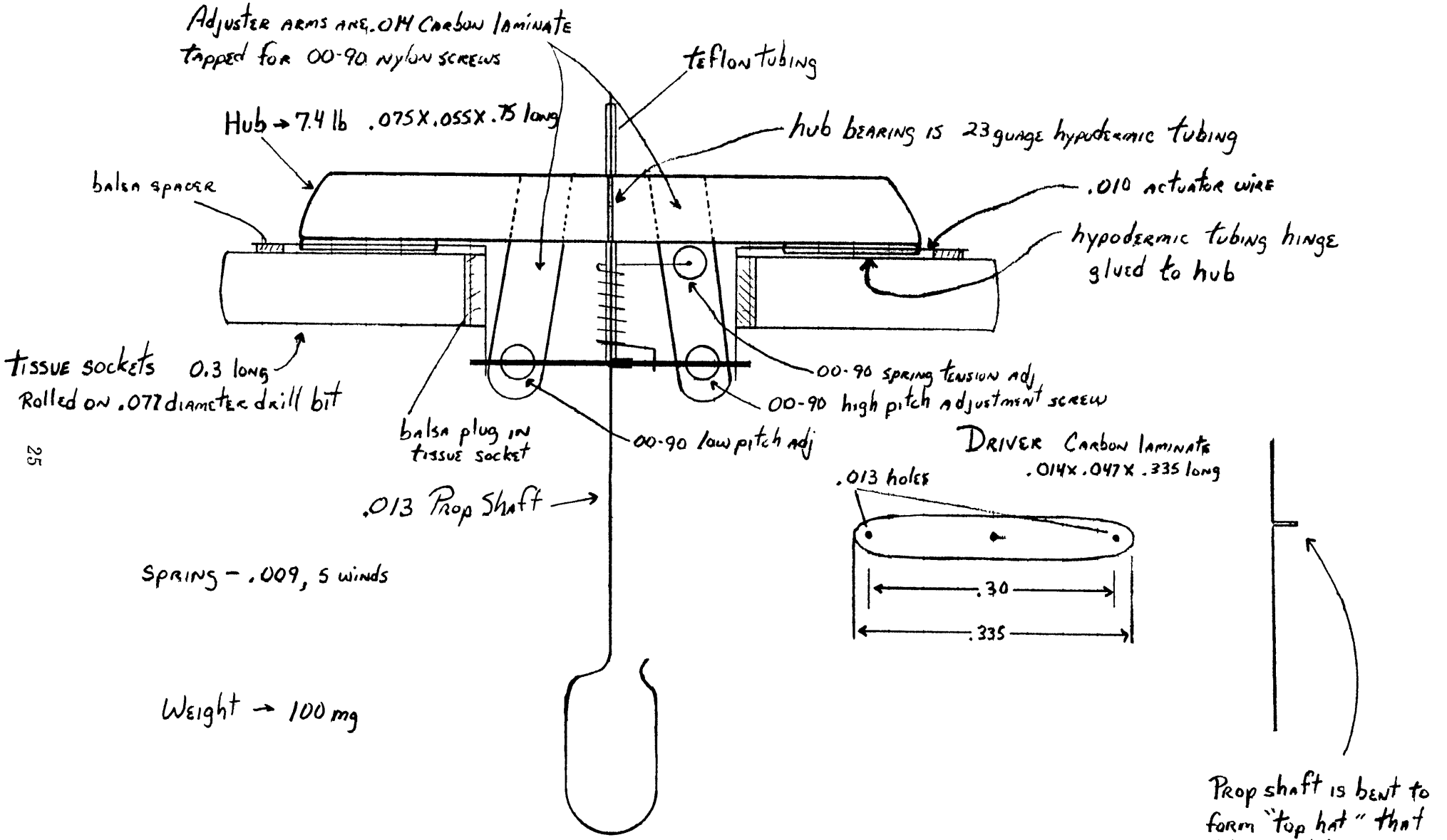
Once the covering has been trimmed the waxed paper is carefully removed and the job is finished.



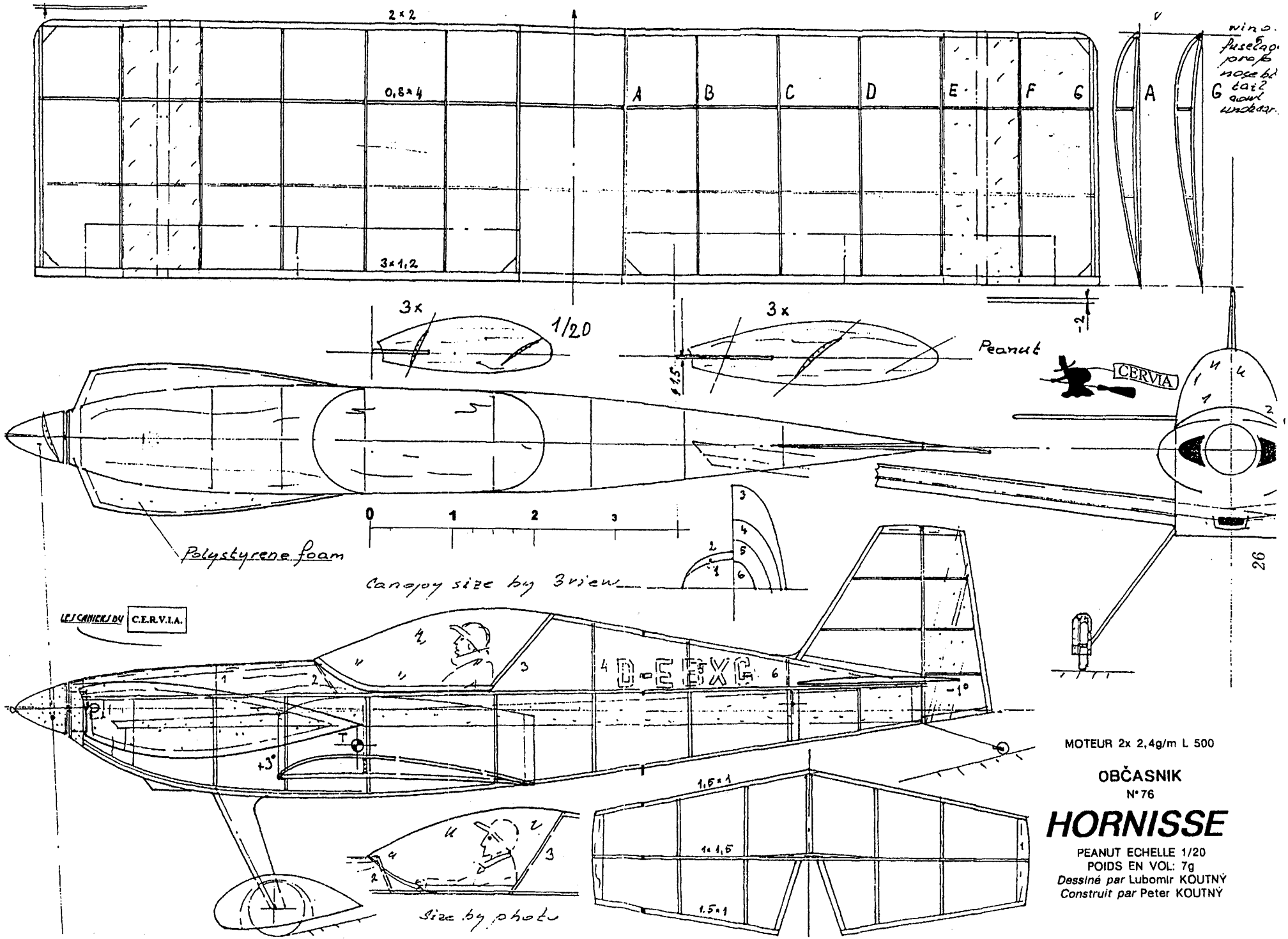
Shears are used so that one blade supports the airframe edge and the other shears the covering off right at the edge. Using right handed shears results in going around the structure counter-clockwise with the structure on the top and the covering beneath.

Smooth Covering with Waxed Paper

courtesy Walt Collins and the Brainbusters


Adjuster arms are .014 Carbon laminate tapped for 00-90 nylon screws
teflon tubing
Hub → 7.4 lb .075X.055X.75 long
hub bearing is 23 guage hypodermic tubing
balsa spacer
.010 actuator wire
hypodermic tubing hinge glued to hub
tissue sockets 0.3 long Rolled on .077 diameter drill bit
balsa plug in tissue socket
00-90 spring tension adj
00-90 high pitch adjustment screw
00-90 low pitch adj
.013 Prop Shaft →
Spring - .009, 5 winds
Weight → 100 mg
Driver Carbon laminate .014x.047x.335 long
.013 holes
.30
.335
Prop shaft is bent to form "top hat" that fits in slot in driver and then epoxied

Tom Sova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B
C
D
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F
G
3 x
1/20
3 x
Peanut
CERVIA
Polystyrene foam
Canopy size by 3 view
Size by photo
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1 x 1,5
1,5 x 1
MOTEUR 2x 2,4g/m L 500
OBČASNIK
N°76
HORNISSE
PEANUT ECHELLE 1/20
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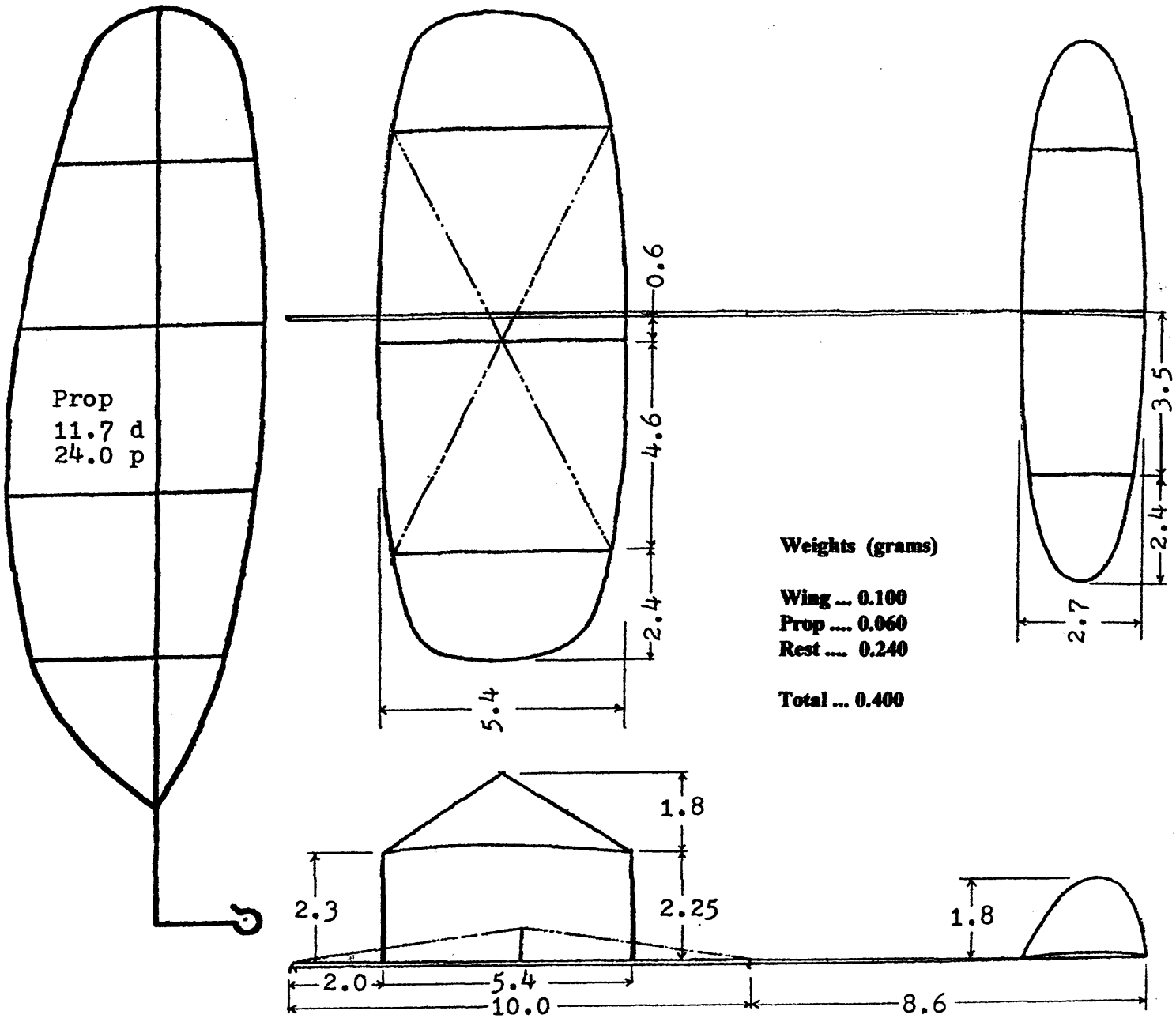
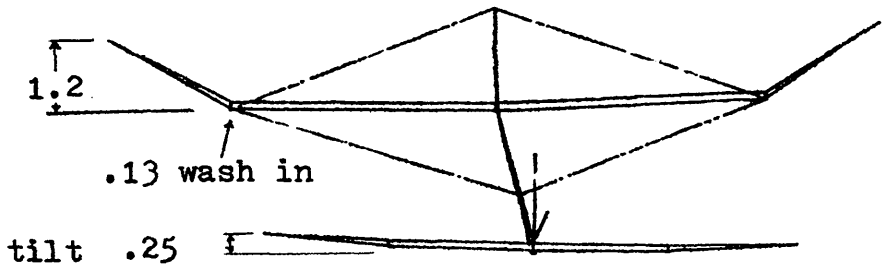
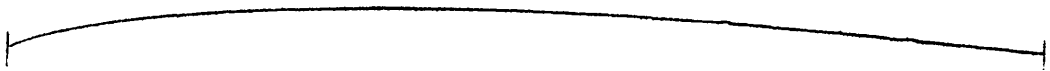
Construit par Peter KOUTNÝ
C.E.R.V.I.A.

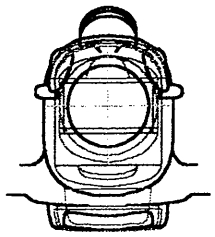


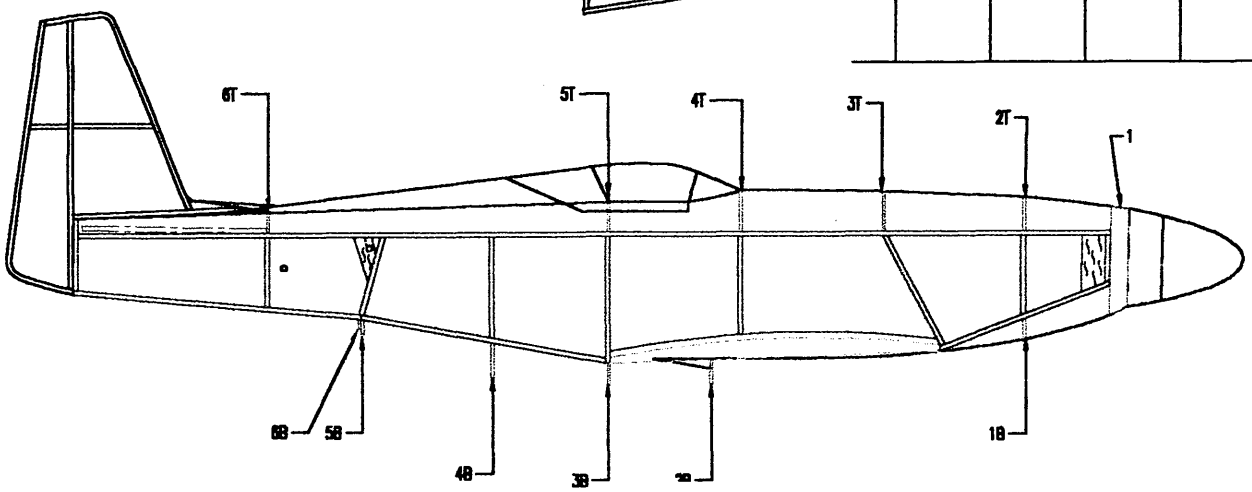
35 cm 1'st Place 2000 U.S.I.C.
Official Flights 25:47 24:38 21:15
Motor .032 x 12.75 (5/99) 2400 turns
By Tom Sova (tsova10756@aol.com)



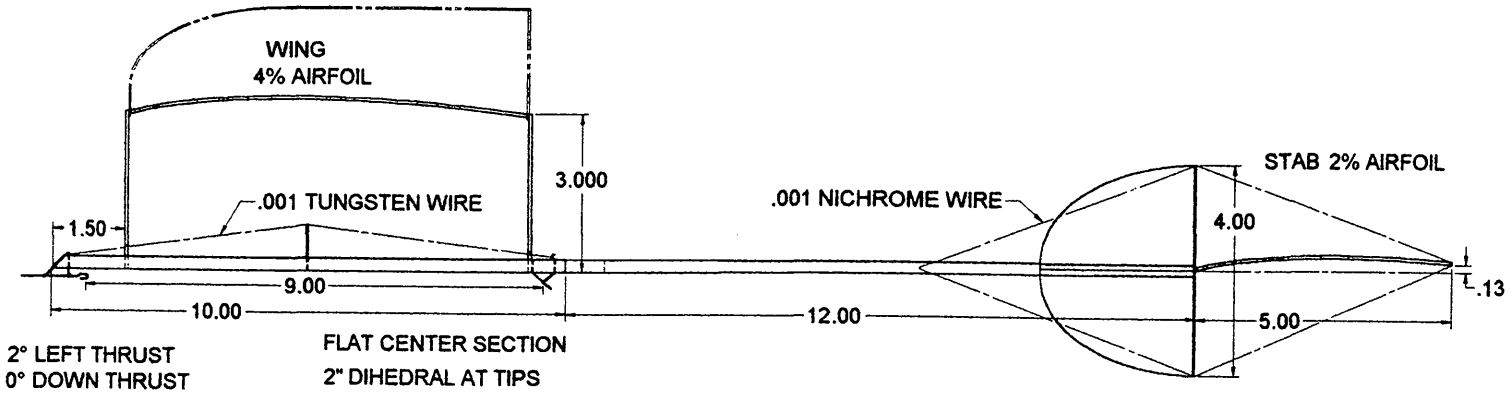


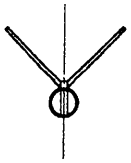
Miss Ashley II

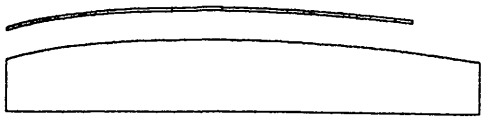




BY JIM BUXTON







WING AND WINGPOST	.47 GRAM
MOTORSTICK	.25 GRAM
STAB	.15GRAM
TAILBOOM AND FIN	.15 GRAM
18"DIA X 34"PITCH PROP	.18 GRAM
TOTAL	1.2 GRAM

WING MAIN SPARS .100 x .035 - .065 x .035

TIP SPARS .065 X .035 - .030 X .035

WING RIBS .045 X .024 - .065 X .024 - .045 X .024

STAB SPARS .058 X.030 - .030 X .030

STAB RIBS .030 X.023

FIN SPAR .025 X .025 -.025 X045 - .025 X .025

FIN OUTLINE .025 X .025

MOTORSTICK .016 THICKNESS X 1/4"DIA

TAILBOOM .009 TAPERED FROM 1/4" TO 3/16" DIA

PROP SPAR .065 X 065 - .025 X .025

PROP OUTLINE AND RIBS .025 X .025

WIRE BEARING AND PROP HOOK .013 MUSIC WIRE

ORS SS CM F1D

BEST TIME SO FAR 28:11

9" LOOP OF .048 .6 GM

1475 TURNS DEADSTICK LANDING

UNBRACED AND POLYMICRO COVERED F1D

DESIGNED AND FLOWN BY DARRYL STEVENS

DRAWN AND FLOWN BY BRUCE KIMBALL

THE INDOOR LEGAL EAGLE EVENT

DRAWING REQUIREMENTS

1. Drawing must fit on one side of one sheet of legal size (8-1/2" x 14") paper.
2. No component parts drawing may be superimposed or overlap another and must clear one another and the edge of the paper by at least 1/8 inch.
3. Wing(s) and stabilizer must be drawn full span, tip to tip and fuselage drawn in its full length from nose through tail in one piece.
4. Fin(s) may be drawn where space allows and not necessarily attached to the side view.
5. Landing gear must be drawn in its place on the side view showing its full length.
6. No top or front view is required.
7. Drawing must be presented to C.D. on demand.

DESIGN REQUIREMENTS

1. Smallest wood size to be 1/16 inch square except for propeller.
2. Fuselage measured to its outside surface must contain a space 1" x 1.5" x 3".
3. Fuselage must have a cabin or open cockpit with a raised windshield of at least 30 degrees of clear or translucent material. Cockpit must be actually open, with a headrest or canopy.
4. Flight surfaces; Leading and trailing edges cannot parallel each other.
5. Tip outlines must have no straight lines except for stabilizer where a twin fin is used.
6. If twin fins, or two wings are used in the design, parts may be built in duplicate over the same drawing.
7. Jap tissue required on all non-sheeted, open framework surfaces except for fuselage surfaces covered by a flying surface directly attached to the fuselage and areas involved in an open cockpit or minimum access area to the motor. No ultra light film covering to be used, unless used for windshield or windows. Flight surfaces may be single or double covered.
8. Landing gear must use at least one 1 inch diameter wood wheel.
9. Use of motor stick(s) or tube(s) O.K. and if used, must be shown on the side view in one continuous length in the proper position.

FLYING

1. Models must R.O.G. from floor or any solid place designated by C.D. on contest day.
2. Total of best 3 flights out of 5 wins and delay timing of 20 seconds with two delays in succession as one official, per AMA rules.

Updated: June 28, 2000

Event USIC Bostonian Mass Launch 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Miller, Richard	179158		

Event 204 Cabin ROG 2000 Nationals Johnson City, TN.

Place	Name	AMA NO.	Score
1	Loucka, Larry	1210	0:32:05
2	Thomas, Mike	615041	0:05:36

Event 202 Intermediate Stick 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Coslick, Larry	4562	0:41:38
2	Kagan, John	469254	0:38:00
3	Chilton, Stan	L-30	0:37:12
4	Tellier, Fred	645957	0:34:36
5	Sova, Tom	473169	0:29:36
6	Olshefsky, Peter	614476	0:28:45
7	O'Grady, Dan	614475	0:28:21
8	Grant, James	614477	0:27:58
9	Hardcastle, Richard	847	0:27:56
10	Thomas, Mike	615041	0:27:41
11	Barker, John	2095	0:26:56
12	Romash, Robert	130061	0:20:30
13	Whittles, John	4400	0:17:26

Event 205 Manhattan 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Van Gorder, Walter	19912	0:13:37
2	Coslick, larry	4652	0:13:36
3	Grant, Jim	159477	0:13:10
4	Schutzel, Emil	508384	0:11:46
5	Thomas, Mike	615041	0:11:29
6	Marett, John	616261	0:11:22
7	Kehr, Joe	549294	0:10:21
8	Tellier, Fred	645957	0:08:51
9	Weckerly, Stuart	13250	0:07:57
10	Duke, William	51508	0:06:59

Event 220 Ministick 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Cailliau, Lawrence	79985	0:12:20
2	Van Gorder, Walter	19912	0:12:15
3	Chilton, Stan	L -30	0:12:12
4	Thomas, Mike	615041	0:11:51
5	Tellier, Fred	645957	0:11:47
6	Loucka, Larry	1210	0:11:46
7	Romash, Robert	130061	0:11:34
8	Schutzel, Emil	508384	0:11:14
9	Diebolt, John	5286	0:10:43
10	Marett, John	616261	0:10:24

Event USIC Modern Civil Production 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	McGillivrey, Jack	MAC L1025	Cub J-5B	220.0
2	MacEntee, Richard	102055	Turbo Beaver	151.0
3	Anderson, Kenneth	587497	Ord-Hume	104.0
4	Lavender, Tim	269765	Spirit of St. Louis	71.0
5	Landrum, Billie	52674	L-19 Birddog	42.0

Event USIC No Cal 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Thomas, Mike	615041	0:07:54
2	Slusarczyk, Chuck	2643	0:07:05
3	Diebolt, John	97263	0:06:57
4	Loucka, Larry	1210	0:06:34
5	Nuszer, Joe	29036	0:05:05
6	Rash, Fred	63458	0:05:02
7	Buddenbohm, Stan	189385	0:04:37
8	Henderson, W.	L1336	0:04:16
9	Van Dover, Abram	894	0:02:59
10	Peterson, Richard	151145	0:02:21
11	Boone, Jack	107857	0:02:18
12	Duke, William	51508	0:01:13
13	Warman, Robert	187	0:02:21

Event USIC Round the Pole 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Italiano, Tony	2386	3.81
2	Boone, Jack	107857	4.77
3	McGillivray, Jack	MAAC L 1025	5.19

Event 214 ROG Stick 2000 Nationals Johnson City, TN.

Place	Cntestant Name	AMA NO.	Score
1	Loucka, Larry	1210	0:19:44
2	Sova, Tom	473169	0:18:22
3	Thomas, Mike	615041	0:17:53
4	Tellier, Fred	645957	0:15:09
5	Chilton, Stan	L30	0:13:19
6	Kehr, Joe	549294	0:12:25

Event 207 Pennyplane 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	O'Grady, Dan	614475	0:18:23
2	Tellier, Fred	645957	0:17:55
3	Olshefsky, Peter	614476	0:17:53
4	Hartman, Phillip	8667	0:17:50
5	Thomas, Mike	615041	0:17:38
6	Weckerly, Stuart	13250	0:16:39
7	Kagan, John	469254	0:16:37
8	Coslick, Larry	4652	0:16:33
9	Wisniewski, Gordon	716	0:15:31
10	Warrman, Robert	187	0:15:24

Event 206 Easy B 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Caillliau, Lawrence	79985	0:31:05
2	Coslick, Larry	4652	0:29:17
3	Kagan, John	469254	0:26:42
4	Thomas, Mike	615041	0:26:27
5	Gardner, Steve	6193	0:24:59
6	Chilton, Stan	L-30	0:24:09
7	O'Grady, Dan	614475	0:23:27
8	Joshu, Eugene	260643	0:22:51
9	Sova, Tom	473169	0:22:27
10	Tellier, Fred	645957	0:22:22
11	Ronash, Robert	130061	0:21:39
12	Monet, Thomosz	675398	0:21:39
13	Hardcastle, Richard	847	0:21:20

Event 203 F1D 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Caillliau, Lawrence	79985	0:54:11
2	Doig, Richard	5392	0:54:02
3	Sova, Tom	473169	0:52:27
4	Tellier, Fred	645957	0:51:51
5	Kagan, John	469254	0:50:58
6	Raymond-Jones, D C	63358	0:48:43
7	Olshefsky, Peter	614476	0:45:55
8	Thomas, Mike	615041	0:38:53
9	Vallee, Thomas	1126	0:34:06
10	Ripley, Ed	484619	0:33:47
11	Barker, John	2095	0:33:09
12	Whittles, John	4400	0:29:15
13	Kehr, Joe	549294	0:27:30
14	Clem, Jim	L55	0:14:38

Event USIC F1L Int'l EZ-B 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Joshu, Eugene	260643	0:20:57
2	Kagan, John	469254	0:20:52
3	Vallee, Thomas	1126	0:19:08
4	Loucka, Larry	1210	0:18:48
5	Tellier, Fred	MAAC 69125	0:17:45
6	Grant, Jim	159477	0:17:31
7	Raymond-Jones, D C	63358	0:17:28
8	Whittles, John	4400	0:17:25
9	Sova, Tom	473169	0:17:04
10	Kehr, Joe	549294	0:16:41

Event USIC Ministick Mass Launch 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Van Gorder, Walter	19912		

Event 505 Peanut Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Thomas, Mike	615041	1911 Voison	261.00
2	Buxton, Jim	75154	Courtaulds	245.00
3	MacEntee, Richard	102085	Waco SRE	202.50
4	Martin, John	712	Gotha Ursus	190.10
5	Lee, Jim	680246	Lacey M-10	180.00
6	Romash, Robert	130061	Infinity	147.25

Event USIC FAC Peanut 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Buxton, Jim	75154	Miss Ashley II	154.5
2	MacEntee	102085	Waco SRE	145.5
3	Martin, Doc.	712	Gotha Float	141.0
4	Lee, Jim	54365	Lacet M10	140.5
5	Miller, Richard	179518	Volksplane	134.8
6	Oleson, Doug	480646	Ganagobie	65.0
7	Anderson, Kenneth	587497	ME-109	60.0
	inelgible for additional placing			
	Martin, Doc.	712	Macchi M-7	138.5
	MacEntee	102085	Piper J-3	131.0

Event 507 AMA Rubber Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Thomas, Mike	615041	Miles Sparrow	191.00
2	Blair, John	29698	ALCO Sport	191.00
3	Martin, John	712	Bleriot 25	173.00

Event USIC Coconut Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Miller, Richard	179518	Zlinn	3
2	MacEntee, Richard	102085	Farman 400	6
3	Smith, Jennifer	615261	Ford Stout 2 AT Transport	*7
4	Weckerly, Stu	13250	Found	*7
5	Anderson, Kenneth	587497	Air Sedan	*9
6	Lavender, Tim	269765	Buhl	*9
7				
	* Place determined by Static Position			

Event USIC Dime Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	McGillivray, Jack	L1025	ARADO	384
2	Blair, John	29698	Cessna Airmaster	374
3	Thomas, Mike	615041	Miles M-5	320
4	Martin, Doc	712	Caudron	240
5	Henderson, W.	L1336	Super Marine Sparrow	105

Event 211 Autogiro 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Thomas, Mike	615041	0:15:58
2	Diebolt, H J	5286	0:08:16
3	Rash, Fred	63458	0:08:05

Event 215 Bostonian 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Coslick, Larry	4562	904
2	Thomas, Mike	615041	884
3	Miller, Richard	179518	781
4	Gardner, Steve	6193	668
5	Schutzel, Emil	508384	646
6	Kagan, John	469254	576
7	Marett, John	616261	533
8	Barker, John	2095	529
9	Buddenbohm, Stan	189385	491
10	Kent, Michael	MAC9874	409
11	Peterson, Richard	151145	197

Event USIC FAC Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	McGillivray, Jack	L1025	SE 5	159.5
2	Miller, RIchard	179518	Curriewot	151.0
3	MacEntee, Richard	102085	Waco SRE	148.0
4	Lee, Jim	29698	Lacey M-10	110.0
5	Martin, Doc	712	Waco SRE	137.0
6	Linstrum, Dave	485	Stout 2AT	129.0
7	Blair, J.	29698	Curtis P6E	110.0

Event USIC Golden Age Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Thomas, Mike	615041	Piper Cub	0:09:10
2	McGillivray, Jack	L1025	DEH 94	0:07:23
3	MacEntee, R.	102085	Stout 2AT	0:07:03
4	Lee, Jim	54365	Taylorcraft	0:06:49
5	Henderson, W.	L1336	Foulke Wolf A17A	0:06:33

Event USIC High Wing Monoplane 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Weckerly, Stu	13250	Stout 2-AT	415.5
2	MacEntee, Richard	102085	Lacey M-10	415.0
3	Lee, Jim	54365	Lacey M-10	390.0
4	Anderson, Kenneth	587497	Ord-Hume	338.5

Event 210 Ornithopter 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Ripley, Ed	484619	0:13:28
2	Coslick, Larry	4562	0:12:14
3	Thomas, Mike	615041	0:10:18

Event USIC 35 CM 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Sova, Tom	473169	2547
2	Loucka, Larry	1210	2527
3	Henderson, W.	L1316	2059
4	Vallee, Tom	1126	2051
5	Tellier, Fred	645957	1957
6	Romash, Robert	130061	1844
7	Raymond Jones, DC	63358	1812
8	Olshefsky, Peter	614476	1617
9	Whittles, John	4400	1422

Event 209 Helicopter 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score
1	Vallee, Thomas	1126	0:08:51
2	Thomas, Mike	615041	0:08:22
3	Loucka, Larry	1210	0:07:44
4	Buddenbohm, Stan	189385	0:06:04
5	Ripley, Ed	484619	0:05:38
6	Romash, Robert	130061	0:03:48

Event 201 HL Stick 2000 Nationals Johnson City, TN.

Place	Contstant Name	AMA NO.	Score
1	Coslick, Larry	4562	0:44:56
2	Chilton, Stan	L30	0:42:38
3	Teiller, Fred	645957	0:39:41
4	Thomas, Mike	615041	0:35:54
5	Hardcastle, Richard	847	0:34:35
6	Leonard, Nick	497460	0:29:28
7	Joshu, Eugene		0:29:04

Event 213 Kit Plan Scale 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Thomas, Mike	615041	Miles M 5	300.00
2	MacEntee, Richard	102085	Daphne	300.00
3	Lee, Jim	680246	Daphne	300.00
4	Blair, John	29698	Rearwind Speedster	300.00
5	Campbell, Glenn	15173	Pitatus P-6	266.00
	Places determined by flyoff			

Event USIC Pioneer 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Schutzel, Emil	508384	Santos 14-Vis	166.0
2	Thomas, Michael	615041	Voisin Hydro	163.5
3	Lavender, Tim	269765	Wright Flier	156.5
4	MacEntee, Richard	102085	Bleriot VII	152.3
5	Grant, Jim	159477	Voisin Hydro	149.5
6	Henderson, William	L1336	Bleriot VII	147.5
7	Martin, Doc	712	Bleriot Canard	65.0
8	Oleson, Doug	480646	Gallaudet Bullet	57.0

Event USIC WWI Mass Launch 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Aircraft Name	Score	
1	McGillivray, Jack	MAAC L1025			

Event 219 Unlim. Cat. Glider 2000 Nationals Johnson City, TN

1	Buddenbohm, S	189385	74.6	84.9	86.4	90.9	86.8	89.3	94.1	90	94.5	94.5	94.1	188.6
2	Marett, John	616261	68.9	74.5	75.7	72.2	73.8	85.9	71.6	88.4	21.3	88.4	85.9	174.3
3	Schlarb,. W. L.	14425	78.2	80.1	77.5	81.7	79.1	76.5	83.2	85.6	83.1	85.6	83.2	168.8
4	Boehm, Bernard	92567	77.2	80.5	80.3	81	81.5	86.5	83.2			86.5	81.5	168
5	Schlarb, Ralph	322352	77	80	27	79.5	77.2	72.3	80.0	82.9	81.7	82.9	81.7	164.6
6	Plassman, J	107613	73.9	69.8	78.5	80.5	71	76.4	83.4	80.1	77.1	83.4	80.5	163.9
7	Romash, Robert	130061	74.8	78.5	78.8							78.8	78.5	157.3
8	Peterson, R	151145	66	73.1	55.2	77.7	79.1	72	76.1	59.6		79.1	77.7	156.8
9	Nishanian, Peter	589485	71.9	74.6	713	70.6	69.9	78.4	58.0	75.5	71.5	78.4	75.5	153.9
10	Buxton, Jim	75154	76.2	76.9	75.7	76.9	73		58.0			76.9	76.9	153.8

Event 202 Unlimited Catapult Glider 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score						
1	Buddenbohm, S	189385	188.6						
2	Marett, John	616261	174.3						
3	Schlarb,. W. L.	14425	168.8						
4	Boehm, Bernard	92567	168.0						
5	Schlarb, Ralph	322352	164.6						
6	Plassman, J	107613	163.9						
7	Romash, Robert	130061	157.3						
8	Peterson, R	151145	156.8						
9	Nishanian, Peter	589485	153.9						
10	Buxton, Jim	75154	153.8						

Event 218 Std. Cat. Glider 2000 Nationals

1	**Schlarb , Ralph**	322352	79.1	77.3	80.1	81.1	82.9	82.7				82.9	82.7	165.6
2	**Buddenbohm,S**	189385	68	75.3	76.3	14.3	80.4	82.1	81.6	80.7	32	82.1	81.6	163.7
3	**Schlarb, W. L.**	14425	77.2	80.5	78.6	78.5	80.9	77.6				80.9	80.5	161.4
4	**Person, Lee**	383504	68.1	61.6	55.4	54.5	71.5	59.2	80	67.1	79.6	80	79.6	159.6
5	**Romash, Robert**	130061	76.8	76.6	78.1	78.5						78.5	78.1	156.6
6	**Plassman,J**	107613	72.1	63.3	79	55.6	66	68.9	74.6	68.3	75.7	79	75.7	154.7
7	**Marett, John**	616261	76	63	77.9	72.1	72.3	73.2	75.2	74.1	68.1	77.9	76	153.9
8	**Johnson, T.E.**	16707	70	67.5	61.9	64.6	63.4	66.3	67.2	65.2	65	70	67.5	137.5
9	**Nishanian, Pete**	589485	66.5	67.6	68	68.1	48.1	69	68.4	66.4		69	68.4	137.4
10	**Jessup,A**	10269	44.4	64.8	62.5	65.4	65.4	64.8	64.7	65.8	65.4	65.8	65.4	131.2

Event USIC Straight line Speed 2000 Nationals Johnson City, TN.

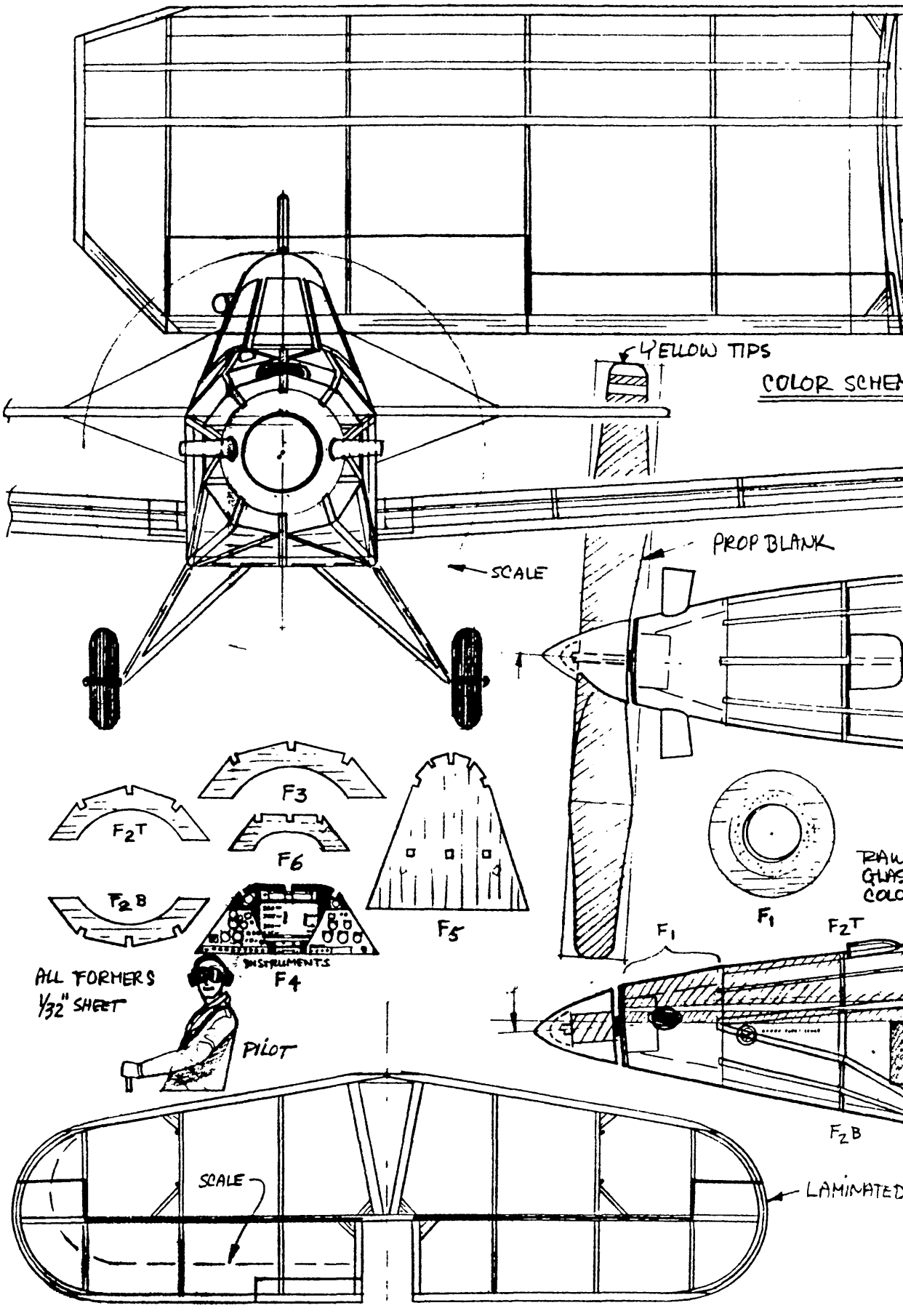
Place	Contestant Name	AMA NO.	Score					
1	McGillivray, Jack	MAC L1025	2.68					
2	Peterson, Richard	151145	3.56					
3	Sova, Tom	47169	4.04					

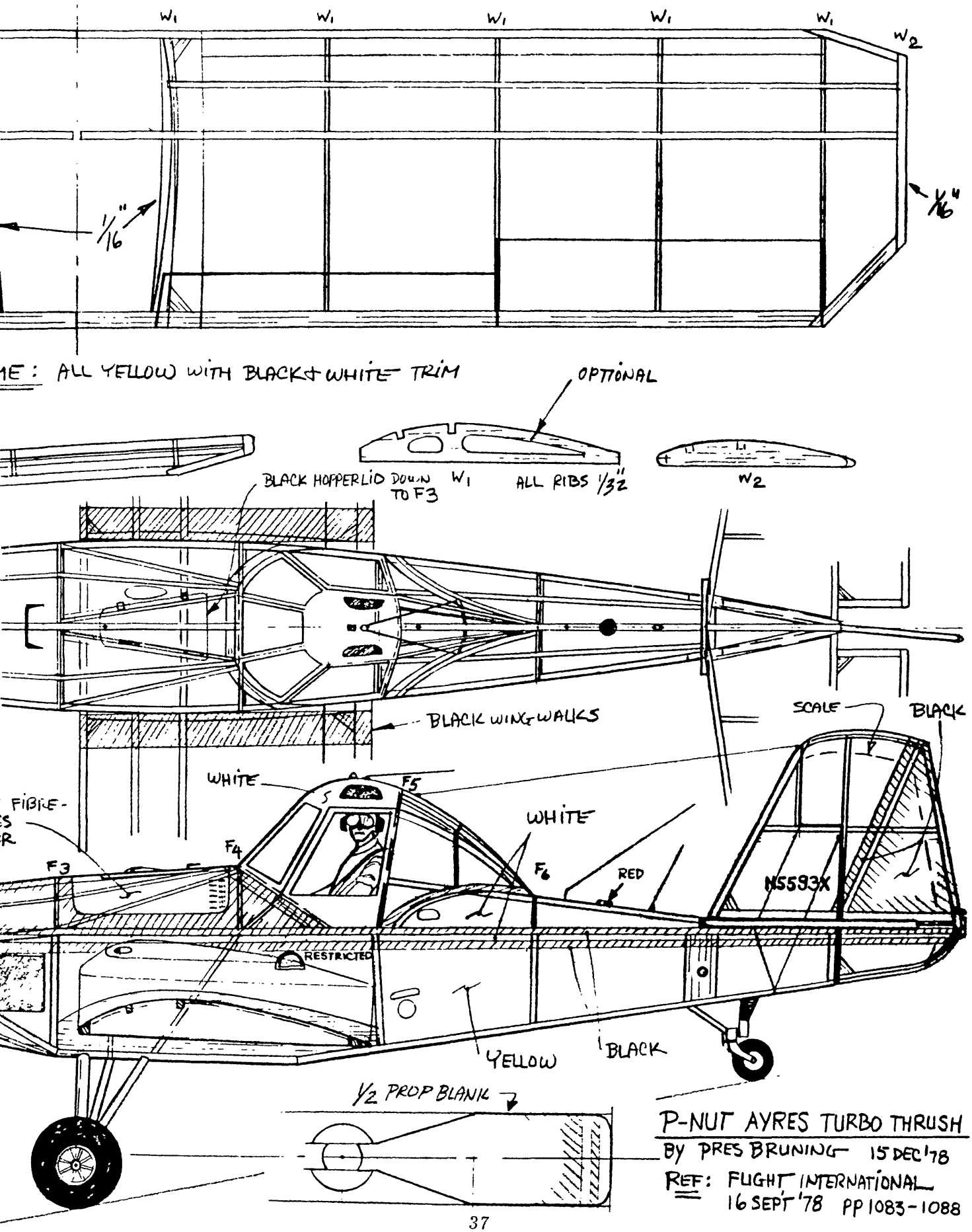
Event USIC Race to the Roof 2000 Nationals Johnson City, TN.

Place	Contestant Name	AMA NO.	Score					
1	Whittle, John	4400	7.6					
2	Romash, Robert	130061	9.7					
3	Lindstrum, Dave	485	25.4					

Handy Engineering Conversions - RC Online

Ratio of an igloo's circumference to its diameter: Eskimo Pi
2000 pounds of Chinese soup: Won ton
1 millionth of a mouthwash: 1 microscope
Time between slipping on a peel and smacking the pavement: 1 bananosecond
Weight an evangelist carries with God: 1 billigram
Time it takes to sail 220 yards at 1 nautical mile per hour: Knot-furlong
365.25 days of drinking low-calorie beer because it's less filling: 1 lite year
16.5 feet in the Twilight Zone: 1 Rod Serling
Half of a large intestine: 1 semicolon
1000 aches: 1 kilohurtz
Basic unit of laryngitis: 1 hoarsepower
Shortest distance between two jokes: A straight line.
453.6 graham crackers: 1 pound cake
1 million microphones: 1 megaphone
1 million bicycles: 2 megacycles
2000 mockingbirds: two kilomockingbirds
10 cards: 1 decacards
1 kilogram of falling figs: 1 Fig Newton
1000 cubic centimeters of wet socks: 1 literhosen
1 millionth of a fish: 1 microfiche
1 trillion pins: 1 terrapin
10 rations: 1 decoration
100 rations: 1 C-ration
2 monograms: 1 diagram
8 nickels: 2 paradigms
3 statute miles of intravenous surgical tubing at Yale University Hospital:
1 I.V. League
100 Senators: Not 1 decision

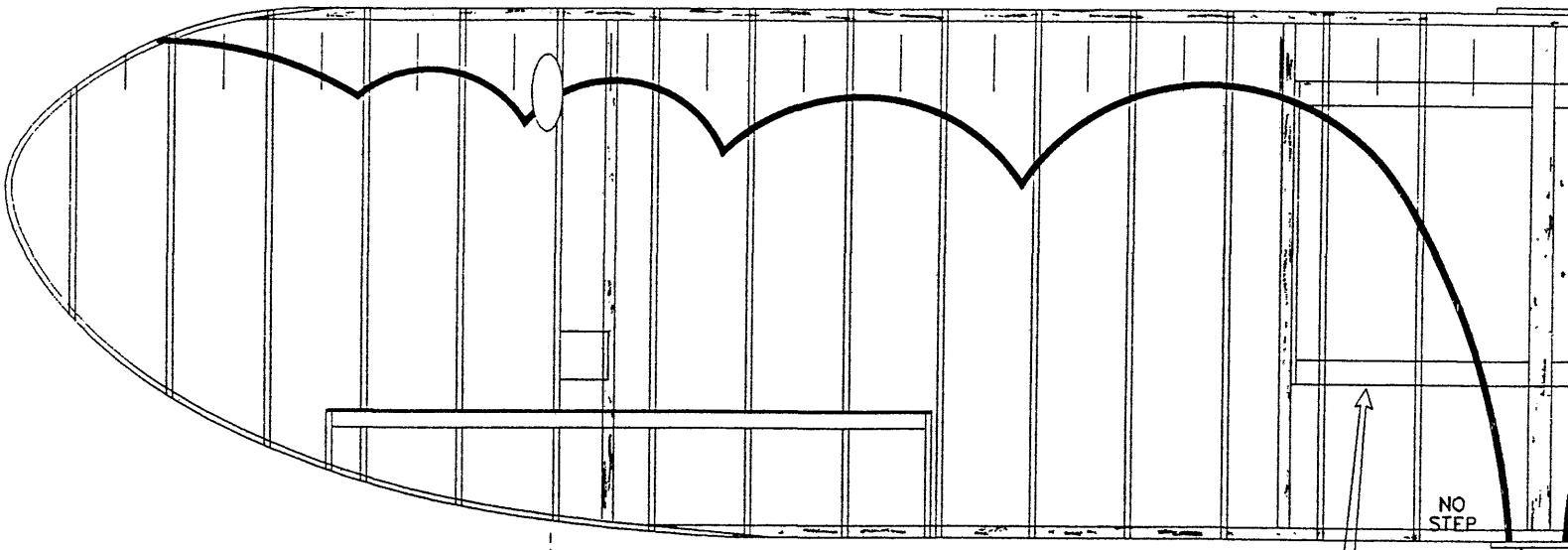

YELLOW TIPS
COLOR SCHE
SCALE
PROP BLANK
F3
F2T
F6
F2B
F5
INSTRUMENTS
F4
ALL FORMERS
1/32" SHEET
PILOT
F1
F2T
F2B
SCALE
LAMINATED

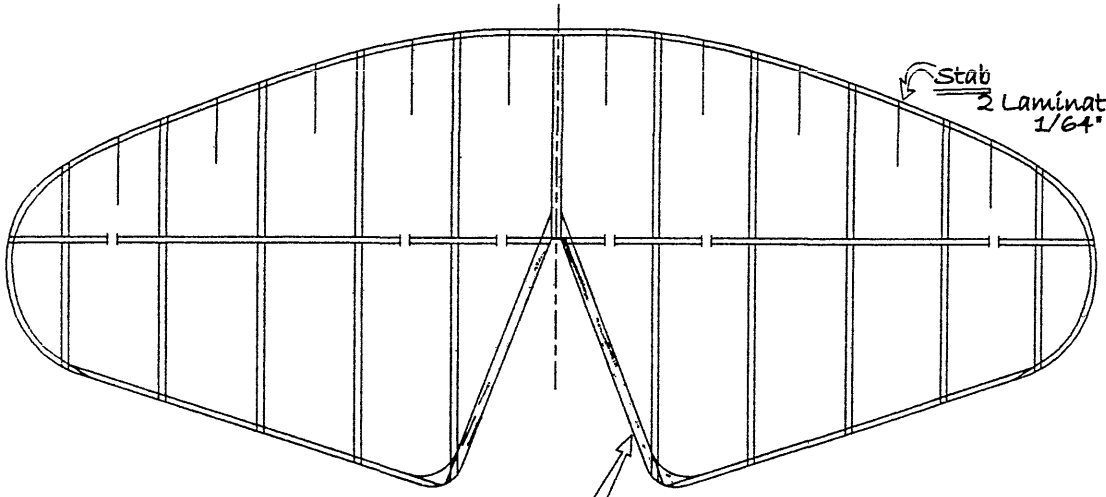


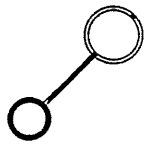
P-NUT AYRES TURBO THRUSH

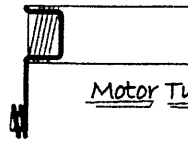
BY PRES BRUNING 15 DEC '78

REF: FLIGHT INTERNATIONAL 16 SEPT '78 PP 1083-1088

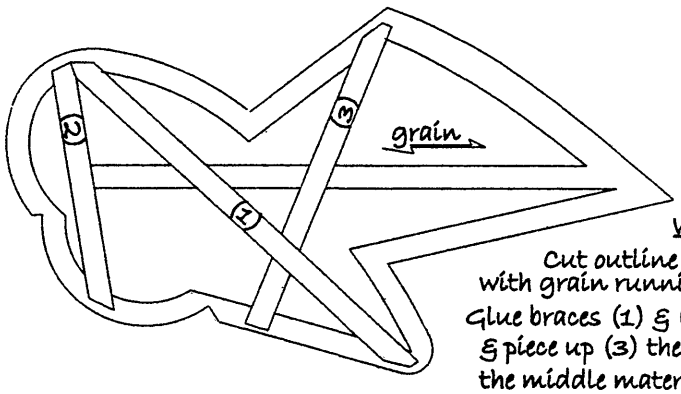




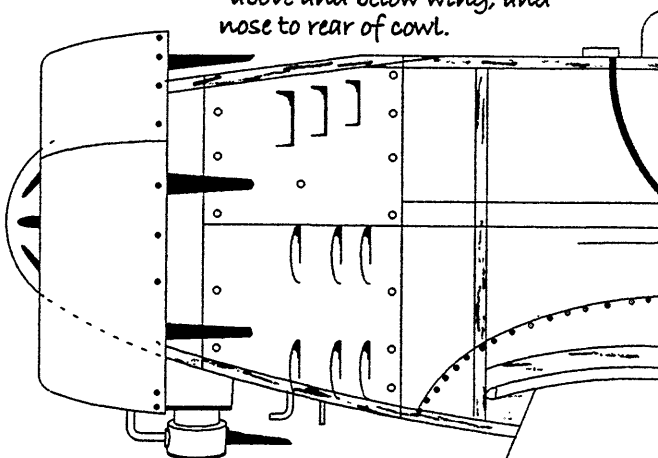




All fuselage framing 1/16" sq. and
sheet balsa; sheet cockpit area,
above and below wing, and
nose to rear of cowl.

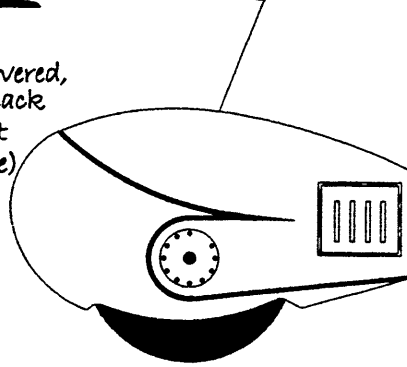


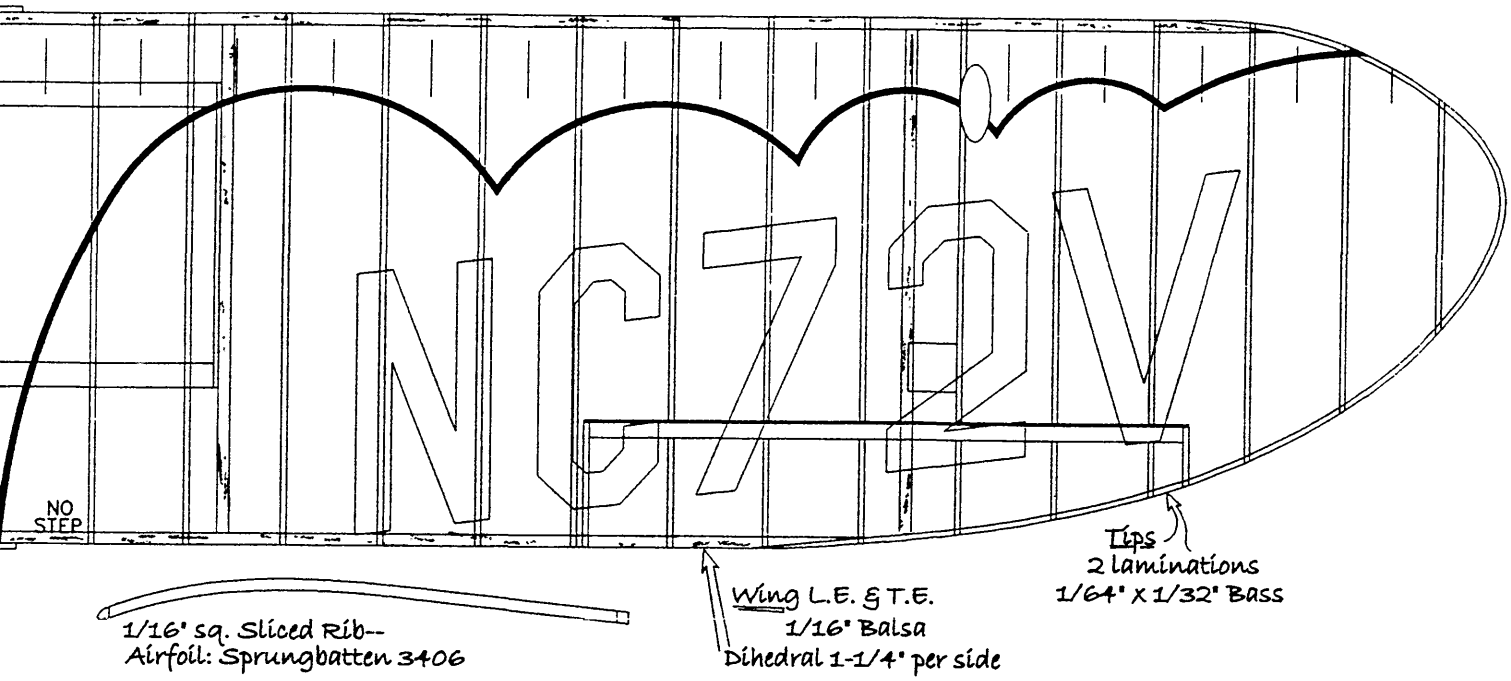
Wheel Pants:
Cut outline from .020" bass
with grain running as shown.
Glue braces (1) & (2) down
& piece up (3) then cut away
the middle material.



My Plane is green on yellow Esaki
per Professor Fate's comments in Sept/Oct 99 FAC News;
lettering, cheat line, and registration numbers black.
Wire and brace points are shown on the drawing;
the plane flies well without them. However, as this
model is meant to raise smiles more than to battle
Mr. Smoothie, it might be fun to include them.
A small twig of a panic brace, running from
the fuse to the right wing T.E., was necessary
to control flopping about.

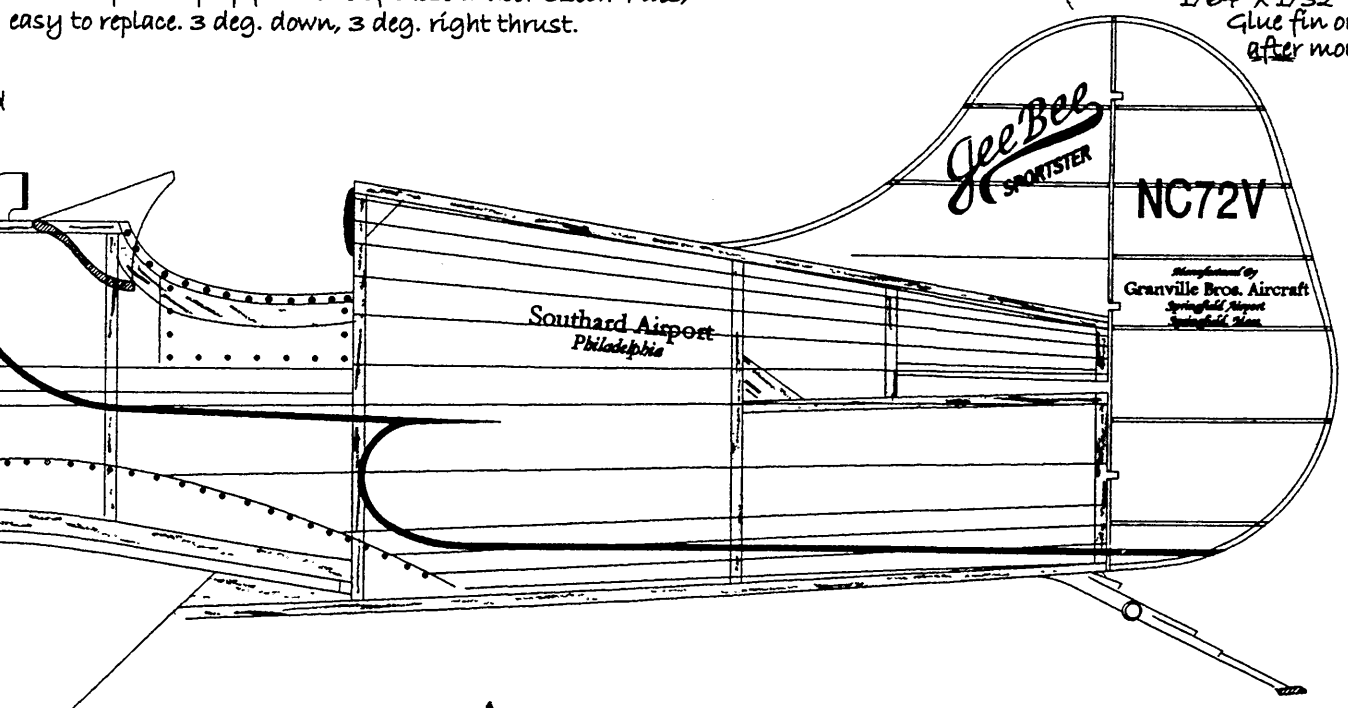
Cowl and mechanical details
1/64" bass, horiz. grain, tissue covered,
glued to nose plate with a strip of black
condenser paper (my NoCal equivalent
of FAC-requisite dummy radial engine)





ube--.020" balsa around .25" dia. mandrel
.020" M.W. ends silked and bound in the
usual fashion--glue to nose plate and rear gusset
at the odd angle shown.
I used a plastic prop from one of those indoor Czech 'Flies;
easy to replace. 3 deg. down, 3 deg. right thrust.

Fin-- 2 Laminations
1/64" x 1/32" Bass
Glue fin on and cover
after mounting stab



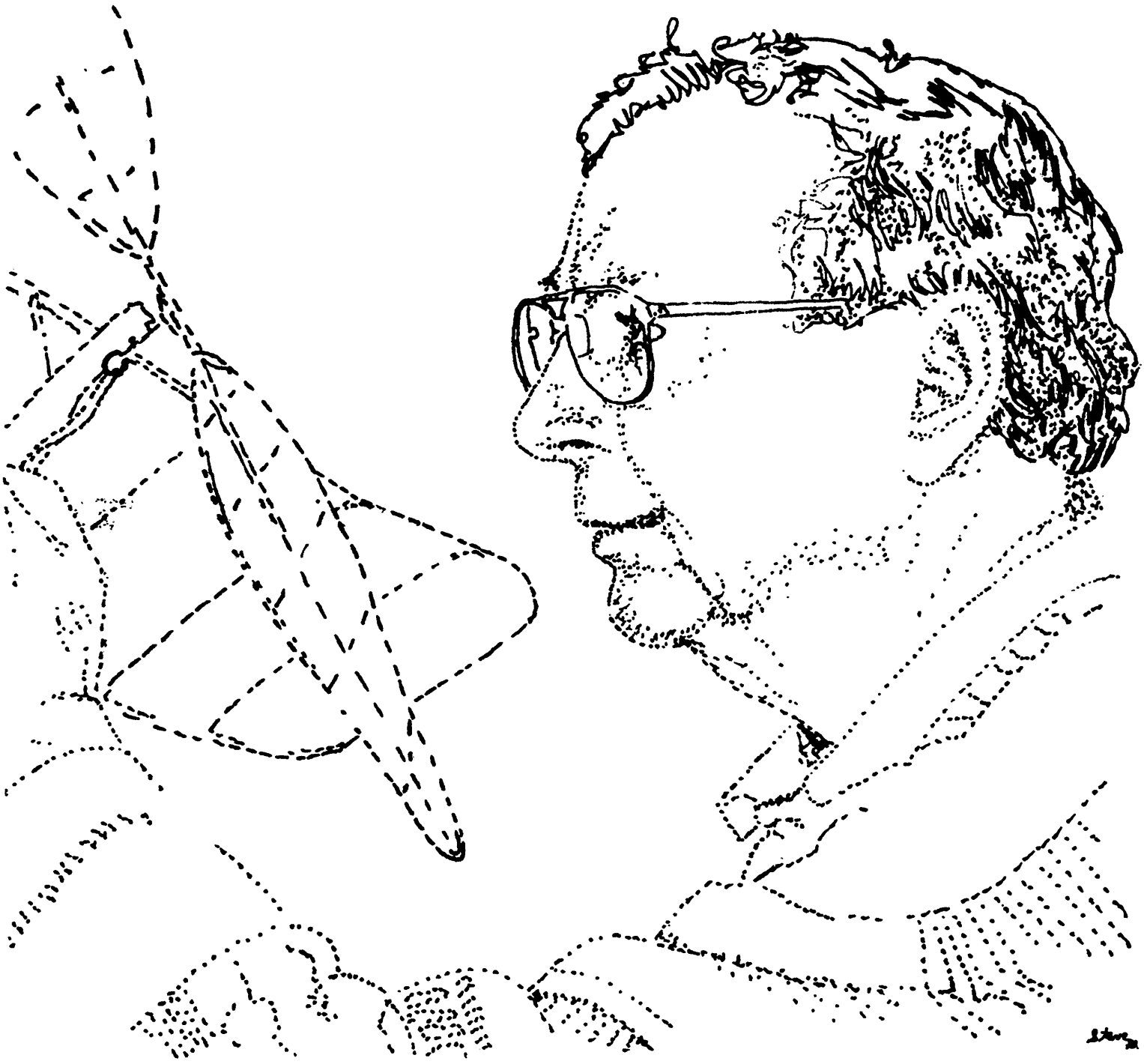
NoCal Jee Bee Mod. E

Des. & Dr. Michael J. Heinrich
After Bob Hirsch & Rocky Russo
Thanx to Flying Aces

12/99MJH

Indoor News and Views
Issue # 101 April 2001

Dick Hardcastle
1930-2001



Indoor News and Views (INAV) is Moving!

This is the last issue of INAV to come out of St. Louis. After asking for someone to take the letter over for a couple of years we finally got a taker! The new editor is Carl Bakay from Louisiana. I hope you all support Carl in his efforts to keep INAV healthy and happy. I will continue to serve as an associate editor to help with the many chores involved in getting INAV together each issue. The rest of the St. Louis gang, Larry Coslick, Gene Joshu, Roy White, and Howard Henderson will get tagged by me to supply submissions ever so often. We have learned a great deal and had a lot of fun with the many friends we meet through INAV. Thank you all.

Steve Gardner

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St. Louis, MO 63119
Aerobat77@msn.com

From the membership desk:
Tim Goldstein (see the front inside cover for contact info)

I would like to thank all of you that have renewed your membership this year. It is what keeps INAV going. I would like to point out some changes from the past. We are no longer marking issues with a red X or putting in a note to tell you that your subscription will expire. We are clearly printing your expiration date on the mailing label and need your help in checking the date and noting when you are ready for renewal.

In the past we have mailed you INAV for about a year after your subscription expired hoping that you would notice and get yourself current. I think that this has only been semi-effective. Some of you have taken note and re-subscribe, others have not notice until issues stop showing up. This causes two problems. First it is a big expense to mail to expired subscribers. Second, there is confusion in that the person now needs to pay for 2 years to continue receiving the newsletter. This happens because they need to catch up the year that we sent beyond what was paid for and an additional year to cover the current subscription. I would like to eliminate the practice of mailing to expired subscribers. In the near term we will be shortening the period past the expiration that issues still get mailed so please check the date on your label so your don't get dropped.

While I hate to be the bearer of bad news, the position I am filling for INAV means I need to mention the following. We need to start thinking about an increase in the cost of an INAV subscription. The current $9.00/$12.00/$15.00 rates were put in effect in January of 1993. Many costs have gone up since then and INAV has held subscriptions. Carl and I plan to guide INAV back to being published on a regular. The current rates will barely cover 3 issues a year and does not provide enough to publish the 4 issues we would like to produce. Feel forewarned and take this opportunity to lock your subscription in at these 1993 rates.

On another front, I would like to propose that we as the indoor community we take another step to reach out to the kids being exposed to indoor flying through Science Olympiad. I would like to propose that we consider buying INAV subscriptions for the science teachers that are involved in Science Olympiad. This could have 2 effects that are both positive. One is that a kid does not have a local flying mentor may be exposed to this great sport and learn there is much more to it then just a school competition. The second is that it will help increase our subscriber base which defrays the fixed costs of publishing INAV. To help encourage this idea I am willing to put up my own money for 10 matching subscriptions. To take advantage of this contact me by e-mail and tell me you are interested and how many subscriptions you will pay for. I will match them on a 2 for 1 basis. You step up for 2 subscriptions and I will pay for a third. I will confirm by return e-mail if I still have funds available for the match. If you get an OK then send me your check along with the name and address for all of them and I will get them signed up. Sorry if you don't have e-mail, but maybe you can ask someone who does to do the communication for you.

I look forward to working with Carl, Steve (who has agreed to stay on as an associate editor), and a long cast of volunteers in keeping INAV as the premier indoor newsletter and getting it out on a regular timely basis.

Tim

Richard Hardcastle
1930-2001

On April 4 Dick Hardcastle passed away after a battle with cancer that lasted more than a year. Just a few weeks before he had been one of the volunteers at a regional Science Olympiad contest here in St. Louis. At that time he told the other volunteers there of the prognosis given to him by his doctors. He was very active and appeared to be more robust that the medical news would have indicated. Dick had re-entered indoor flying at about the same time I had started indoor flying. I remembered him from the old American Aircraft Modeler issues reporting the NATS where his name appeared in list of winners. We hit it off very well, he was a very likeable man and we had a common interest in visual arts and photography. Dick flew with us off and on with gaps in his attendance during his vacation trips to Florida. I considered him a good friend, but I always looked forward to getting to know him even better during each flying season as I had done for the past several seasons. When I learned of his illness I knew it was a serious matter, but I did not understand the pressure of time. Now that he is gone I realize that he meant a very great deal to me and I had failed to let him know. I missed my chance to tell him about the pleasure his company gave to me and what he taught me about indoor flying and many other things. I wish I had let him know how happy I was to have known him.

Dick was a major presents in the indoor scene in the 70s and 80s flying microfilm events as well as others. He was an innovated designer and a good builder who used meticulous record keeping to extract top performance from his models. During his return to indoor he was much less competition oriented. He flew with the St.Louis group for the fun and the company. His trips to Florida resulted in his building a few scale models to fly with the Miami group. He was new to scale modeling but he really enjoyed his models and the flying he got to do down in Florida. Dick made the USIC/NATS last year and flew a few events with success and a good deal of fun.

Indoor will miss Dick Hardcastle. We that knew him will miss him most and are most aware of our loss, but there are many indoor people who will never have the benefit of his friendship or his help. This is a very sad thing indeed.

Steve Gardner
4-18-01

Stronger Indoor Scale Models

Look at the average high performance indoor duration model. See all the special materials like carbon fiber, Kevlar, boron, and metal bracing wires? These materials are used to get the very greatest weight reductions while insuring the model is strong enough for its intended use. There is little extra strength built into these models for crashes or careless handling because the people who fly them are very careful and the models rarely "crash" at the speed they fly. Our scale models are a very different kettle of fish. Part of the life of a scale model is running into all sorts of hard, uncaring obstacles at what are for indoor flying very high speeds. If anybody needs the extra strength of these special materials it is the scale flyer.

Unless you fly in one of the few really large indoor sites your models will have to endure a number of very sudden stops involving the wall of the site. This sort of impact is one that we can apply certain engineering tricks to deal with. The simple idea is to look at what members of the model most often break in these impacts and how they break. Once you have a "culprit" you can go after him with common sense and perhaps some of these new materials.

1. Nose first into the wall.

This situation is pretty simple to understand but harder to combat. There are of course the compression stresses on the fuse longerons. The thing to remember here is that the stresses on any one section of longeron are proportional to the amount of mass behind that section. The longeron sections in front of the wings are stressed a good deal more than the ones even with or behind the wings. Also, any sections that run at large angles to the center of the model, like nose sections that taper inward or upward steeply, will need to be a good deal stronger since the section's compressive strength is not ideally oriented.

In the case of pure compression the best solution is often more balsa. The special materials can help here, but simply going to larger sections of harder balsa is usually the best method. Spacing the uprights closer together so that the longerons are supported against buckling is also a good idea.

There are a few other specific places that suffer in nose first impacts. The prop is of course the most abused part of the model in any case, but nose first impacts are especially rough on them. Props made from stacked balsa planks or those made from molded sheet blades are very tender. Covering these props with tissue and several coats of dope can help a good bit. Epoxy and ¾ ounce fiberglass will add more strength to those props that need to be heavier for those short nosed models. I have some ¾ ounce carbon mat that I apply with thin CA glue that adds less weight than you might think. Bass wood props carved the traditional way are a lot of work, but they are very tough and can be made nice and thin, which helps the prop efficiency a bit. Prop blades made from thin plastic cups or regular plastic props scrapped down to lighten them are extremely crash resistant with the added benefit of absorbing a certain amount of the impact in springing the blades out of shape momentarily. I have a Stinson Flying Station wagon with drinking cup prop blades that obviously soak up a good deal of the shock of wall

impacts. By using cups with a steep taper these props look and work better than those made from bottles. It is a very good idea to use thin CA to glue the nose bearing tubes into the nose block so that these impacts don't loosen the tube. Use brass unless you don't need the nose weight, and score the outer surface for best glue adhesion.

If the wings are glued to the fuse sides instead of being made in one piece they tend to swing forward when the model hits the wall. This causes either the wing to break off at the trailing edge or the cross member at the leading edge of the wing to buckle. In both cases the longerons are usually damaged as well, but are not the culprit. To prevent the buckling of the cross member at the leading edge of the wing use harder balsa. At the trailing edge we can use some very thin Kevlar thread to reinforce the joint and so tie the trailing edge to the cross member as well as the longeron. Just a few of the super thin fibers can do wonders. I use some Kevlar fishing line I bought at the dollar store long ago. I cut it to about ½ inch long and then tease the line into small bundles of fibers with tweezers. A ¼ inch long bit of fibers that are only about a tenth number of fibers of the original 12 pound line are almost invisible once glued into place.

2. **Wing first wall impacts.**

In these we have a much more complex set of stresses, but again all we really have to do is look at what breaks and how. In the worst ones it may seem like everything breaks loose but there are still culprit areas. One of the worst is the tendency for the whole cabin of a high wing model break apart at the glue joints. The wing hitting the wall with its tip twists the cabin and if the glue joints are not well made then some or all of them pop loose. The Kevlar fibers can be used to tie the major cabin joints together with good results. A glue with good shock resistance is also a good idea. The water-based glues sold to apply windshields are very flexible and will hold well. Attaching the windows to all the members they are in contact with instead of just the outline is a good way to get more cabin strength. This can make any repairs more difficult if you finally do break the cabin area, but the crash resistance is several times more than the regular set-up. On biplanes and other configurations the torsion of wing first impacts tends to twist the fuse so as to fail the longerons at or near the wing trailing edges. A very small gusset or a diagonal member across the longeron/cross member cell between the wing trailing edges will help here. Any diagonal member anywhere in the structure will resist compression in one direction fine, but if the load is in tension a bit of the Kevlar on each end is needed to see that the glue joint holds. Diagonals are pretty good ideas where there is danger of any twisting loads from wing first wall banging.

3. **Other obstacles**

If it is not a wall you are going to hit then the obstacle will probably be hard and small or sharp cornered like a toolbox, steering pole, or machine gun pillbox. Things to break props, leading edges, landing gears, or other bits hanging out on the model. Prop materials were already mentioned, but there are a few things you can do about the other things that can help a good deal. The leading edge of the wing can be made tougher by the addition of a very small strip of bamboo. A strip only .015" thick and maybe .025 wide added to a .080 square leading edge will double the impact resistance as well as

allowing a very sharp edge to be used. Back when bamboo was hard to glue well and usually was bound to the model as well as glued, but with CA glues we have no problems. Get some Chinese food spears from the grocer. They are cheap and have lots of uses. Split them into strips as small as you need them. Remember a very small section will have a good strength. A few more ribs will also help the leading edge resist breaking. Weight the five ribs you were going to use in the wing and then weight eight ribs and see if you were really saving all that much weight. You do not need ribs every half an inch, but a scale model with a starved horse looking wing sporting four ribs and the leading and trailing edges scalloped between them is going too far in the quest for lightness.

To help keep the landing gear on the model the first step is to keep the wheels very light. If the model stops quickly and the wheels are hardwood or plastic they might tear the gear loose when they try to fly forward. Very light balsa wheels that are hollowed or blue foam wheels will not cause this problem. They are plenty strong for even large scale models and very easy to make. Be sure to tie the landing gear wire into the fuse well enough. Size the members that the wire attaches to with rough treatment in mind and use hard balsa. Gluing the wire into place with a shock resistant glue is a good idea as well.

One of my favorite ideas to make scale models tougher is to glue on the fairings, struts, windows, and other details as well as the wire parts with Pliobond glue from Goodyear. This is contact type cement that is very flexible and very strong. A fairing can be added to a wire strut and that strut can flex without the fairing popping off. All sorts of things that you are used to having pop off will now stay put. This glue is very stringy, and hard to get off things you do not want it on, so cut it with acetone until it behaves. You will like this stuff.

4.Getting things lighter

Once you have added a bit of stuff here and there to strengthen your models where they most often break you can think about where you can lighten the remaining structure to make the model lighter. Use the good wood is a good rule. If the model is worth your time you should use good wood on it. Do not use heavier wood for a component when you do not have the weight wood you need. Get out your stockpile and find the right weight for the part. If the model doesn't land on it and you do not have to handle it to wind or launch the model then it needs to be light wood. Save weight in the tail since it hits things last anyway. Any weight saved in the tail will take about three times that much weight off the finished model with no strength penalty at all. The lighter model will actually hit the wall with less force and so actually be stronger than the heavier model. A ten gram peanut hits the wall twice as hard as a seven gram Bostonian and will break much more often. Use the lightest covering you can. A seven gram Bostonian is almost half covering material (about three grams) and so if you can save 30% on the tissue then the model will be 15% lighter.

A Motor-loading Jig for Scale and Cabin Models
by Roy Markham (CAN)
(from SAM 86 Speaks as printed in Indoor News)

The usual method of winding the rubber motor of a scale or other model aircraft with a full fuselage is to leave the motor in the fuselage while winding. To protect the aircraft from a motor which breaks during winding a "blast tube" must be used, which sometimes is too much of a bother to install, and which also necessitates an extension to the winder to allow removal of the tube. If a torque meter is used it is Usually mounted onto the spinning shaft of the winder. All in all, the winding system is a Complex and rather awkward arrangement.

Wouldn't it be nice if you could wind the motor of a cabin model externally of the fuselage, and transfer the fully wound motor to the model in the same manner as you do for stick and No-Cal models? Winding the motor externally has some very distinct advantages:

You can use the same bench-mounted torque meter/stooge arrangement and simple winding equipment as you use for your stick models.

The model is completely protected from a motor which breaks during winding.

You can examine the wound motor easier, rearrange knots, etc., before mounting the motor in the aircraft.

Well, you can wind motors for cabin models externally. All you need is a jig to load the wound motor into the aircraft through the nose section. I started using a simple motor-loading jig for my cabin models a year ago, and several others in the Markham Group have since picked up on the idea and have developed their own innovations. The system is very simple to use, and has saved many aircraft from destruction from a broken motor. Alex Pafiolis calls his the "Thank you, Roy!" jig, because each time he breaks a motor while winding externally, with no damage to the aircraft or to his composure, he says "Thank you, Roy!".

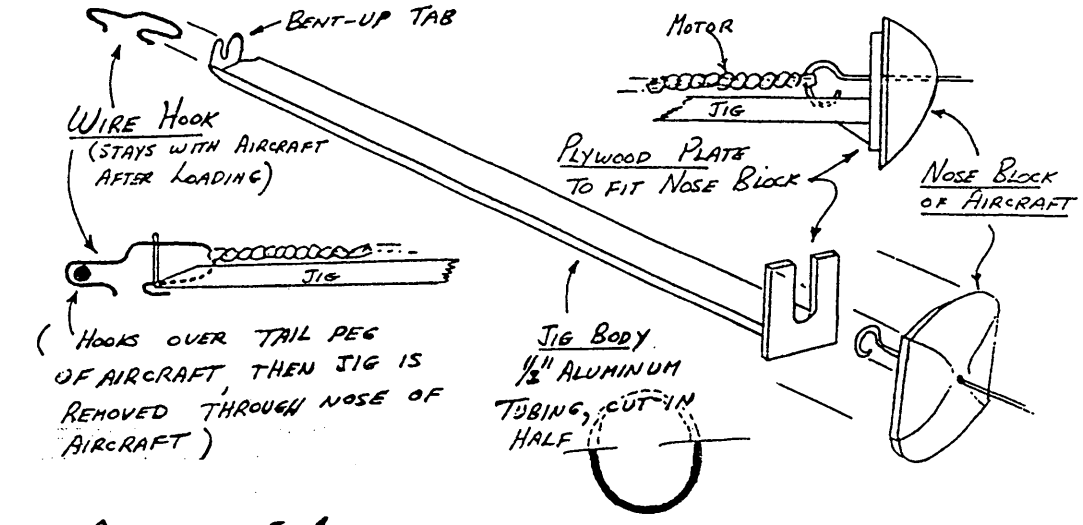
The loading jig is a device which will allow the transfer of a fully-wound motor, with nose-block and prop on one end and a small adapter hook on the other, from the winding equipment to the aircraft. The loading jig is inserted through the nose until the adapter hook can be hooked over the tailpeg of the aircraft (the jig is built long enough so that there is still a half inch or more protruding from the nose). Then the nose block is removed from the jig and held to one side, and the jig withdrawn leaving the adapter hook in the aircraft. Finally, the nose plug is fitted to the aircraft, ready for flight.

The attached sketches show the first jig that I tried, using a half-cylinder of aluminum as a jig body (made from ½" aluminum TV antenna tubing). This rig works well, but the bent-up tab used to hold the wire adapter hook sometimes gets caught while withdrawing the jig from the aircraft. Alternative 1 is a variation developed by Barry Fletcher, using a simple stick for the jig body, which allows for easier withdrawal because there is nothing on the jig to catch on the way out.

Finally, for ultra-light competition aircraft (such as the Manhattan cabin, etc.) alternative 2 shows an arrangement which does not require the extra weight of an adapter hook. The jig holds the tail-peg itself, which Can be hooked into slotted peg holes in the aircraft. The peg is wider than the aircraft, but still short enough to fit diagonally through a rectangular fuselage. To adapt the peg to a bench mounted torque meter/stooge I use a wire hook (inserted into the ends of the tail-peg) which is removed when the wound motor assembly is mounted to, the jig ready for transfer to the aircraft.

So far, the jig idea has worked like a charm for those in the Markham Group who have tried it. There are, no doubt, many other variations and innovations of the loading jig. I would be interested in hearing about your innovations and experiences if you give the system a try.

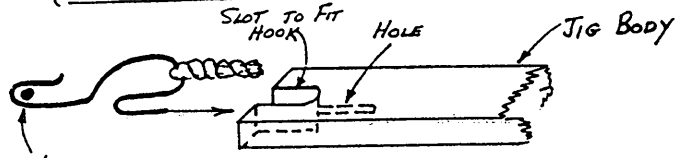
Loading Jig for Wound Motors



Alternative 1

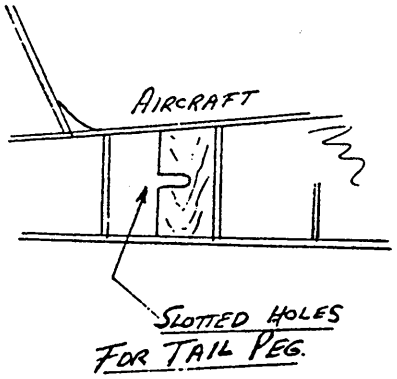
(using a stick for a jig body)

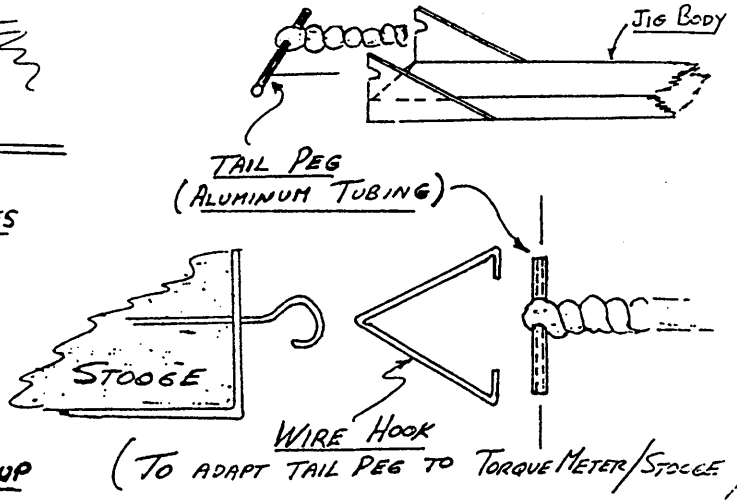
Not to Scale



Alternative 2

(uses the actual tail peg of the aircraft)

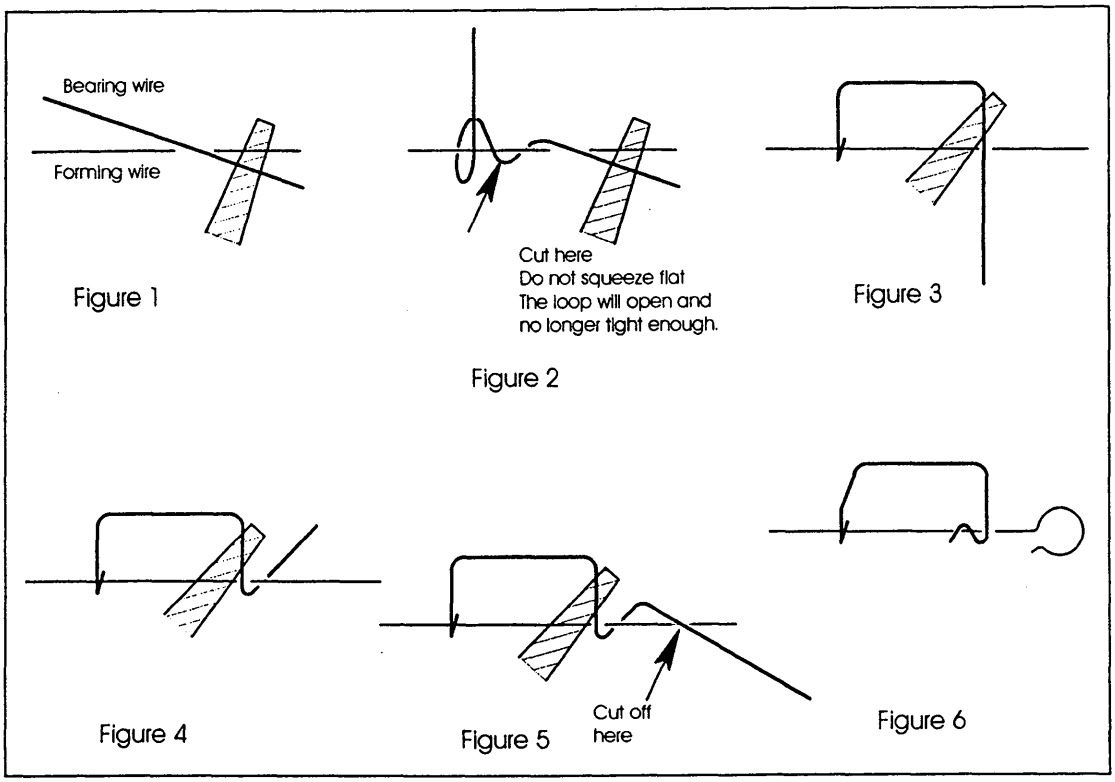




Roy Bourke
Markham Indoor Group

Forming Nose Bearings for Indoor Models
by John Marett (CAN)
(This article is copied from SAM 86 Speaks. This is a Canadian newsletter, edited by Dan O'Grady, 50 Largo Crescent, Nepean, Ontario K2G3C7, Canada)

I get two pieces of .020 wire (assuming a prop shaft of .020 or slightly smaller). One is almost 2" long, it is the 'forming wire'. The other from which the bearing is formed is about 12" to 15" long. The tools I have are a pair of needle nose pliers and a pair of wire cutters. So first I place the forming wire tinder the 12" bearing wire and grab with the needle nose pliers in my right hand, see Figure 1.



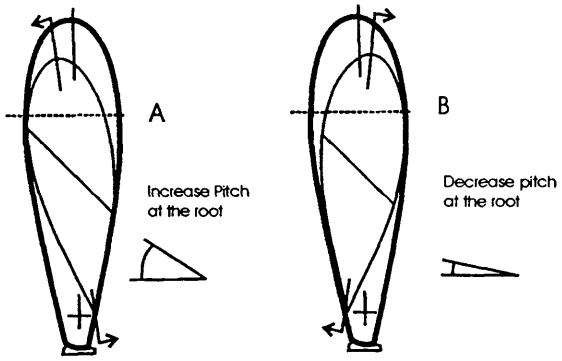
When I start to bend the bearing wire around the forming wire with my left hand, it pig tails at first, but as soon as I can, I wind at least a full turn perpendicular to make the nose loop (Figure 2). Make sure it is a full closed loop - don't squeeze, but make sure the loop is not more than 1 loop. Now you bend the bearing into the shape shown in Figure 3.

Put the forming wire through the loop and under the extended end of the wire and grab the two as shown with the needle nose pliers in the left hand. Now using the right hand twist the long bearing wire up under (Figure 4) and around over the top, finishing up like Figure 5. When you cut off the pig tail end leave only enough to hold the prop shaft wire firm. Too much and you'll have trouble getting the prop hook through.
You can also put the pigtail inside the bearing (Figure 6) to cut down on the prop shaft, but don't try this until you have mastered the outside pigtail first. Now all of this will take practice. You will probably make 8 or 10 before you get one you like. .015 wire is easier to use and are made smaller.

Molding a Mini-Stick Propeller
by Jean-Francis Frugoli (FRA)
from Indoor News March 99

I herewith present you a method for forming a Living Room/Mini-Stick (or Sainte Formule) propeller which I think is a little more precise than the classic cylinder or beer bottle method and also much quicker than the construction of a built-up propeller jig.

The method is nothing more than using a plastic Peck Polymer propeller (diameter 180 mm, 7 inches) as the base mold instead of a cylinder or bottle. Both blades are soaked in water and bound on the propeller with paper bandages. The advantage of this method is that you can use a pitch and camber distribution which has already Proved itself in practice. An additional refinement is the possibility to change the inclination of the blade with respect to the propeller center line and hence fiddle a bit with the twist at the root of the blade (see illustration).



There is a minor inconvenience in that you must let the blades dry at ambient temperatures, say 48 hours, because it is not possible to put the plastic propeller in an oven or micro-wave. Just start your project with the propeller and while this is drying, build the rest of the airplane!

Making Colored Tissue
by Paul Boyanowski
(from SAM 86 Speaks as printed in Indoor News)

Every scale free-flight builder has faced this same dilemma; sometimes the range of color available in tissues simply won't match your scale documentation. To paint the model seems like a burden you really don't want to negotiate. But, even those of us with minimal airbrushing skills, indeed can come up with virtually any color required, and with a minimum amount of effort. First, aside from an airbrush and compressor (the air brush need not be an overly fancy model, just of good quality), we will use a friendly paint. Winsor & Newton Designer's Gouache comes in a tube as a paste form. There are many colors available,. and all are water soluble. The paints mix well, give brilliant colors and clean out of the airbrush nicely with tap water. I also use plain tap water to thin the paint for application. The paints are available at artist supply stores. It may seem pricey, but a tube of gouache goes a long way.

Next, get together enough frames to paint several sheet's of tissue. You may as well make plenty while you have everything out, .and besides, when the inevitable time comes to repair your ship, you'll need Some tissue that matches. Frames can be made from a variety of materials, wood, metal, etc.. They can be purchased as picture or window frames. I like Ralph Kuenz's idea of simply cutting. an opening through an appropriate size piece of: rigid cardboard. At any rate, whatever material you choose make the frames large enough to accommodate a full size sheet of tissue.

After you have attached the tissue to the frame with white glue, water shrink and allow to dry. Now apply several light coats of paint. If water droplets begin to appear you've applied a bit to much. No problem, let your work dry thoroughly and proceed to complete painting. It does not take much paint to bring the color out. Keep in mind the weight factor and shoot for the type of tissue that will display your model's lovely structure after it is applied. By the way, I use a good quality white Japanese tissue available at Joe's Hobby Centers in Dearborn, MI.

Because the paints are water soluble, they will need to be sealed. Use Krylon Crystal Clear 1301 Acrylic spray coating to do this. It is available in spray cans at your local hardware store. If your model requires a dull finish use Krylon No. 1311 Matte Finish spray coating. An even dry coat over your paint will adequately do the job. Now simply remove the tissue from the frames and it is ready to be applied. I use thinned white glue (50/50) to attach the tissue to the airframe. For neatness sake be careful about the amount of glue you use. The tissue can be water shrunk after it is applied. Use a spray bottle and just allow the fall- out from the spray to come into contact with the tissue. Personally I just let nature take its course to do the shrinking process. There is enough humidity in the air here in Michigan to eventually give you a smooth cover job. If you like, another coat of the clear Krylon may be applied after completion of your covering to homogenize the finish although it probably isn't necessary. However, it will cover any dull spots from excess white glue. Just be sure you mask off anything you don't want to spray. Any foam parts should be covered and sealed with tissue as the spray Will attack and destroy foam. As a final note, rather than using dope to apply markings such as registration etc. to the model, apply 3M Spray Mount to the back of the tissue markings for application. 3M Spray Mount Artist's Adhesive is available in spray can form at your artist supply store. I have also seen it at Kinko's Copies.

I have found using the airbrush in this manner to be enjoyable and fun, I hope you do too. Good flying.

WING TIP

by Bill Henderson (CAN)

As published in Indoor News

Four different types of covering material are used on indoor models: Japanese tissue, condenser paper, thin plastic film, and microfilm.

Japanese tissue is made in the same way as regular softwood pulp paper, but uses pulp made from the mulberry tree, which produces a very thin, but strong, paper tissue. It shrinks when moistened with water and it is best to preshrunk it on a frame and lightly spray it with dope to seal the porous surface.

Condenser paper is a tan-coloured, non-porous, thin tissue used in the electronics industry. It also shrinks when moistened with water or when exposed to high humidity, To overcome these problems it is usually placed on newsprint, sprayed with water and then ironed under a J-cloth to give it texture. The texture allows it to shrink further without distorting the structure.

Plastic film, such as Ultrafilm or Polymicro is usually made from thermoplastic polyester (the same plastic that is used for soft drink bottles), although some appears to be made from polycarbonate (the plastic used for Cds).

Microfilm is made from a solution of cellulose nitrates in thinners, modified with plasticisers and other additives. The formulation of microfilm solution is an arcane secret, but when poured onto the smooth surface of a tank of water produces a very thin film with shimmering colours. The thickness of the film is the wavelength of the colour of the film, hence red/green is the thickest and purple/silver is the thinnest. The film must be aged after lifting from the tank, since some of the additives take a long time to evaporate from the film surface, causing long term shrinkage.

Weight is one our major enemies and the table below gives the weight of each covering for a given area and it's nominal thickness.

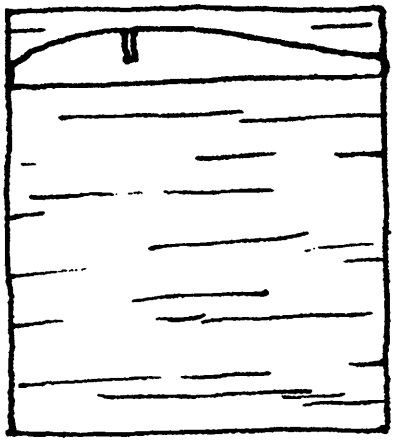
Material	Weight		Thickness	
	(gr/m2)	(gr/100 sq. in)	(um)	(inches)
Jap tissue (preshrunk and doped)	10.79 - 13.21	0.696 - 0.852	20.32	.0008
Condenser paper	4.84 -3.52	0.312 -0.227	7.62	.0003
Ultrafilm (Ray Harlan)	1.98	0.128	1.524	.00006
Polymicro 2 (Dick Obarski)	1.19	0.077	0.889	.000035
Microfilm	0.67	0.043	Varies according to colour	

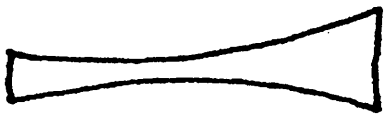
The next question is "How do you attach it to the model structure?" and this will be dealt with when we discuss adhesives.

STARTING WITH .065" BALSA SHEET, SAND THE CENTER AREA TO .015" AND THE LEFT EDGE TO .020". USE A 1/32" PLY RIB TEMPLATE HELD IN PLACE WITH A BIT OF REPOSITIONABLE GLUE STICK DURING TRIMMING.

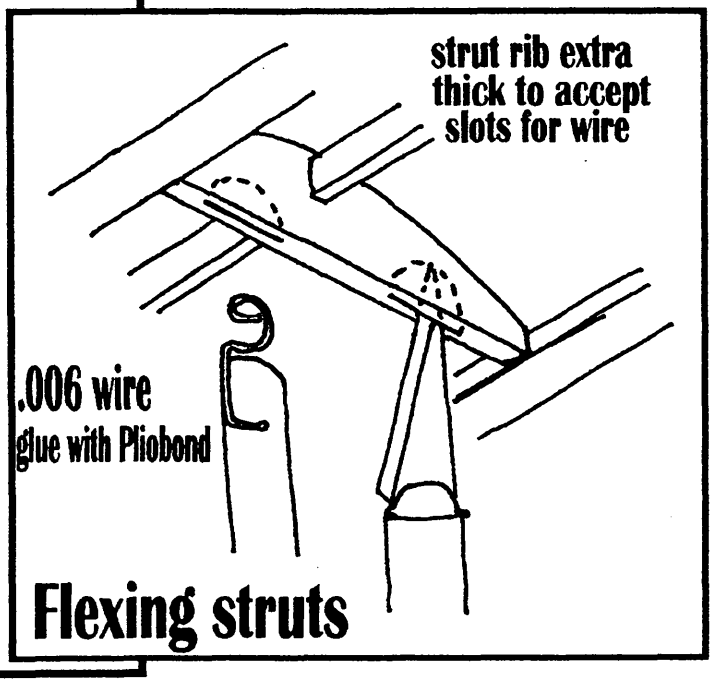
THE RESULTANT RIBS ARE ALL THIN WHERE THE RIB IS DEEP AND THICKER WHERE THE RIB IS WEAKEST.

THE EXTRA THICKNESS PREVENTS THE TRAILING EDGE FROM BUCKLING

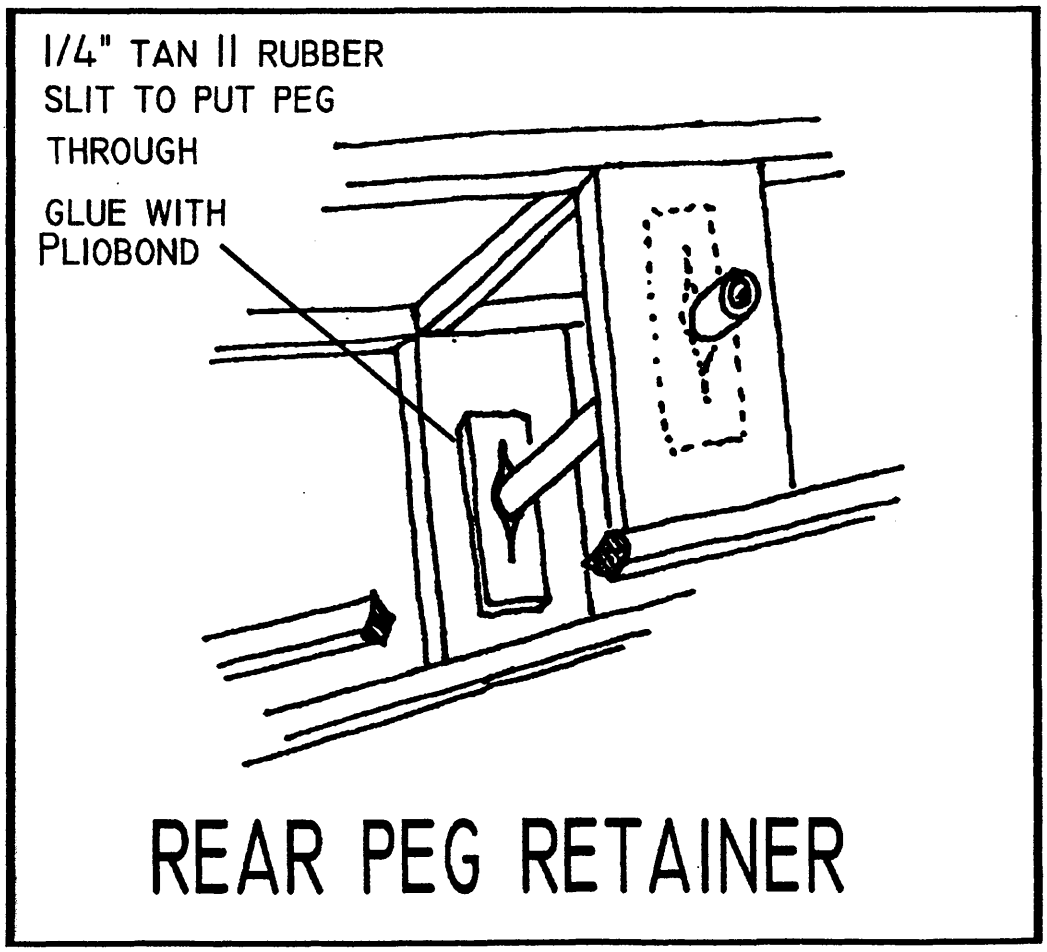


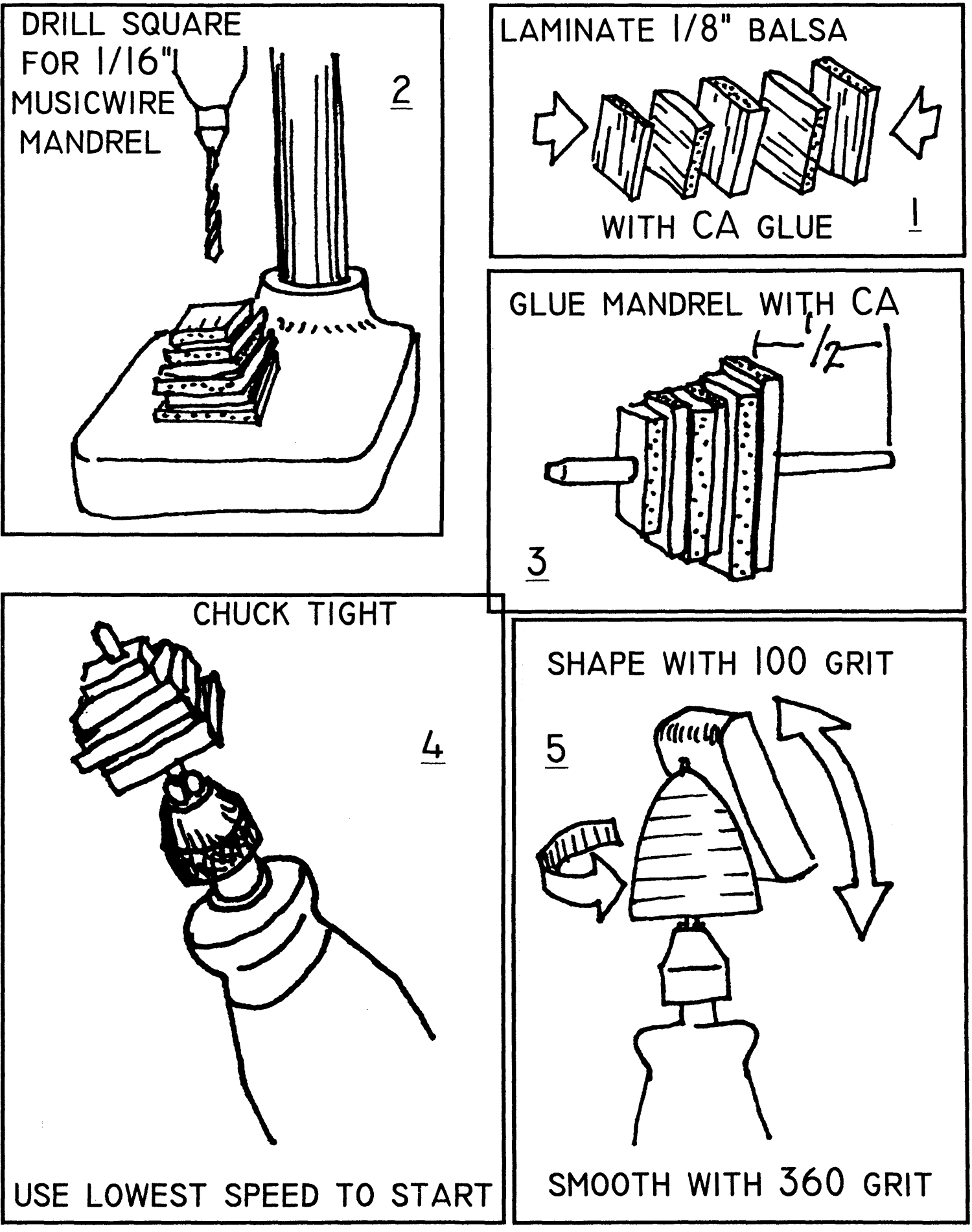


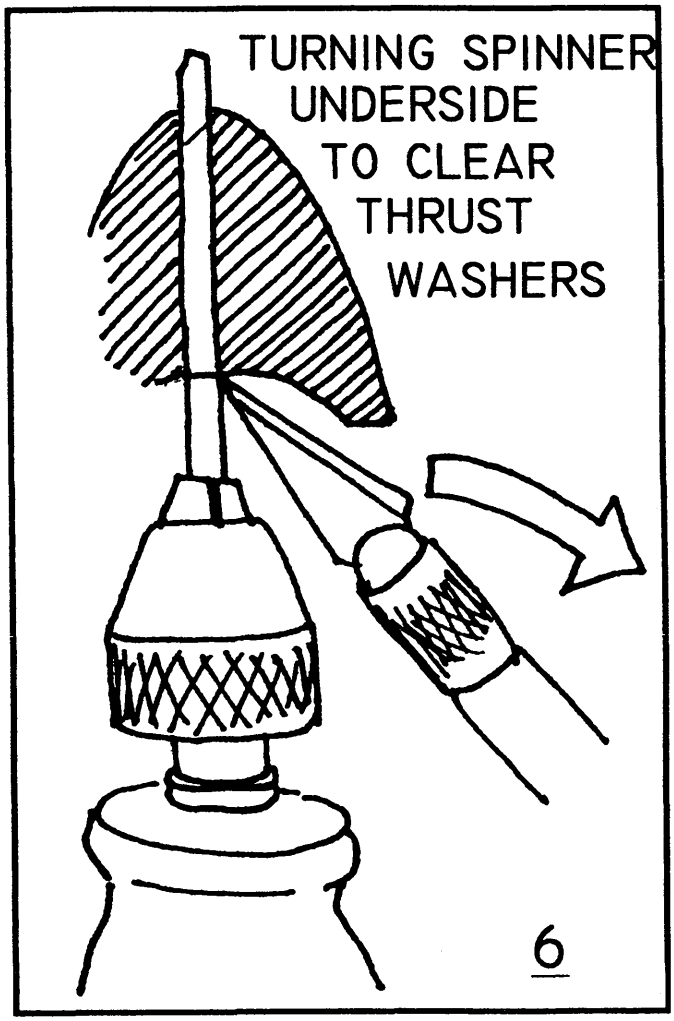
EXAGGERATED CROSSECTION

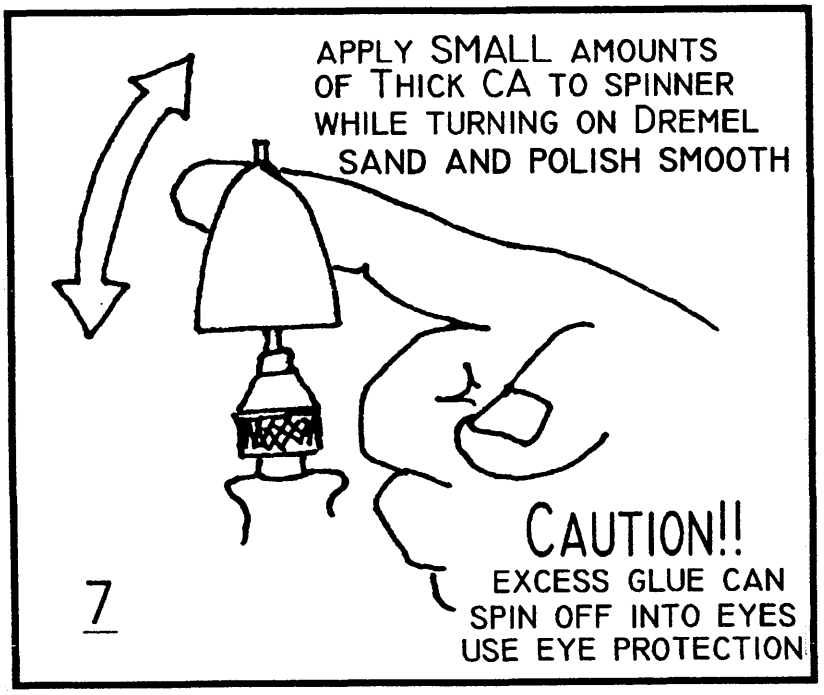


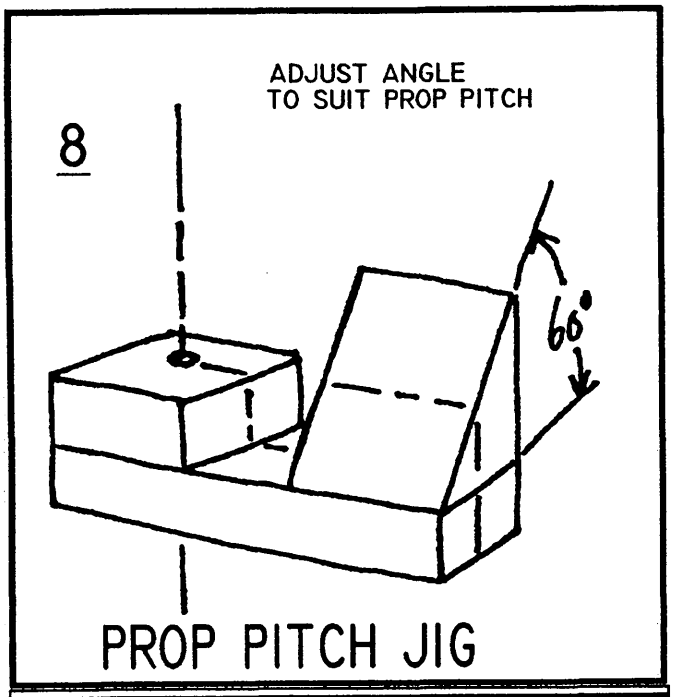
Ideas!

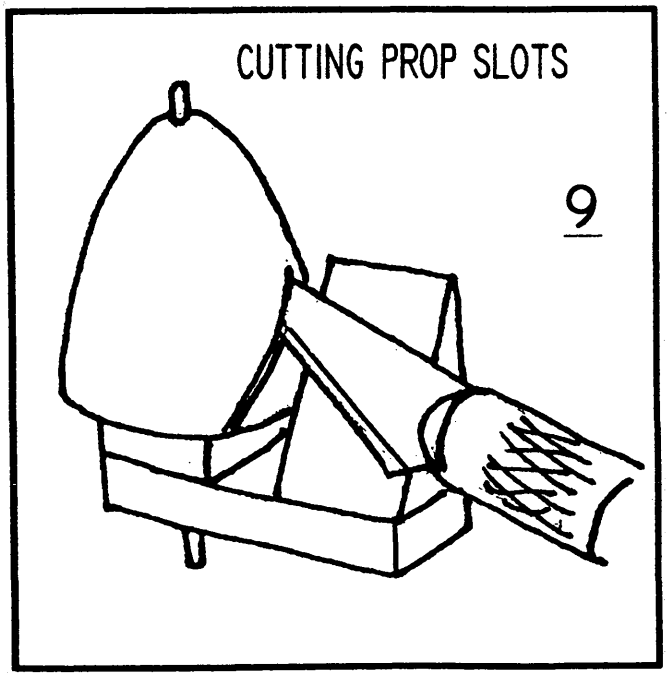


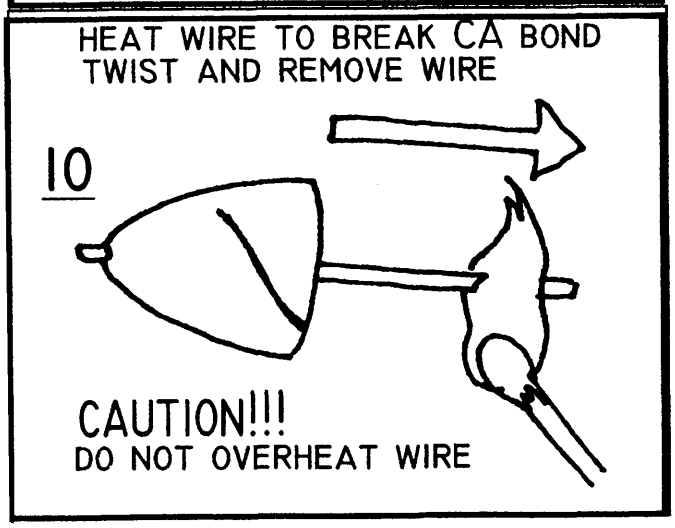

LAMINATE 1/8" BALSA
WITH CA GLUE
1
DRILL SQUARE
FOR 1/16"
MUSICWIRE
MANDREL
2
GLUE MANDREL WITH CA
1/2
3
CHUCK TIGHT
4
USE LOWEST SPEED TO START
SHAPE WITH 100 GRIT
5
SMOOTH WITH 360 GRIT

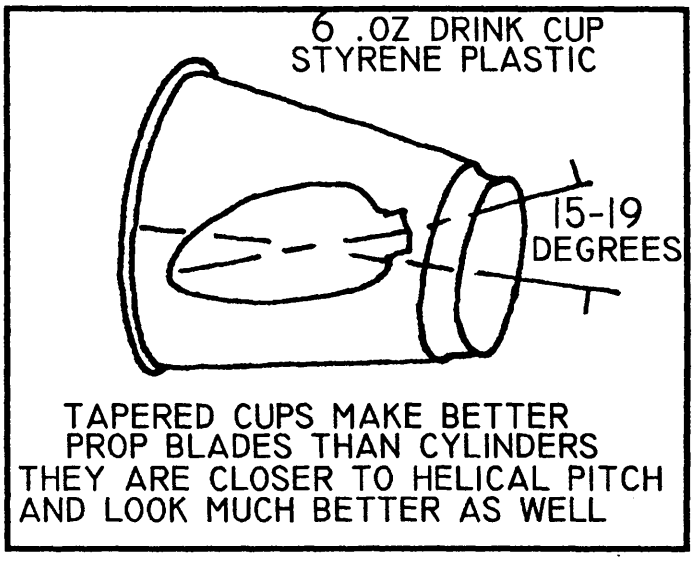

TURNING SPINNER
UNDERSIDE
TO CLEAR
THRUST
WASHERS
6


APPLY SMALL AMOUNTS
OF THICK CA TO SPINNER
WHILE TURNING ON DREMEL
SAND AND POLISH SMOOTH
7
CAUTION!!
EXCESS GLUE CAN
SPIN OFF INTO EYES
USE EYE PROTECTION

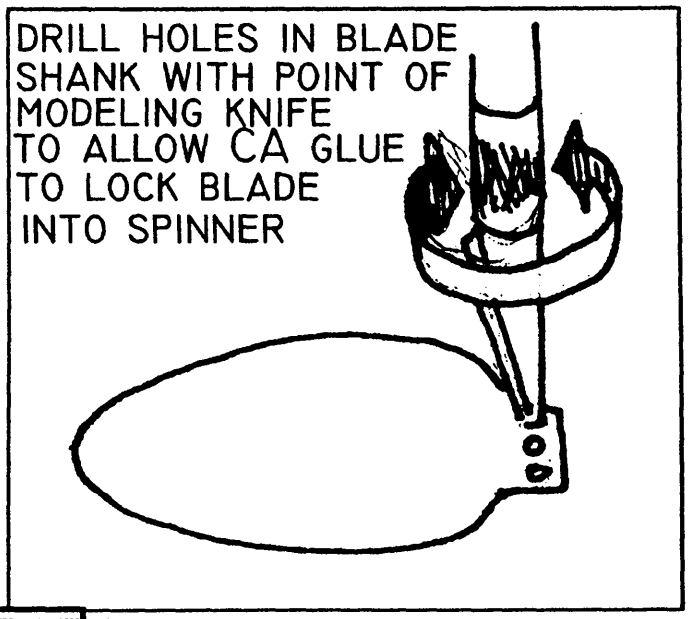

ADJUST ANGLE
TO SUIT PROP PITCH
8
66°
PROP PITCH JIG

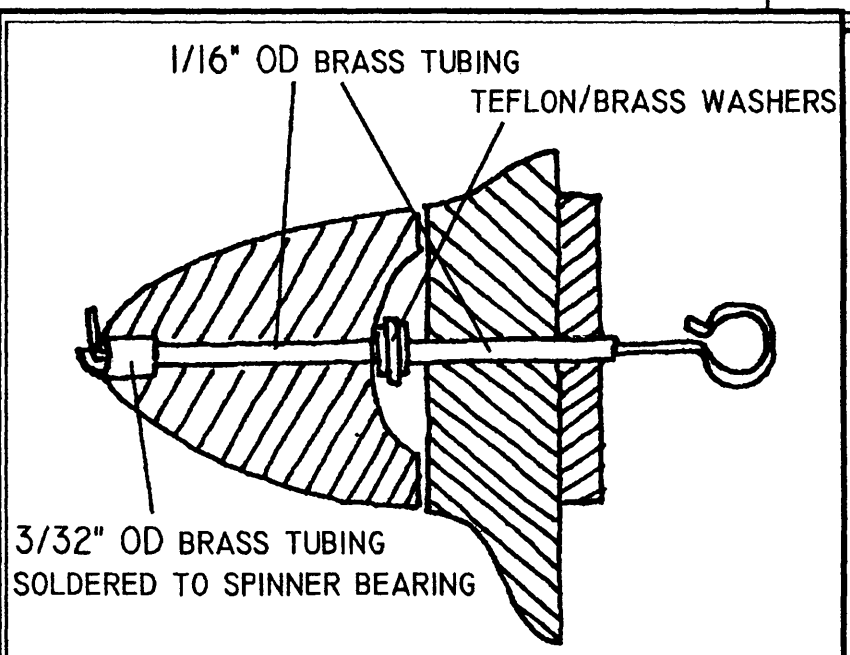

CUTTING PROP SLOTS
9


HEAT WIRE TO BREAK CA BOND
TWIST AND REMOVE WIRE
10
CAUTION!!!
DO NOT OVERHEAT WIRE

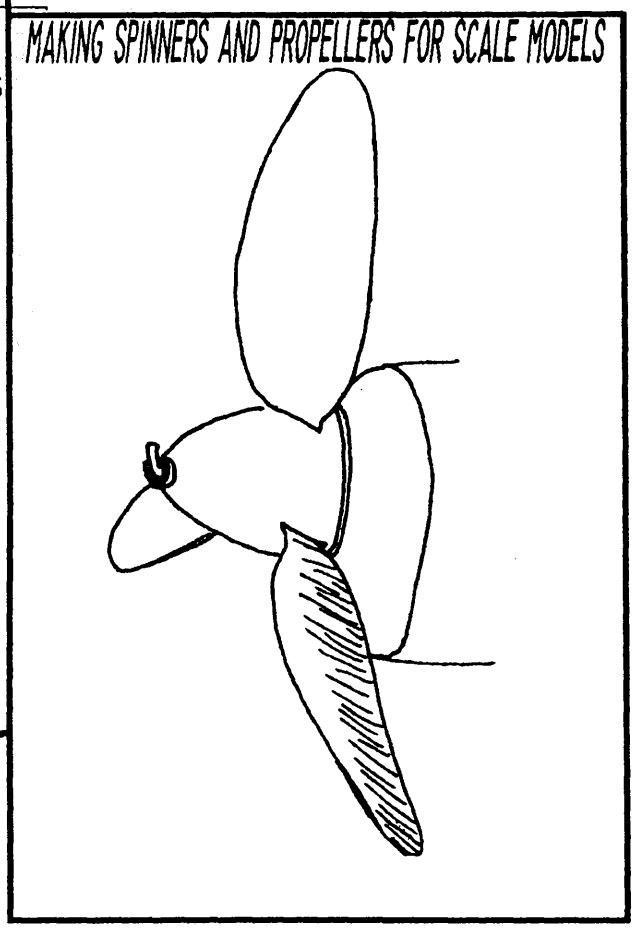


TAPERED CUPS MAKE BETTER PROP BLADES THAN CYLINDERS THEY ARE CLOSER TO HELICAL PITCH AND LOOK MUCH BETTER AS WELL



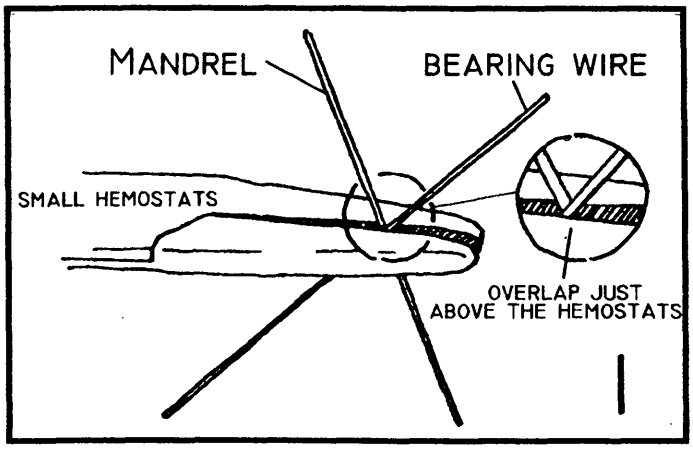


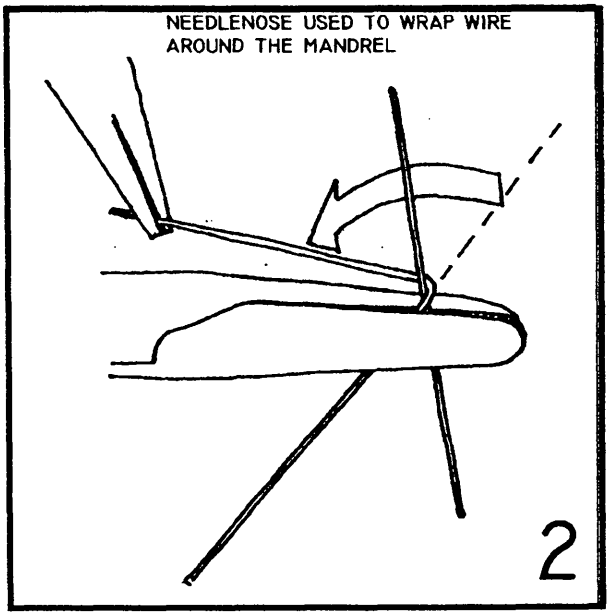
SPINNER NOSEPLUG SECTION

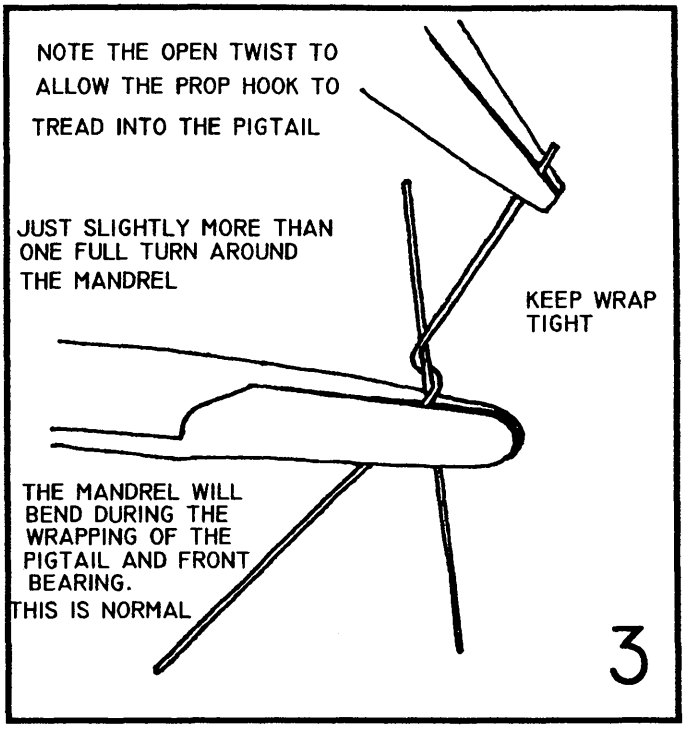


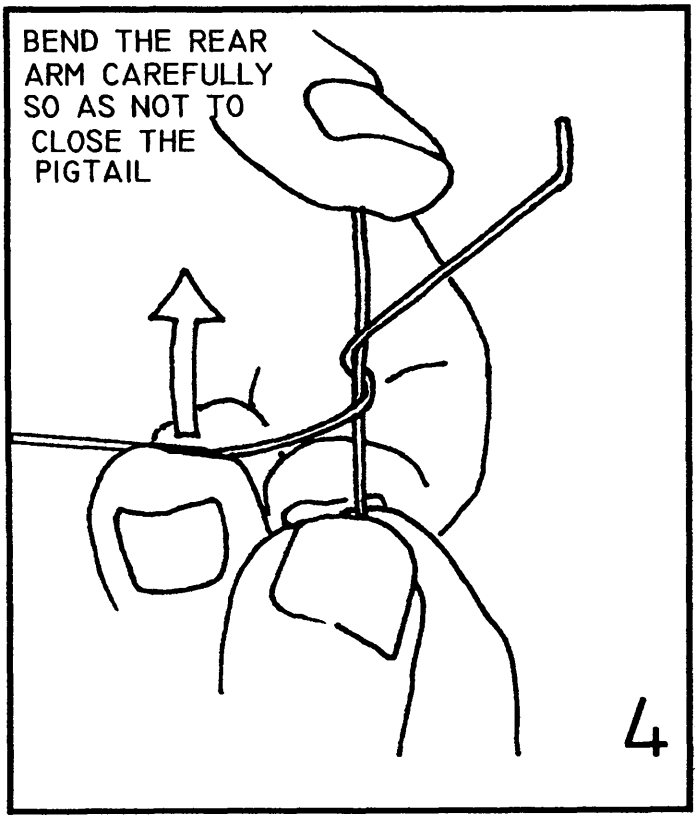
EASY TO MAKE, GREAT LOOKING VERY TOUGH, AND FAIRLY EFFICIENT

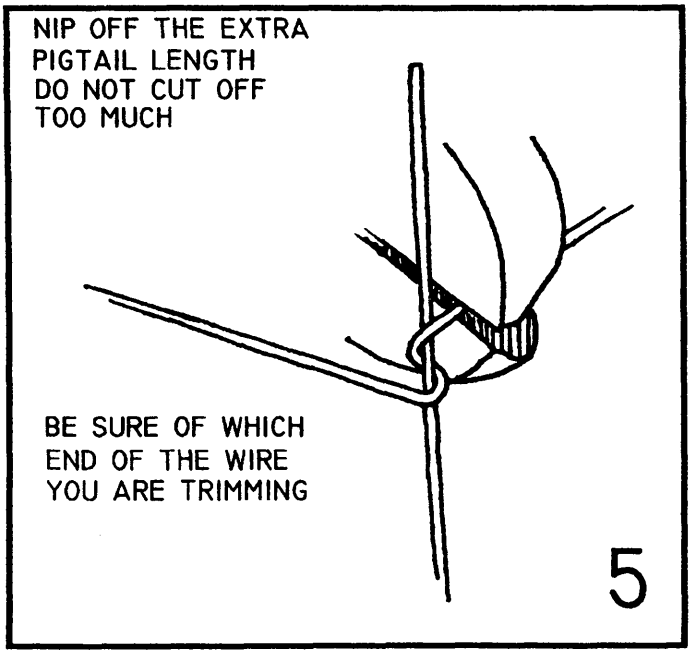
THESE PROPS AND SPINNERS ARE FUN TO MAKE

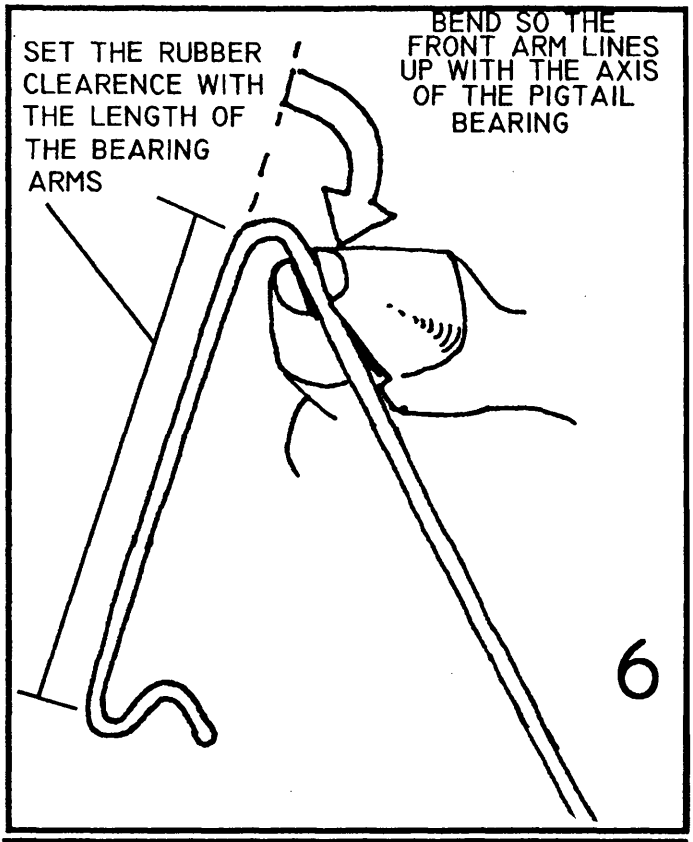

MANDREL
BEARING WIRE
SMALL HEMOSTATS
OVERLAP JUST ABOVE THE HEMOSTATS
1

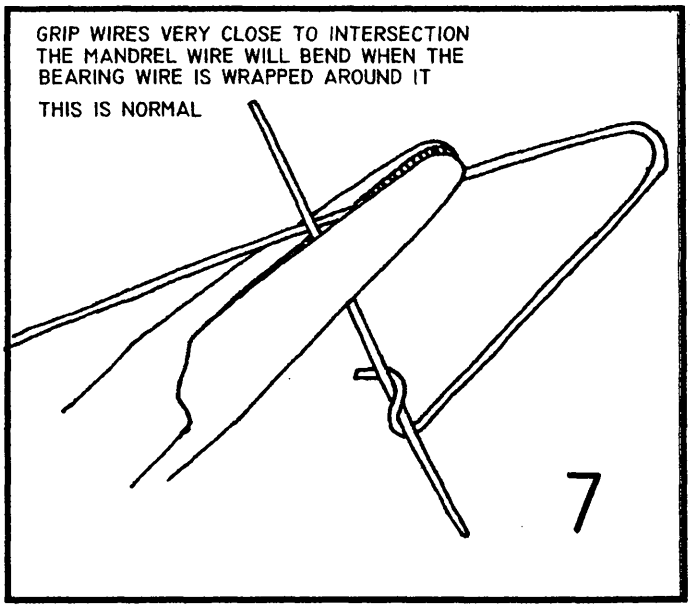

NEEDLENOSE USED TO WRAP WIRE AROUND THE MANDREL
2

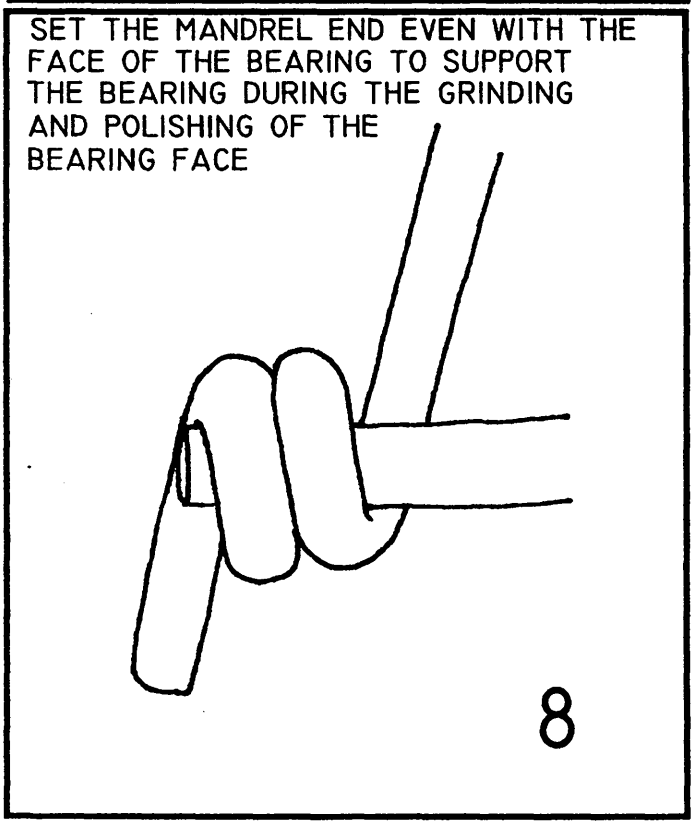

NOTE THE OPEN TWIST TO ALLOW THE PROP HOOK TO TREAD INTO THE PIGTAIL
JUST SLIGHTLY MORE THAN ONE FULL TURN AROUND THE MANDREL
KEEP WRAP TIGHT
THE MANDREL WILL BEND DURING THE WRAPPING OF THE PIGTAIL AND FRONT BEARING. THIS IS NORMAL
3

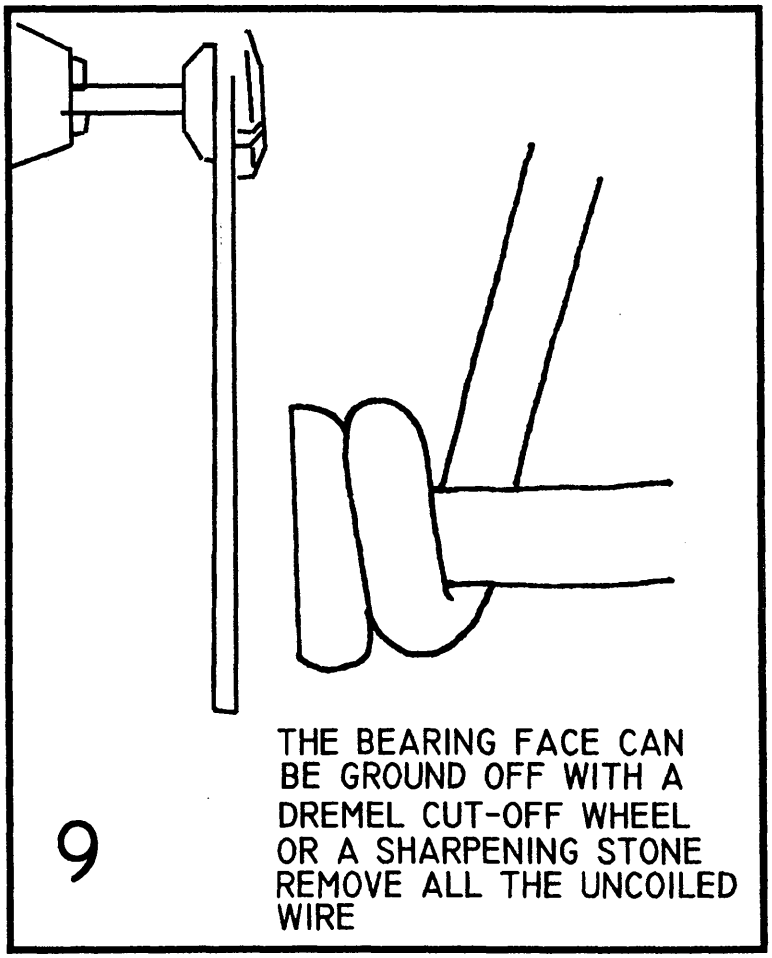

BEND THE REAR ARM CAREFULLY SO AS NOT TO CLOSE THE PIGTAIL
4

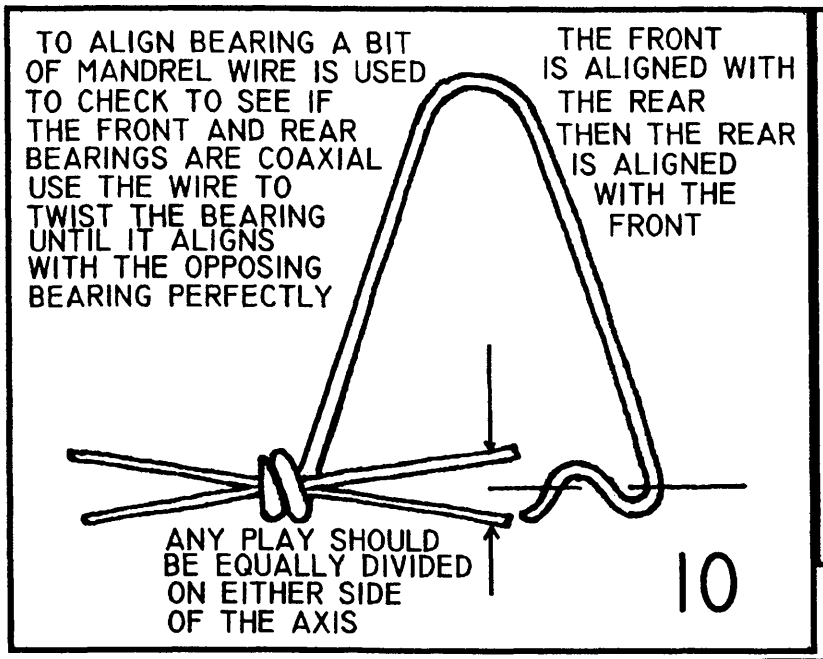

NIP OFF THE EXTRA PIGTAIL LENGTH DO NOT CUT OFF TOO MUCH
BE SURE OF WHICH END OF THE WIRE YOU ARE TRIMMING
5

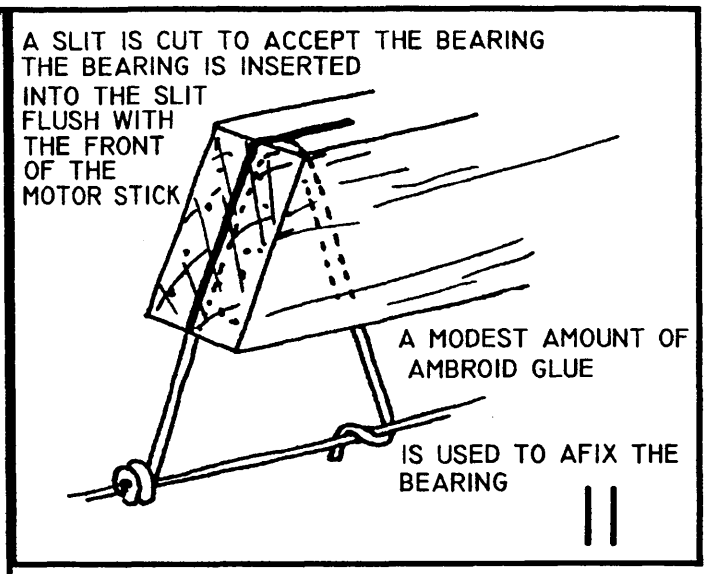

SET THE RUBBER CLEARENCE WITH THE LENGTH OF THE BEARING ARMS
BEND SO THE FRONT ARM LINES UP WITH THE AXIS OF THE PIGTAIL BEARING
6

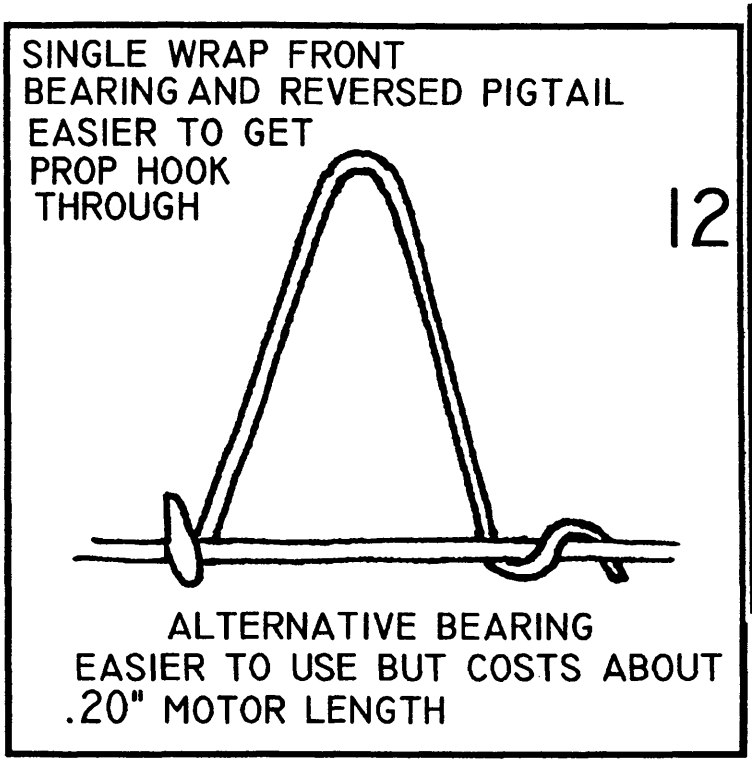

GRIP WIRES VERY CLOSE TO INTERSECTION THE MANDREL WIRE WILL BEND WHEN THE BEARING WIRE IS WRAPPED AROUND IT
THIS IS NORMAL
7

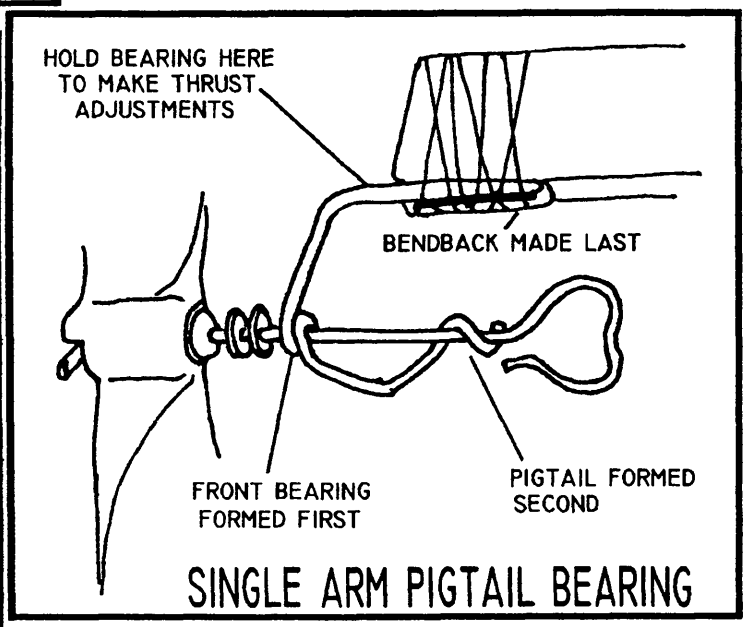

SET THE MANDREL END EVEN WITH THE FACE OF THE BEARING TO SUPPORT THE BEARING DURING THE GRINDING AND POLISHING OF THE BEARING FACE
8


9
THE BEARING FACE CAN BE GROUND OFF WITH A DREMEL CUT-OFF WHEEL OR A SHARPENING STONE REMOVE ALL THE UNCOILED WIRE









MAKING PIGTAIL BEARINGS IS EASIER WHEN YOU USE VERY GOOD TOOLS
GET A REALLY GOOD PAIR OF NEEDLE NOSE AND MEDIUM HEMOSTATS AND THESE STYLE BEARINGS WILL BE SIMPLE TO MAKE

New Product from Y2K!
PPP film (Penny Plane Plastic)

This new film is a .7 Micron thick plastic weighting .0021 oz per 100 sq in. Light enough for any indoor application this film is both economical and very easily worked.

Prices for 50 foot X 12 inch roll

Postage Payed U.S.....$25.00

Postage Payed Overseas.....$30.00

Checks payable to: Y2K-PPP

send to:
Roy White
1025 Cedar ST
Catawissa MO 63015

Indoor Clip Art on CD

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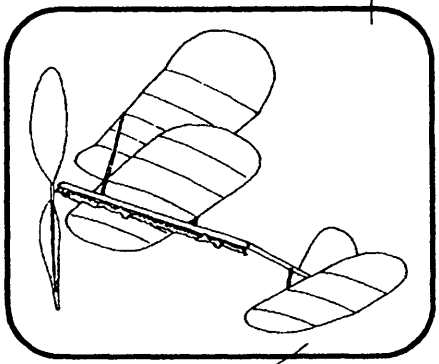
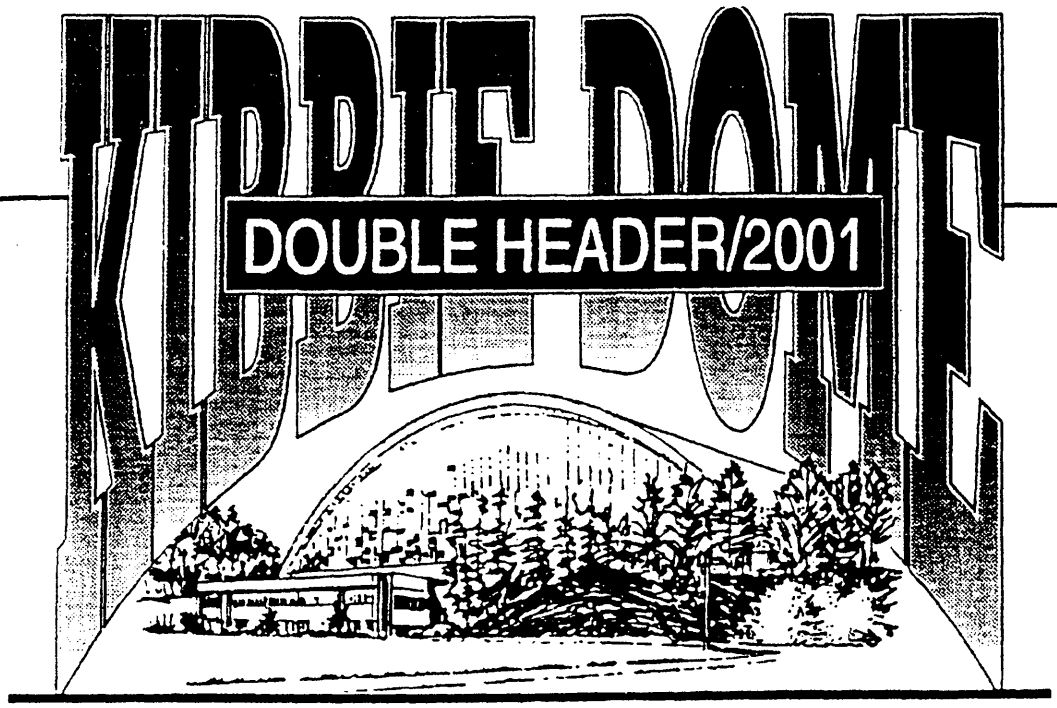
send to:
Steve Gardner
1130 Pembroke
St. Louis, MO 63119





ANNUAL JULY 21 THRU JULY 24, 2001
UNIVERSITY OF IDAHO, MOSCOW, IDAHO

KIBBIE DOME OPEN FOR FLYING – 8:00 AM TO 8:00 PM

MEET 1. (July 21 thru July 24) Kibbie Dome Annual

All AMA Indoor Events. 6 official flights per event (Can be flown all 4 days, 9:30 am, to 8:00 pm)

Hand Launched Gliders and Catapult Gliders flights 8:00am to 9:30 am only, all four days. 9 official flights allowed.

SPECIAL EVENTS: A-6 and Non Radio-Controlled Electric F.F.(30 gram max weight for Electric F.F.)

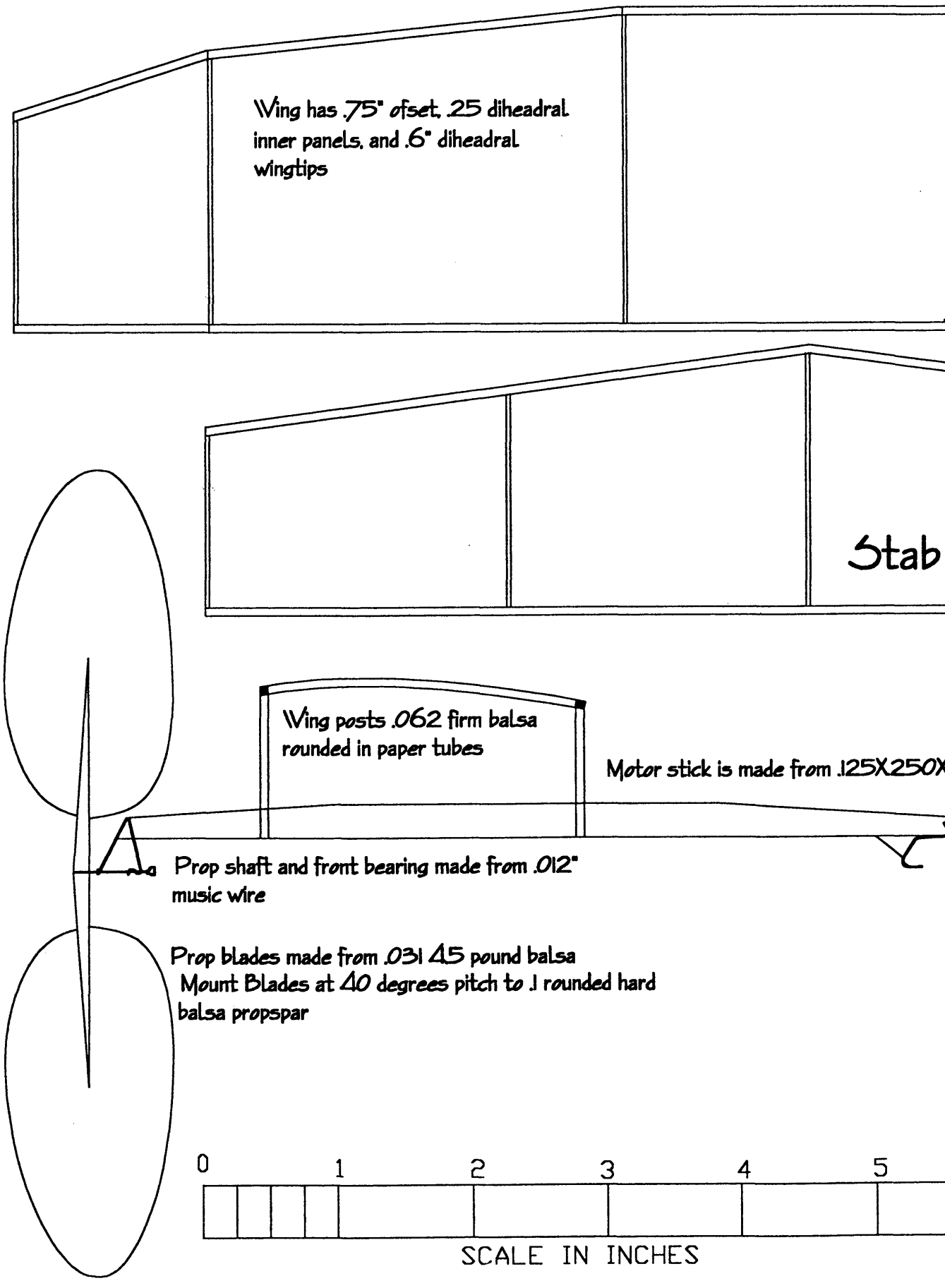
ENTRY FEE: Open & Senior - $60.00, Junior flyers - $25.00. Table & 2 chairs rental $5.00. There are no additional event charges.

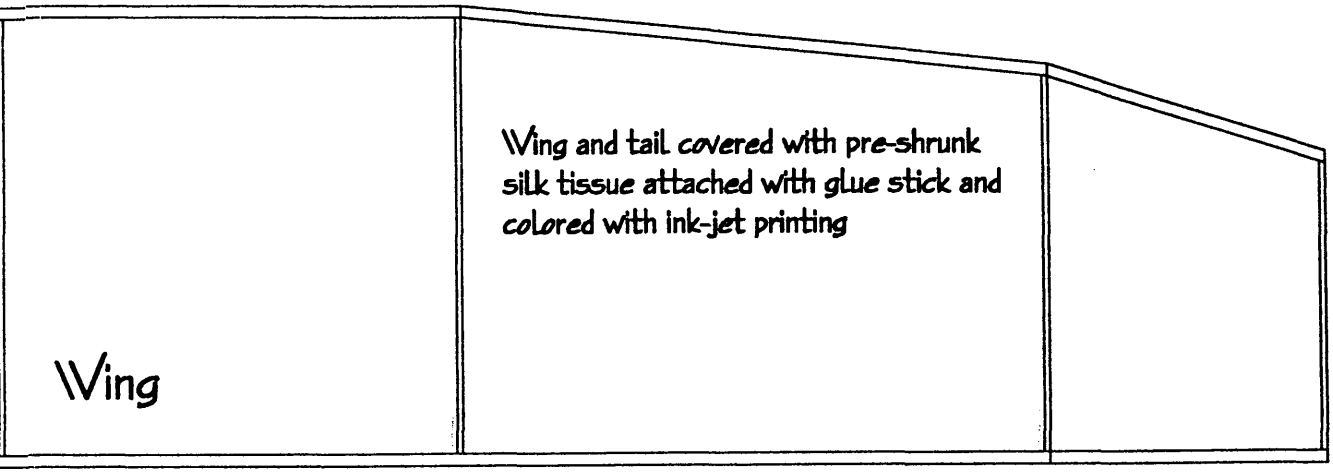
CONTEST DIRECTOR: Andrew Tagliafico, Phone 503-452-0546 for additional information. Modest prizes will be awarded.

FLYING SCALE CONTEST DIRECTOR: Dave Haught, Phone 208-744-9026 for additional info. Flying Aces Rules will be used. Static Scale Judging will take place prior to flying.

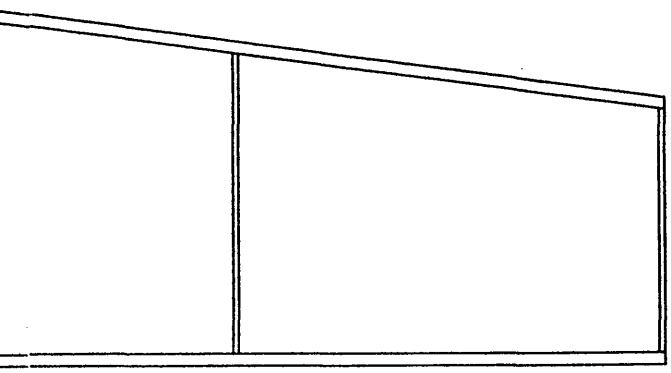
DISTRICT XI F1D REGIONAL will be held during the Kibbie Dome Annual. 55 cm Wing Span, 1.2 gram min. weight with 0.6 gram rubber rules will be in effect. Models will be processed.

MEET 2. (July 22 & 23) International Easy B, 1.2 gram. Six official flights allowed. Official flights to be flown: Three on Sunday, July 22 & three on Monday, July 23, between 9:30 am & 8:00 pm each day. Models will be processed per AMA-EZB rules plus minimum weight of 1.2 grams. Junior, Senior, and Open combined. No additional fee required if entered in the Kibbie Dome Annual. This event only entry fee: $20.00 plus table & 2 chairs if required. **Special plaques awarded to third place.**

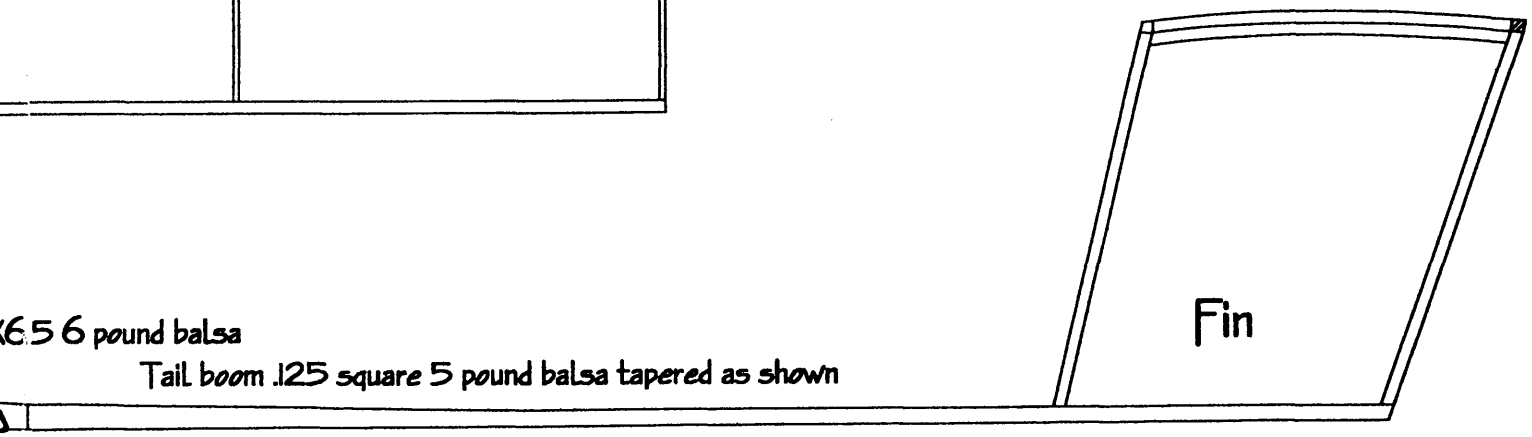

Wing has .75" ofset, .25 diheadral inner panels, and .6" diheadral wingtips
Stab
Wing posts .062 firm balsa rounded in paper tubes
Motor stick is made from .125X250X
Prop shaft and front bearing made from .012" music wire
Prop blades made from .031 45 pound balsa
Mount Blades at 40 degrees pitch to .1 rounded hard balsa propspar
0
1
2
3
4
5
SCALE IN INCHES



Wing and stab spars are .0625" square 5 pound balsa
Ribs are .031 sheet 5 pound balsa cut .06 deep



Stab mounted atop fin
Fin spars are .062 square 5 pound balsa



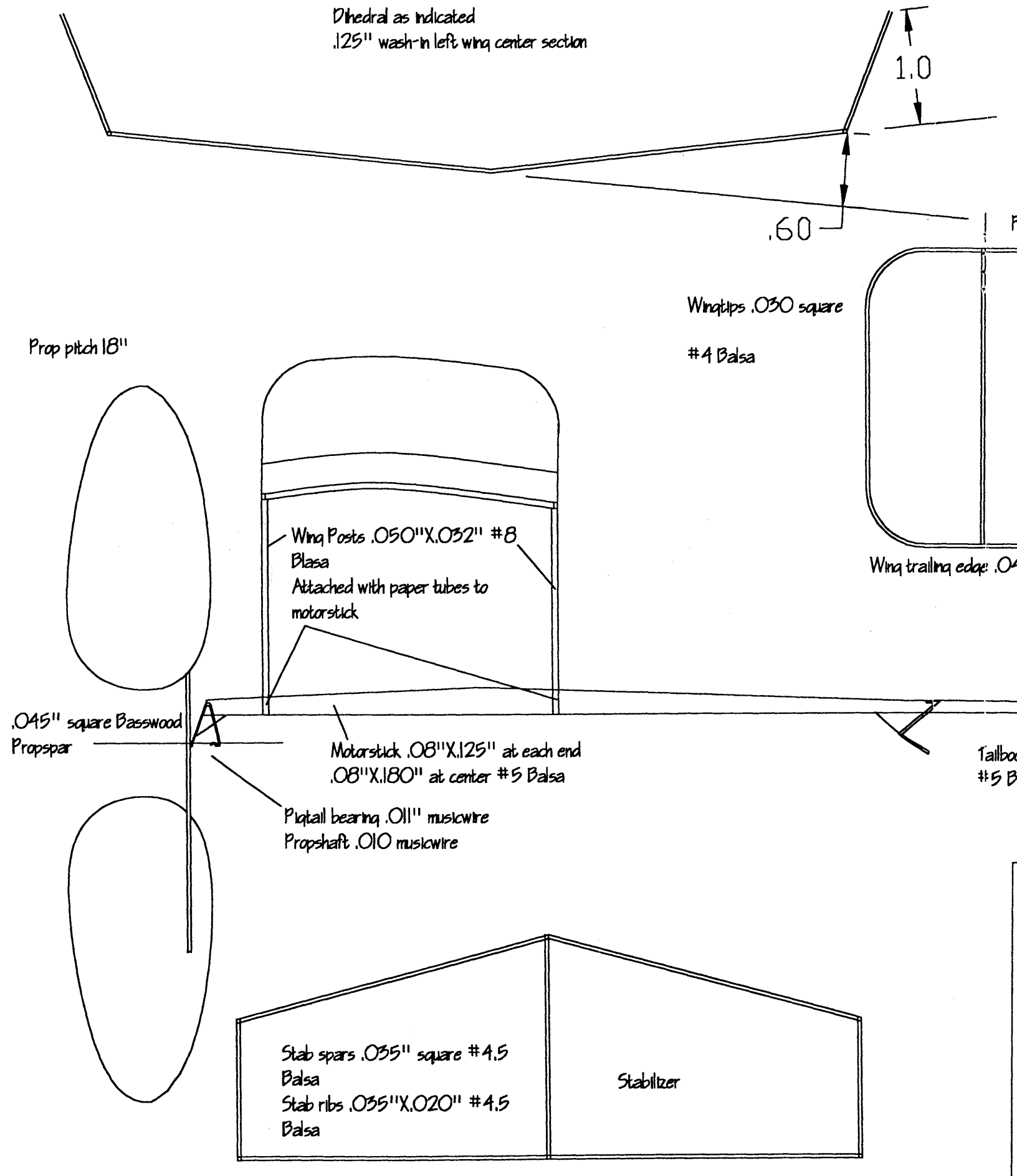
X6.5 6 pound balsa
Tail boom .125 square 5 pound balsa tapered as shown

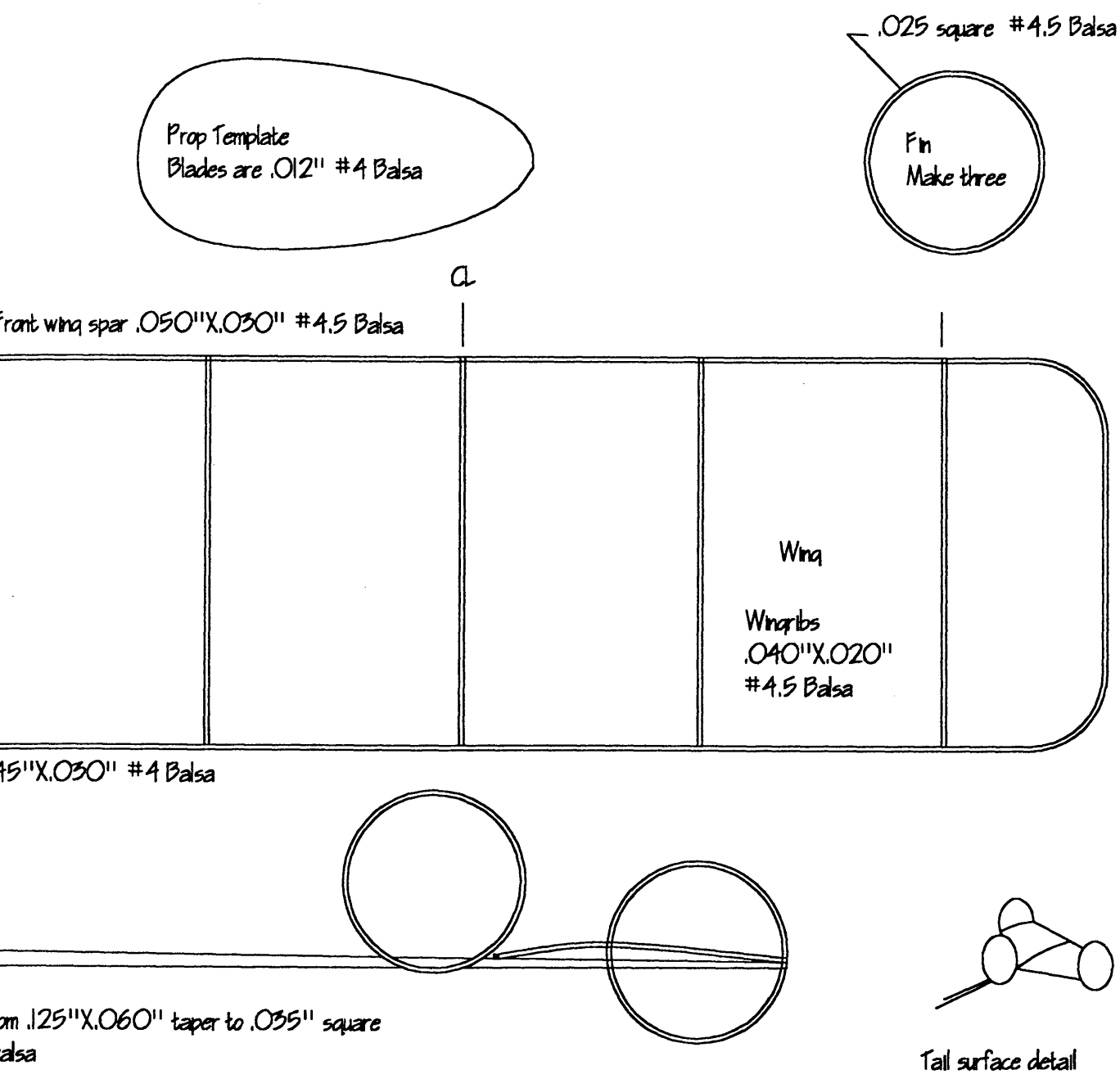
Rear hook made from .012 music
wire

GIGGLEBOX II A6

Designed and Drawn by
STEVE GARDNER

6


Dihedral as indicated
.125" wash-in left wing center section
1.0
.60
Wingtips .030 square
#4 Balsa
Prop pitch 18"
Wing Posts .050"X.032" #8
Blasa
Attached with paper tubes to
motorstick
Wing trailing edge: .04
.045" square Basswood
Propspar
Motorstick .08"X.125" at each end
.08"X.180" at center #5 Balsa
Pigtail bearing .011" musicwire
Propshaft .010 musicwire
Tailboo
#5 B
Stab spars .035" square #4.5
Balsa
Stab ribs .035"X.020" #4.5
Balsa
Stabilizer



Triceratops Ministick

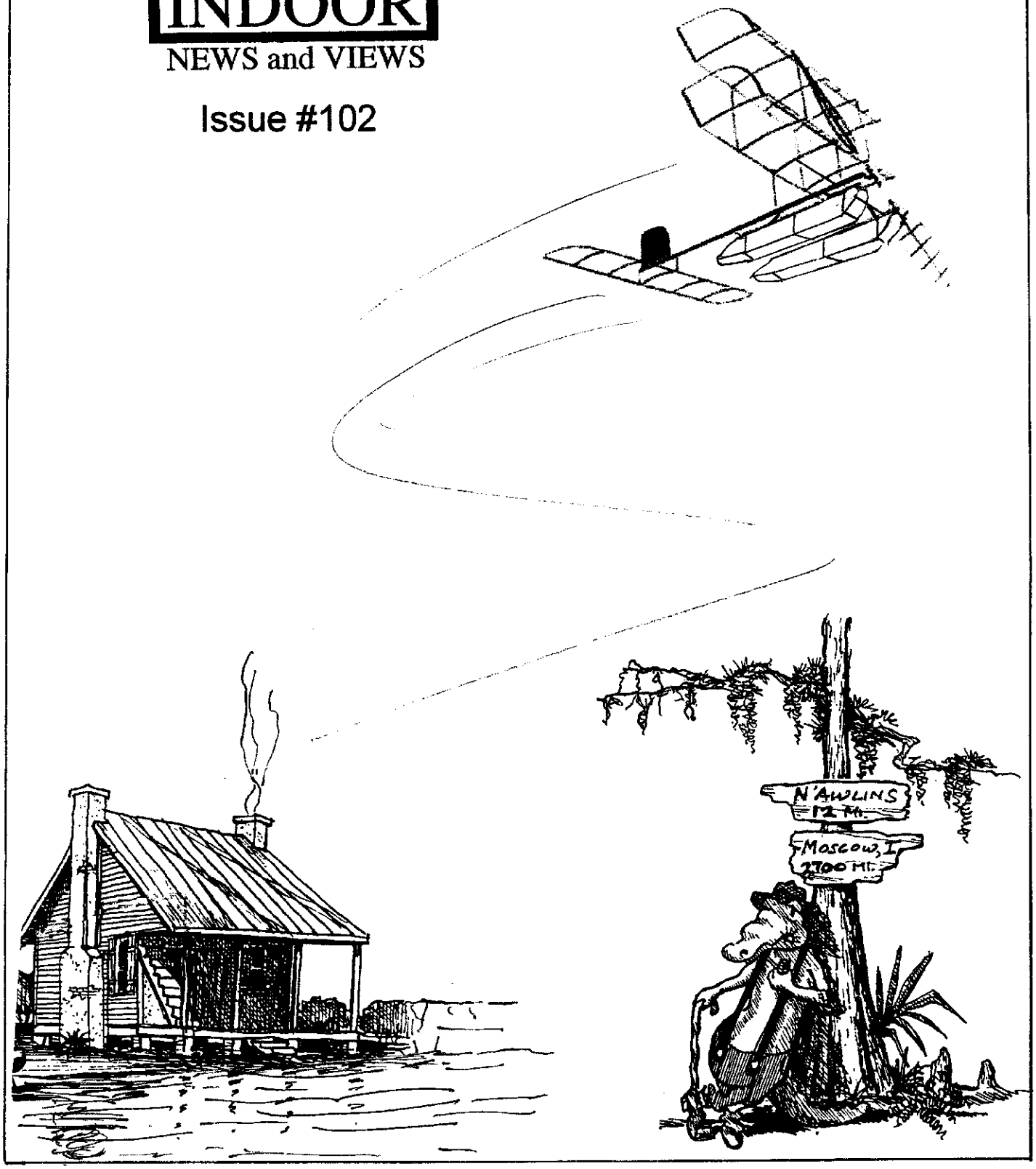
Designed and drawn by

Steve Gardner

4-17-01

INDOOR
NEWS and VIEWS

Issue #102



Indoor News and Views has Moved!

With INAV Issue #102 we begin publication from that famous jewel of the South, New Orleans, Louisiana (pronounced 'Nawlins, down here, mon Cher). You may be thinking of backwater bayous and crawfish and Carnival, but it was Big Oil that brought me down here in 1982, and it is still a pretty big industry. We have some prime indoor spaces, too; covered football and hockey fields such as the Louisiana Superdome, and the new Sports Arena. We hope to arrange for the use of these in the future. We also hope to build on Steve Gardner's use of digital techniques in laying out the magazine, and most of what you see in the following pages is a reflection of that. I would like to thank all the contributors who just about wrote this issue for us, Tim Goldstein for getting the word out, Steve for a great format which we will continue to use, and all of those at U.S.I.C. who gave their well wishes for the future.
- Carl Bakay

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Can't get enough of Indoor News And Views? Then get the INAV Archive CD. This CD includes over 250 complete issues of INAV along with a custom viewer program that allows you to print all the issues, articles, and plans. Order your Archive CD today by sending US$45.00 plus shipping (USA US$3.00 all others US$5.00) to Tim Goldstein at the above address. Proceeds from the Archive CD go to support Junior indoor flying.

Unless specifically stated, INAV does not endorse any products or services advertised herein.
Sample ad copy should be sent to Tim Goldstein at the above address for publishing details.

Coming in issue 103 due out in August
•USIC Results
•Built up prop construction by Steve Brown
•Steering by John Kagan

From the Membership Desk

Tim Goldstein (see inside front cover for contact information)

Exciting things have been happening with Indoor News and Views since the last issue and a few changes have been made. Great feedback has been provided by you INAV members and Carl and I have been working hard to help INAV get greater exposure.

First the changes:

INAV subscriptions rates have been increased. Details are on the inner cover. With the greater frequency we are planning and the increased postage rates this was unavoidable. Any renewals or new subscriptions since May are at the new rates. Expiration dates for paid up subscribers will not change, but any new subscriptions or renewals since May are being adjusted to the new rate.

Discounted Junior subscriptions:

We are implementing a new subsidized subscription for juniors to help them learn about the sport and expose them to the great range of activities indoor flying covers. Details are on the inner front cover. We have already signed up a number of Juniors who are finding INAV to be an invaluable resource.

Back issue price increase:

Back issues are being increased from $3.00 to $4.00 per issue plus postage. While we know that back issues are very valuable to new people entering the sport the cost and trouble to make them available is very high. The new rate still does not totally cover all that it takes, but will help us to continue offering this service. We are now able to provide any issue from January 62 to current as a back issue. If you need more than 1 or 2 issues I would suggest you consider the Archive and then print them yourself at a far lower cost.

Announcements:

INAV Archive on CD:

Indoor News and Views announces the release of an Archive CD containing the complete issues from Jan. 1962 to current. The archive comes with a custom written viewer program. The program is only for PC computers running Windows 95, 98, ME, 2000, or NT 4. Recommended minimum is a 350 Mhz system, but it will work on any Pentium class computer. The viewer program lets you look up issues by publication date, print any page of an issue, build an index, search by your index, and just plain view the issues. All articles, plans, tips, photos, drawings from over 250 issues are included. This is a great way to have all the tremendous information from INAV at your finger tips. Cost is only US$45.00 plus shipping ($3 USA, $5 all others) which works out to less than 0.18 cents per issue. Proceeds from the sale of the Archive CD will be used to promote Junior flying and and is already subsidizing the Jr subscriptions.

Subscription expiration:

Everyone has been great on getting themselves caught up on their subscription and we appreciate it greatly. I will be marking the expiration date on your mailing label with a highlighter if you have reached the point that this will be your last issue. Please check your label just incase I missed marking any. Starting with the next issue we will be mailing only to subscribers that are current and missed issues will have to be purchased as back issues.

General:

Our new editor Carl Bakay has been on a campaign to promote awareness of INAV. He has been sending subscription forms and sample issues to clubs and set up a booth at USIC demonstrating the Archive CD and promoting the newsletter. First, I think we all need to thank Carl for the initiative he is displaying to help this newsletter. Second, based on his feedback I am amazed at the number of people that are flying indoor and don't even know that INAV exists. You can help the sport and the newsletter by telling anyone with even a remote interest in indoor flying about INAV and suggesting they subscribe. I attended the Science Olympiad Nationals and worked as a volunteer. I handed out over 50 promotional copies of INAV to the SO fliers. They were excited to learn that a source of information on indoor flying exists. Had some of the fliers take advantage of the new Jr subscription rate and had a great time.

I am planning on attending Kibbie Dome in July and hope that you will all wander down to the light weight area and say hello.

S.O. Wright Stuff INTRODUCTORY ARTICLE

Indoor News and Views will begin to present news from Science Olympiad and other school freeflight activities to compliment the growing trends in education. The last five years have been exciting as both individual schools as well as national education competitions have accepted freeflight as a bonified learning tool. The most visible activity has been occurring in the Science Olympiad community and this column will key on those events. We also want to give coverage to other schools or school organizations in hopes of spreading the freeflight phenomena. Feel free to contact the editors if you have experienced kids learning with freeflight or if you have something to teach these students.

My current experience not only includes Science Olympiad's Wright Stuff Events but also the Technology Student Association's (TSA), EAA's Wild Blue Wonders ™ and Civil Air Patrol's (CAP) education initiative which are all promoting miniature flight (freeflight) as part of their curriculum. All four-education programs offer an opportunity to connect freeflight with the general population. By no means are any of these a "magic bullet" to eliminate the "youth problem". In reality, most young people are simply overwhelmed with too many activities and entertainment options to maintain a dedicated commitment to the more sophisticated activities. We, as the freeflight community, will eventually see a gradual increase in enthusiasts over the next few years. The substantial increase will happen after ten years when today's youth flying in these competitions will have started their own families and are financially secure. It will be then that the majority of these former students will sentimentally reflect on what thrilled them in their youth and once again become enamored with the freeflight legacy.

In the mean time, we should commit to priming the freeflight pumps to nurture the few gifted novices out there today, since those few who will be the inspirations for the future enthusiasts to follow.

With these thoughts in mind, I chose for the first installment to focus on Science Olympiad mentors. Hopefully, you will recognize many of these people as strong AMA competitors who have become involved with the "SO kids".

We can begin in the northeastern states and swing our way around to the southwest.
In Connecticut, those flyers congregating at the MIT indoor site have been quite generous with the local SO teams. Ray Harlan from the AMA Indoor Board has been very productive in the providing kits and other support to many SO teams. In New York there is Bob Clemens who not only coaches teams but also runs the NY State Wright Stuff Competition. Bob puts out an excellent resource on the internet that can be found at <**http//www.scaleaero.com/ffvendors.htm**>. Don Ross is pitching whenever he can in **FLYING MODELS** and at the local flying sites including the new Armory site.

Moving down to the tri-state area near Philadelphia, both the members of Scale Old Timers Society (SOTS) and the East Coast Indoor Modelers (ECIM) have had positive impact on local teams. By far the most active is Joe Krush whom, it is rumored, has coached over seven teams ranging as far south as the bottom of Delaware. Joe's been flying since the middle 30's so that's quite an achievement. Incidentally, Joe and the SOTS still put on indoor airshows at local middle schools whenever they can.

In Maryland, D.C. and Virginia there is activity covered by Tom Valee, the DC Maxecuters and the ever-industrious Brainbusters. Note that the Abraham Van Dover and the Brainbusters assisted at TSA NATS in DC a few years ago and coaches still come up to give a compliment on their fine job of officiating.

Reaching the Georgia Peach State it seems every freeflighter in the Thermal Thumbers has been a mentor. Dohrm Crawford, Gary Baughman, Dave Zeigler, George Perryman and many, many others have all supported the winning efforts coming out of Georgia. A gaggle of teams are expected to come to USIC for the special SO events in June.

In Tennessee, Neal Henderson, has coached at least four teams and happened to coach some of the winning teams at SO NATS last year. This year Neal was arranging to have some of these team members compete at USIC.

Here in the Midwest we can start near Cleveland where Doc Hacker, Don Slusarczyk and the Cleveland Clowns have the most progressive programs for the local SO Teams. The recent news is that their protégé's are now knocking down AMA junior records. More details on these record breakers will be covered in the future. There will be a few strong teams representing the Cleveland area at USIC too. In Columbus, Jim Buxton coaches a couple of teams and assures the Ohio State finals fly smoothly. Down near Cincinnati, Joe Mekina, Bucky Servaites and even Walt Van Gorder have all answered the tough questions from kids.

Moving onto the Chicago area, the Aeronuts, IMAC and Bong Eagles are all assisting. Earlier this year Chuck Markos enjoyed an afternoon at Memorial Hall in Racine helping some novice team members from Wisconsin. Their coach was effervescent in her next day's e-mail messages.

Gym teacher, Denny Dock in Michigan and his father Ted Dock in Indiana have strongly influenced a couple of teams and have had local newspaper articles written on their success.

Detroit has been coming on strong with the local clubs being very supportive. Fred Tellier and other Cloudbusters have helped SO schools and assisted during competitions, Since Michigan has the greatest population of SO teams; I suspect the Detroit area to become another hotbed of activity.

Up in Minnesota, Bill Kuhl dedicates himself to educators and freeflight activities. Bill has been developing some websites to compliment the future.

Into St. Louis area we have Roy White, Gene Joshu and Larry Coslick who have all done excellent jobs with SO fliers. Roy and Gene have been my High School officials at SO NATS for the last few years and thanks to them the competition flies smoothly.

Jumping from the Midwest to the pacific coast we can thank Dick Baxter, Sandy Peck and the southern California fliers for not only mentoring but running area flying events for SO. Dick has patiently written to me about the goings on to keep me informed of trends, problems along with valuable suggestions. Way up in the northwest, Keith Varnau and the other Boeing "BEAMS" members have done an excellent job in supporting SO teams and other education based events. They plan to host special events in their large hangars and invite the local SO teams to come out for special trim flying sessions.

Thanks to these people and many others, the caliber of airplanes and fliers has improved dramatically. The event has matured over the last five years to a bonafide favorite. The increase in popularity also causes an increased need for mentors. Ask around anyone that is involved, these kids are sharp, willing and appreciative of anyone making any effort to assist them in winning.

I request, on behalf of the indoor freeflight community, that you share your knowledge with a budding indoor flier. It takes so little to leave a legacy.

If you need a place to start, check out Science Olympiad's website at <www.SOinc.org> and search for your state's director or go to the helper's site run by Thayer Syme at <www.sirius,com/~thayer/sotsa/soplanes.html>

One final thought. The larger national education competitions encompass many types of events besides just the Wright Stuff flying. There are occasions that a team may do well in flying yet because they were poor in other events that the whole team, the fliers included, cannot proceed any further in state or national competition. For many of these dedicated fliers, having another chance to fly, competitively, would be both a blessing and surely an inspiration. As a case in point, I understand that at the last Kent State Indoor Competition (near Cleveland, OH) over sixteen students flew in SO events and the competition overall was the largest one ever. The feedback I have received was that SO airplanes were always in the air striving for the highest timed flight and the mass launch event was equally impressive. I strongly urge that our own AMA contest organizers consider including *non-rulebook* events so that more of these young competitors get another chance to fly against their peers.

Just think how our own enthusiasm for freeflight will inspire them to fly their own dreams.

Hail to Freeflight Mentors Everywhere!
Tom Sanders, Science Olympiad National Supervisor-Aeronautics

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The following was posted by Marty Sasaki on the Indoor mailing list on the internet:

This is probably common knowledge for folks more seasoned than myself, but it was new to me and I think it's worth sharing.

During USIC, I was talking to Fred Tellier while watching one of his F1D test flights. He would occasionally mention the current prop RPM. I finally asked him how he knew the RPM and he replied that he was using his stroke watch. "What's a stroke watch?"

It's also called a cadence watch, and is used in rowing to figure out the stroke rate of the oarsmen. With Fred's watch, you start the watch, and three "events", i.e. prop revolutions, later you stop the watch, and it reads out the stroke rate, or prop RPM in this case.

I told Ray Harlan about it and Ray pulled out a mechanical stop watch with additional marks on the dial that did the same thing. However, Ray likes gadgets (don't we all?) so he did a web search and found a source for these things. I also did a web search, but the search engines I used didn't measure up.

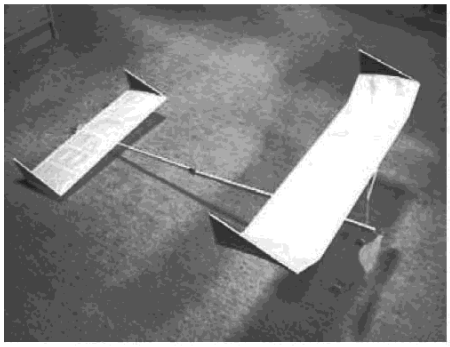
I'm sure there are other sources, but here's a pretty good one:

Go to http://www.stopwatches.com and click on Ultrak Stopwatches. There are two Ultrak stopwatches that have stroke capability, the Ultrak 495, which uses 3 events (it also has 100 dual/split memory, and time and calendar displays) for $40, and the Ultrak 499, with selectable number of events (500 dual/split times, time, calendar, count up/down timers, lap speed modes, and an available computer interface as well as an available printer) for $58.99.

PHOTO GALLERY

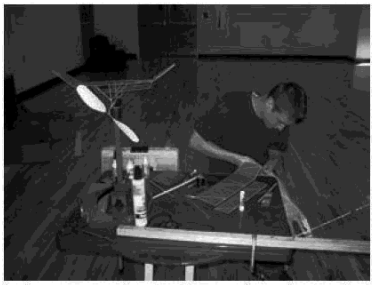
Here's some typical Science Olympiad photos, shamelessly copied from the website of the Cleveland clowns, and from INAV's files, too.

Glenn is the 2001 Georgia State Champion

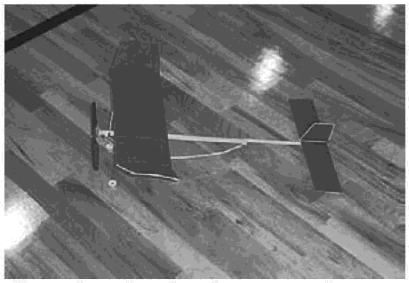


Akihiro's Science Olympiad Design Comes From Tokyo

Ben and His Bipe from Ohio

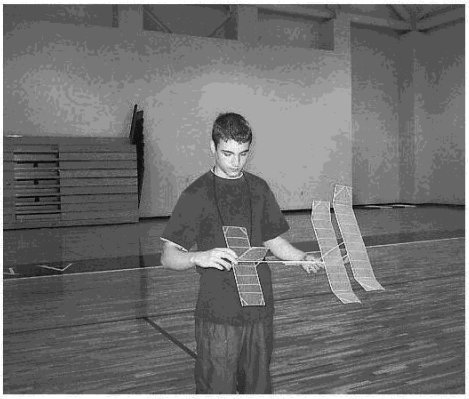


Brian Looks as Professional as Any World Champion



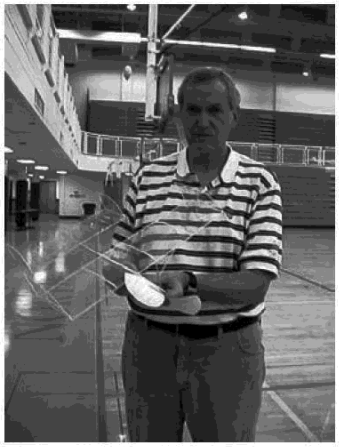
The Cleveland Clowns' Olympus Award Winning S.O. Design

Another Ben and His Bipe



Brian Ready to Launch His Bipe

Ray Harlan Demonstrating a Mini Stick to S.O. Fliers at USIC



Bill Gowen Not only Designs IHLG's, But Coached 5 S.O. Teams in Georgia

SCIENCE OLYMPIAD
OHIO CONTEST REPORT

by Vernon Hacker
April 3, 2001

With this year's State Contest I will be finishing my third year of experience with the Science Olympiad program. I have only one regret. That regret is that we did not take photos of the builders first planes that were brought to events so that we could better show the evolution of our participants skills. Even this year we have seen the following covering materials used: The Cleveland Plain Dealer newspaper, Saran Wrap. wax paper and toilet paper. The varieties of glues used was also interesting and included every type of carpenter, white glue, pvc and cyanos. All of the above used in excess. We, the Cleveland Clowns, have offered our help to many schools but there is still a gap of knowledge that we have not been able to overcome. There are several schools that we have offered to help that have not responded to our invitations. Part of our effort to "level the playing field" was to sponsor a two day How-To-Do-It Clinic in January. Eleven coaches attended and were very satisfied with our effort. The great majority of that symposium's teaching was by John Kagan, Don and Chuck Slusarczyk. It was at this meeting that Don Slusarczyk introduced a C-D Rom that exquisitely shows the hows and whys of building and flying a Wright Stuff Plane. Don has also kitted an SO plane called 'Olympus".

In the above paragraph I noted my personal disappointment in the fact that some schools have not been helped. But, on the other hand, we are very proud of the seventeen teams that have come from as far away as Columbus and Piqua, Ohio, to learn and to fly with us at The Andrews School for Girls at Willoughby, Ohio. Another unfortunate occurrence is the fact that we did not keep a record of the number of internet contacts that we have made. There are three regional Science Olympiad invitationals in northern Ohio. At those competitions the people that we have monitored have always placed high on the list. Our State Science Olympiad contest will be April twenty-first. It will be an interesting Wright Stuff competition as there will so many of our spin ups competing.

Spin ups to me is a title that I use for the five from our group that have developed an interest in Indoor Free Flight and will be going to the U.S.I.C. to fly A.M.A. events as well as the invitational Wright Stuff event. There are also two or three others from southern Ohio who plan to go to the U.S.I.C. This interest in indoor free flight flying is truly a "spin up" from the S.O. planes and is quite a different response from the A.M.A. Cub [Delta Dart] program. When I do a Delta Dart program I always leave my address, phone number and E-mail address. The numbers by now have to have exceeded three hundred. As yet I have never received a call for help. I know that there are some guys in Georgia who also are "spin ups' and are already starting to rewrite the record book. Those of you who are interested in records can watch out for the following names: Doug Schaeffer, Matt Chalker, Palmer Parker, Ben Saks, Alex Johnson, Brian Johnson, Dave Rigotti, Melissa Rigotti, plus a several names that have escaped this vintage 1922 cerebral computer. The Cleveland Clowns also had a postal contest for S.O. planes The total number of entrants was fifty one. That is in spite of little marketing on our part.

I have attended many indoor events including three of the internationals. I have had the pleasure of seeing my son win trophies and a national record, but the recent Science Olympiad experiences come close to being the most gratifying of all of them.

Cutting EZB Prop Blades Without Frustration

By Tim Goldstein (tim@IndoorDuration.com http://www.indoorDuration.com)

Cutting EZB prop blades from a blank has been a frustrating experience for me. The general technique I have always read about is to make a thin template and then use a brand new blade to just cut them out. Doing this I seem to continually have problems with the balsa blade material ripping and tearing. Besides frustration this also leads to heavy blades as I end up patching them and gluing the tears back together so as to not waste my precious EZB blade material. I have tried all the suggestions I have run across including not pulling on the razor blade but just pressing it down and not trying to cut the curve but just a series of straight lines. None of this seems to work for me.

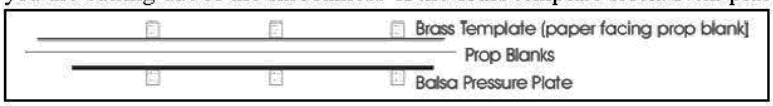
I had read quite a bit about the new type of magnets referred to as rare earth or neodymium magnets. So, I got hold of some of them for just general playing around and trying to see what uses I could find. What impressed me about these magnets beyond just their power was that a pair of even relatively little ones could be placed with quite a few pages of a phone book between them and they were still hard to separate and when you moved one the other on the opposite side of the pages would move with it. What does that have to do with EZB props you say? Well it dawned on me that I could use these powerful little magnets to clamp my prop blanks to a template that I could hold in my hand and then cut around the edge of the template with scissors cleanly cutting the .006" balsa without any tearing or splitting. I gave it a try and the results were beyond belief. Smooth cuts and nice curves without frustration or splits. So, now onto the how to do it.

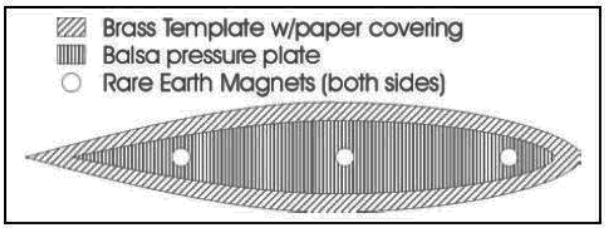
To start you need to make a template that is the exact size of your finished blade. I made mine out of .010" brass shim stock as it is thin enough you can cut it out with a good pair of scissors, but tough enough to make a great template. To get the correct shape for the template I photocopied the blade outline and used double sided carpet tape to attach the photocopy to the brass stock. The attached paper is an important part of this process as explained later, so don't try to get by without it. Now I just cut the template out with a pair of heavy duty scissors.

The next thing to make is a balsa piece I refer to as the pressure plate. I made mine from some scrap 1/16" balsa. This piece is cut the same shape as your template, but undersized so you have about .100" clearance from the edge of the template all around.

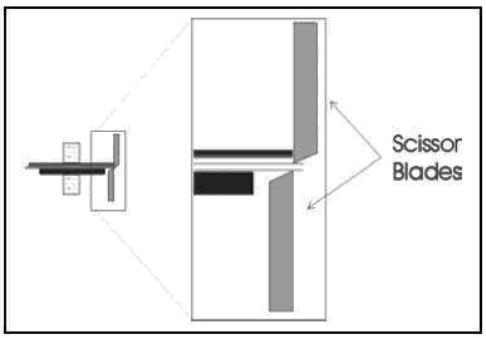
The last piece to this puzzle is the magnets themselves. I use 6 magnets that are about ¼" in diameter and ¼" in length. I have also used some smaller ones and they worked OK, but I like the tighter clamping I get with these little larger ones. The particular magnets are not critical, but I will warn you that if you get to any much larger they can be VERY difficult to separate and will have far more power than you really need. These magnets are readily available from a variety of surplus houses and vendors on the Internet.

You are now ready to cut out the cleanest set of blades you have ever made. To start grab the template with the paper covered side facing up. It is important to have the paper face of the template against the prop blanks or you may get the blanks shifting while you are cutting due to the smoothness of the brass template stock. Next place the pair of prop blade blanks on the template. Now, holding the assembly up to the light, place the balsa pressure plate on the stack using the outline of the template you see through the blanks to allow you to align the pressure plate evenly. Holding the complete stack in one hand grab one magnet and place it on the stack in the middle on top of the balsa plate. Then grab another magnet and put it under the stack against the brass template. The 2 magnets will pull together with enough attraction to tightly clamp it all together. Now add the additional sets, one at each end, to keep everything from slipping. When placing the magnets be very careful as the attraction is so great they will try to jump out of your fingers.





Now comes the fun part. Grab the best, sharpest pair of scissors you own. I use a set of Fiscars as I find them sharper than the imitations. I start at the inner blade tip on the right side and cut in a counter clockwise direction. This allows you to have the top scissor blade ride against the brass template and the lower blade comes up from the bottom exactly in line with the template outline. I now proceed to cut all the way around. Take extra care as you cut the curve at the tip to not turn the scissors to follow the template faster than you are cutting with the blades. Once you get all the way around remove the magnets to see the cleanest set of EZB blades you have ever cut.



WILLAMETTE MODELERS TWO DAY INDOOR MEET
ALBANY, OREGON - APRIL 28,29 2001
Reported by John Lenderman, Contest Director

The doors to the gymnasium were to be opened at 11 A.M on Saturday, but when I arrived, there were several modelers waiting, with their model boxes, ready to get in and set up their spaces. This was at 10 A.M, and before the doors finally opened, we had a good group of flyers in the midst of discussions about models, the welfare of others, and what they had been doing with their lives. Frank Hirleman had recently moved from Lincoln City to Sequim, Washington, and drove to the contest that morning, a distance of 360 miles! There were others who had come the night before and were anxious to get into the swing of things. Bob Stalick, whose wife was in the hospital for treatment for Leukemia, came down to help get the contest going, and to give last minute instructions to the officials in their duties. He is staying in Portland with a relative during Barbara's treatment time. Glenn Grell was there to handle some of the paperwork necessary to run an orderly contest, and was invaluable in the final compilations of the results. Several other members of the club were there to time and do the scale judging. Needless to say, there was a busy time the first few hours getting things organized, and entering the contestants.

Later in the morning and early afternoon, we began to realize the amount of work Bob does in getting a contest under way and running smoothly. We had a record number of contestants this year, and many came long distances to attend. Gordon Dona flew in from Minnesota to Seattle where his brother and father met him and his models. They all drove to Albany together, with a lot of model boxes and luggage. As mentioned before, Frank Hirleman came from Sequim, Washington, several others from the Seattle area, three from California made the journey to this premier event. Fred Hollingsworth and his wife, Phyllis, drove from British Columbia, and said they really enjoyed coming here because of the good flying site, but mainly for the good friends and pleasant time. All four walls of the gym were solid with tables and chairs, and a few had to use the pull out bleacher seats for their work areas. Once everyone had settled in, the flying began, and there were models in the air at all times. Since our format for this competition was for general flying on Saturday, and regulated flying times for Sunday, the light and heavy models had to share air time together. For the most part this worked out pretty well, and there were very few incidents involving the models. As we had noticed previously, most were polite, and waited for the air to be cleared before launching, so things ran smoothly for the Saturday flying. We flew until 5
P.M. when we broke for supper, returning at six to start the symposium.

We had a good number turn out, and they were rewarded with some interesting and provocative discussions. Ed Berray showed his adjustable form for covering Mini-stick wings, and the method he used to prepare the film for transfer to the forms. He used thinned out rubber cement to attach the film to the wing structure—the cement being thinned to the consistency of water. Ed also talked about his experiences with the new Science Olympiad event. He stressed that the flying surfaces be kept straight, with just a slight amount of wash-in on the left wing panel. Ed has been working with the schools in Vancouver, Washington, and helping middle schoolers and high schoolers in construction and flying of these models.

Next, Ken Hark gave us some of his tricks of helping in the building process. For attaching blades to prop spars, he demonstrated his clamp, made from a small piece of wood. Across one end he glues a strip of wood, then splits the small piece of wood up to the cross piece. This gives enough tension to hold the blade to the spar, while the spar is in the prop jig. To hold the rest of the blade, he had a piece of thread attached to the 45 degree pitch gauge that goes over the blade into a small piece of balsa slit to receive the thread. If you have trouble making accurate wing posts, he devised a method to insure that they areround and even. He has a small piece of brass, about one sixteenth thick, which he drills a hole the size you want for the wing post. He doesn't dress the burrs on the other side where it is drilled. You then take a square piece of balsa of the size needed, and twists it through the. brass , with the burrs shaving of the wood edges to produce the nice round, even, wing posts. Very clever. Ken also stressed the use of insect pins for holding balsa pieces in place. Most pins are .009, and make very small holes, but holds things in place very well. Ken then told of his method for keeping the glue bottles clear of clogs. When he used the glue gun, he afterwards puts some acetone on the glue tip to clear the tip for the next use. In extreme cases, he lets the tip soak in acetone for a while to clear it. Ken then told of how he keeps his carbon razor blades sharp. He has a small honing block with two grades of sharpening material, and strokes the blade on both sides to get them sharp again. Gordon Dona showed a tapering block his brother Steve made, with an adjustable base, that can make tapered spars, or prop spars, to whatever you need for sizes at either end. Andrew Tagliafico then demonstrated how he makes the pigtail bearings he uses. Instead of a clamp that is no longer available, he used a small dowel that is split to receive the wire

used in the bearings. It is held in a small vise, and the pigtail wound around the wire. Andrew tells us the who!e procedure will be published shortly in one of the magazines. Ed Berray also showed us the way to use a quarter motor balancer and spacer to use in the quarter motor events. After the symposium, the flying commenced again, and when the last modeler had flown, it was 11:37 P.M., and time to get some rest.

At 8:15 next morning, the competition began again, with hand launch and catapult gliders. I'll give a run down of the events, beginning with the ones that had the most contestants. Fifteen modelers entered the A-6 event, and most had their models flying well. Andrew Tagliafico, with his new design, topped everyone with a great flight of 7:03. A number of other modelers had built this design, and all flew with great potential. In second was the CD with his Minnie Thrush with a time of 6:43.4, and third was a new flyer from the Seattle area, Bruce McCrory, with a nice flight of 6:33. Bruce is a modeler to watch, as he is learning quite fast, and has a real interest in getting better. The Mini Stick event brought out 13 flyers, and again Andrew was tops with a nice time 9:29. His new design really is a good flyer, and very stable. His rival, Ed Berray was second with a 8:31. Both of these flyers once held the Cat. II record, flown in this building. Chuck Dorsett, from Walnut Creek, California, came in third with 7:58. Several flyers noted that the conditions in the building were not conducive to record flights. There were also 13 flyers in the Limited Pennyplane event, which was won by the CD with the only flight over 4 minutes—4:18. Close behind was Steve Dona, flying a new model, with a very good time of 3:53, and then Ed Berray with 3:39. This event is flown with quarter motors also. It is interesting to see the variations in the designs, especially with the limitations in the rules. Some are using the tail boom to lower the stabs out of the wing wash. They angle the boom quite a bit, then support the stab with extensions from the boom. There may be some merit in this. In the regular EZB event, the times were not particularly real high, probably because of the conditions in the building. We never saw the buoyant air that sometimes happens during the day. The winning time of 6:59 was acceptable, but we were hoping for something better. Gordon Dona got his act together late in the day with a 6:16 flight, but last year this model did a 6:54. In third was Ed Berray with a 4:42.8 flight, and he was disappointed, because his model had done over 7 minutes in previous years. These models also flew with quarter motors.

There was a good turnout for Peanut Scale, with 9 entries, and Mark Allison, flying his Chambermaid, topped everyone with 55 total points. Mark is such a steady flyer, and is well prepared for this competition. Tom Kopriva was second with his Fike, model E, and Bob Carpenter, with his S.E.5 was third. Bob had flown in the Albany contests some 20 years ago, and has started back again. He lives in Welches, Oregon, and does an excellent job of building. He also has lots of fun flying. In the new 1.2 Gram EZB event, with quarter motors, the winner with a new model and design was Andrew Tagliafico, with a great time of 6:26. Andrew is very patient when testing new models, and this proved his point when the model performed to his expectations. Jerry Powell flew his English design to a good time of 6:08.6, and some very steady flying. Third was John Lenderman, flying some old model parts, made to conform to the 1.2 rule, with a flight of 5:27.

The Science Olympiad event was again won by Chris Borland, from Sacramento, with 3:10 flight. Chris has been very consistent in this event, and he also won the mass launch at noon with his design. Second was Ken Hark, with a flight just over the three minute barrier, a 3:00.9. Third was Mark Allison with 2:48. There were 7 Bostonian entrants, and no one went over the 3 minute mark. Steve Dona got close with a 2:52, and Jerry Powell, usually the winner in this event, had to settle for second with his flight of 2:43. Third was Gordon Dona with 2:31. Seven entrants flew No-Cal scale, and Mark Allison was first with a very nice 4:36. He flew his Heinkel. Tom Kopriva got out his Fike E and put up a very good 4:02 for second, and Gordon Dona flew his Shinden to third place with a 2:21 flight. Ed Berray shows his class in catapult glider event with great consistancy in posting a 75.49 two flight total. Gordon Dona gave him a run for the gold with a good total of 74.64, and Mark Allison, flying a model with a small canard in front, was third with 70.00. The A-ROG event had five flyers with good models, but the topper was Andrew Tagliafico with a fully wound flight that escaped some dangerous situations, and eventually touched down at 14:35, for a great flight to just about duplicate his win a few years ago of 14:32. In second p!ace) flying a 25 year old model, was the CD, with a nice time of 11:29.6. Jon Sayre was third with a nice model, ands good flight of 10:14. Hand launched glider provided a great deal of suspense, as Jonathan Sayre, Gordon Dona, and Ed Berray battled it out. With some excellent flying they placed one, two and three. Jonathans two flight total was 86:36. Other events will be shown in the results.

WILLAMETTE MODELERS TWO DAY INDOOR MEET RESULTS

A-6 EVENT (15)*		MINI-STICK (13)		LIMITED.PENNY PLANE (13)	
1. Andrew Tagliafico	7:03	1. Andrew Tagliafico	9:29	1. John Lenderman	4:18
2. John Lenderman	6:43.4	2. Ed Berray	8:31	2. Steve Dona	3: 53
3. Bruce McCrory	6:33	3. Charles Dorsett	7:58	3. Gordon Dona	3:39
				3. Ed Berray	3:39
EZB (9) 1/4 motor (9)		PEANUT SCALE (9)		1.2 GRAM EZB (8)	
1. John Lenderman	6:59	1. Mark Allison	55 Pts.	1. A. Tagliafico	6:26 +
2. Gordon Dona	6:16	2. Tom Kopriva	47 Pts.	2. Jerry Powell	6:08
3. Ed Berray	4:42.8	3. Bob Carpenter	46.7 Pts.	3. J. Lenderman	5:27.8
SCIENCE OLYMPIAD (7)		BOSTONIAN (7)		NO-CAL SCALE (7)	
1. Chris Borland	3:10	1. Steve Dona	2:52	1. Mark Allison	4:36
2. Ken Hark	3:00.9	2. Jerry Powell	2:43	2. Tom Kopriva	4:O2
3. Mark Allison	2 :48	3. Gordon Dona		3. Gordon Dona	2: 21
CATAPULT GLIDER (6)		A-ROG (5)		HAND LAUNCHED GLIDER (5)	
1. Ed Berray	75.49	1. Andrew Tagliafico	14:35	1. Jonathan Sayre	86.36
2. Gordon Dona	74.64	2. John Lenderman	11:29.6	2. Gordon Dona	81.70
3. Mark Allison	70.0	3. Jon Sayre	10:14	3. Ed Betray	63.88
DIME SCALE (3)		AMA SCALE (3)		MOORHEAD EVENT (3)	
1. Mark Allison	1:44.7	1. Mark Allison	1:57.98	1. Mark Allison	583.2
2. Bob Carpenter	0:29	2. Tom Kopriva :	0:27.62	2. Frank Hirleman	42.4
				3. D. Klingenberg	28.5
EMBRYO (2)		INTERMEDIATE STICK (2)			
1. Frank Hirleman	259.1	1. Dave Hagen	13:49		
2. Jerry Powell	239.6				

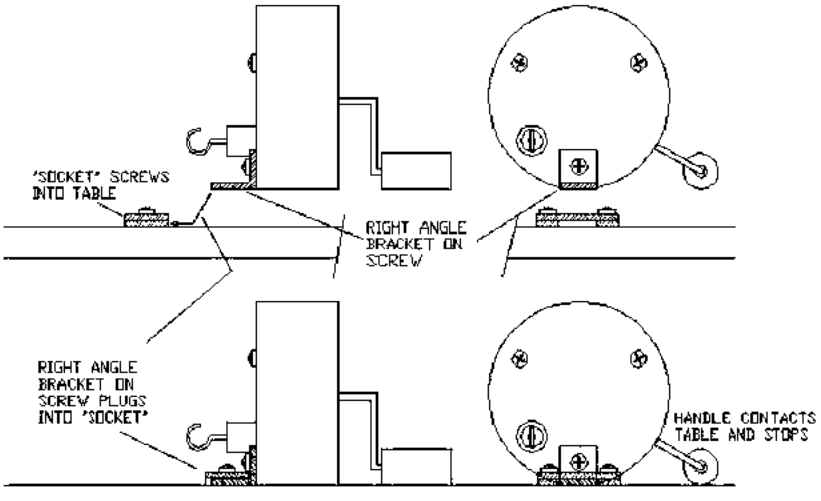
NEW CANADIAN RECORD

*Number of contestants — Limited Pennyplane

\+ New site record — Fred Hollingsworth 8:34

A Holder/Handle Brake System

Bill Dodson writes: This is the holder/ handle brake system that Larry Cailliau uses, which I drew up for a friend. It is simple, neat, and works well. Larry made his from an aluminum angle and three pieces of flat sheet for the socket. The screw that holds the angle bracket on must be replaced with a longer one.



Larry Cailliau Design, drawn by Bill Dodson

U. S. INDOOR CHAMPIONSHIPS, JOHNSON CITY, TENNESSEE

Several weeks before the Johnson City Nats, I wrote a letter to Dave Thomson the Contest Director, asking for permission to set up an INAV table to sell sub scriptions and the brand new CD archive. Dave wrote back a very warm letter saying he would do anything he could for the newsletter, and give me a free table set up at the 50-yard line, right next to the sign-in area. He was good to his word. Tuesday evening we came in to check out the site, drop off our model boxes and set up. Wednesday, May 30 was Day One, and everyone stopped by to chat, visit, and reach for their wallets. We sold seven archive CD's and twelve subscriptions that first day alone. Associate Editor Steve Gardner also did well with his indoor clip art and T-shirts. It proved to be the start of a busy week for everyone.

The morning of Day One had the air filled with hand launched and catapult gliders. Jim Buxton won Hand Launched Glider with a best two flight total of 163.5 seconds. Standard Catapult was won by Ralph Schlarb with a two flight total of 163.4, and Unlimited Catapult by Kurt Krempetz with 174.4. Glider technology has really advanced. Look in the middle of this issue for three very competitive designs. The minidome also was filled with shouts of glee as the new rubber speed events took place, now in their second year, I believe. Only four hit the tarp in Straight Line Speed. Jim Lewis won, with Tom Sova, Dave Linstrum, and John Blair following. Jim also won Round the Pole. Unlimited Rubber Speed was won by John Diebolt, with John Blair second. Race To The Roof was harder than you might think–116 feet is a long way! Eight people tried but only five made it. John Kagan won in 6.9 seconds, followed by Jack McGillivray, Dave Linstrum, Fred Rash and John Diebolt. One of my favorites, P-24 condor set a new record of over six minutes this year. John Diebolt put over 7400 winds in his motor to accomplish this feat. Perennial winner Jim Clem got second place.

Wednesday afternoon and evening saw a close competition in 35 CM, with Larry Loucka edging out Tom Sova for first place by only 10 seconds, with a best time of 23:17. Intermediate Stick was dominated by John Kagan in first, followed by Fred Tellier and Jim Richmond. John's best time was 38:47.

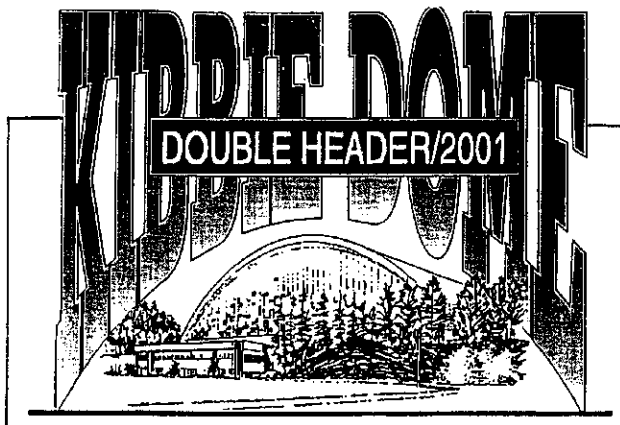
Thursday's competition began with two days of much-needed rain, which cooled the dome and kept inside temperatures pleasant throughout the meet. FAC and AMA scale events went on for three days. Canadian Jack McGillivray won Golden Age, FAC and Dime Scale, as well as the WW II Mass Launch. Rich Miller won FAC Peanut Scale, Coconut Scale, Bostonian, and Bostonian Mass Launch. Emil Schutzel wowed us with a Pioneer Scale win with his Santos Dumont 14bis canard. Jim Miller and his Lacey won AMA Peanut Scale. Thursday evening , Tom Sova put up two identical F1D flights of 28:51 and 28:52 to win, followed by John Kagan in second place and Richard Doig in third. Larry Loucka won Cabin ROG with a 29:49, Vlad Linardic won HL Stick with a 37:26, with Tom Iacobellis placing second in both events. Tom's son, Vito put up a very respectable 13:46 in Limited Pennyplane, and beat your editor in Ministick with a 6:20 best flight. Watch those Juniors!

Friday morning saw 28 fliers duke it out in the ever-popular Ministick event. East Coast Indoor modeler Rob Romash put up an amazing 12:37 early on, which scared everyone except Walt van Gorder, who did a 12:36. In all, seven fliers broke 10 minutes.Walt was credited by the AMA with winning the Ministick Mass launch, but we hear the real winner was Larry Loucka. Sorry, Walt. Speaking of watching Juniors, Parker Parrish is the hot Senior to watch from North Atlanta, and he almost made the 10 minute club with a 9:26 posting. That afternoon Parker went up against 26 of us in EZB to pull out a 12th place with a 21:22. Rumor has it he will do no better until his planes stop their love affair with the ceiling girders. Larry Cailliau won EZB easily (little pun, that) with a 29:55. Vladimir Linardic repeated his HL Stick form when it came to F1L and won with a best two-flight total of 42:38.

Saturday had a nice change of pace when Dave Linstrum of the MIAMA group called on Tom Sanders and over 50 of the Science Olympiad champs to an invitational flyoff at the Minidome. Sixteen teenagers showed up, and put up some impressive three and four minute flights. Results are not in yet, but we hope to have them by the next issue. Even better, several SO champs stopped by the INAV booth and signed up at the reduced $6.00 yearly rate.

Limited Pennyplane on Sunday was the hottest event. A total of 50 entrants competed with only 9 seconds separating the top three finishers. Tom Sova got first with a 15:01, Larry Cailliau second with a 14:56, and Vlad Linardic third with a 14:52. Also on Sunday the F1M event had the top three finishers all beating the 27 minute mark in two flights. Like Parker Parrish, Bill Gowen is from Georgia and won with a 27:49, followed by Fred Tellier from MAAC in Canada with 27:15 and John Diebolt with a 27:06 two flight total. Many thanks to Fred, who is not only a great indoor guy, but is also computer-friendly, and has shared his Tan II rubber testing with INAV. His energy numbers are among those listed on page 26 in this issue.

Look for complete results plus photos in issue 103!

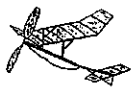


ANNUAL JULY 21 THRU JULY 24, 2001
UNIVERSITY OF IDAHO, MOSCOW, IDAHO
KIBBIE DOME OPEN FOR FLYING – 8:00 AM TO 8:00 PM

MEET 1. (July 21 thru July 24) Kibbie Dome Annual
All AMA Indoor Events. 6 official flights per event (Can be flown all 4 days, 9:30 am, to 8:00 pm)
Hand Launched Gliders and Catapult Gliders flights 8:00am to 9:30 am only, all four days. 9 official flights allowed.
SPECIAL EVENTS: A-6 and Non Radio-Controlled Electric F.F.(30 gram max weight for Electric F.F.)
ENTRY FEE: Open & Senior - $60.00, Junior flyers - $25.00. Table & 2 chairs rental $5.00. There are no additional event charges.
CONTEST DIRECTOR: Andrew Tagliafico, Phone 503-452-0546 for additional information. Modest prizes will be awarded.
FLYING SCALE CONTEST DIRECTOR: Dave Haught, Phone 208-744-9026 for additional info. Flying Aces Rules will be used. Static Scale Judging will take place prior to flying.
DISTRICT XI F1D REGIONAL will be held during the Kibbie Dome Annual. 55 cm Wing Span, 1.2 gram min. weight with 0.6 gram rubber rules will be in effect. Models will be processed.

MEET 2. (July 22 & 23) International Easy B, 1.2 gram. Six official flights allowed. Official flights to be flown: Three on Sunday, July 22 & three on Monday, July 23, between 9:30 am & 8:00 pm each day.
Models will be processed per AMA-EZB rules plus minimum weight of 1.2 grams. Junior, Senior, and Open combined. No additional fee required if entered in the Kibbie Dome Annual. This event only entry fee: $20.00 plus table & 2 chairs if required. **Special plaques awarded to third place.**

"A Well Kept Secret"



– INDOOR FREEFLIGHT –

Come fly with us, (or just observe and see what it is all about)!

For 29 consecutive years, M.I.A.M.A. (Miami Indoor Aircraft Model Association) has been holding indoor model airplane contests in Florida. Currently, the Association sponsors about 7 two-day contests in the Tampa Bay Area each year. They are held in various locations such as the aircraft hangars at the U.S. Coast Guard, Clearwater and Delta Maintenance, Tampa and other sites such as Homer Hesterly Armory, Tampa and State Fairgrounds,Tampa.

If you are an old "stick and tissue" modeler or a just a beginner, you might find something of interest for you in the many classes of models flown. Detailed scale models from the 8" Pistachio class to the 36" Coconut class are flown in addition to the feather weight endurance models weighing less than a gram. Many AMA National Indoor records have been set at these contests. However, you will find lots of friendly help for newcomers.

For more information on these activities and future contest schedules, you can contact:

Hillsborough County - Newt Bollinger 813 685-4164
Pinellas County - Don Brimmer 727 525-6667
Sun City Center - Dick Obarski 813 634-8683
Manatee County - Rich MacEntee 941 723-0764
Sarasota - Sidney Gilbert 941 355-0554

or write to: "THE HANGAR PILOT" **Editor: Dr. John Martin, Jr.**
(Or subscribe- 1yr. $12.50 - lots of plans, tips, 3-views, articles, contest information) **2180 Tigertail Ave. Miami, FL 33133**

Think about it - Wind or rain is never a problem and no one yet has suffered a sunburn. *Check It Out !!!!!*

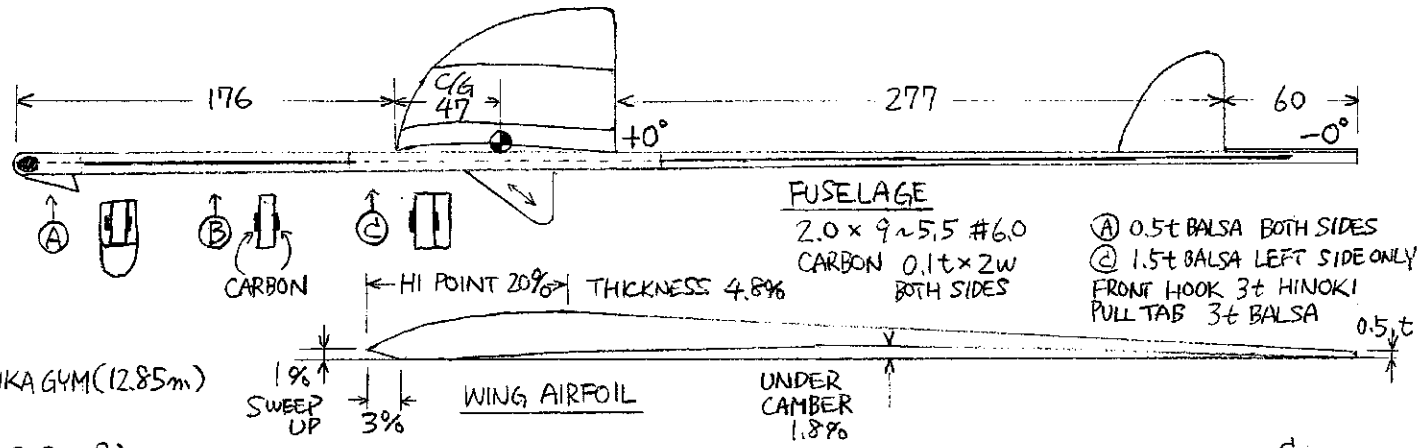
RanRan 70 by Akihiro Danjo

This is my 3rd indoor unlimited class catapult glider. My 1st unlimited class model was 45cm span and did about 45sec at a 12.85m gym. And 2nd model was 60cm span and did about 50sec at the same site. So I thought that building larger model would be the way to go.
When sanding the bottom of the wing, the trailing edge waved heavily. I was disappointed to find the wave and stopped sanding. Fortunately, I could cure the waving (except the center panels) when the wing was cut into 6 parts, though it was slightly heavier than I expected. The washin of the center panels are not intended, but it must have helped the performance. The wing has a removable (adjustable) wing mount system, but I cannot write about it here because it is designed by Stan Buddenbohm (USA). If you want to know about it, please order LIT'L-SWEEP plan (and other plans, too!) from him.
I use about 6 inch long loop of 3/16 inch Tan2 rubber to catapult my model to 12.5m, about 70 deg up and 20 deg right bank. Adjust the circle as wide as possible.
This model did 66.8 + 66.8 sec = 2:13.6 (best2 from 9) at a 15.8m ceiling gym. So it proved to be able to do over 2 minutes if I could find a 15m (=cat2 limit) site.

Shooting Star RanRan 70

UNLIMITED CLASS
CATAPULT FOR CAT2

BY AKIHIRO DANJO



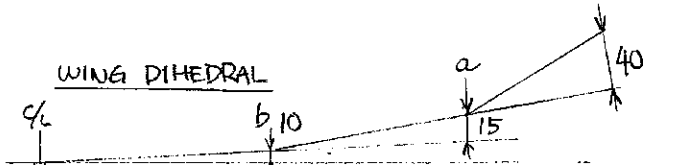
FUSELAGE
2.0 × 9~5.5 #6.0
CARBON 0.1t × 2W BOTH SIDES

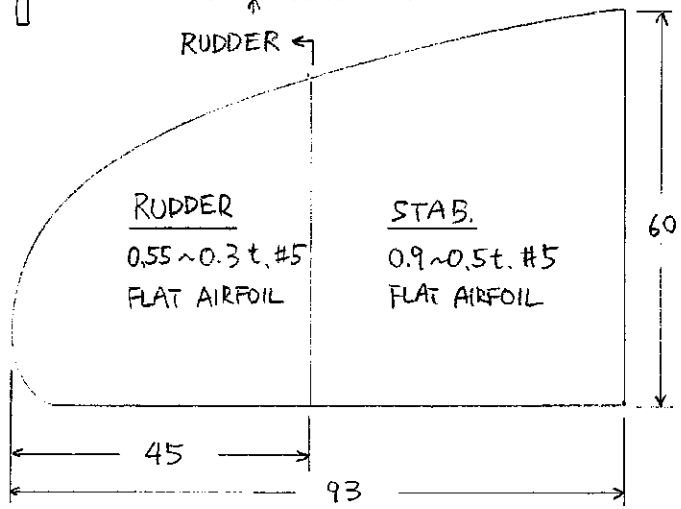
Ⓐ 0.5t BALSA BOTH SIDES
Ⓒ 1.5t BALSA LEFT SIDE ONLY
FRONT HOOK 3t HINOKI
PULL TAB 3t BALSA

RECORD AT YOKOHAMA BUNKA GYM(12.85m)
ON 20.JAN.2001

54.9 + 56.3 = 01:51.2 (BEST 2 OF 9)

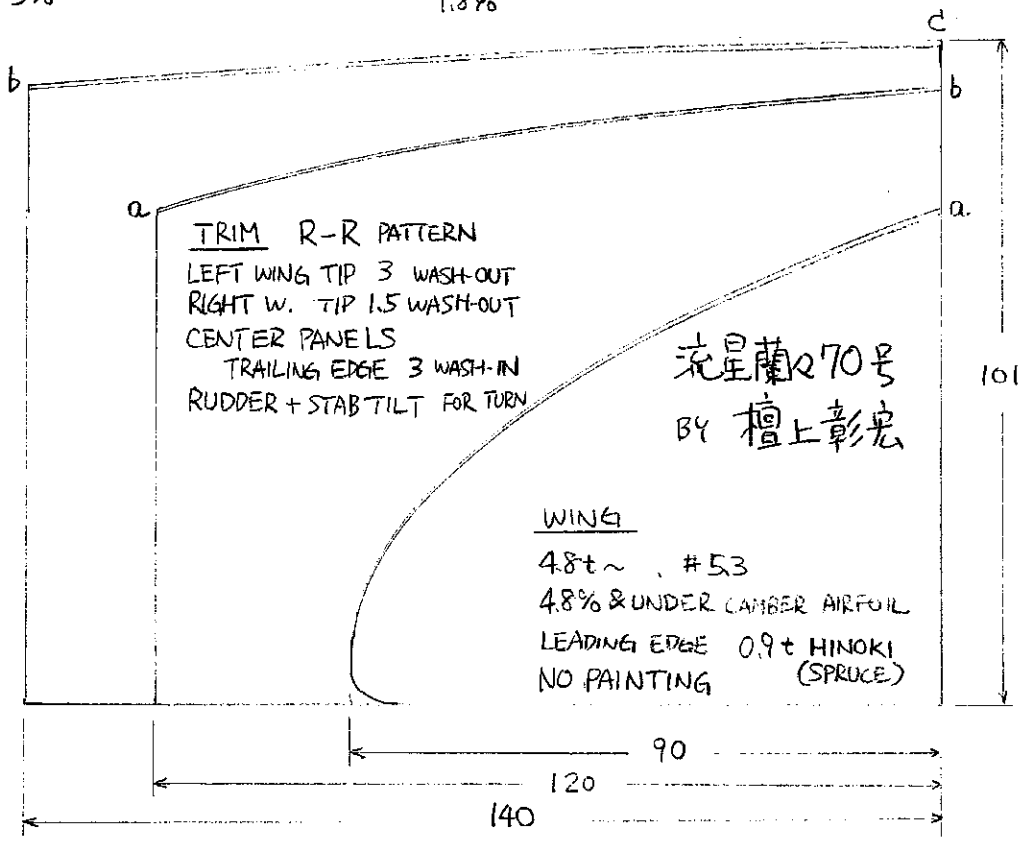
WEIGHT: 11.7g





RUDDER
0.55~0.3t, #5
FLAT AIRFOIL

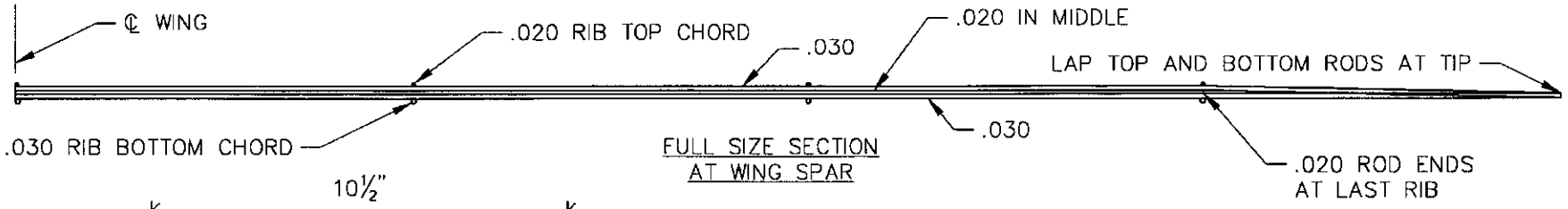
STAB.
0.9~0.5t, #5
FLAT AIRFOIL



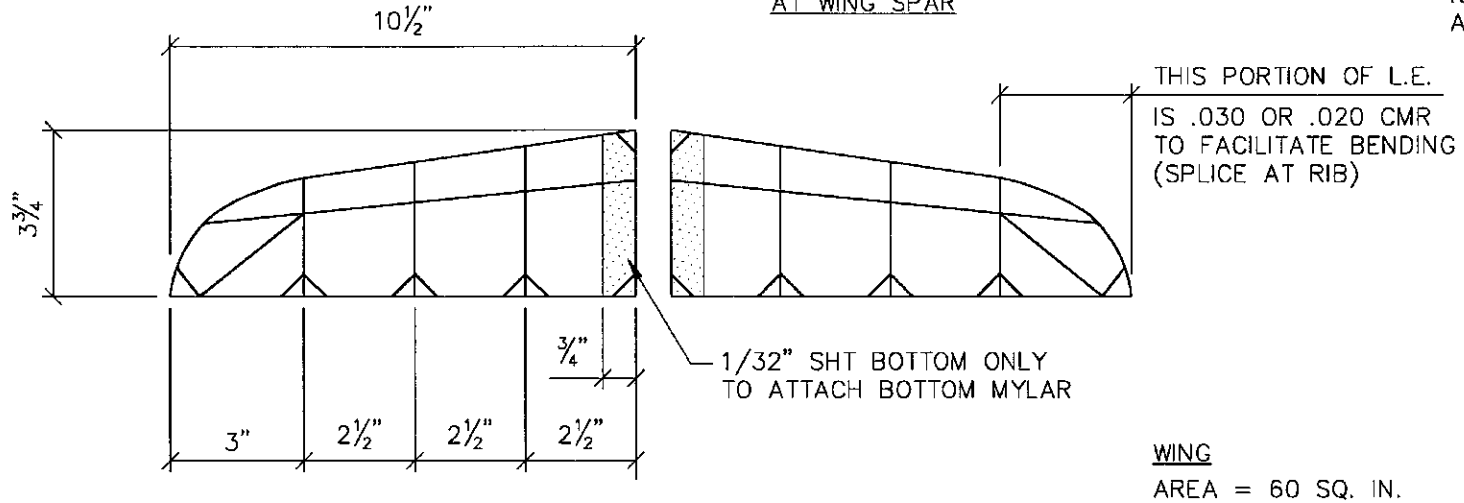
TRIM R-R PATTERN
LEFT WING TIP 3 WASH-OUT
RIGHT W. TIP 1.5 WASH-OUT
CENTER PANELS
TRAILING EDGE 3 WASH-IN
RUDDER + STAB TILT FOR TURN

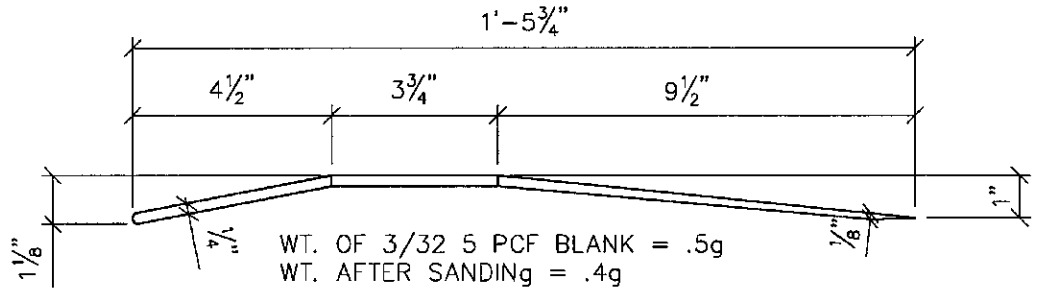
流星蘭R70号
BY 檀上彰宏

WING
4.8t~ , #53
4.8% & UNDER CAMBER AIRFOIL
LEADING EDGE 0.9t HINOKI (SPRUCE)
NO PAINTING

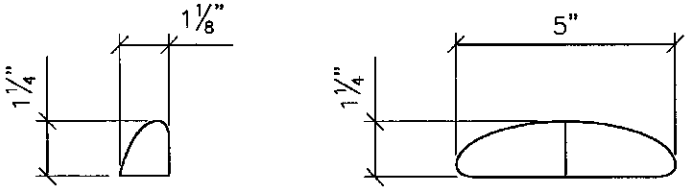


FULL SIZE SECTION
AT WING SPAR





WT. OF 3/32 5 PCF BLANK = .5g
WT. AFTER SANDINg = .4g
WT. WITH CARBON = .6g



RUDDER

STAB

SCALE 1"=4"

FINISHED WT. = .15g

WING

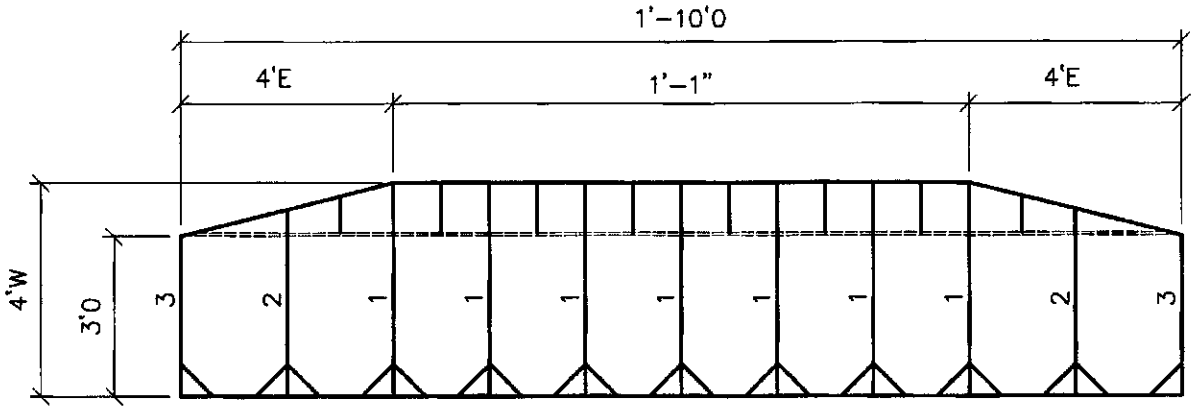
AREA = 60 SQ. IN.
RIBS = .030 BOT, .020 TOP = .8g
SPAR = .030 + .020 + .030 CMR = .65g
LE = .040 CMR = .7g
TE = .030 CMR = .3g
MISC. BRACES .020 CMR
TOTAL = 2.4g
.000059 MYLAR = .2g
PROJECTED FINISHED WT = 2.6g
ACTUAL FINISHED WT = 2.99g

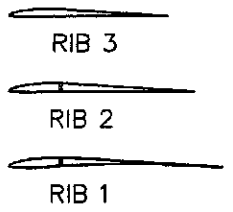
FINISHED GLIDER

ACTUAL WT LESS BALLAST = 3.8g
ACTUAL WT W/ BALLAST TO 50% CG = 4.2g
ACTUAL WT AFTER FLIGHT TRIM = 4.3g

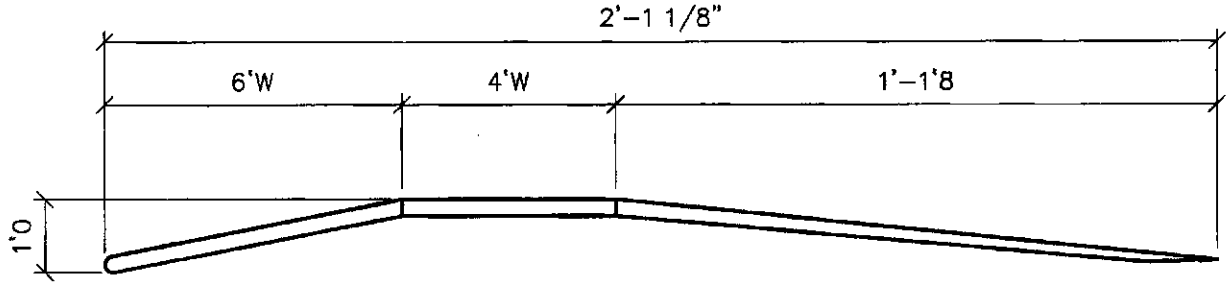
"CARBON COPY"

BASED ON 1980 "UPSTART 4"
WITH CREDIT AND APOLOGIES GIVEN
TO MARK DRELA

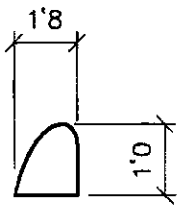




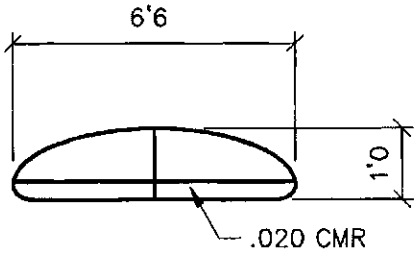
2" DIHEDRAL EACH TIP



WT. OF 3/16 5.7 PCF BLANK = 2g
WT. AFTER SANDING = 1.1g
WT. WITH CARBON = 1.3g



RUDDER



STAB

FINISHED WT. = .4g

SCALE 1"=4"

WING

AREA = 100 SQ. IN.
RIBS = .020 BOT, .020 TOP = .8g
SPAR = 2 x .030 + '1 BALSA = 1.3g
LE = .040 CMR = .7g
TE = .030 CMR = .3g
BALSA TIP RIBS = .4g
BALSA TIP RIBS = .1g
MISC. BRACES .020 CMR = .1g
.000059 MYLAR = .3g
PROJECTED FINISHED WT = 4g
ACTUAL FINISHED WT = 4.35g

FINISHED GLIDER

ACTUAL WT LESS BALLAST = 6.1g
ACTUAL WT AFTER FLIGHT TRIM = 7.25g

"LITE CARBS"

BY BILL GOWEN

Carbon Copy and Lite Carbs **by Bill Gowen**

Here is some info about my new IHLG's with carbon rod wings. A lot of people have commented on the high level of craftsmanship in these gliders. Actually my craftsmanship is highly suspect, but I've got a fertile imagination and a lot of guts! I did a lot of unsuccessful experimenting before hitting on this idea. These are the only two examples built so far. The wings are very strong but also very flexible. It takes a lot of care to keep them straight, especially when shrinking the covering. Ultrafilm has been my most successful covering material. It has a very gentle pull even when shrunk tight. If I get around to doing an outdoor version, I will probably use .00025 mylar.

Carbon Copy is based on the planform of Mark Drela's Upstart 4 but has a simple flat bottom airfoil. The ribs are built up as you go by cutting lower rib chords to fit between the LE and TE. The spar is then added by gluing a stack of three rods to the rib lower chord. I do this by putting them in one at a time. The rib top chord is then glued to the LE, bent over the spar and glued to the TE. The whole airplane took about 4 hours to build. Carbon Copy has been flown several hundred times with no structural breaks in the wing. Further weight reductions are possible by using smaller rods. It has 60 sq. in. of wing area and weighs 4.3 grams (the Upstart 4 weighed 5.5 grams). It was originally conceived as a Cat I glider. The best time so far in a 22' flat ceiling gym is 27 seconds, but it has not been in a Cat I competition yet. It currently holds the Georgia state Cat II record at 65 seconds for 2 flights. Currently my maximum launch height is about 30'. At the Peach State Indoor Championships Carbon Copy had it's tail boom cracked, then the stab torn off, and then the boom broken in two. At that point I switched airplanes to Lite Carbs even though I didn't feel that Lite Carbs had the altitude potential to do the job in Cat II.

Lite Carbs has a more ambitious airfoil that required building the ribs first. That's the main reason I went with a constant chord center section - not as many ribs to figure out. It took about 2 days of concentrated effort to build, and all but about two hours of that time was in building and covering the wing. Matt Gewain of CST suggested the balsa half ribs to better control the airfoil in the critical leading edge area. The main ribs are .020 carbon rods laminated to 1/32 balsa forward of the spar. The spar is 1/16 balsa with an .030 rod top and bottom. The airfoil came from a catapult glider called the Inside Sling as published in INAV. It has 100 sq. in. of wing area and weighs 7.3 grams. During preliminary outdoor tests, I threw Lite Carbs into a telephone pole at full power with no damage. At the Peach State Indoor Championships, an all out, maximum, knee busting throw would get it up to around 30'. Reaching the ceiling in a 22' gym requires only a gentle toss.

All the carbon rods came from The Composite Store. . Glue used was Balsa Gold thin CyA. Mylar came from Model Research Labs (www.modelresearchlabs.com/). Curt Stevens at MRL has a dim view of this project if you want a dissenting opinion (Curt's projection: "no climb, no glide, it'll never break 30 seconds"). Film was attached with 3M 77.

If you have the itch to try one of these airplanes, feel free to experiment as you go. This is a whole new concept in construction and there are lots of avenues to explore. Just let me know if you find out something useful! I'm thinking about beefing up the planes a bit and taking them to the Nats just for fun. Very thin sheeting on the LE is a possibility.

One important addition: carbon rods do not like heat, especially if they are bent. I've had to replace the bent tips on Carbon Copy several times after ruining them with heat. I now trim the Ultrafilm with a razor blade instead of a hot wire. Also, in the process of setting the wing shape with heat, I have caused the tips to fail. A wing shape without curves is safer to work with if you are planning on any kind of heat.

Materials specs for both planes and competition results are on the next page.

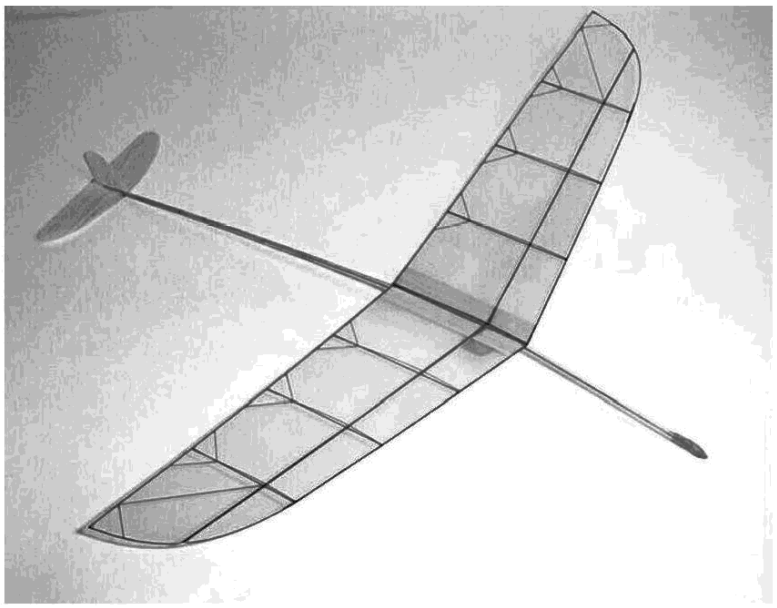
Carbon Copy Specs	**Lite Carbs Specs**
CMR = Carbon Micro Rod Ribs = .030 CMR Bot, .020 Top = .8g Spar = 21" .030 + .020 + .030 CMR = .7g LE = 15" .040 + 9" .030 = .7g TE = 21" .030 CMR = .3g .000059 Mylar = .2g TE Braces = .1g Total Materials = 2.8g Actual Finished Wing Wt = 3.0g Fuse And Tail = .73g Actual Total Wt Less Ballast = 3.77g Actual Total Wt After Flight Trim = 4.3g Area = 60 Sq. In. Loading = .072g/si, .36oz/sf	CMR = Carbon Micro Rod Ribs = .020 CMR Bot, .020 Top + 1/32 balsa = .8g Spar = 22.6" 2 x .030 CMR + 1/16 Balsa = 1.3g LE = 22.6" .040 CMR = .7g TE = 22.6" .030 CMR = .3g Balsa Tip Ribs = .4g TE Braces = .1g 1/32 Center Sheeting = .4g Balsa Half Ribs = .1g Total Materials = 4.1g Actual Framed Up Weight = 3.9g Ultrafilm Both Sides = .3g Total Finished Wing = 4.35g 3/16 Fus Blank = 2.3g Sanded Fus = 1.1g, Finished Fus = 1.3g Stab = .35g Total Less Ballast = 6.1g Total After Flight Trim = 7.25g Area = 100 Sq. In. Loading = .073g/si, .37oz/sf

Contest Results

3/17/01 TTOMA indoor meet at North Springs HS (35' Cat II) – Carbon Copy 1st place with flights of 32.0 + 33.0 = 65.0 seconds total (Georgia State Cat II record)

4/14/01 Peach State Indoor Championships at North Springs HS – Lite Carbs 1st place with 29.8 + 32.3 = 62.1 seconds total.

5/30/01 U.S.I.C. Unlimited Cat. Glider - Carbon Copy catapult version – 44.2 seconds.



2 Product reports on the INAV Archive CD

by Marty Sasaki

What is the most valuable published resource for indoor modeling?

Some would say Ron Williams' "Building and Flying Indoor Model Airplanes." It is packed with building and flying instructions, plenty of photographs, drawings and plans. Unfortunately, "Building and Flying Indoor Model Airplanes" is long out of print and is rarely available for purchase, and when it does appear it is usually very expensive. Further, it is a bit dated since there have been considerable advances in modeling since it was published.

Lew Gitlow's "Indoor Flying Models" is also a must have for the serious indoor modeler. While not as well written as "Building and Flying Indoor Model Airplanes", "Indoor Flying Models" is more up to date and is still being published. It is available from hobby shops, via mail order from the NFFS, or directly from Indoor Model Supply.

Tim Goldstein has just released the new king of the hill, "Indoor News and Views Archive Collection 1962 - 2001". Imagine being able to access every issue of INAV from 1962 up to the present. All of the articles, reports, plans, and photographs are here.

"Indoor News and Views Archive Collection 1962 - 2001" is a CD with scanned images of every page of Indoor News and Views. The INAV Viewer is an easy to use program that lets you display and print individual pages of INAV.

A simple to use search function that allows searching the index by author, topic, and article type is part of the INAV Viewer. Unfortunately, the index has very few entries in it, but Tim hopes that as people use the INAV Viewer they will send him index entries which he will collect and redistribute. Adding index entries is easy to do.

Want to know when Paper Stick became Intermediate Stick, or what competitors thought about the last change to F1D? How about the winner of the 1968 World Championships? What did folks think of Tan II back in 1993? It's in here.

There are drawings and descriptions on building variable pitch propellers, rolled motorsticks and tailbooms. There are instructions on winding rubber, testing rubber, and test results of various batches of rubber. There are articles on microfilm and the latest thin mylar films. There are descriptions, drawings and photographs of variable diameter propellers. There is a description of how to make plug in tail booms.

There are plans and more plans. EZB, F1L, F1M, NOCAL, 35 cm, FROG, F1D, Cabin, Bostonian, mini-stick, Manhattan, HLG, CLG, scale stuff, and much more.

This CD is a real bargain. You won't regret buying it.

"Four Stars", "Two Thumbs Up", etc.

By Mathew Chalker

A new indoor Flier from the Science Olympiad program

The INAV archive is wonderful! All of the pages are in wonderful detail and very easily read. The program has a zoom feature, which is very helpful when trying to read various sizes of fonts and qualities. It also has a rotate feature so you can rotate any plans which are tilted for easier viewing of the plans. The archive also has a feature in which you can make you own index of the articles which can be a little time-consuming but once done saves tons of time. Tim mentioned something of a program to be able to share and mix indexes which will be posted to Tim's IndoorDuration website soon. The INAV archive is a great tool and reference material for anyone who flies indoor!

A TECHNICAL ANALYSIS OF RUBBER STRIP

By Carl Bakay

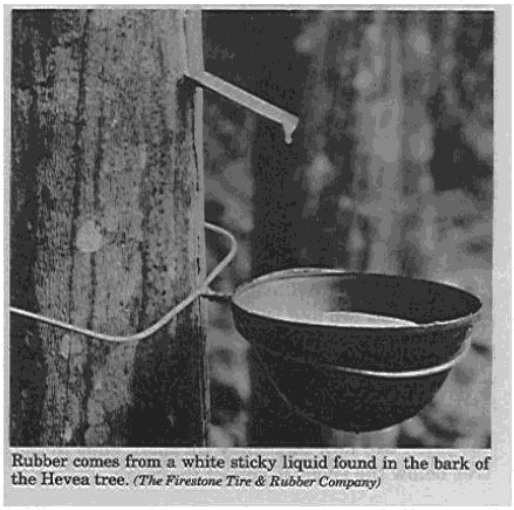
To start with a little backround, I was working at Union Carbide Corporation in the 1960's as an organic R&D chemist at their Silicones plant in West Virginia. Although it was not my area, many of my friends were involved in the new field of synthetic silicone rubber, as were their counterparts at General Electric and Dow Chemical. The task was to make uniform batches of gum feedstock, and use it to make silicone elastomers for demanding environments such as aircraft window and door seals, engine o-rings, and the like. You have seen the gum sold in a slightly doctored form as Silly Putty, and it's also spread on paper as a non-stick backing for postage stamps and address labels everywhere.

Well, as you might expect, not only did the silicone gum come out of the extruder in a wide range of viscosities, but when blended with fillers and catalysts, the resulting rubber it produced had properties all over the scale. One batch of rubber would be outstanding, with everyone running around congratulating themselves, and then the next run would be so bad it would have to be burned. We liked to relate a similar tale of woe in the paper making industry. The paper mill made an outstanding roll of card stock for IBM cards, better in quality than any that had been made before, and the foreman wanted to know if he should ship it to the customer. The quality control guy said no, destroy it, because once IBM saw it they would want more of the same, and the paper mill could never make it that good again. Although my friends at Union Carbide worked on the problem for years, to this day, synthetic rubber manufacturing is more an art than a science. This is true even more so for natural rubber products.

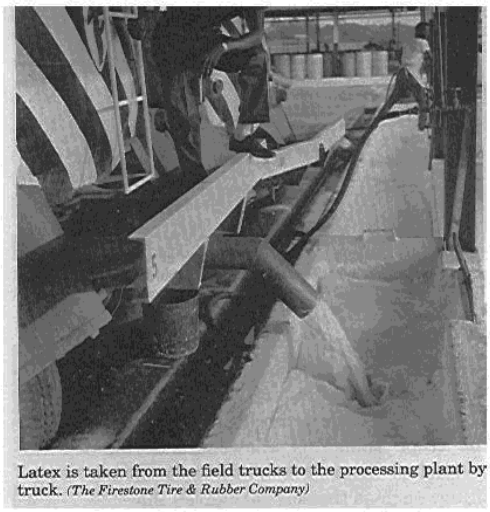
FROM SAP TO STRIPS

We rubber fliers find ourselves in an even worse predicament than the stories told above. Tan II is a natural rubber product that relies on tree sap as a raw starting ingredient. And as John Clapp said, like wine made from grapes, some years are better than others. As you will see, adding in the variable of manufacturing just compounds this problem (a little pun, that).

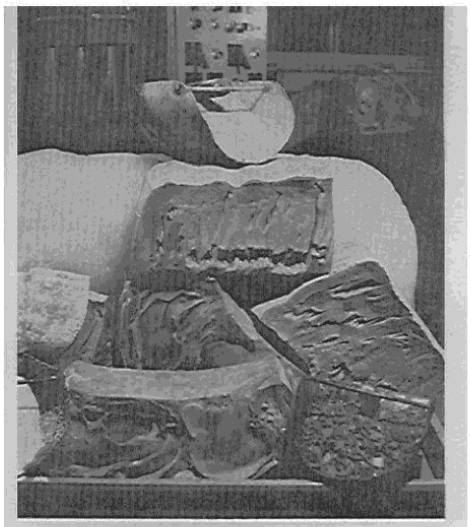
Most of today's natural rubber comes from the sap of the Hevea tree. Its bark contains a white milky fluid called latex, from the Latin lac, meaning milk. From the time the tree is six years old until it is about thirty-six, it can be counted on to produce about four to fifteen pounds of latex a year. As shown in the photos, this is collected from each tree in cups, and taken by truck to a processing plant. There it is mixed with acid causing it to curdle and separate into rubber and water.



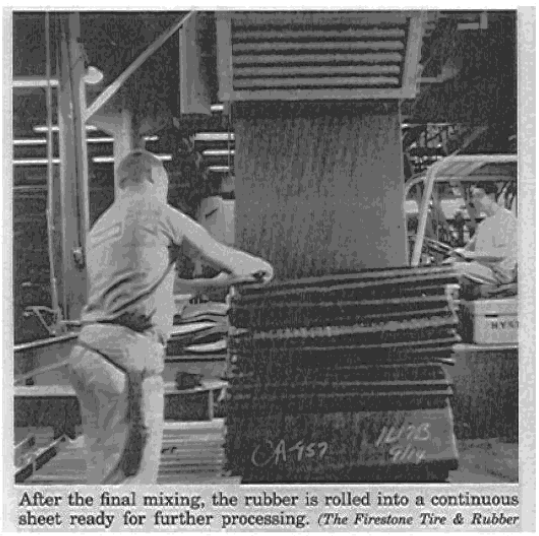
Rubber comes from a white sticky liquid found in the bark of the Hevea tree. *(The Firestone Tire & Rubber Company)*



Latex is taken from the field trucks to the processing plant by truck. *(The Firestone Tire & Rubber Company)*



In the mixing operation, rubber, carbon black, sulphur, and other materials are carefully measured into a large machine. *(The Firestone Tire & Rubber Company)*



After the final mixing, the rubber is rolled into a continuous sheet ready for further processing. *(The Firestone Tire & Rubber*

This crude product is then squeezed, dried, and formed into bales for shipment all over the world. When a bale of rubber arrives at the manufacturing location, it is first opened and sliced into small pieces.
It is again washed and dried to get rid of impurities, and heads to a compounding room. Here, strips of crude rubber are fed through rollers to soften the rubber. Here, too, vulcanizing agents such as sulfur and charcoal, accelerators, pigments, and antioxidants are added as specified by the laboratory.

It is now combined with about an equal amount of reclaimed rubber, and fed into a Banbury mixer, which has grooved rollers and can do a better job of mixing than a smooth roller mill. At this point, it is still a crude, workable mixture, and what happens to it next depends on its end use. If it's going to be made into rubber bands, the mix is fed through an extruder which forms a rubber tube ten to twenty feet long. These tubes are then baked to vulcanize them, and sliced into circular rubber bands. If it's going to be made into rubber strip, it is warmed on a warming mill and passed through a calender, which has a series of rollers which can be adjusted to turn out a sheet of any thickness. For Tan II, it is calendered into sheets 0.021" thick, and two of these sheets are then pressed together and vulcanized to get a 0.042" thick finished rubber sheet. A more uniform product can be made in this way than by rolling one, thicker sheet. This is treated with talcum powder and fed through slitters to get Tan II rubber strip.

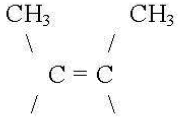
As far as size goes, this customer can testify that quality control is very good. FAI Supply says the thickness is 0.042 $\pm$ 0.005", and I've seen a range from 0.0415 to 0.0433 by measuring 6 to 8 strip stacks with a micrometer, which is considerably better than claimed. As for the width, my 1/8" strip samples are always exactly 0.125" with no discernible variation. However, I only have experience with 1998-2000 batches.

THE CHEMICAL SIDE OF RUBBER

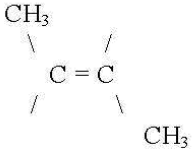
Natural rubber is a unique material. It is maleable and can be extruded and molded like a liquid, yet it is elastic and retains its shape like a solid. What modelers are concerned with is its ability to absorb energy in the form of stretching and twisting, and then give back most of that energy in returning to its original shape. It is able to do this because rubber is a matrix of long polymer chains. "Poly" means many and "mer" means units, so these long chains are made up of many, repeating, units.

The monomer is called isoprene, and is made up of four carbon atoms, with what chemists call a "double bond" in the middle. On either side of this bond are two methyl, or CH_3, groups, large and bulky.

"Cis" Configuration



"Trans" Configuration



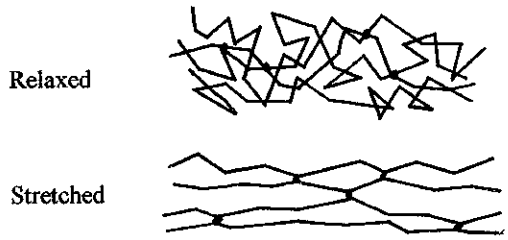
As latex forms in the bark of the hevea tree, the monomer units join up to make a rubber polymer. The size of the molecules are determined during the growing season. Since the double bond holds the two central carbon atoms rigidly in a plane, the methyl groups can either be on the same side of the rubber chain (cis), or on opposite sides of the rubber chain (trans) as it forms. So, aside from the molecule size, or molecular weight, the cis-trans ratio is determined at this time. This is because the molecule is never all of one or the other, but a mixture of the two configurations.

This is not so important to us while the latex is in a watery solution, and the long chains are just floating about in a dissolved state. But as the latex is coagulated, dried, rolled, and generally beat to death, the molecules fold into an ordered, semisolid mass. If there is a high proportion of Cis units in the chains, the bulky methyl groups prevent folding, and the final vulcanized product will have one set of properties. If there is a higher proportion of Trans units, the chains are more flexible and can fold easily into a more ordered solid. This final product will have a different set of properties. What is known at this point is that the "cis-trans ratio" in rubber is very important in determining, and eventually predicting, its properties. What is also known is that a more highly folded solid will crystallize more easily, and then break under high stress.

THE ENGINEERING SIDE OF RUBBER

Engineers have long known of elasticity when measuring the strength of materials –it can be measured in the form of a stress-strain curve. An applied stress, or pulling, yields a resulting strain, or elongation and/or twisting. This is reversible, so all solids are elastic to a certain degree, until the stress exceeds the strength of the material, and it breaks. Vulcanized rubber is a tremendously strong material, but it doesn't give much warning of its yield point - it just breaks.

As shown in the sketch at right, in its relaxed state, the chains are folded and entwined around each other. They are also crosslinked, or joined to other chains by linkages in the sulfur atoms formed during the vulcanization (or heating) step in manufacturing. But when stretched, the coils unwind and absorb energy. If kept lined up at the right temperature for too long, crystallization and breakage can occur.

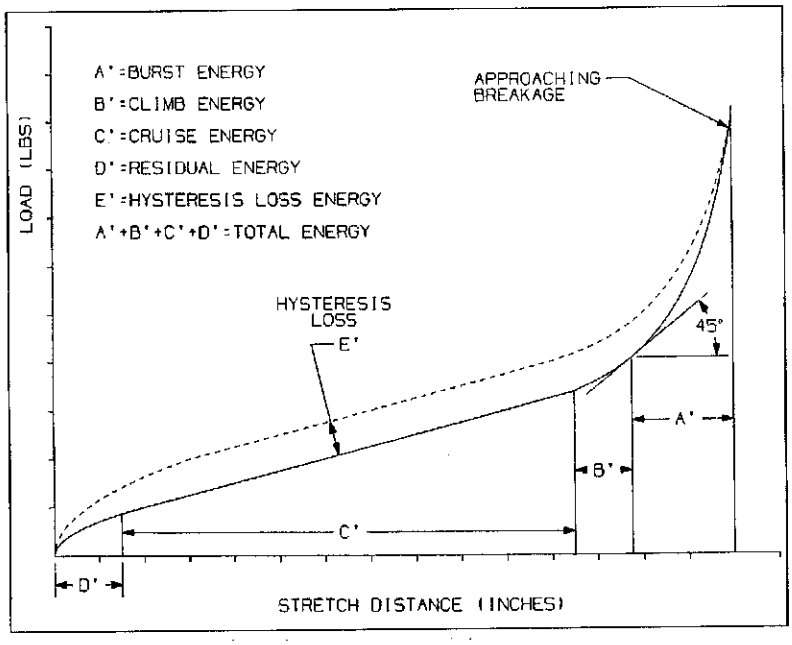


An important feature of a reversible stress-strain chart is that the stretching and relaxation curves don't lie on top of each other. In other words, you never get out what you put in. This is due to hysteresis, a French word meaning 'to fall short'. In the case of rubber, it is energy lost. Pull on a rubber band and press it to your skin; it will feel warm. This is stretch energy lost in the form of heat. Pull very hard on it and hold it for a long time, and it may turn brittle and snap. This is energy lost in forming brittle crystals and the failure of weak crosslinks in the rubber matrix.

FINDING THE ENERGY IN A RUBBER LOOP

All this leads us to the heart of this article, which is how and why rubber loops are tested for something called "total energy", and what this means to the serious flier. The whole point of the introduction *From Sap to Strip* was to highlight all the variables inherent in making the box of rubber we buy and use. But, as a friend of mine asked, "Why all of this testing? Are we going to send it back?" No, I'm not, but I can accumulate many different batches, test them and see how others have tested them, and use the best to compete with and the rest for practice or sport flying. Also, Chilton and Tenny and Rash and Coslick will tell you that you have to wind a lot of samples and break a lot of motors to get good at it. Testing is a way to speed up that process.

The hysteresis stretch-strain energy curve for a rubber loop drawn by John Clapp is shown below. It should be familiar to most readers. It is dimensionless, in that it doesn't have actual numbers on the axes, but if it did, the best numbers to have would be 0 to 100% on both. That way all sizes and weights and batches can be drawn on the same plot, and only the differences between samples would show up.



Whether we are winding or stretching, the first step is to make up 5 to 10 identical loops from the same batch, weigh them, break them in if desired, and wind or pull a few until they snap. This will establish the 100% point on the x (horizontal) axis. Then we record force in either pounds pull every 3 inches, or inch-ounces of torque every 100 turns, up until 95 to 98% of the breaking point, and then record the same increments while relaxing or unwinding the strip. The difference between the two curves is the hysteresis loss due to friction heat, broken links and crystallization mentioned earlier. The area under the return (lower) curve is the useable energy of the rubber sample.

ENERGY FROM STRETCH TESTS

Let's take stretch testing first. If we divide the return energy curve into slices, or bars to denote the sample size, the calculation method to find the area becomes obvious. Merely add up the pieces to get the whole. We add these bars together into one long strip of forces, three inches wide. The actual amounts of pull recorded during the test are noted on the graph below as F values. We first sum the forces by totaling up the average heights of all the rectangles under the return energy curve. The average value is simply the force on one side plus the force on the other divided by two. So the sum of the forces looks like

$F = (Fmax + F1)/2 + (F1 + F2)/2 + (F2 + F3)/2 + \ldots\ldots,$

But this can be simplified. If we multiply through by 1/2, we get

$F = \frac{1}{2}Fmax + \frac{1}{2}F1 + \frac{1}{2}F1 + \frac{1}{2}F2 + \frac{1}{2}F2 + \frac{1}{2}F3 + \frac{1}{2}F3 + \ldots\ldots,$

and combining like forces, gives

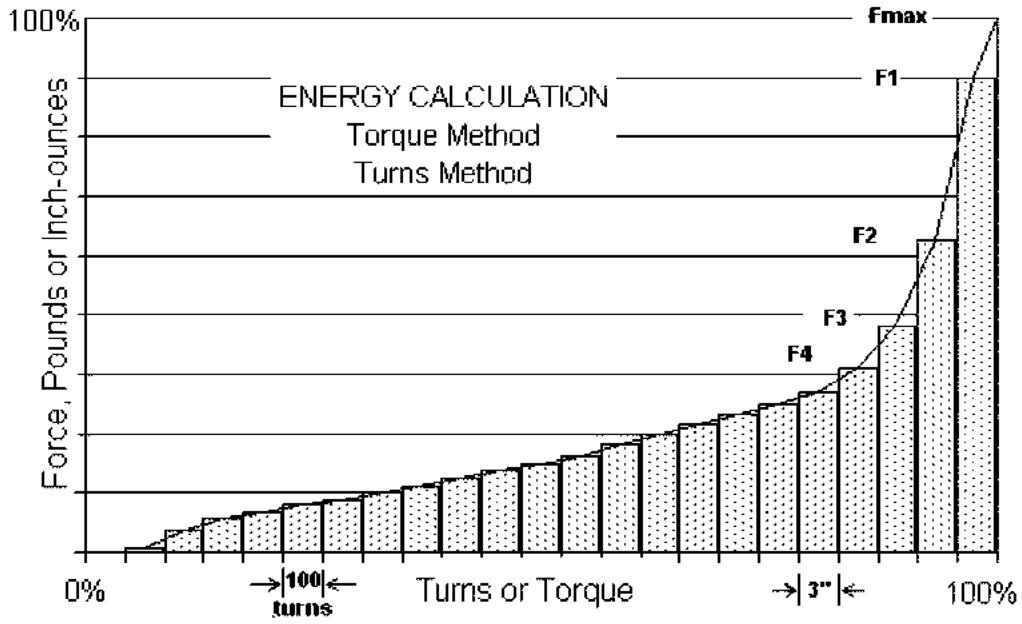
$F = \frac{1}{2}Fmax + F1 + F2 + F3 + \ldots.$

$F = \frac{1}{2}Fmax$ + sum of all the remaining forces,

(or the way Gibbs writes it, (2sum + Fmax)/2 , which is the same thing).

The last step is to convert to foot-pounds/pound, using ¼ to change the 3-inches to feet, and 16 to change the strip weight in ounces to pounds.

Energy = ¼ x 16 F / Wt of strip in oz. = 4F/Wt of strip in oz.



ENERGY FROM TORQUE TESTS

The good news is that we don't have to go through the explaination of summing all the forces again, because finding the energy under a torque/turns curve is the same as for stretch. We are adding up strips that are T units high by 100 turns wide. Now we use T instead of F, so

T = ½Tmax + T1 + T2 + T3 + ...

T = ½Tmax + sum of all the remaining Torques.

We have angular energy being measured, so multiplying by 2¶ converts this to linear, there are 100 turns and 12 inch-pounds to the foot-pound, so the final equation needed is

E = 100 x 2¶ x T/ (12 x Loop wt in oz) = 52.35 x T / Loop wt. in oz.

The last question to be asked when talking about measuring rubber energy is, "How do these two methods compare, and are the results meaningful?" The answer is, "It depends." Mathematically, the two analyses are the same, in that they accurately find the area under each curve, whether it be stretch or torque. But the following variables enter in to the test findings:

Are tests adjusted for the same temperature?
Are the samples from the same batch? The same box?
Were the loops broken-in before testing?
Was winding done by turns or by torque?
Was the winding slow or fast?
How close to the breaking point limit were the samples stressed?
Was a lubricant used?
Were enough samples tested to get a good average?

Without some examples, the usefulness of energy testing will be debated forever, but as backround for this article, the table of energies below was assembled. It not only includes stretch and winding results, but also rerun values that show that all samples benefit from a breaking-in of some sort. To get some idea of the range in values, ordinary office rubber bands have an energy of 1800, and a steel spring an energy of about 8100 ft-lbs/lb. Readers are asked to search their files, and help INAV expand even further on this list.

RUBBER TEST ENERGIES – 1976 to 2000

Type	Batch	E @ 75°
FAI	2/76	3400-3500
FAI	3/77	3200-3500
FAI	6/77	2700-3300
FAI	11/77	3050
FAI	9/78	3020
FAI	2/79	3350
FAI	6/79	3360
FAI	11/79	3290-3500
	Rerun	3370-3600
Pirelli	1978	3910
Pirelli	1978	3680
Pirelli	4/79	3500
Pirelli	6/79	3700
Pirelli	9/79	3430-3615
	Rerun	3600-3720
FAI Tan	1991	3770-4100
FAI Tan	1990	3050-3120

Type	Batch	E @ 70°
Tan I	11/91	3596 ft-lb/lb
Tan II	5/94	3475
Tan II	6/94	4100+
Tan II	8/94	4100+
Tan II	4/95	3497
Tan II	1/96	4042
Tan II	4/96	4272
Tan II	6/96	4137
Tan II	7/97	3580-4140
Tan II	10/97	4513
Tan II	2/98	4485
Tan II	5/98	4042-4325
Tan II	7/98	3942-4390
Tan II	2/99	4582
Tan II	3/99	4198
Tan II	5/99	4110-4675
Tan II	7/99	4093-4215

Type	Batch	E @ 70°
Tan II	9/00	4014
	Rerun	4277
Tan II	4/01	4172
	Rerun	4327

BRINGING IT ALL TOGETHER

Some technical types I know are in love with data; lots and lots of data. But the real value comes when this is organized into information that the reader can use. Two modelers who have shown the way in turning energy testing into contest performance are Lt Col. Bob Randolph of F1D fame, and Wakefield flier Jim O'Reilly. In his short article in April 1993 INAV, Randolph states:

"Suddenly the idea hit me that what makes F1D so great is that everything is important. You need a good design, a well built model, a well adjusted model, good rubber, and capability to find the optimum motor to obtain really long flights. Any one factor that doesn't measure up will reduce duration. Therefore you goal should be to improve all of the skills required. Some may question what skill has to do with rubber. The skill is in being able to identify which of the rubber you possess is the best and to keep an active lookout for better."

Since 1983, Randolph as been using quarter motors in practice, and using his best quality, full motors for contest day. This way he stays with the best batch, and conserves what he has at the same time.

Jim O'Reilly has taken this a step further and has outlined a system of integrated testing and flying. This means that his stretch testing is done on actual contest motors, not samples from they box they came in, and this both breaks in and sorts the motors by specific energy. Although developed for outdoor, it is just as applicable to indoor.

1. Make up motors to weight and length and put motors and labels in plastic bags.
2. Lube motors and check their lubed weights.
3. Conduct pull-type energy and break-in tests.
4. Make a table of motors and their energies for the contest. Plan the best motors for early morning and flyoff rounds, with lesser motors for the warmer, thermal part of the day.
5. Wind to torque values on the torque vs. length chart. Finish winding very slowly.
6. Don't be afraid to re-use a motor if it has no broken strands or nicks.

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Photo Credits:
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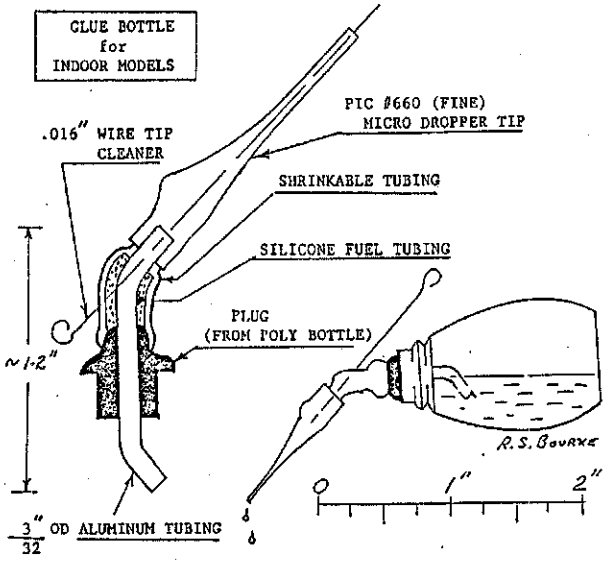
From SAM 86 speaks as Published in Indoor News Nov 95

A MICRO-DROP GLUE APPLICATOR FOR INDOOR MODELS
By Roy Bourke Markham Indoor Group

One of the secrets of building light indoor models is to pay attention to the glue joints. Excess glue is heavy, and does not necessarily add strength to the joint. A good glue applicator can go a long way to ensure the accurate placement of just the right amount of glue to each joint. The accompanying sketches show an excellent glue bottle that can be used with acetone-thinned model air- craft cement or water-thinned white glue or Titebond, as used on indoor m o d e 1 s . incidenta1ly, I did not design this glue bottle. It is available Commercially from the USA, but it is much cheaper to make one yourself.

The best poly- bottle to use is a small food colouring bottle (McCormacks food colouring), but there are several other poly bottles that could be used with minor modifications to the design. Begin by bending a piece of 3/32" aluminum tubing to the shape shown, and fit it to the plug that comes with the poly bottle that you are using. Make sure that you make the lower bend such that you can still insert the plug into the bottle without interference from the tubing.



Drill a small hole (0.016") in the upper bend for the wire tip cleaner, then cover the bend with a short piece of silicone fuel line. Add a piece of shrinkable tubing over the silicone tubing, shrink it in place, then add the Pic Micro-Dropper tip to the end of the aluminum tubing. Make up the wire tip cleaner, and insert it backwards through the nozzle to pierce a hole in the silicone end shrinkable tubings. Finally, re-insert the tip cleaner from the back end of the nozzle, and the glue bottle is complete.

To use the bottle, simply draw the wire tip cleaner back only far enough to clear the narrow part of the bore of the Pic nozzle, tip the bottle and squeeze. You will find you have excel1ent control of the amount of glue that appears the tip. During storage, the tip cleaner is left fully inserted to seal off the nozzle. Since polyethylene does allow some evaporation of the acetone, you should check the thickness of the glue periodically, and add acetone as necessary.

The Indoor group started by Don Slusarczyk is a tremendous resource and great way for indoor fliers to stay in touch. This group is free and can be read via a web browser or received as e-mails. To join from a web browser go to http://groups.yahoo.com/group/indoor/join

indoor-subscribe@yahoogroups.com

Mini Miter box

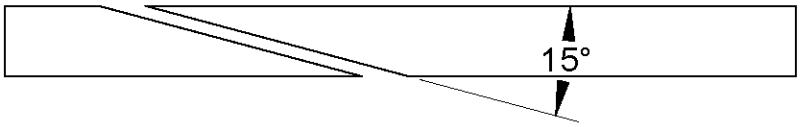
By Bruce Kimball

I originally designed the mini miter box to help improve the quality of my scarf joints that I use to join prop spars together. I was tired of cutting the spars to the correct taper for the prop and then screwing up by trimming too much away as I tried to get a perfect splice. I sometimes ended up with a spar that was too small and weak or in the worst case too short for the blade. None of the commercial miter boxes had a shallow enough angle to splice the length that I wanted.

I made the first one by gluing a piece of 3/8" square wood to a small base. I needed to cut a slot in it while keeping it at the correct angle. I also discovered that by using a razor saw to cut the slot you ended up with a slot that was too loose to guide the razor blade correctly. I wanted a tighter slot so that when I slid the razor blade down into it there would be no slop and the cut would be very precise. It finally dawned on me that it was easier to put the exact angle on two pieces of wood and then glue them into place with the correct space between them. The first version was fabricated out of some scrap walnut and was assembled with the new technique and it worked beautifully. The joints fit together so well that it is close to impossible to see the splice.

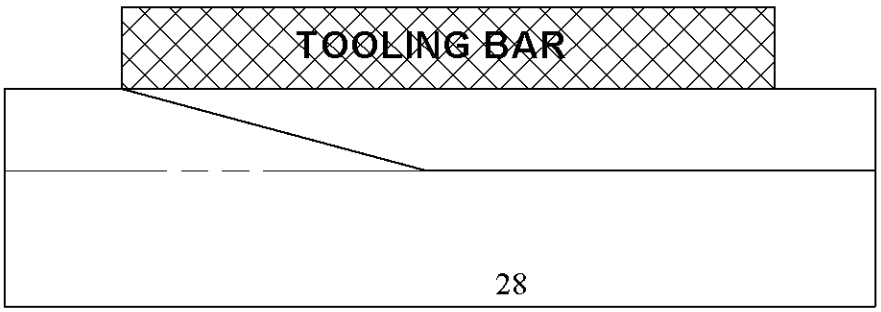
I made a few extra and brought them to the Kibbie Dome contest to give away as prizes. The versions that I have made have all been out of walnut just because it looks nice and is easy to work with. You can use whatever wood you want but the harder it is the longer it will last. The bases are made out of thin wood between 1/8 to 1/4" thick and the back pieces are out of 3/8" square. I suggest a small piece of 1/8" plywood for the base and some 3/8" square spruce for the back if you don't have any other wood in stock.

The dimensions are not too critical but I have found that this is a nice size that fits into your toolbox, for onsite repairs. Take your time and make sure everything is square, as it will affect the quality of the splice. Take the 3/8"sq and cut the 15-degree angle across the width using one of the Foremost Model Products mitersaws to give you an angled cut as shown in the following diagram.

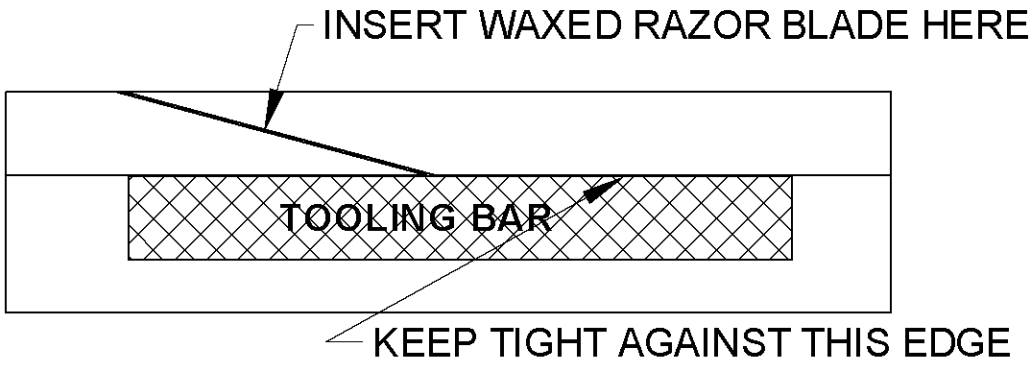


I sand the angle using the Foremost Model Products miter so it is smooth and both pieces are at the same angle. If you have a table saw and a disc sander then use them making sure that everything is accurate.

I glue the longer piece on the base first by using a straight edge to line up the edges. I use a 3/8" square tooling bar but you can use a scrap piece of the spruce, just make sure that it is straight. I use a very thin layer of 5-minute epoxy to glue the parts together. You can also use white glue or even CA if you prefer. It has to be very thin so it doesn't tip the 3/8" square when it is glued on. The part should look like the following figure.



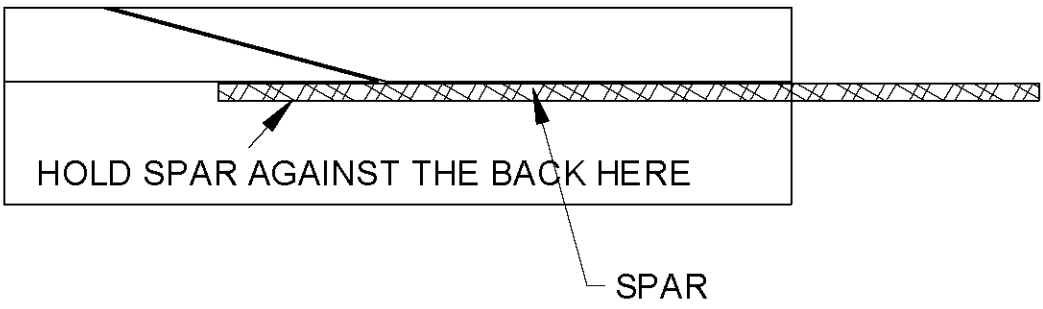
After it has cured then the next piece is glued onto the base. The secret of the tight fit on the razor blade is that you put a razor blade in between the two pieces when you glue the second piece on. I put the tooling bar (or straight piece of spruce) on the lower edge of the 3/8" square as the next drawing shows and put the waxed (to prevent it from being glued in) razor blade next to the angled edge of the back piece. I put the next angled back piece against the razor blade and wedge it in place by pushing it into the blade while keeping the tooling bar in place. You can use a clamp to hold the tooling bar tight to the back piece, which will prevent it from moving.

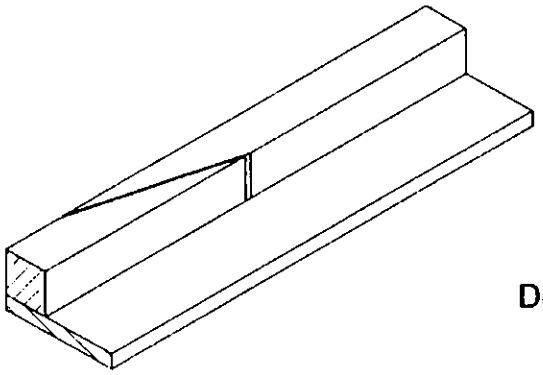


After the glue dries, remove the tooling bar and clean out any excess glue that may have dried between the base and the back piece. You want that corner to be square so that the spars fit tight up against the back. Give the entire miter box a light sanding to clean off excess glue and to also give it a nice appearance. I also chamfer the edges so the balsa will not crease on a sharp edge while being held in place. Check the fit of the razor blade to see how snug it fits. You want it to be tight so the blade will not tilt and give you a crooked cut.

When I cut the splices, I hold the large end of the spar on the left side in place with my left index finger gently pressing it into the corner and then sliding the sharp blade down through the slot until it slices through the part. I usually push the blade down and into the back piece to shear the wood and help prevent the crushing from cutting straight down. Repeat for the other spar and when you are happy with the results glue them together using your favorite method.

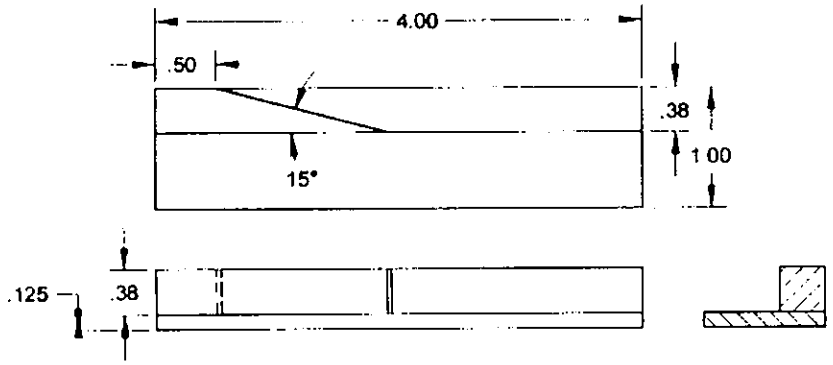
You can also make different angles for different splices using the same technique or even 90 degrees for square cuts. I have completed some boxes with the angle on one end and a 90-degree slot on the other end. I hope that you give one of these tools a try, I think you will be impressed how nice they work





Mini Miter Box

Design and Drawn by Bruce Kimball



KNOTS

All of us who fly rubber powered models are faced with the same dilemma. Connecting the ends of a strip of rubber into a loop, or, the infamous knot. Here we present three different knots, with some pros & cons of each.

#1. The Classic Knot. This knot has been used for years. It works quite well, except that it tends to come untied, especially with really slippery lubes. Also, it is heavier than any of the other knots presented here. An added problem is that due to it's large size, it can rotate around and punch holes through your motor sticks. Just such an incident caused me to look seriously at other knots.

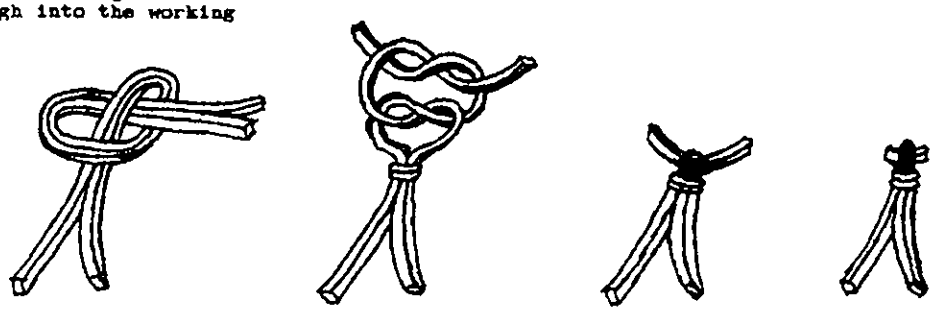
#2. The Thread knot. In a recent article I referred to this as a "Richmond style" knot. That's because Jim Richmond taught me how to tie this knot in 1982. I don't know who originated this knot, but it has been around for many years. It is favored by many because of it's light weight (.0005 -.0007 ounces). I used it for many years, but I ran into occasional problems with breakage at the knot.

After some careful observation, I realized that the rubber was actually sliding right through the thread, and when the glued section of the rubber slid through into the working part of the rubber, BANG! The rubber broke. When I began experimenting with alternate lubes, like Armor-All, the problem got worse.

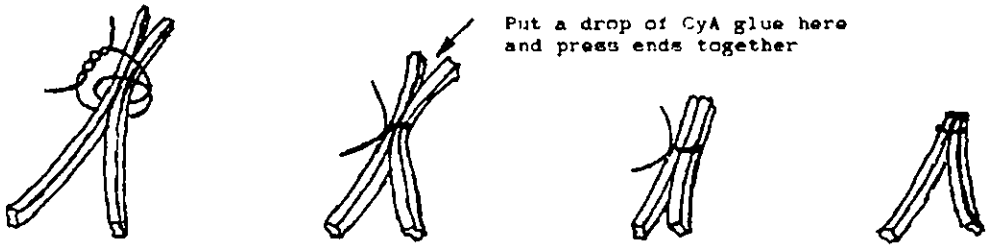
The breakage peaked out when I bought a force gage and began to stretch test rubber. I found that this type of knot consistently came apart at about 3.6 to 3.8 pounds of stretch. Yet the Pierce formulas called for stretch up to about 4.7 pounds to test these particular samples. This is when I watched the knots carefully and discovered the slippage. After some experimenting, I came up with the modified knot as shown in #3.

#3 Modified Classic Knot. The basic problem with the Thread knot, is that the wrap of thread is static, and doesn't tighten up as the rubber is stretched. Both the Classic knot and the Modified knot have a wrap of rubber that stretches and tightens as the motor is stretched. The key to the Modified knot is that the CyA glue secures the backup knot into a shape like a bow-tie, so the backup knot can't slip through the wrap. This knot will take in excess of 5.0 pounds of stretch when tied in the same loops of rubber that broke the thread knots at 3.6 to 3.8 pounds. This knot is definitely stronger. My samples of the Modified Classic knot weighed between .0008 and .0009 ounces, which is a very small weight penalty when compared to the Thread knot.

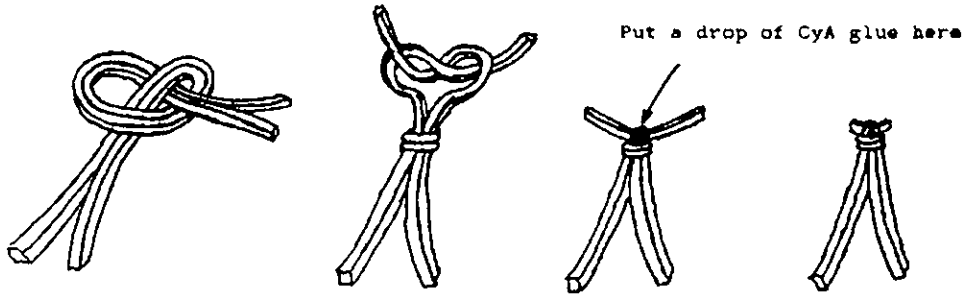
THE CLASSIC KNOT



THE THREAD KNOT

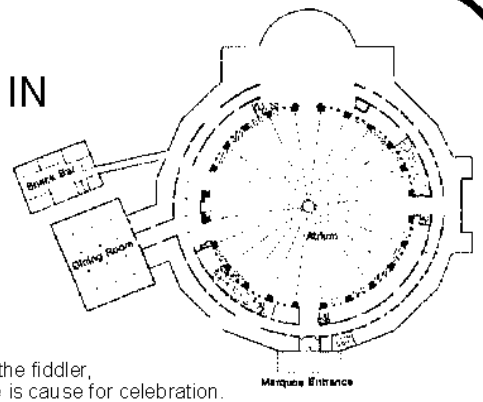


THE MODIFIED CLASSIC KNOT



From Indoor News and Views, #29-32, April 1987

West Baden, IN



NEWS FLASH!!

Sweep the barn floor, call in the fiddler,
and bring your friends! There is cause for celebration.

Walt Van Gorder has announced he's gotten access to
the dome in West Baden Indianna. (Thank you Walt!!!)

This is not a contest.
It is an attempt, after years of work on Walt's part, to prove to the new owners of the building that we are, at best, an attraction, and at worst, harmless...

Details:
Saturday August 11, 10 AM to 4 PM. Sunday August 12, 12 PM to 5 PM.
You must have a current AMA membership card to fly. No electrics
In addition you will have to register with the Historic Landmarks Foundataion.
10 people must be registered before July 9 to make the event happen and registration cutoff is July 20.
There is no cost to register or fly at this casual event.

To register call the Historical Landmarks Foundation at 800 450 4534.
Ask for Andrea Hill. Say you want to fly at "Fly me to the moon" at West Baden
Other Questions call Walt Van Gorder at 513-922-3351 between 6:30 - 9:30 pm.

INDOOR
NEWS and VIEWS

ISSUE # 103
September 2001

From The Editor's Desk

We would like to thank everyone for their favorable comments on Issue #102. One of the observations made was that it seemed to be a good mix of novice and expert articles. We will try to continue this in the future, not only with Science Olympiad stuff, but how-to articles that bear repeating, because the great thing about indoor fliers is their willingness to share their "secrets". We would like also to have a theme each time. Just as last month had gliders and S.O., this issue features F1D. Thanks also to all who sent material and photos. We WILL use it all.
- Carl Bakay

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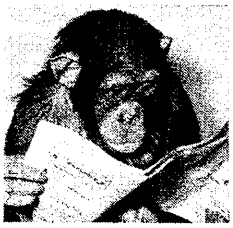


Unless specifically stated, INAV does not endorse any products or services advertised herein. Sample ad copy should be sent to Tim Goldstein at the above address for publishing details.

Membership Desk, August 2001

Business first : As announced in #102 prices were raised effective July 1. If you sent in a subscription that was received after July 1 it was entered at the new rate. For USA subscribers you get 1 month per $1 received. I hope those of you affected can understand the reasoning behind this. Check your mailing label for your current expiration date.

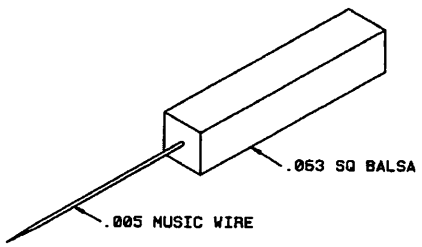
Jr Issues : The CD archive has been well received and is creating a nice pool to help Jrs. We are working on some ideas and will be announcing them in the next issue. What we are not doing with this particular fund is using it for the Jr F1D team. That is a separate fund and we will be asking for help on that once we have identified the team at the trial over Labor Day weekend. Looks like we may be fielding a full Jr team for the first time since?? Thanks to Ray Harlan and Bob McLinden for sponsoring some Jr subscriptions.

Ramblings : Attended the Kibbie Dome contest. It continues to be one of the best flying opportunities in the USA. Andrew Tagliafico runs it with a unique format that allows virtually unlimited flying of any class for 4 days straight in the site many top fliers call their favorite. Gives you the choice of flying lots of classes or spending all your time honing your skills in a single event. Events flown included FAI, AMA, FAC, and SO. If you are looking to get in a lot of flying, learning, and talking this is a must attend.

Pins For Indoor Models

Ray Harlan

Years ago, Erv Rodemsky had a great idea for pins for indoor models. He reasoned that, while standard sewing pins and even insect pins were too thick for our skinny spars, pins made from .005 music wire might not damage the wood to any significant extent. I can't remember exactly the configuration that he had, but I made some that used a bent loop for the head. These always got tangled up in their container, so recently I thought of trying to CyA some wire in the end of 1/16 sq balsa strips. The wire was centered in the balsa as well as possible and pushed in about 3/16 inch. It also was kept parallel to the strip. A small drop of thin CyA locked it in place and the wire was cut off at a length of about .3 inch. It was sharpened on a Dremel tool with a fine cutoff wheel. The wire was kept tangent to the outside of the wheel and at a shallow angle to the plane of the blade, with the rotation of the wheel moving away from the wire. The balsa could be rounded to make it easier to rotate the pin when sharpening, but the square shape worked fine. Half a dozen of these pins in the toolbox can make field repairs simpler by helping to hold parts in place while the glue dries. The wood handle makes them visible so you won't forget to take them out after repairing and fly the model with some extra baggage.



Having spent the past few years working with Science Olympiad students, parents, and coaches, at one point or another they all ask the same few questions. Typically, after their first time using a winder they say "Where can we buy one of those? And after tweaking some more offset into the tailboom to fix the circle I usually hear "How did you know to do that?" Questions which to the seasoned modeler are easily answered, but to the beginner are difficult to solve because of the handful of suppliers in the indoor free flight community. And unless your local library is lucky enough to carry a copy of Ron Williams' "Building and Flying Indoor Models", info on how to trim a model are virtually non existent.

Fortunately, within the past few years the internet has become a great tool for joining indoor modelers worldwide, and web sites are starting to pop up along with mailing lists and consequently a great resource is now available to us. The majority of Science Olympiad (SO) students will have easy internet access so I felt an internet guide is much more suitable. And who knows, while we are helping students learn to fly models, maybe they can help us learn to use the internet!

The following links are useful for anyone trying to mentor students in the 'Wright Stuff' event.

www.geocities.com/soincus - official Science Olympiad national home page.
www.freeflight.org/science_olympiad/tips_by_jeff_englert/scioly.htm - online building guide
www.geocities.com/soincus/vend2001.htm - excellent resource list by Bob Clemens
www.faimodelsupply.com - rubber strip and winders
http://members.aol.com/~IndoorMS/IMS.htm - supplier of premium grade indoor wood
http://people.ne.mediaone.net/indoor/index.htm -has an excellent vendor list
www.sigmfg.com - contest grade balsa wood
www.indoorduration.com - lots of articles on indoor building technique
www.indoorfreeflight.com - CD-Rom detailing how to build a 'Wright Stuff' model

In addition to these web sites, the Indoor Free Flight Mailing List may be able to provide you with the extra help needed for those really specific questions about building and flying your SO models. We currently have over 300 members worldwide who are more than willing to help out with hints, tricks, and suggestions. To subscribe, you can visit the following link,
http://groups.yahoo.com/group/indoor/join or just send and email to
indoor-subscribe@yahoogroups.com and you will be signed up.

The last item I want to mention is a product which I have created, called the "Illustrated Guide to building the Olympus". It is a CD-Rom which is written like a web page and can be viewed on any computer with your web browser, and covers both the B and C divisions. The CD has over 300 color photos and has very detailed close up photos showing the step by step process of building the 'Olympus' model design. The 'Olympus' design is a very competitive design which has done over 4 minutes under the current SO rules. The CD comes with a full size plan and is an excellent tool for those who have limited access to experienced indoor fliers. It was written truly for the beginner, and many students who have never built a model before were coming in close to weight and doing 2 minutes with their first models! Some of the topics covered include: wood selection, cutting ribs and spars, building technique, pre-shrinking tissue, covering, making tissue tubes, bending wire nose bearings, prop scrapping and re-pitching, model assembly, flight adjustments, winding, vendors, troubleshooting and more. Currently I am in process of updating it to the new rules, and the newest version will be available sometime in the in the fall, and will have many new sections including video clips! The 2000-2001 version is still available with a full size plan for $20 (free postage). If you are interested in purchasing a copy, you can either email me, buy it online at my website, or by postal mail.

Until next time, see you on the net!

868 Eaglewood Dr., Willoughby, OH 44094.
www.indoorfreeflight.com
don@indoorfreeflight.com

Steering Guide

John Kagan

Steering is a critical skill for F1D, and extremely valuable for many other categories. However, I've seen many people struggle with it at all levels of competition - either missed / botched steers or people too intimidated to steer when required. Learning the skill will dramatically improve your chances for successful flights, save many models that might otherwise be lost or destroyed, and generally take a significant portion of the stress out of competition flying.

As many people are taking up F1D again or for the first time, I'd like to pass along some of the current steering tips and techniques I've managed to collect.

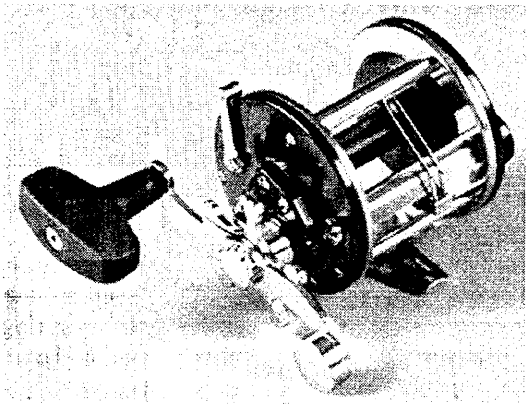
Equipment

Balloon: You need a balloon that provides enough "pull" to give adequate control at high altitudes. If the balloon lags behind you as you walk, it will never respond quickly enough to catch a model. I've seen the following types used successfully:

- 100gm meteorological balloon from Scientific Sales 800-788-5666 (about $8)
- 4' Qualatex balloon from a local party supply store (about $12)
- 3' latex balloon from a local gift shop, filled to the max (about $3)
- Homemade 4' Mylar balloon by Ray Harlan (priceless)
- Army surplus weather balloon, partly filled, from an Army Surplus store ($?)
- I've used 5' balloons (about $25) in the past, but since they are heavier and larger they end up having about the same pull and response as smaller, lighter balloons. Plus, people freak about all the helium you use.

Plug: The old-fashioned balloon tie-off method uses a wooden stick to roll up the balloon nozzle, with a rubber band wrap. Modern setups have a tubing coupler tied in the balloon neck with a removable plug (check out http://www.engineeringfindings.com/cat21/p61.pdf - about $4)

Reel: Baitcast or casting reels work well. They provide enough capacity for braided line, stand up to the abuse of abrupt stops (clicking on the brake), and provide smooth action when reeling down a model.



Find a cheap, heavy model, preferable at a tag sale. If you buy an expensive, light alloy gem you'll most likely end up waving goodbye as your balloon carries it to the ceiling.

Line: Braided nylon line provides excellent strength and little stretch, which give good sensitivity and feel for steering. It also comes in bright neon colors for visibility. A reasonable alternative is 10 to 15 pound monofilament fishing line.

Steering tube: One of the best recent innovations is the use of caulk backing as the material contacting the airplane. Essentially a long foam rod, the caulk backing provides a gently, non-snag surface that won't get tangled in VP mechanisms. It's made for jamming in concrete cracks before filling with caulk. You can get some from your local Home Depot or equivalent (about $3 for 25' or 30'). A good connection method is to fold the caulk backing over a loop of the line and secure with plastic tape.

Retrieval rig: Now that you've got a spiffy steering setup, don't mess it up by using it to retrieve stuck models. Murphy's Law guarantees the first time you use it (or someone borrows it) to retrieve, you'll end up with balloon fragments and a pile of line – and your next flight will be in desperate need of a steer. Instead, get an inexpensive Mylar balloon (I like the 4' star balloons best), and the cheapest reel available at Wal-Mart, pre-spooled with monofilament. Not only will you spare your steering rig, you'll also have a gentle, durable way to retrieve. You can rest the balloon on the ceiling, without worrying about popping it, and use the line to gently nudge your model off girders.

Preparation

- Know the rules. They explicitly state how you can steer, and the situations in which you are allowed to steer. Paraphrased: "...from the front of the model" and "...to avoid collision with another model or primary structure of the building". This way you won't jeopardize your reputation with inappropriate steering, and you will have ammunition to justify your decision if questioned.
- Know the interpretation of the rules for the site in which you are flying. The CD usually announces this at the beginning of the contest. For example, in a dome like Johnson City, where does the roof end and the wall begin? In the past the CD's have specified that you are allowed to steer once your model crosses the edge of the tennis court markings or the running track, so you need to know this.
- Keep your balloon with you when you have a flight up, especially when flying in sites known for drift. It's amazing how quickly you can go from "hmmm, should I steer?" to "Ack! It's about to hit the wall!".
- Put your balloon up early if you are heading into danger. Primarily done for the reason listed above, this also gives you a relaxed chance to confirm proper balloon height. In general you want the model to be in the middle of the caulk backing, so about 12' to 15' from the bottom of the balloon. You are allowed 1 helper in F1D - have them move far away from you and check your balloon height.
- If you are in danger of colliding with another model, confer with the other flyer and quickly decide who will steer. The rules specify that the flier with the lower flight time has the responsibility to steer, but if there is any hesitancy or doubt take the initiative.
- If you decide that you need to steer, announce your intentions to your timer. This will give him/her a chance to prepare the prop-stop watch.

Technique

- Position yourself so that you will contact the model at the point farthest from the obstacle you are avoiding. If you miss, worst case, you will move the circle farther out rather than closer in to the obstacle.
- Turn your body so you are facing in the direction the model is flying, and keep turning as the model turns. You will be looking over your head as the model approaches. I've found this helps tremendously in accurately projecting the model's flight path.
- Use exaggerated movements with correction to reposition the balloon. For example, if you want to move the balloon 2' forward, quickly walk 10' forward and then 8' back. Otherwise the balloon will still be plodding slowly along as your model fly by.
- Plant the balloon in the model's path and let the model fly into it, rather than trying to move the balloon into the model. Position it so the balloon ends up on the left side of the motorstick. The prop will work itself right past the line.
- Begin moving forward immediately. It's best to walk fast enough to "capture" the prop (prop-stop time is deducted, so there is no benefit / penalty). This will eliminate any controversy regarding control of climb or descent (see "know the rules"). It will also keep the model more securely on the line until you reach the point at which you intend to release the model. The only exception is during the initial part of the flight when there is a lot of torque on the prop – where "capturing" the prop may break the inner ribs. In this case you may want to let the prop turn while you reposition the model.
- When you reach your target release point, gently pull the line down and move to the left. This disengages the top prop blade and moves the line out of the way. Very important: KEEP WALKING. The most common mistake is to stop walking when you are trying to release the model. If you stop, invariably the model will drop its tail, roll over, and wrap around the line. Now you'll never release it.
- It is quite common to need a few attempts to release the model. As stated above, keep walking. Don't panic. If required, walk in a circle to the right until you are back where you want to release the model. Make sure the model is level, that you are moving at an appropriate pace, and try to release the model again.
- Once the model is off the line, move the balloon away from the area. More than one modeler has pulled off an impressive steer, only to inadvertently walk the balloon right back through his/her model.

With a little bit of preparation and practice you too can enjoy the many benefits of steering. Just like building and trimming, steering is an important skill to add to your repertoire.

KIBBBIE DOME ANNUAL 2001

By Andrew Tagliafico

Great sight! Kibbie Dome looming up across the University of Idaho campus. Great site! Walking into that vast clean space, carefully prepared for the 2001 Annual, knowing you will have 12 hours a day to fly any or all the events you wish. Just get your officials in before the end of the four-day event.

Arriving the day before the start of the meet to take care of all the little things that make the Kibbie Dome Annual a special event for those who attend is a pleasure, because you are able to greet the early arrivals. You are able to help them set up tables in that certain preferred place that feels just right, unpack models and equipment, talk of past adventures here, see old models and new improved models, talk of rubber, weather, and "where are we going to eat dinner tonight?"

Everyone's friend, John Lenderman, car packed and ready to leave for Moscow, experienced a medical emergency serious enough to prevent his attending the meet. At this writing it can be said that John is well on his way to recovery and will be flying locally at our very next contest.

Entries were up this year with contestants from as far away as Saskatchewan, British Columbia, Illinois, Minnesota, and Southern California. The Flying Scale group was back in force this year. Dave Haught, C.D. of that event, had two beautiful, large B-17 models. They were impressive in the air. Next year: "formation flying". Orville Olm and wife, Marcia Green, down from Saskatoon, Canada, livened the scale meet with their participation. Orville strayed over to the Duration Area and managed a third place in Unlimited Catapult Glider.

New F1D rules (2002) are catching on. Despite their restrictive wing and elevator, they are displaying better flight performance than anticipated: Potential flight times of 30-plus minutes. Surprisingly, unbraced wing models seem best suited to handle launch torque characteristics of the small tightly wound 0.6 grams of rubber. This from Steve Brown. He also likes the new Y2K2 covering material as do others flying F1D, EZB, Mini-Stick, etc. Pretty stuff and easy to work with.

EZB 1.2 gram was a new event this year, replacing the previous Wally Miller International, which was the AMA version EZB flown in six rounds during one day. EZB 1.2 gram was flown in three rounds on Saturday and three rounds on Sunday, anytime each day, combined with all other events. The two longest flights were the flight score. It was a more popular event than AMA EZB. The intent of the event was to provide contestants an easier-to-build and easier-to-fly EZB. Not sure this was proven, but from the response it will surely be more popular next year.

Wally Miller designed a new EZB for this event and tested it on the first day with an almost 20 minute first flight. "Great! Let's wait until tomorrow for the first round." First round launch, well-torqued, climbs to the ceiling, catches easterly drift, lands on top of the flag at the east wall. The maintenance crew able to beat it off the flag with a pole from the attic above, but the model was damaged beyond repair. A Coslick designed back-up model did not perform well. Wally placed 5th. Jerry Powell won the event with a great flight of 21:01. Wally Miller and Larry Coslick provided plaques to third place, beautifully designed by Fred T. Hollingsworth of Vancouver, B.C.

The maintenance crew managed to free four models from the ceiling tiles. Two be-longed to Gil Coughin, one an early Mini-Stick of Ed Berray, and a Mini-Stick of possible English origin.

Among the most improved flyers this year were Juniors, Jake and Matt Dona and Arron Dona, flying H.L. Glider and Limited Pennyplane. They also excelled at the University Inn Sunday Brunch event.Senior Jonathan Sayer continues to surpass himself, this year placing first in Pennyplane and Ornithopter, both difficult events. His workmanship has improved dramatically.

Open flyer Bruce McCrory has improved remarkably with little more than a year of building experience. Bruce attended last year's Kibbie Dome Annual with his first models. He enjoyed that visit enough that he designed and built new models, flying and perfecting them for this year's Kibbie Dome Annual. Now placing third in A-6, a popular event in the Northwest.
By consensus this year's annual was determined to be the best ever. The awards were M-C'd by Charles Dorsett, who was an excellent replacement for John Lenderman, who normally handed out the prizes and made light of the contestant's flying efforts.

The 2002 Kibbie Dome Annual dates are July 27 through July 30, 2002. Hope to see you there again. Kibbie Dome results to third place to follow.

KIBBIE DOME 2001

INTERMEDIATE STICK

1.	MIKE PALRANG	27:04
2.	CHARLES DORSETT	22:48

FID RUBBER

1.	STEVE BROWN	60:15
2.	BRUCE KIMBALL	54:45
3.	HERB ROBBINS	50:37

EZB

1.	MIKE PALRANG	28:17
2.	LEW GITLOW	25:43
3.	ANDREW TAGLIAFICO	24:02

PENNYPLANE

1.	JONATHAN SAYER	13:59
2.	BOB WARMANN	13:11
3.	HERB ROBBINS	11:02

LIMITED PENNYPLANE

1.	STEVE DONA	14:23
2.	JERRY POWELL	13:02
3.	WALLY MILLER	12:47

ORNITHOPTER

1.	JONATHAN SAYER	7:49
2.	HERB ROBBINS	4:04

HAND LAUNCHED GLIDER

1.	BRUCE KIMBALL	1:42
2.	GORDON DONA	1:38
3.	ED BERRAY	1:08

STANDARD CATAPULT GLIDER

1.	BRUCE KIMBALL	2:39
2.	ED BERRAY	2:34
2.	BOB WARMANN	2:34
3.	HERB ROBBINS	0:56

UNLIMITED CATAPULT GLIDER

1.	ED BERRAY	2:33
2.	BRUCE KIMBALL	2:32
3.	ORVILLE OLM	2:02

R.O.G. STICK

1.	ANDREW TAGLIAFICO	17:52
2.	ED BERRAY	16:47
3.	FRED HOLLINGSWORTH	14:29

BOSTONIAN

1.	GORDON DONA	4:31
2.	STEVE DONA	4:17
3.	JERRY POWELL	3:29

1/2g. EZB

1.	JERRY POWELL	41:34
2.	ANDREW TAGLIAFICO	41:25
3.	ED BERRAY	39:09

MINI-STICK

1.	MIKE PALRANG	12:07
2.	ANDREW TAGLIAFICO	12:05
3.	ED BERRAY	11:20

JR. LIMITED PENNYPLANE

1.	MATT DONA	11:36
2.	JAKE DONA	10:33
3.	CAMERON ERICKSON	7:03

A-6

1.	ANDREW TAGLIAFICO	7:40
2.	ROBERT LANDHUIS	7:26
3.	BRUCE McCRORY	7:14

JR. HAND LAUNCHED GLIDER

1.	JAKE DONA	1:13
2.	MATT DONA	1:01

JR. SCIENCE OLYMPIAD

1.	TEIXEIRA SNAVELY	2:46
2.	CAMERON ERIKSON	2:15

OPEN SCIENCE OLYMPIAD

1.	CHRIS BORLAND	3:52
2.	ED BERRAY	3:28
3.	KEN HARK	3:14

News Flash!

USA F1D team members are selected and for the first time the USA will be fielding a full 3 member junior team. Senior team members are Jim Richmond, Larry Cailliau, Steve Brown. Junior team members are Doug Schaefer, Parker Parrish, Ben Saks.

Turn out for the team trials was quite heavy with 13 senior fliers competing and 6 juniors. Flying was in the Akron airdock. Conditions were variable with a steady wind running down the hanger early in the first day and improving during the afternoon. By early evening flying was quite good. Day 2 and 3 were quite similar with the exception that the morning breeze was less strong each day.

Results 2001 Nationals Johnson City, TN.

Event 208 Limited Pennyplane 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Score
1	Sova, Tom	473169	10:49	13:50	14:24	13:05	15:01	15:01
2	Cailliau, Lawrence	79985	11:47	14:56	14:51			14:56
3	Linardic, Vladimir	714084	13:23	14:16	12:08	14:44	14:52	14:52
4	Hartman, Phillip	8667	11:13	13:23	13:22	14:11	14:30	14:30
5	Grant, James	159477	11:50	11:20	12:50	14:28		14:28
6	Kagan, John	469854	13:59	14:12	6:27			14:12
7	Kirby, Noel	267885	4:17	14:12	12:26	3:34		14:12
8	Miller, Richard	179518	11:30	12:34	4:50	14:08	6:02	14:08
9	Marett, John	616261	13:30	13:59	3:14			13:59
10	Clem, Jim	L-55	11:04	13:28	13:53	13:56		13:56
11	Rigotti, David M ***	599400	13:56	13:31				13:56
12	Van Gorder, Walter	19912	11:59	13:56	12:02			13:56
13	Gardner, Steve	6193	12:18	11:12	13:49	13:18	13:20	13:49
14	Romash, Robert	130061	13:09	13:48	13:18	13:12		13:48
15	Iacobellis, Vito ***	699301	12:48	13:48	12:57			13:48
16	Warmann, Robert	187	13:18	12:45	12:35	11:42	13:34	13:34
17	Diebolt,John	5386	11:52	13:16	13:02	10:27	12:27	13:16
18	Iacobellis, Thomas	6698	13:10	13:06				13:10
19	Kehr, Joe	549294	12:59	12:06	12:29			12:59
20	Olshefsky, Pete	614476	10:12	4:31	5:15	12:49	2:55	12:49
21	Rigotti, David	66859	12:16	12:41				12:41
22	Wisniewski, Gordon	716	8:49	8:40	9:08	12:38		12:38
22	Raynond-Jones, D C	63358	7:48	11:17	12:31	10:50	12:05	12:31
23	Rash, Fred	63458	12:07	12:26				12:26
24	Boone, Jack	107857	3:25	11:16	12:24	10:46	6:06	12:24
25	Sipple, Joe **	714758	10:09	12:21				12:21
26	Gowen, William	615737	12:17	3:47	12:20			12:20
27	Johnson, Brian **	643961	11:36	10:48	11:50			11:50
28	Gigilano, Victor		11:37	10:51				11:37
29	Johnson, Alex ***	643962	10:41	11:33				11:33
30	Tellier, Fred	645957	7:58	11:31	10:19			11:31
31	Person, Lee	383504	10:23	10:55	10:58	11:27	9:06	11:27
32	Italiano, Tony	2386	9:13	8:48	11:19	10:45	9:06	11:19
33	Shaeffer, Doug ***	680152	10:04	10:15	11:07	10:59		11:07
34	Duke, William	51508	10:27	6:16	10:41	9:53		10:41
35	Sasaki, Marty	613054	10:28					10:28
36	Landrum, Billie	52674	7:35	10:24				10:24
37	Singer, Len	209081	9:04	10:00				10:00
38	Johnson, Wayne	643960						
39	Hacker, Vern.	L-304	7:50	9:30	8:03	9:56		9:56
40	Barker, John	2095	8:27	9:42	9:16			9:42
41	Parrish, Parker **	627320	8:06	6:11				8:06
42	Sullivan, Ed	69585	7:11	7:26	8:04	7:25	7:31	8:04
43	Saks, Ben **	663661	8:02	7:57				8:02

Event USIC F1M 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Flt #6	Score
1	Gowen, William	615737	14:10	13:39					27:49
2	Tellier, Fred	645957	14:02	12:48	12:50	13:13	3:50		27:15
3	Diebolt, John	5286	5:49	13:09	13:29	13:37	12:54	13:04	27:06
4	Barker, John	2095	9:13	9:32	10:27	12:04	11:50	11:51	23:55
5	Sasaki, Marty	613054	3:27	12:18	10:55				23:13
6	Rash, Fred	63458	10:57	8:14					20:12
7	Kehr, Joe	549294	6:41	12:41					19:22
8	Raymond-Jones, DC	63358	7:51	9:30	10:20				19:50
9	Downs, Sandy	2209	9:12	7:13	8:53				18:05

Event USIC F1L 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	FLT #6	SCORE
1	Linardic, Vladimir	714084	8:22	19:00	19:28	20:50	21:48		42:38
2	Kagan, John	469254	19:07	20:44	18:52	20:20	6:15		41:04
3	Loucka, Larry	1210	19:04	10:05	21:20	14:46	11:35		40:04
4	Tellier, Fred	6459957	8:52	18:08	16:30	18:52	18:15	17:55	37:07
5	Romash, Rob	130061	18:24	12:40	18:10				36:34
6	Sova, Tom	473169	16:44	13:32	17:23	5:02	18:13		35:36
7	Grant, Jim	159477	15:59	18:42					34:41
8	Leppard, Bill	93740	14:36	16:14	17:15	17:03			34:18
9	Kehr, Joe	549254	16:45	112:06	12:25	11:56	6:17	16:09	32:54
10	Raymond-Jones, DC	63358	17:50	13:03	7:20	15:00			32:50
11	Duke, Wm	51508	14:03	14:40	10:18	13:58	9:20		28:43
12	Singer, Len	209081	8:41	12:04	13:28	14:27			27:55
13	Olshelfsky, Pete	614476	9:30	13:29	12:32	13:42			27:11
14	Landrum, Billie	52674	10:04	9:22	9:00				19:26
15	Barker, John	2095	7:29	11:05					18:34
16	Gagliano, Vito	110081	16:22						16:22
17	Clem, Jim	L55	12:49						12:49
18	Wrzos, Chet	20454	10:02						10:02
19	Gowen, Wm	615737	5:44						5:44

Final score equals sum of two best flights

Event USIC Dime Scale 2001 Nationals

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	McGillivray, Jack	L1025	ARADO	390
2	Miller, Richard	179518	BAP Monoplane	375
3	Miller, Jim	89382	MO-1	278
4	Blair, John	29698	DH Leopard Moth	242

Event USIC Coconut Scale

Place	Contestant Name	AMA NO.	Aircraft Name
1	Miller, Richard	179518	Zlin
2	Lavender, Tim	269765	Verville
3	Lindstrum, Dave	485	Zippy Sport
4	Anderson, Pat	615260	Prest Pursuit
5	Jacob, Bobby	615269	Waterman Gosling

Event USIC 35 CM 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Best Flt
1	Loucka, Larry	1210	18:10	17:47	20:17	23:17	23:01	0:23:17
2	Sova, Tom	473169	20:25	22:19	20:37	23:07	22:42	0:23:07
3	Iacobellis, Thomas	6698	16:53	18:24	20:40	19:47		0:20:40
4	Raymond Jones, DC	63358	10:36	18:42	18:40			0:18:42
5	Olshefsky, Peter	614476	18:24	9:42	17:56	17:21	17:31	0:18:24
6	O'Grady, Dan	614475	18:09	18:01				0:18:09
7	Romash, Robert	130061	17:26	16:15	17:33			0:17:33
8	Grant, Jim	159477	1:35	8:14	14:13			0:14:13
9	Duke, William	51508	11:02	11:49	10:29	13:58	13:19	0:13:58
10	Parrish, Parker	627320	6:24	6:58	6:07	7:08		0:07:08

Event USIC A 6 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Hodson, Gary	669378	8:19	7:25	8:35			8:35
2	Tellier, Fred	645957	6:52	7:11	7:27			7:27
3	Johnson, Tem	16707	6:19	4:19	7:05			7:05
4	Schutzel, Emil	5083384	3:50	6:40	6:39	6:44		6:44
5	Singer, Len	209081	4:24	4:58	5:07			5:07
6	Gagliano, Vito	110081	2:24					2:24

Event 507 AMA Rubber Scale 2001 Nationals

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Blair, John	29698	Alco Sport	297.00
2	Miller, James	89382	Lacey	295.00
3	Lee, Jim	680246	Lacey	293.00
4	Martin, John	712	Komet	278.00
5	Grant, Jim	159477	Taylorcraft	261.00

Event USIC P24 2001 Nationals

Place	Contestant Name	AMA NO.
1	Diebolt, John	5286

Event USIC Ministick Mass Launch

Place	Contestant Name	AMA NO.
1	Loucka, Larry	1210

Event 505 Peanut Scale 2001 Nationals

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Miller, Jim	89382	Lacey	189.00
2	Hodson, Gary	669378	Travel Aire	164.50
3	Lee, Jim	680246	Lacey	162.00
4	Martin, John	712	Gotha	161.20
5	Jarrett, Curtis	235021	Moustique	132.00
6	Neff, Vernon	64529	SE5-A	110.50

Event 220 Ministick 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Score
1	Romash, Rob	130061	10:53	11:17	12:21	12:17	12:37	12:37
2	Van Gorder, Walt	19912	8:31	12:06	12:36			12:36
3	Schutzel, Emil	508384	11:34	10:43	8:31	10:26	12:11	12:11
4	Tellier, Fred	645957	9:06	11:23	11:01	12:05	11:11	12:05
5	Loucka, Larry	1210	11:42	11:55				11:55
6	Diebolt, John	5286	10:16	10:02	9::48	11:03		11:03
7	Sova, Tom	473169	7:33	7:51	10:05			10:05
8	Singer, Len	209081	9:58					9::58
9	Rigotti, David ***	599400	5:43	9:49				9:49
10	Parrish, Parker **	627320	6:49	7:32	9:12	7:15	9:26	9:26
11	Downs, Sandy	2209	6:46	9:16				9:16
12	Clem, Jim	L 55	9:15	6:28				9:15
13	Hodson, Gary	669378	9:13	4:44				9:13
14	Warmann, Robert	187	8:44	9:03				9:03
15	Kehr, Joe	549294	4:30	6:32	8:57	2:22	5:23	8::57
16	Olshefsky, Pete	614476	4:02	7:38	8:31			8:31
17	Leppard, William	93740	8:30	6:21				8:30
18	Raymond Jones, D.C.	63358	8:19	5:20				8:19
19	Rash, Fred	63458	7:38	4:21	8:16	2:08	1:08	8:16
20	Saks, Ben **	663661	7:09					7:09
21	Person, Lee	383504	6:28	6:01	6:18	6:17		6:28
22	Iacobellis, Vito ***	6993001	4:22	6:12	6:20			6:20
23	Rigotti, David	66859	6:17					6:17
24	Grant, Jim	159477	1:43	5:34				5:34
25	Bakay, Carl	478659	2:59	0:03	5:24	0:19	4:47	5:24
26	Neff, Vernon	64529	3:42	2:33				3:42
27	O'Grady, Dan	614475	2:30					2:30
28	Duke, William	51508	1:54					1:54

Event 219 Unlimited Cat. Glider 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Flt #6	Flt #7	Flt #8	Flt #9	Score
1	Krempetz, Kurt	69866	70.10	72.00	66.50	71.70	86.40	54.40	66.20	88.00	15.00	174.40
2	Boehm, Bernard	92567	78.60	82.40	82.60	82.40	80.10	85.20	86.00			171.20
3	Schlarb, Ralph M	322352	81.40	83.80	82.40	8.00	84.20	23.20				168.00
4	Lewis, Jim	119	70.50	82.20	13.90	80.00	51.00	66.50	43.20	78.60	70.00	162.20
5	Marett, John	616261	77.70	12.10	78.50	76.40	77.80	79.70	70.20	80.80	26.00	160.50
6	Person, Lee	383504	73.00	74.00	75.00	75.40	33.80	77.40	79.80	14.10	68.00	157.20
7	Schlarb, W.L.	14425	77.80	76.90	72.00	79.00	42.00	45.00				156.80
8	Romash, Robert	130061	77.60	76.60	77.50	78.10	75.70					155.70
9	Buxton, Jim	75154	76.10	72.40	76.10							152.20
10	Warmann, Robert	187	66.20	68.40	60.20	70.50	65.40	75.90	65.70	75.60	66.00	151.50
11	Jessup, Artie D.	10269	63.60	58.70	53.90	21.30	68.60	71.70	65.60	71.80	22.60	143.50
12	Krempetz, Kenneth	11951	66.80	64.70	69.00	72.20	45.50					141.20
13	Johnson, T.E.	16707	64.60	36.80	58.60	70.10	69.50	66.00	69.00	70.10	66.40	140.20
14	Krempetz, Kenny L.***	559200	51.00	62.70	62.30							125.00
15	Duke, William	51508	56.00	50.00	59.90	54.00	57.00	36.00	28.00	46.00	30.00	116.90
16	Gowen, Wm	615737	49.90	50.20	27.10	44.20						100.10
17	Parrish, Parker	627320	32.80	36.20	34.40	35.30	34.60	25.80	34.20	38.50	34.00	74.70

Event USIC Bostonian Mass Launch

Place	Contestant Name	AMA NO.	Aircraft Name
1	MIller, Richard	179158	Road Runner III

Event USIC Pistachio

Place	Contestant Name	AMA NO.	SCORE
1	Schutzel, Emil	508384	2
2	Linstrum, Dave	L712	5
3	Martin, John	485	5

Event 218 Standard Cat. Glider 2001 Nationals

Place	Contestant Name	AMA NO.	Flt 1	Flt #2	Flt #3	Flt #4	Flt #5	Flt #6	Flt #7	Flt #8	Flt #9	Score
1	Schlarb, Ralph M	322352	79.90	77.40	78.70	82.20	79.40	81.20				163.40
2	Person, Lee	383504	81.00	73.80	71.50	78.20	71.50	81.00	61.00	62.70	81.70	162.70
3	Schlarb, W.L.	14425	79.80	78.20	79.50	75.40	80.20	76.20				159.70
4	Krempetz, Kurt	69866	72.70	76.10	10.00	79.40	79.00	71.20				158.40
5	Romash, Robert	130061	74.00	75.00	73.00	76.40	75.80	77.50	77.20			154.70
6	Boehm, Bernard	92567	74.20	71.30	68.90	75.50	71.60	5.00				149.70
7	Johnson, T.E.	16707	64.90	70.20	60.50	70.90	57.40	70.40	73.50	67.80	69.00	144.40
8	Jessup, Artie	10269	67.70	10.50	64.40	63.40	6.20	26.40	72.70	66.20	69.50	142.20
9	Marett, John	616261	70.70	66.40	23.40	49.50	68.90	70.20	63.10	52.50	34.10	140.90
10	Harlan, Raymond	131	52.60	15.60	60.30	65.20	65.50	66.80	60.90	60.40	68.00	134.80
11	Krempetz, Kenny L.***	559200	60.80	57.00	52.60	63.40	60.20	63.20				126.60
12	Duke, William	51508	52.40	54.90	62.80	56.90	61.80	50.50	10.40	6.50	27.20	124.60
13	Miller, Richard J.	179518	29.00	48.20	50.00	53.30	50.70	32.90				104.00
14	Saks, Ben ***	663661	5.20	45.30	28.00	5.50	38.60	41.80	28.50	41.50	45.30	90.60
15	Gagliano, Victor	110081	6.90	5.60	44.50	41.30						85.80
16	Jarrett,Curtis	235021	8.30	10.60	9.30	27.70	36.40	36.70	35.90	35.70	37.50	74.20

Event 215 Bostonian 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	Charisma	SCORE
1	Miller, Richard	179518	5:38	5:58	5:41			1.05	733.95
2	Schutzel, Emil	508384	4:33	3:53	4:27	4:45	5:02	1.20	702.02
3	Gardner, Steve	6193	3:45	4:43	4:57	4:00		1.19	690.20
4	Diebolt, John	5286	2:52	4:41	2:45	4:37	2:47	1.20	669.60
5	Kagan, John	469254	3:50	3:03	3:14	4:00	3:58	1.08	516.24
6	Barker, John	2095	3:12	3:40	3:48	3:53	4:11	1.05	508.20
7	Marett, John	616261	3:48	4:20	4:08	3:58		1.00	508.00
8	Wieczorek, Leonard	10105	1:44	2:00	2:43	2:48	3:05	1.17	413.10
9	Duke, William	51508	1:33	2:41	2:53	2:48	2:25	1.14	388.70
10	Neff, Vernon	64529	1:58	2:27				1.10	291.50
11	Jarrett, Curtis	235021	0:34	0:41	0:34	0:44	0:46	1.15	103.50

Event 212 H L Glider 2001 Nationals

PLACE	Contestant Name	AMA NO	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Flt #6	Flt #7	Flt #8	Flt #9	Score
1	Buxton,Jim	75154	81.30	78.20	82.20							163.50
2	Boehm, Bernard	92567	63.20	66.60	67.80							134.40
3	Lewis, Jim	119	23.70	58.20	57.80	42.00	36.70	63.10	62.30	64.00	65.40	129.40
4	Romash, Robert	130061	63.00	64.00	61.00							127.00
5	Gagliano, Vito	110081	16.00	38.60	24.10	36.90	37.30	39.00	37.30			76.30
6	Jarrett, Curtis	235021	4.30	6.20	4.40	9.70	3.40	3.90	5.30	4.90	4.80	15.90

Event 211 Autogiro 2001 Nationals

Place	Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Rash, Fred	63458	5:38	7:19	4:05	8:34		8:34
2	Diebolt, John	5286	6:05	6:10	4:07			6:10

Event 210 Ornithopter 2001 Nationals

Place	Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Harlan, Ray	131	11:28	14:34				14:34
2	Diebolt, John	5286	0:24					0:24

Event 209 Helicopter 2001 Nationals

Place	Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Saks, Ben	663661	4:21	7:47	7:27	8:15		8:15
2	Diebolt, John	5286	6:26	6:19	7:30			7:30
3	Loucka, Larry	1210	5:11					5:11

Event 207 Pennyplane 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Linardic, Vladimir	714084	15:31	13:49	17:22	18:30		18:30
2	Kagan, John	469254	11:02	16:47	18:02	14:44		18:02
3	Teller, Fred	645957	4:21	12:47	16:38	17:03	15:24	17:03
4	Hartman, Phillip	8667	6:15	13:50	13:45	16:45	4:22	16:45
5	Wisniewski, Gordon	716	6:21	15:27	16:33			16:33
6	Olshefsky, Peter	614476	15:21	15:21	3:57	15:23	16:15	16:15
7	Warrman, Robert	187	15:12	12:16	8:58	8:27		15:12
8	Iacobellis, Thomas	6698	!5:02	12:07	11:53			15:02
9	Saks, Ben **	663661	13:34	14:11	3:15	14:06		14:11
10	Raymond-Jones, DC	63358	10:45	14:02	12:38	8:44	9:16	14:02
11	Sova, Tom	473169	13:20	11:00	13:39			13:39
12	Grant, Jim	159477	12:06	3:51	11:29	5:11	13:33	13:33
13	Sasaki, Marty	613054	11:17	12:31	13:33	9:59	9:21	13:33
14	Gowen, Wm	615737	11:44	7:40	5:55	13:17		13:17
15	Rigotti, David M ***	599400	13:04	12:10	12:47			13:04
16	Iacobellis, Vito ***	699301	11:03	12:09	12:12	11:58	10:04	12:12
17	Sippel, Joey **	714758	10:41	12:01	11:46	9:08		12:01
18	Clem, Jim	L-55	10:08	7:39	11:42			11:42
19	Johnson, Brian **	643961	11:23					11:23
20	Schaefer, Doug ***	680152	10:45	11:16	10:57	11:19		11:19
21	Johnson, Alex	643962	10:24	4:47	10:33			10:33
22	Kehr, Joe	549294	5:40	8:32	1:53	10:11	8:01	10:11
23	Dalton, Jeff **	UNK	10:05	0:42	2:18	7:04	5:45	10:05
24	Landrum, Billie	52674	8:59	9:50	8:59			9:50
25	Italiano, AJ	2386	8:05	8:03	7:10	9:16	9:20	9:20
26	Parrish, Parker **	627320	7:32	8:24	7:25			8:24
27	Wrzos, Chet	20454	7:03	8:06				8:06
28	Johnson, T E	16707	5:22	6:54				6:54
29	Rash, Fred	63458	3:38					3:38

Event 206 Easy B 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	SCORE
1	Cailliau, Lawrence	79985	29:55					29:55
2	Kagan, John	469254	26:32	6:09	23:22	23:51	7:59	26:32
3	Linardic, Vladimir	714084	22:17	25:17	25:17			25:17
4	Sova, Tom	473169	23:05	25:09	24:14			25:09
5	Gardner, Steve	6193	21:50	23:34	21:46	24:28	19:28	24:28
6	Harlan, Ray	131	22:40					22:40
7	Iacobellis, Thomas	6698	22:32					22:32
8	Van Gorder, Walter	19912	21:12	22:19				22:19
9	Tellier, Fred	645957	20:57	21:00	22:06			22:06
10	Grant, James	159477	22:03	4:58	12:28	9:39	16:21	22:03
11	Raymond-Jones, D C	63358	11:54	20:04	5:28	21:44		21:44
12	Parrish, Parker **	627320	18:49	21:22	17:29	19:00		21:22
13	Clem, Jim	L-55	19:37	21:04				21:04
14	Marett, John	616261	20:35	21:04	20:53			21:04
15	Saks, Ben **	663661	11:37	21:03	19:02	20:35	1:57	21:03
16	Richmond, Jim	4936	20:27	8:16				20:27
17	Olshefsky, Peter	614476	14:42	15:53	9:27	4:49	19:20	19:20
18	Singer, Len	209081	14:33	8:49	15:09	17:33		17:33
19	Downs, Sandy	2209	10:11	14:28	17:24			17:24
20	Chalker, Mathew **	683977	14:58	12:58				14:58
21	Gowen, William	615737	10:25	14:06				14:06
22	Italiano, Tony	2386	11:14	12:03	13:29	10:59		13:29
23	Hacker, Vernon	L-304	13:07					13:07
24	Wrzos, Chester	20454	13:02					13:02
25	Van Dover, Abram	894	10:24					10:24
26	Gagliano, Vito	110081	10:19					10:19
27	Bakay, Carl	478659	5:48	3:45	5:56	6:57	7:12	7:12

Event 205 Manhattan 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	FLT #3	FLT #4	FLT #5	Score
1	Grant, Jim	159477	13:11					13:11
2	Van Gorder, Walt	19912	8:41	12:54	1231	12:25		12:54
3	Schutzel, Emil	508384	9:39	4:49	11:40	12:41	12:13	12:41
4	Marett, John	616261	11:09	10:45				11:09
5	Tellier, Fred	645957	3:26	8:08	9:56	8:41		9:56
5	Linardic, Vladimir	714084	6:48	9:15				9:15
5	Kehr, Joe	549294	8:02	7:27				8:02
7	Duke, William	51508	4:35	4:48	5:35	7:30		7:30

Event 204 Cabin ROG 2001 Nationals

Place	Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	Score
1	Loucka, Larry	1210	29:49					29:49
2	Iacobellis, Thomas	6698	6:22					6:22

Event 203 F1D 2001 Nationals

Place	Contestant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	FLT #5	FLT #6	SCORE
1	Sova, Tom	473169	23:00	18:39	24:52	27:45	28:51	28:52	57:43
2	Kagan, John	469254	22:49	27:05	28:10	27:33	28:00	28:57	57:07
3	Doig, Richard	5392	26:47	24:04	28:13	28:09	25:18	25:57	56:22
4	Momot, Tomasz	675398	19:49	22:16	26:22	27:25	25:35	27:43	55:08
5	Tellier, Fred	645957	26:42	26:22	22:33	26:20	22:03	28:19	55:01
6	Cailliau, Lawrence	79985	12:02	27:04				25:19	52:23
7	Iacobellis, Thomas	6698	24:05	26:56	23:35				51:01
8	Richmond, James	4936	23:16	23:35	24:34				48:09
9	Olshefsky, Peter	614476	18:44	22:09	6:22	22:55	11:57		46:04
10	Johnson, Brian **	643961	22:10	22:27					44:37
11	Saks, Ben **	663661	17:10	16:54	19:11	18:48	17:56	21:35	40:46
12	Rigotti, David M ***	599400	20:07	19:58	17:12	18:34	20:00		40:07
13	Raymond-Jones, D C	63358	7:35	12:09	17:42	20:58	10:31		38:40
14	Kehr, Joe	549294	17:48	18:04	15:44	19:01	18:18	18:44	37:45
15	Chalker, Matthew **	683977			15:13	17:07	14:03	11:01	32:20
16	Schaefer, Doug ***	680152	15:16	14:38	15:26	15:15	16:10		31:36
17	Barker, John	2095	13:49	13:57					27:46
18	Parrish, Parker **	627320	10:33	13:01	13::46				26:47
19	Downs, FS	2209	12:17						12:17

Event 202 Intermediate Stick 2001 Nationals

Place	Contestant Name	AMA NO.	Flt #1	Flt #2	Flt #3	Flt #4	Flt #5	Score
1	Kagan, John	469254	9.0	38.47	37.32			38.47
2	Tellier, Fred	645957	35.45	27.42	22.25	37.39	35.14	37.39
3	Richmond, James W.	4936	33.23	35.12	12.27			35.12
4	Linardic, Vladimir	714084	24.1	31.46				31.46
5	Grant, James B.	159477	17.03	18.28	28.15	10.00	23.15	28.15
6	Olschefsky, Peter	614476	25.51	27.40	23.17			27.40
7	Sova, Tom J.	473169	23.36	25.44				25.44
8	O'Grady, Dan	614475	19.30	24.02	24.46			24.46
9	Barker, John	2095	20.24	21.42	21.37	18.51	6.30	21.42
10	Parrish, Parker **	627320	11.28	18.57	20.25			20.25
11	Saks, Ben ***	663661	14.54	16.39				16.39
12	Rigotti, David ***	599400	1.03	2.56	8.04			8.04

Event 201 HL Stick 2001 Nationals

Place	Contstant Name	AMA NO.	FLT #1	FLT #2	FLT #3	FLT #4	Flt #5	Score
1	Linardic, Vladimir	714084	25:58	37:26	26:45	35:41		37:26
2	Iacobellis, Thomas	6698	31:55	24:31	34:44			34:44
3	Grant, James	159477	28:02	15:02	24:11			28:02
4	Parrish, Parker **	627320	14:23	15:54	17:34	17:55		17:55

Event USIC Straight line Speed

Place	Contestant Name	AMA NO.	Score
1	Lewis, Jim	119	1.27
2	Sova, Tom	473169	1.88
3	Linstrum, Dave	485	2.54
4	Blair, John	29698	3.97
5	Hacker, Vernon	L304	ATT
5	McGillivray, Jack	MAAC 1025L	ATT

Event USIC Race to the Roof

Place	Contestant Name	AMA NO.	Score
1	Kagan, John	469254	6.9
2	McGillivray, Jack	MAAC 1025L	8.1
3	Lindstrum, Dave	485	20.8
4	Rash, Fred	63458	62.6
5	Diebolt, John	5286	82.1
6	Romash, Robert	130061	ATT
7	Hacker, Vernon	L304	ATT

Event USIC Round the Pole

Place	Contestant Name	AMA NO.	Score
1	Lewis, Jim	119	1.27
2	Sova, Tom	473169	1.88
3	Lindstrum, Dave	485	2.54
4	Blair, John	29698	3.97
5	Hacker, Vernon	L304	ATT
6	McGillivray, Jack	MAAC 1025L	ATT

Event USIC Unlimited Rubber Speed

Place	Contestant Name	AMA NO.	Score
1	Diebolt, John	5286	9.3
2	Blair, John	29698	15.4
3	Rash, Fred	63458	ATT

Event USIC FAC Scale

Place	Contestant Name	AMA NO.	Aircraft	Score
1	McGillivray, Jack	1025L	SE5	157.0
2	Anderson, Wayne	587497	B. Voss	155.5
3	Miller, Richard	179518	Currie	155.3
4	Miller, Jim	89382	MO-1	146.0
5	Blair, John	29698	P51B	138.5
6	,Lindsrum, Dave	485	Stout Forc	135.8
7	Lee, Jim	54365	Lacey	135.0
8	Brownhill, Chris	3797	Lacey	133.8
9	Martin, John	712	Komet	129.3

Event USIC No Cal 2001 Nationals

Place	Contestant Name	AMA NO.	Score
1	Warmann, Bob	187	7:59
2	Harlan, Ray	131	7:31
3	Loucka, Larry	1210	7:28
4	Diebolt, John	5286	6:20
5	Linardic, Vladimir	38165	6:07
6	Kehr, Joe	549294	4:55
7	Anderson, Wayne	587497	4:48
8	Leiifer, Louis	MAAC2418	4:15
9	Rash, Fred	63458	3:58
10	Van Dover, Abram	894	2:01
11	Jarrett, Curtis	235021	1:18
12	Saks, Ben	663661	0:47

Event USIC WWI Mass Launch

Place	Contestant Name	AMA NO.	Aircraft Name
1	Loucka, Larry	1210	DH-4

Event USIC WWII Mass Launch

Place	Contestant Name	AMA NO.	Aircraft Name
1	McGillivray, Jack	L1025	I Mustang

Event USIC FAC Peanut

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Miller, Richard	179518	Volksplane	144.0
2	Miller, Jim	89382	DH-6	131.5
3	Neff, Vernon	64529	Fairchild 22	129.0
4	Hodson, Gary	669378	Farman Moustique	127.5
5	Martin, John	L712	Gotha-Ursinus	125.5
6	Grant, Jim	159477	SE-5A	121.0
7	Jarrett, Curtis	235021	Pietenpol	91.0

Event 213 Kit Plan Scale

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Grant, Jim	159477	Lacey M-10	276.00
2	Martin, John	712	Dorien Komet	273.00
3	Lee, Jim	680246	Lacey	270.00
4	Blair, John	29698	Cessna C-34	259.00
5	Jarrett, Curtis	235021	Lacey	221.00

Places determined by flyoff

Event USIC Modern Civil Production

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Brownhill, Chris	3797	Piper PA-20	339

Event USIC High Wing Monoplane .

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Jim Lee	54365	Lacey M-10	137.5
2	Jim Miller	89382	Lacey M-10	127.5
3	Chris Brownhill	3797	Hi-MAX	125.5

Event USIC Golden Age Scale 2001 Nationals

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	McGillivray, Jack	1025L	Piper J-5	3:23 *
2	Miller, Jim	89382	Martin MO-1	2:34 *
3	Lee, Jim	54365	Taylorcraft	2:25 *
4	Blair, John	29698	Waco	5:10
5	Martin, John	712	Dornier Komet	3:59
6	Neff, Vernon	64529	Avro Z5 Racer	2:41

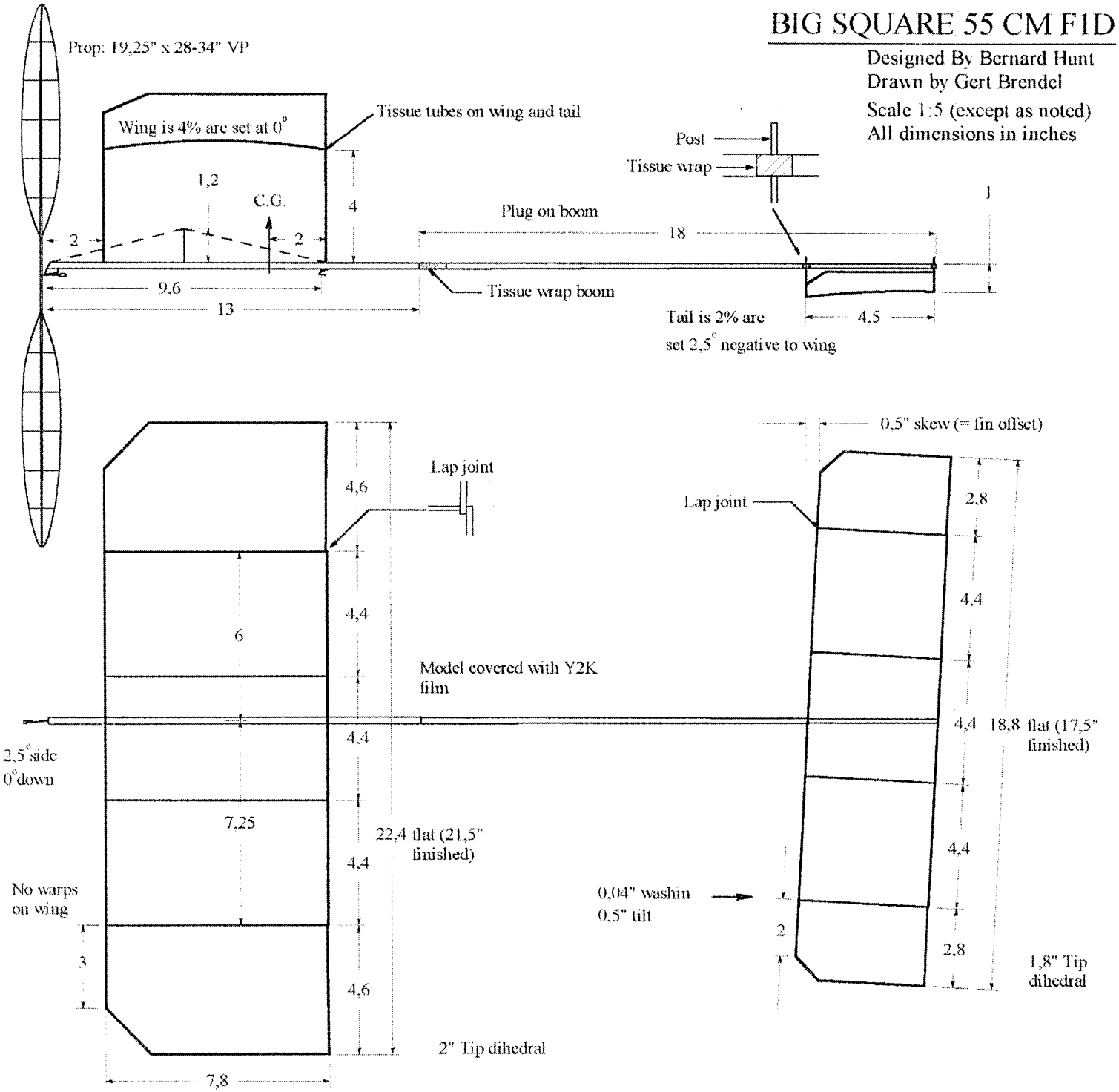
Event USIC Pioneer 2001 Nationals

Place	Contestant Name	AMA NO.	Aircraft Name	Score
1	Schutzel, Emil	508384	S. Dumont 14bis	2:38.5
2	Miller, Jim	89382	Vosin Hydroplane	2:35.5
3	Neff Vernon	64529	Fokker A (1912)	1:59.0

NOTE: *Top three places determined by fly off
** Equals Senior Class
*** Equals Junior Class
DNF's not listed to save space

BIG SQUARE 55 CM F1D

Designed By Bernard Hunt
Drawn by Gert Brendel
Scale 1:5 (except as noted)
All dimensions in inches

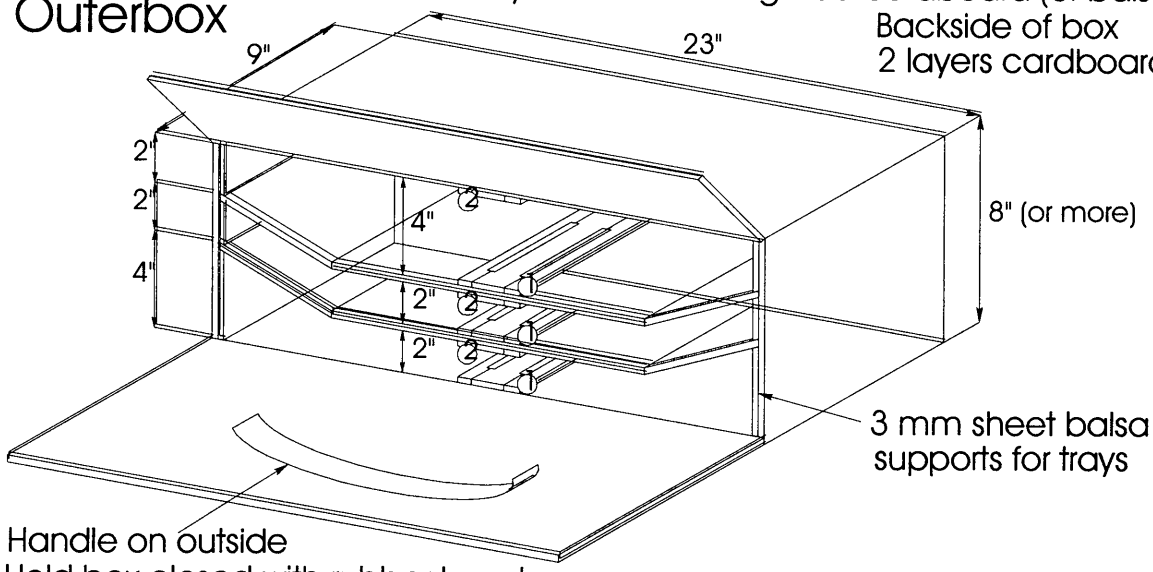


BIG SQUARE 55 CM TRAVEL BOX

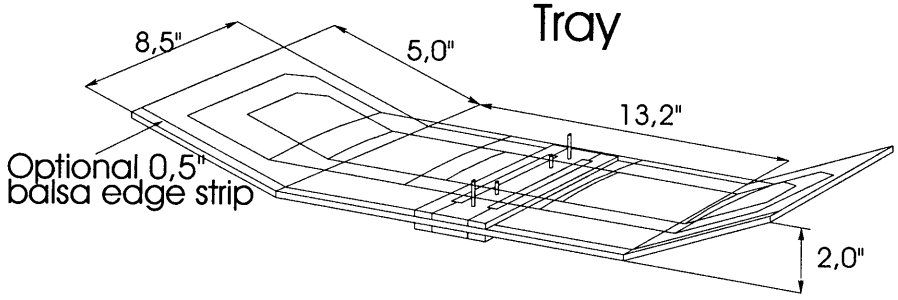
By Bernie Hunt

Outer box 3 mm corrugated cardboard
Trays 2.5 mm corrugated cardboard (or balsa)

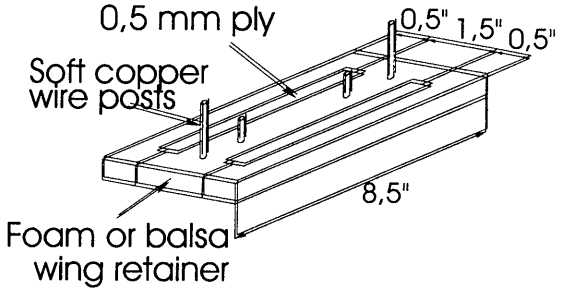
Outerbox



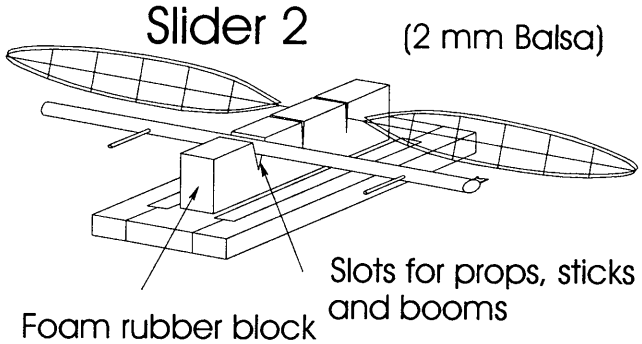
Tray



Slider 1 (2 mm Balsa)



Slider 2 (2 mm Balsa)



Slider 1 for wings/tails on top of trays
Slider 2 for sticks/booms & props
Best find ready made computer box of right size (I did!)

Big Square 55cm F1D - by Bernie Hunt

This model is full size (wing and tail as big as the rules allow) and built down to weight despite being unbraced and Y2K covered. I have flown it for most of last Summer at (150' high) Cardington. It seems plenty strong enough and flies a beautiful pattern. With a fixed pitch prop and the optimum motor, it comfortably outclimbs the site. From 1/3 and 1/2 motor test flights, it looks like the full motor and no-back-off, the max height will be about 165' for a just-deadstick landing. Using a pretty conventional VP prop from my 65cm F1D (19.25" dia, bottom stop 28" ish with 5gcm = 0.07 oz in preload, top stop 36"ish) and a 2% back-off, it managed one flight of 33:55 from about 135' landing with 4% turns left. Clearly the VP needed some more movement (slightly higher top pitch) to achieve the ideal no back-off flight. On this evidence, really high sites like Akron (180') and Slanic (210') will be fine with fixed pitch but the rest will need VP, VD or whatever.

I have avoided curved outlines so I can use springy wood (my best spar wood will not go round curves easily without kinking). I think the 19" prop is a bit big for this class and 16-18" diameter might make trimming easier and save weight. My prop is a scaled down version of Steve Brown's 21.5" prop with my own VP mechanism. I don't give details as Steve's is well described elsewhere (see IN&V #89 Oct 1996).

I suggest that builders new to F1D increase the wood sizes on the wing and tail by about 10%, use a 16-18" dia fixed pitch prop (even an all sheet EZB prop scaled up to 16" dia I tried was fine) and shorten the wing posts to 2". It is always better to have a stiff, if slightly heavy, model that flies well rather than a floppy, down to weight, one that does not. Covering is with 0.3-0.5 micron Y2K plastic film or microfilm applied from frames (0.9 micron Polymicro plastic is too heavy). I have used 3Ms 777 in toluene as adhesive and also saliva which I now prefer.

I use my normal packing system where the model breaks down to wing (no posts),stick / posts, tail, prop and boom which can be fitted into a very compact (23" x 9" x 8" for 3 models) box for hand carrying on planes. I found a sturdy computer box which was the exactly the right size when cut down on one side. Each model fits in a slot in the box. The wings and tail sit one on top of each other on posts on a slider on the bottom of each slot. The props, sticks and boom are held in foam blocks on a sliders at the top of each slot (props in wider top slot only). Increasing the depth of the bottom two slots by an inch would make the packing a whole lot easier. The box travels safely as carry on hand luggage or in the hold inside a plastic suitcase.

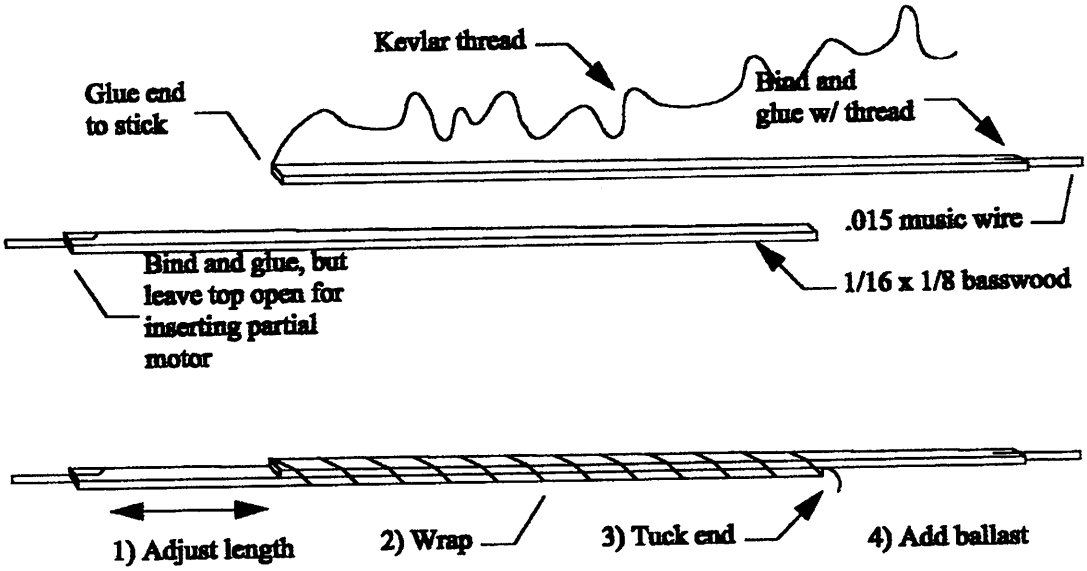
There is not much I can say about flying this class. The models are launched with very little back off and have a fast initial climb so they need the sidethrust and wing / tail washin to get a nice circling pattern. The washin on the wing comes entirely from stick twist from the motor torque. All my tall post designs like plenty of "down" pulled in at launch. I adjust the tension on the stick bracing (shorten post) to get the right amount. My prototype had the bracing slack except for the first few seconds of the flight.

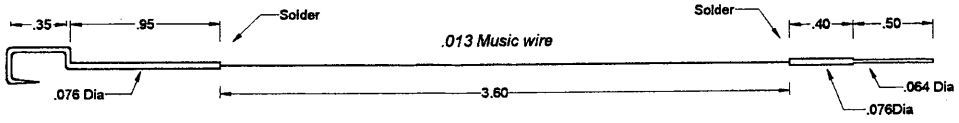
Now for a few constructional details: Motor sticks for 55cm rules F1D are much less of a challenge than old rules. The 0.6g motor x ca 0.050" motor between 9" hooks means you can get away with small dia. sticks and quite thin wood. I use a 0.22" (7/32") mandrel and 0.013" x 4.3 lb wood + 4 boron strips, but I have heard of thinner wood being used. Three boron strips are probably enough and some guys over here use 4 or 5 borons and no tungsten bracing. I make a 13" long motor tube and let in the rear hook on its web into a slot 9.6" from the nose. You could make a 9.6" stick complete with boron, bearing, hook and bracing and then add a separate 3.4" rear section before adding the wing posts and stub boom.

I have used plug in booms for years. You can manage with 1" overlap but 1.5 -2" is better. It is really important to get the tapers the same and exactly the right tightness. Binding the end of the boom with a few strands of Kevlar or tissue helps stop slackness developing. If like me, you use a short stub boom directly at the rear of the stick then adding a 0.25" long internal sleeve to the joint between the stick and the stub boom avoids a weak spot. Well engineered, plug in booms are trouble free and they have the advantage of easy adjustment of tail tilt. The 3 strips of 0.003" boron keep the boom stiff and straight.

I use hobbyshop wood for all spars. I select the best feeling 1/8"or ¼" 5-6lb wood and strip it down to 1/8" x 1/4" x 18" pieces with a Kavan stripper and test it for stiffness (see Don Slusarczyck's web site for details). Finally I strip it to size / taper with a Jim Jones stripper. Remember the old adage: "if it weighs enough it is strong enough" so make the spars as least as heavy as I quote.

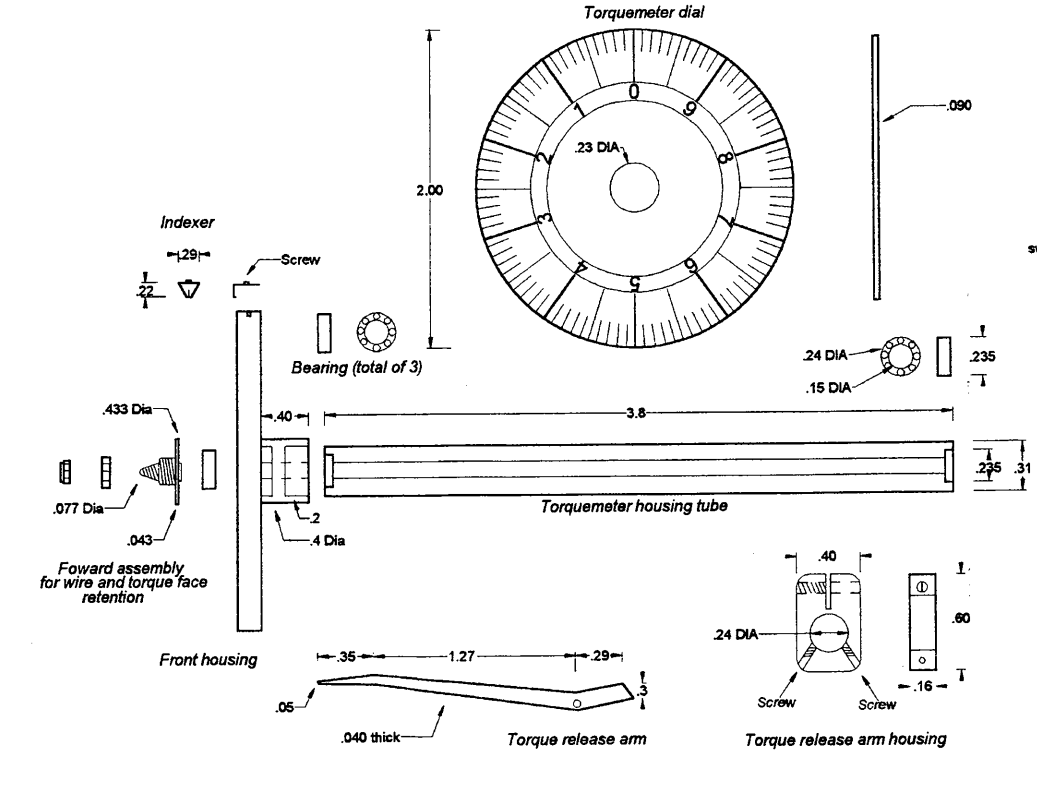
Adjustable Partial Motor Stick - by John Kagan





Material List

Front hook & rear bearing mount	Steel
Front wire & face retension assy	Steel
Torque release drum assy	Steel
Torquemeter housing	Aluminum
Torque release arm & housing	Aluminum
Indexer	Aluminum
Torquemeter dial	Pheonolic
Torqumeter wire	Steel
Torquemeter mount	Aluminum



Ryszard Czechowski Torquemeter

Drawn by: Gary W. Underwood
Date: November 1998
Modifications: Dial divisions

THE F1D CHALLENGE
By Lt. Col. Bob Randolph
As published in Jan 1993 INAV

Introduction

Plenny Bates convinced me that there is an urgent need for more F1D flyers (new blood) if this sport is to endure. He suggested that I write a series of articles to stimulate more interest in this type of model. Because of all the success and pleasure I have received from indoor over the years, I've accepted the assignment and this is the first of the series.

It is a little ironic for me to be pushing F1D when I've had sort of a love/hate relationship for the last 20 years. For example I recall Rick Doig asking If I still hated F1D after I finally made the US team and won the Bronze in 1984. Actually, I never really hated F1D. It is just that I dislike the dumb 65 cm and 1 gram rules that together result in low aspect ratio wings and somewhat ugly models. On the other hand , F1D's are outstanding flyers and have other redeeming advantages. Most important, it is the only class of indoor model recognized internationally for World Championship Competition. F1D provides the opportunity for us to match our skill and ability with the world's best modelers.

Building and flying the many other types of Indoor is fun, however it takes F1D to reach the ultimate goal of Indoor World Champion. I can assure you that nothing equals the pride and satisfaction of standing on the winners' platform when the US flag is raised and our National Anthem played. As a retired USAF Lt. Col. with 30 years of service, I've had more than my share of pomp and ceremony but I frankly admit that my eyes moistened up at each of the four World Champs I've participated in.

Building an F1D model isn't easy but it is not as difficult as many modelers seem to think. My daughter, Linda, built some pretty good F1D's when she was a Junior. I recall I used to tease her that I could teach a baboon how to build indoor. The point is your first F1D won't be the greatest but with determination and effort, each F1D will be better. It took me 15 years to win my first US Team slot. For those modelers that are interested in competition, your first F1D will fly better than anything you have ever built. Please humor this old timer (69 years young) and give F1D a try. My next article will suggest how to get started.

GETTING STARTED IN F1D from April 1993 INAV

I have assumed that my direct and logical appeal in the previous issue was successful and some have decided to try F1D. My suggestions will not only get you started, but are intended to guide the novice to progress rapidly by doing it "my way".

I was prepared to start out with a discourse on wood selection. Suddenly the idea hit me that what makes F1D so great is that everything is important. You need a good design, a well built model, a well adjusted model, good rubber, and the capability to find the optimum motor to obtain really long flights. Any one factor that doesn't measure up will reduce duration. Therefore you goal should be to improve all of the skills required. Some may question what skill has to do with rubber. The skill is being able to identify which of the rubber you possess is best and keep an active lookout for better. For the 84 world champs, Stan Chilton furnished the US Team with three batches of Pirelli rubber that was so superior that I would almost kill for more. Both of my world records were set using good Dolby Tan.

You can't improve your F1D Craftsmanship without good tools. You must be able to obtain uniform readings of wood sizes and weights. I use two direct reading scales that I made. One is 0 – 5/1000's and one is 0 – 25/1000ths. (Col. Randolph works in ounces, not grams. -Ed.) I use a dial paper (thickness) gauge that cost $12.50 about 30 years ago. Also, you absolutely need the best rubber stripper available. I've tried them all, and I suggest the one made by Bob Oppegard (Editor note, this stripper is no longer in production.).

I still use Ambroid thinned with acetone. I don't have a set ratio but go by color and viscosity. I recall the advice from Bill Bigge to use only enough Ambroid that the wood fails before the glue joint after about 2 minutes. You must remember to keep adding acetone to your glue gun, because it will evaporate after a week or so.

I strongly recommend that your first F1D be a Proven superior design. This will not only save a lot of development time, but will also allow you to expedite and concentrate on improving your building and flying skills. One very common mistake is to try an hit the designer's light weights with your first ship, resulting in a really weak model that won't last through a test flight program. It is

better to make everything 25-30% heavier, and then keep reducing the weight on your 2nd, 3rd and 4th copy before you match weights. You must also keep detailed records of all parts if you expect to progress.

Set your own reasonable goals for model parts. Here are some of mine: I retire F1D wings when they hit .012 oz. I won't use a stab frame if it exceeds .0027 oz. I won't use a cabane that exceeds .0006 oz, nor wing posts (two plus boron) that exceed .0014 oz.

When I was assigned in Cleveland between 1965-68, my home was only 12 miles from Micro-X.
I spent hours sorting through Jerry's 4000 sheet stock, weighing and measuring to find exactly what I needed. I will admit that I am very picky about wood. Because of my standards, about 75% of what I order from both major suppliers I do not use. However, I never send back any wood. For several years now I have been building from my "reject" stockpile, so Jerry thinks I buy from Guitlow and Lew thinks I buy from Jerry.

The secret of my success really is no secret. I love to fly indoor and year after year I make between 500-800 flights. I doubt if anyone does more. I know that constant practice flying, adjusting and steering helps. The word "practice" makes me smile, and I'll explain why. Last year an old friend from my Cleveland days was vacationing in California and looked me up. Since I was all packed up and actually enroute to my flying site, I invited him and his wife and two kids to my practice site. After 2 or 3 flights his 5 year old son said he didn't see why I had to practice, since I knew how to fly. The kid was right, and perhaps we should call these "test sessions".

I don't know about you, but I find it difficult to maintain a high level of indoor enthusiasm if I don't fly frequently. I suggest you look over every gym in your area and try to get the best on a regular basis. I should point out that stable air and a non-catchy ceiling are way more important than a high ceiling. Teachers and principals are usually fascinated at the lightness and technology that goes into an F1D. I got my site by accepting complete responsibility for my "assistants" and being meticulous about cleanliness, locking up, and resetting the school alarm systems. I frequently hold talks and flight demonstrations for classes. School officials know that I am very serious in my efforts to advance the state of the art and are pleased to hear of my accomplishments. Last October I was lucky enough to take the new principal up in a sailplane on an excellent thermal day for a 3-hour flight, topping Mt. San Jacinto (next to Palm Springs). I've never seen anyone enjoy a flight more. The point I'm trying to make is that you have to work at getting and keeping a good flying site.

My next article will probably cover test flying and the use of partial test motors to find the optimum motor. Since you will need an F1D to test fly, start building and good luck.

****

A note sent in by Lew Gitlow who is once again flying F1D

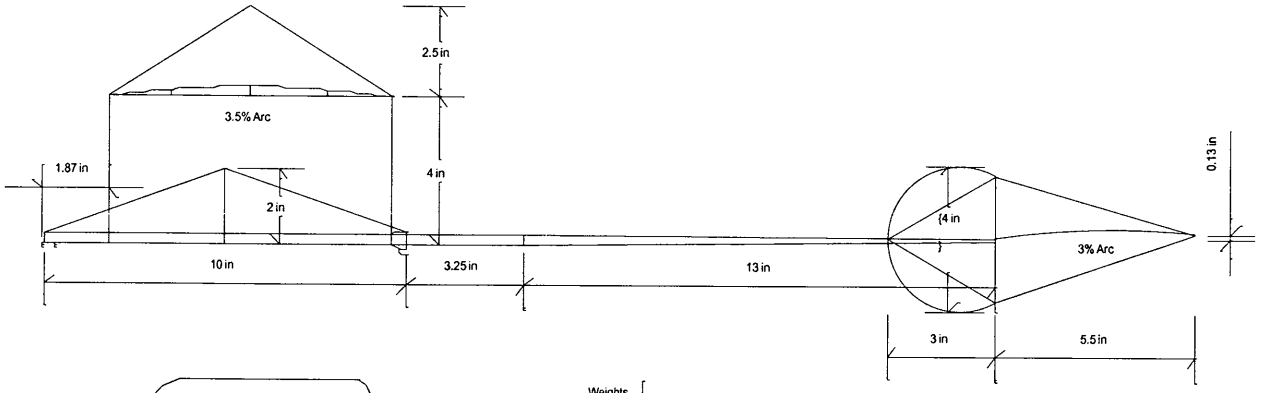
NEW RULES FID ATTRACTS PARTICIPATION OF MANY

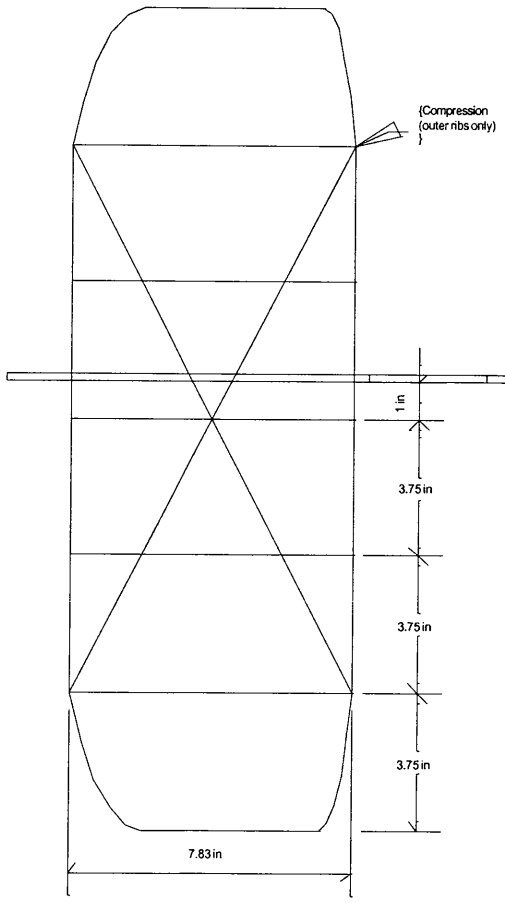
Our West Coast group will work towards that end by leaving time at the 3 or 4 club events for practice flights with our models and in addition try to plan for a trip south as a group to fly in Moffit and or Santa Anna hanger by next year sometime.

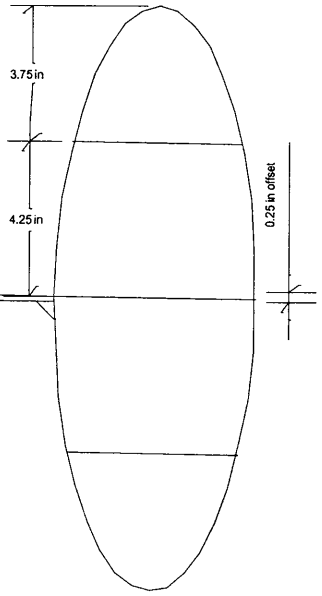
Moscow next summer may have FID replace the now out dated Miller event, and I think that a lot of- guys would build FID instead of intermediate stick as a step up if they were starting out and wanted to take a step up. There may be flying time at Moscow devoted to FID only if it becomes clear that there will be substantial participation. We already know of several out west that will be building their first FID planes this year. Canadians, West Coasters, let's here from you . You know that the Moscow Field House roof and West end wall work has made air conditions that are very stable. In addition the curtain is rolled higher.

This year FID Junior level entries have several new members as a result of the Science Olympic Program, exposure to Indoor Model Supply Kits and materials, the help of the parents, and senior fliers over the last three years. We should expect that there will be more interest and prepare for it. We need your contributions; articles on construction related topics.

John Kagan F1D 55







Weights

Stick + 1/2 boom	.35gm
Stab + 1/2 boom	.21
Wing	.37
Prop	.25
Ballast	to 1.2gm

Wing

Spar	.034 x .060 5# A
Tip	.034 x .040 5# A
Ribs	.024 x .050 5# C
Compression Ribs	
Top	.024 x .024 5# C
Bottom	.024 x .030 5# C
Uprights	.024 x .024 5# C
Cabane	.034 x .050 5# A
Post	.034 x .050 6# A + .003 Boron (2)

Stab

Outline	.029 x .054 5# A
Outer ribs	.024 x .055 5# C
Middle rib	.024 x .060 5# C

Rudder

Post	.034 x .055 5# A
Outline	.029 x .040 5# A

Stick

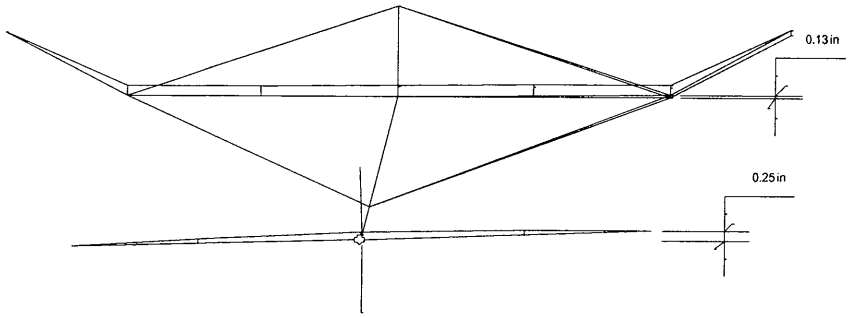
Motor stick	.013 x .25 dia 4.3# C + .004 boron (4)
Stub	.013 x .25 dia 4.3# C
Boom	.009 x taper 4# C + .004 boron (2)
Joiner	.009 x .5 x taper 4# C
Web	.020 5#
Prop hanger	Harlan
Post	.050sq. -> .040sq.

Prop

VP hub	Banks style w/ Kagan hinges and yoke attachment
Spring	.008 music wire x 8 wraps
Blade planform	Tellier
Pitch / Diameter	24" (low) x 18"
Outline	.024 x .024 5# A
Ribs	.024 x .024 5# A

Motor

.054 x .6gm 5/99
"O" rings
Liqurfied Dow33 lube



Cat I: Cat II: Cat III: Cat IV: 28:57	F1D
05/09/01	Designed/Drawn/Built/Flown By John Kagan

F1d Prop Construction

by Steve Brown

This article focuses on the practical aspects of prop construction, not theory. Some of the techniques may seem simplistic, but they work. For the theoretically minded reader, the author uses "pitch" and "blade angle" interchangeably and knows that they are not the same. The information in this article is applicable to both fixed pitch and variable pitch propellers.

Wood

Wood can be obtained either from Indoor Model Supply or from "hobby store" balsa. Using the right wood is critical to the success of the prop. All parts are best made of wood that is as close to pure "A grain" as possible.

I use a Harlan balsa stripper for almost all construction. If you obtain your wood from "hobby store" balsa then the Jim Jones stripper will probably be more appropriate.

Materials

4.5 – 5 lb. "A" grain, .023 - .025" thick X 18" long
5.5 – 6 lb. "A" grain , tapered from approximately 0.1" thick to .30" thick, at least 12" long
.013" straight music wire (not stainless steel wire or wire that has been coiled)
An empty aluminum cola or beer can
Glue: Ambroid or Duco thinned with acetone to the consistency of cream. Titebond or similar for one joint.

Prop block

Much has been written on making prop blocks and helical pitch vs. non-helical pitch. I won't repeat that information. I only use one prop block. A solid block carved from 3" X 3" X 12" balsa has proven to be the most useful. It's better to make the block longer and wider than you'll need for 55cm props since you can use the same block for microfilm models and props up to 24" in diameter.

The sketch below illustrates an adjustable prop hub mounting for the prop block. The prop spar is rotated in relation to the block to achieve various "pitches." This adjustable hub mounting makes setting the spar quick and simple. Once I have set up this block for a given "pitch" I make index marks on the block and the circular plate. The "fence" is just a small block of wood that is exactly parallel to the prop shaft. I shim the block to place the 45-degree point for a given pitch at the appropriate distance from the prop shaft. Then I loosen the screw and rotate the mounting so that the prop shaft is vertical when checked with a square. The "fence" provides a reference surface to place against a square. You only have to do this once for each pitch. Generally, I find I don't change pitches very often. For 55cm F1d I usually set the block at 26 for a variable pitch prop or 31 for fixed pitch props.

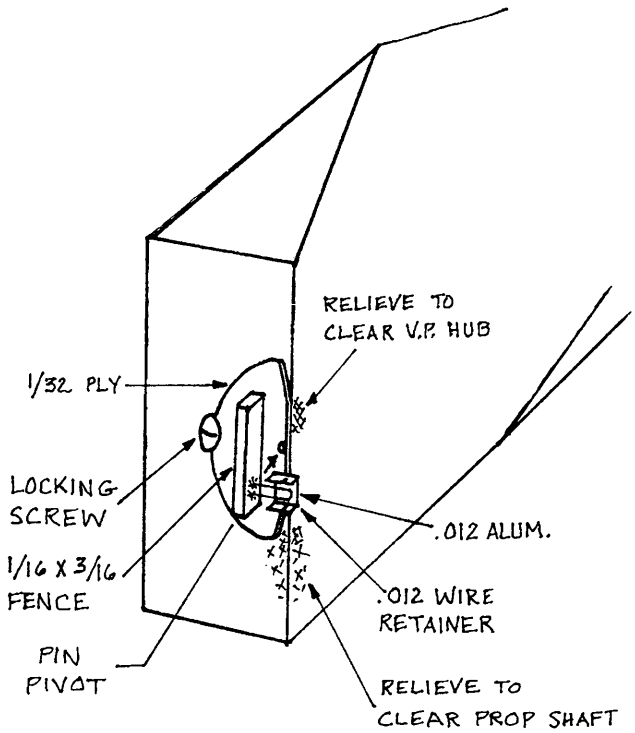
A helical pitch block is the simplest to construct. If you want to try a non-helical pitch distribution try 28" or 30" pitch and decrease the blade angle as you move toward the tip and hub, to about - 6 degrees.

The basic formula for locating the 45-degree angle station for a given pitch is:

$$\text{Pitch in inches} \div 3.14 \div 2.$$

For example, to locate the 45-degree angle station for a 30" pitch prop, the formula would be:

$$30" \div 3.14 \div 2 = 4.77"$$



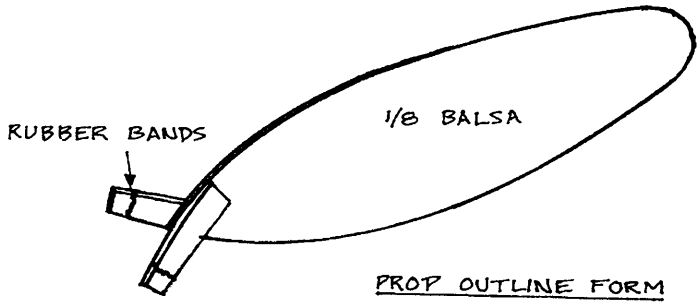
ADJUSTABLE PROP SHAFT MOUNTING

I have always used what is described in the literature as the "graphical" method to lay out the prop block. This method involves locating the 45-degree point for the block, then projecting lines from the hub through the 45-degree point to the tip. I then use a saw to cut down to lines drawn directly on the block and finish the form with a spokeshave and a sanding block with rounded edges.

Make sure that the centerline is straight from hub to tip and that the surface of the block is flat when measured at any point perpendicular to the centerline. The block surface should not be cambered. Resist the urge to dope or paint the block. Give it two coats of sanding sealer and sand down to the wood when the sealer is dry. The goal is a dull, matte finish that will not absorb water rapidly. Avoid glossy finishes, which will result in static attraction problems with either plastic or microfilm covering. Mark exact diameters at ½" intervals measured from the mounting of the prop shaft directly on the wood surface of the block, beginning at a radius of 9" (for an 18" diameter prop).

Bending the prop outline

Construct a balsa prop outline form as illustrated:



PROP OUTLINE FORM

When bending the outline do not attempt to make the tip radius too small. A 7/16 – 1/2" radius is safest. A lot of balsa will not bend around small radius curves without kinking. Aside from the bending technique, the main determinant of bendability is the grain structure of the wood. Using "A" grain increases your odds of success, as will the use of densities of 4.5 – 5 lbs. Most wood will be "AB" grain at best. "B" grain wood will not bend.

Draw 4 or 5 lines perpendicular to the long dimension of the sheet across the wood using a waterproof felt tip pen before cutting the wood. This will identify the "top" or "A" grain sides of the wood and helps to assure that all the strips will be oriented the same. The

best pen for writing on balsa is the Sakura Pigma Micron in .005mm. or .01mm. sizes. These pens are available at art or craft supply stores. The ink won't run on balsa and is impervious to water or acetone when dry.

Cut 18" strips of .023 - .025 thick 4.5 – 5 lb. "A" grain .024 or .025" tall. Don't make the outline out of larger wood thinking it will ease construction. Larger wood will be harder, or impossible, to bend and may add excessive stiffness to the structure. Soak the strips in a tray of water for 45 minutes. Select two strips and, under strong light, check to make sure the orientation of both strips are the same. It's easy to get one with the "A" grain face up and the other with the "C" face up. Align the ink marks to check orientation.

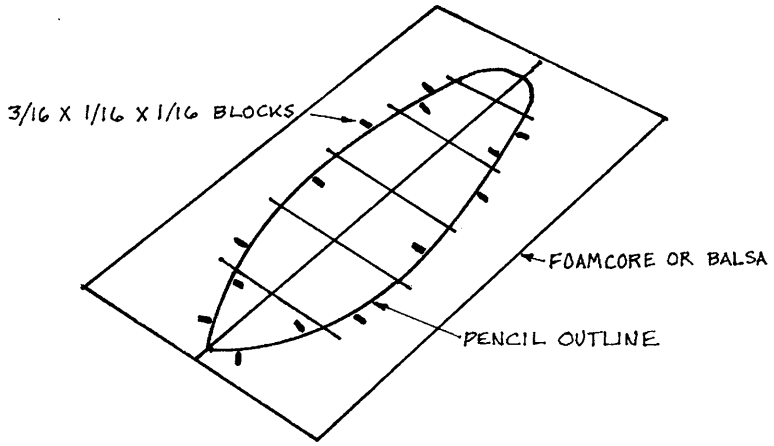
Secure the pair of strips to one leg of the former with a thin soft rubber band. I make the rubber bands by cutting them from ¼" X 6" toy balloons. (These are the balloons used to produce "twisted" animal shapes.) When you come to the tip, push the wood against the former firmly with your index finger and do not allow the wood to spring back once it's been bent. Don't attempt to "pull" the wood around the former, always push it. Cut off the excess wood, if any, with scissors. Secure the ends of the pair of wood strips to the other leg of the former with another rubber band and bake for 30 minutes at 175 degrees. Always use light rubber bands about 1/8" wide because the wood will shrink during baking. Soft rubber bands allow movement as the wood shrinks during baking.

Ribs

The ideal wood for ribs is wood that is similar to the outline. Look for 4.5 - 5 lb. "A" grain .022" - .024" thick. Make a rib template from .020" aluminum or from scrap Formica. The exact airfoil thickness is not important. What is important is that the arc of the ribs is appropriate to the height of the spar so that the ends of the ribs will touch the block on both sides when glued to the top of the spar on the block. Try a 4% arc. Using a Harlan stripper cut 10 - 12 ribs the same height as the outline.

Assembling the blade outline

The prop outline is built flat on a simple jig:



OUTLINE JIG

Place the bent outline wood into the jig. Cut through the two ends of the strips where they overlap at the hub end and glue them together. Glue the ribs to one side of the outline, then turn the jig and, using a new, sharp razor blade, cut them to the appropriate length. Double glue each rib.

When the outline is completely assembled place a small ink dot (using the Micron pen) to on top of each rib and at the tip to mark the centerline. You will use these marks later to position the blade on the spar.
Allow the glue to dry for a few minutes, then run a razor blade under each glue joint to separate it from the jig. Gently pry the finished outline free from the jig. I usually loosen the outline in the jig and then turn the jig upside down and shake it lightly to remove the outline. If you find the outline glued to the jig you are using too much glue.

Examine the completed outline under magnification to look for bad glue joints. Re-glue as needed.

(to be continued next issue)

TRIMMING F1Ds – by Bernie Hunt

The new 55cm F1Ds fly with a much wider range of power than the old 65cm class. This can cause problems in trimming so I have attempted to set out my own understandings.

Surprisingly, a normal rigid model (like a braced F1D), properly trimmed, flies at a near constant speed throughout the flight. The relative incidence of the wing and tail are fixed and chosen to give the minimum power requirement at cruise and hence the best duration. If a model were to fly faster for any reason (high power or launch-ed flat),then the wing will generate more lift and the model will raise its nose and slow down (component of weight offsets thrust) until it reaches equilibrium. So at high power, a model climbs quickly but its flight speed is no more than at cruise (in fact it should be slightly less). You should always try and launch a model at the correct (ie equilibrium) attitude and speed. If it does set off too flat or too fast then structural distortion (aeroelasticity) may prevent the return to a stable pattern.

You can get indoor models to fly faster than their cruise speed but you need one or more of: 1. downthrust to counteract the extra lift 2. a variable incidence tail (via stick bow) to reduce the incidence and lift 3. a spiral climb. Successful models usually use 2 and 3. Really fast flying indoor models are probably not a good thing because aeroelasticity can cause fatal outcomes (dive in, roll or deep stall) and also our models are very draggy.

A spiral climb is the classic way that a rigid model can be trimmed successfully for fast climb with a big range of power. Free flight power (gas) models (those without VIT) use this method. The model is allowed to loop on high power but it is rolled at the same time so it stays the right way up and flying stably. How is this achieved in practice for indoor? I am not exactly sure of all the factors for braced models but for my unbraced models PLENTY of left wing washin and a LITTLE stick bow are the key. Fortunately, on unbraced models (like floppy EZBs and unbraced F1Ds), the stick twist caused by the high initial motor torque does naturally induce a lot of washin at the critical launch phase . A stick that is too stiff in torsion between the wing posts definitely harms the climb pattern. Some of the old braced 65 cm F1Ds were able to achieve lovely spiral climbs but braced 55cm F1Ds and 35cms are tricky. It must be something to do with the ultra low aspect ratio of these classes.

Now onto props. Props are a bad thing for model stability and the bigger the diameter and pitch the greater the problems they create. One textbook I read said that a prop behaves like a destabiliser equivalent to half its area. The ultra high pitches of VP props are particularly bad because they are often partially stalled and distorted. So for the easiest trimming model, choose the smallest diameter prop with a very conservative P/D ratio. A nice rigid 16" dia x 26" fixed pitch prop is a dream to fly but it will cost you time in a low site against VP props.

In the light of the above here are the my suggested steps in trimming an unbraced model like 55cm F1d:

1. Assemble the model with A. ½" tail tilt, B, a little fin offset and C. 0.2" negative on the tail. Start with no wing warps and 2-3 deg sidethrust and a touch of washin on the left tail panel.
2. Fly the model on low power (0.15 oz in)and adjust A, B and C until you get a nose up attitude without stalls and a 30-40' circle - do not exceed 1" tail tilt. If the model has inadequate or excessive cruise wing washin the alter the warps now - the ideal is about 0.25".
3. Apply more power (0.25 oz in) and check that the circle does not open up - you may need more washin or sidethrust. Recheck and adjust the trim as seen in the calmer air higher up.
4. Now fly on full power (0.4-0.5 oz in) on a 1/3 or ½ motor + ballast, being careful to launch at the climb angle (about 30 deg).If the model stalls whilst turning OK to the left you need to reduce the stick bracing tension to get more stick bow. Achieve this by shortening the bracing post height 0.030" at a time - you will need to increase the negative on the tail to compensate. Obviously, if the model goes flat you need to increase the bracing posts height(add a little block on top). If the elevation seems OK but the model does not execute a spiral climb then you will need to add more washin and go back to 2. If you just cannot get good spiral climb try a smaller prop.
5. Finally, fine tune the trim of the model by altering elevation, wing warps and stick bow till you get the trim perfect both on the way up and the way down - you always have try too much of each adjustment to know where the optimum lies.

BALSA TESTING SIMPLIFIED by John Taylor As printed in Norwind News

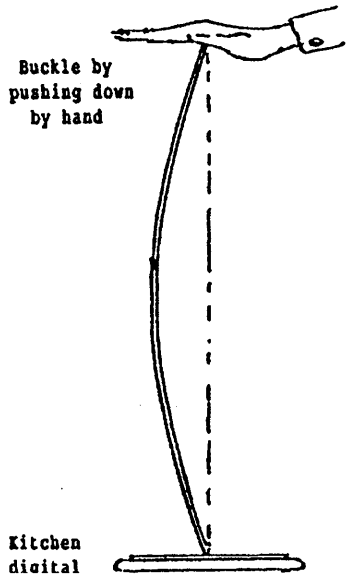
The subject of balsa testing has been addressed several times in previous issues of NORWIND NEWS, Refs. 1-4. Initially the tests were aimed at measuring Young's Modulus and many members found this difficult to understand. Later tests calculated a Stiffness Coefficient which was more easily understood but the test method was relatively clumsy and was therefore not widely accepted. The test method described in this note is very simple and calculates a Stiffness Coefficient which is compatible with that from the previous method, thus allowing direct comparisons to be made.
The method is based on the calculation of the buckling load for struts developed by the mathematician Euler but don't be alarmed, you don't have to understand Euler's analysis, you will only have to apply a very simple formula. The test method was proposed by Hewitt Phillips, in reference 5, as a means of calculating Young's Modulus. It has been adapted here to calculate Stiffness Coefficient.
To perform the test you first have to measure the dimensions of the specimen and weigh it. You will have to do this anyway if you are going to calculate the density of the specimen. Next you measure the buckling load as shown in the diagram. To do this you will need a digital kitchen scale obtainable for about £20. You will notice that after the initial deflection the buckling load remains sensibly constant for a fairly large range of deflection. You will find that the specimen tends to deflect only in one direction. In this case force it to deflect both ways and take the mean value.

The final step is to calculate the Stiffness Coefficient from the following formula:

$$SC = \frac{2.54}{10^6} \cdot \frac{bl^4}{t} \cdot \frac{L}{W^2}$$

I = Specimen length in Inches
b = Specimen breadth in inches
L = Buckling load in gms
t = Specimen thickness in inches
W = Specimen weight in gms

This method is so simple that my friendly model shop proprietor allows me to do the tests in his shop. However if you find the above formula daunting we are developing an even simpler approach and we intend to give a demonstration at a future meeting.
A few words of warning are in order. Although the length and breadth of a typical 36" sheet can easily be measured with the necessary accuracy, the thickness needs to be measured with a micrometer. If you assume that the nominal thickness Is correct significant errors could be incurred. Even more important is the measurement of weight. A 36"x 3'x 1/8"sheet, in the density range 4-6lb/cu ft, will weigh between 15 and 25gm. Although kitchen digital scales can be used in model shop tests for preliminary selection, more accurate weighings, ideally to a resolution of 0.1 gm, will be needed for the final calculation.



Care should also be taken not to overload the scales. 3/16" sheet, particularly if it is high density, may have such a large buckling load as to overload the scales.

When making a choice for indoor models wood in the density range 4-6lb/cu ft with a Stiffness Coefficient of at least 100 will give the very lightest models. However robustness and impact resistance are important, particularly for wing and tail spars, in order to withstand wall and steering pole impact. In this case denser wood should be chosen providing it has a high Stiffness Coefficient.

When a sheet with promising properties has been found it should be cut into smaller specimens for more detailed testing. A useful size is 18"x I/4"x I/8". This is a good starting point for EZB motor sticks and for stripping down further for wing spars, etc. (For stripping advice see references 6 and 7). The method is still ideal for specimens of this size provided accuracy is maintained, especially with regard to weight.

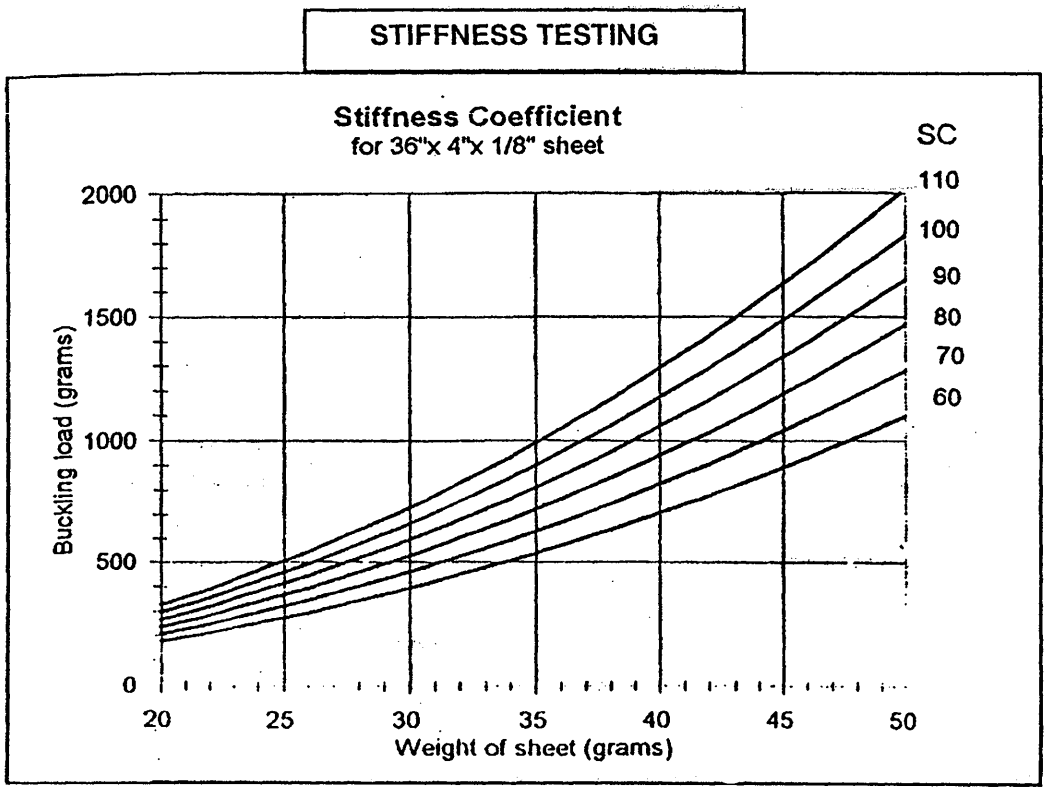
REFERENCES

1-4 Norwind News, issues 22, 23, 27 and 34
5 NFFS Digest, May 1987
6-7 Norwind News, issues 34 and 35

STIFFNESS TESTING by John Barker

It is often said that good things come in small parcels and the above is no exception. It may only be half a page but information like this from one of the world's best indoor flyers (even if he is our Bernie) is invaluable. You will notice that Bernard has referred throughout to Stiffness Coefficients (SC) and you can find the SC of your own wood by the method and formula given in the last NORWIND NEWS. It is mentioned on page 7 of this issue that I gave a demonstration of stiffness testing at Wigan and that I used some tables that make the calculations easier. It was intended to publish these tables but, since then, I have gone further and produced some graphs which remove the need for calculation altogether when dealing with standard sheets.

Unfortunately there is not room to publish all the graphs at the moment but a sample for 4" wide 1/8" sheet is given at reduced size opposite. All that one needs to do is draw a vertical line from the Weight of the Sheet and a horizontal line from the Buckling Load. The Stiffness Coefficient can be estimated from the two SC lines nearest to the intersection. If anyone wishes to try this method I an supply graphs at A4 size for whatever sheet size you want to test.



WOOD SELECTION FOR INDOOR MODELS
By B. J. Hunt

The quality of wood can be fully described by its density, grain type and stiffness coefficient. The highest stiffness wood (highest resistance to bending or buckling) is usually found with wood of density 4-5 Ib per cu ft The highest strength wood (resistance to breaking) is usually found with wood of density 7-8 Ib per cu ft. These statements assume a constant weight because, all other things being equal, the heavier the weight of a component the stiffer and stronger it will be. The grain type of the wood (a, b or c) has no effect whatsoever on the properties of spars but it is essential that the grain runs truly straight along the length of spar. C grain wood (recognised by its pearly surface appearance) is dramatically stiffer across the grain in sheets.

The table opposite gives the suggestions for choosing wood for competitive EZBs (US or F1 L). For Limited Pennyplane, Fl D Beginner and No Cal, where there is more weight to spare, use wood of 1-2 lb. per. cu ft higher density.

WOOD CHOICE	
Component	**Suggested Type of Wood**
Motor sticks and booms	Need maximum stiffness so choose highest SC regardless of density - target 120+
Wing posts and prop spars	Need maximum strength so use 7-9 lb wood with best SC available - target 100+
Wing and tail spars	Need compromise between maximum stiffness and strength so choose 5.5 - 7.0 lb wood with highest SC - target 115+
Prop blades	Need stiffness across the grain so choose C grain with highest SC regardless of density - target 100+

The Mylar Doll Limited Penny Plane Propeller Construction

By
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The "Mylar Doll" propeller is the result of careful design and development. The original props were similar to Banks' propellers. It became evident that the model could not carry all the rubber weight that it structurally could by using this prop. Since the class limits the minimum weight and dimensions my approach has been to load the model with all the rubber that it can carry and then to optimally use this stored energy. Slowly the propeller blades got larger and the spare was moved back to reduce the back off. At one point I over did it and the model's flying weight and wingloading became too high to produce good flight times. In its current setup the propeller has the spar at 81% and the area of 1.72 that of the Banks prop.

I have different props for different ceiling heights and each is carefully tested and adjusted to get as close as possible to avoiding back-off a waste of stored energy. My models usually fly on .080-.090 cross-section motors. The length is determined conditions but the key is to fly no back-off flights and to trim the propellers for different ceiling heights. Over the years I have flown many different designs and they all fly about the same. My current models are very similar to the model published back in '93 except I have now separated the rudder from the stab to give more stability on launch. The Prop is in my opinion the key difference between pennyplane performance.

I start the construction by selecting the prop blade wood. My blades range in density from 4.0-5.0 lb/cu.ft. It is very important that both blades come from the same sheet and that the cut is of same quality on both. By cut I mean the size of the speckle is the same on both blades. This is very important as this will determine the flexibility and flare of the prop. Large speckle is stiffer than small speckle. The thickness That I start with is about 0.035". Grain is parallel with the spar. The blades are cut and sanded together to get them to match exactly to each other area wise. Next the spar location is marked with a waterproof marker. Each blade is then sanded to an airfoil section with the high point at the spar location. I believe this gives extra stability at launch and also improves the flare at the front of spar and reduces it at the rear of spar producing a larger pitch change with less required deflection. Finish sand the blades with 600 grit sandpaper and soak in a solution of hot water and 15% ammonia for 2hrs.

A piece of 10.0-12.0 lb/cu.ft. density balsa is selected for the prop spar. Cut and sand to .110 round, but do not taper. The wire hook is made in my usual manner from 0.016" diameter wire. I have used a deep hook shape combined with plastic O-rings has given me a non-binding combination. The propeller shaft/hook is attached to the spar with 30 min epoxy thinned with methyl alcohol 50 %. It is very important to ensure that shaft/hook to spar angle is 90 degrees to eliminate the side to side wobble when the prop is finished which effects the sidethrust adjustment and balance of the prop.

By now the blades should be well soaked. Rinse well Under cold water to remove the Ammonia residue. Next some white jap tissue cut a little larger than the blades. Lay one pece of tissue on your work surface. Place one of the blades on it, leading edge away from you, airfoiled surface up. Cover with another piece of tissue. Place the second blade exactly over the first and cover with another piece of tissue. It is important to use white tissue otherwise the die may transfer to wood. Wrap everything with a bandage onto a 5.0" dia can at 22 degrees and bake at 200 degrees Celsius for one hour. I actually use a Jim Jones cork form. The purpose of this step is to add the undercamber to the blades.

For final form of the blades a carved helical block is used with a support .300 high on the surface to retain the pre formed camber. The blade is moistened under tap water and formed on the block using pins with balsa blocks to hold the edges flat on the block. Do not use pins only as they will damage the delicate wood. Bake 1 hour at 200 degrees Celsius and remove from the block once things have cooled down. Repeat for the other blade. Next a slot is cut for the spar to fit into 0.110 wide. This has to be done carefully with sandpaper and patience. If the slot is too tight problems will occur later as the blades will crack or distort defeating your efforts for a true helix. If it is too loose it will take too much glue and the weight will be too high and glue shrinkage during the curing process will be a problem resulting in an unevenly pitched propeller. The blades are now finished and ready for installation to the spar.

We are now ready for the final assembly of the propeller. The spar is fixed in the pitch gauge that has been set for 19.0" pitch. The blades are glued to the spar using 50% thinned down ambroid cement from both sides of the blade all around the slot/spar contact. We must be careful that the blade is centered on the spar or in other words that the spar is front and aft of the blade equally. Let dry for at least 1 1/2 hours checking for glue shrinkage and correcting often. Repeat for the other side of the prop.

The final finishing step is to sand the spar to a taper starting from the ½" from shaft to the end of spar. The idea here is to blend the spar into the blade. Go slowly as this takes time. Once done you will notice that your spar now too has a somewhat helical/twisted shape as the result of the blending. This results in a lighter and stiffer spar than a round spar glued to the back of the blade. Finally, The sharp edges of the spar are rounded and the pitch x diameter is noted on one blade. I also note a number on the prop so

That I am able to keep track of the prop in my notes and that I may trim the prop for a particular ceiling height. Adding 2 Teflon washers and a drop of light oil completes the propeller.

As mentioned earlier I try to trim the props for different ceiling heights by changing the amount of flare by sanding the blades very carefully. If we plot a turns vs. torque graph we see a curve which displays peak torque/steep climb/climb/cruise/decent/sharp drop to zero torque. Usually we would back off turns to discard the peak torque and steep climb sections. This works, however, we have just give up some potential energy stored in the motor during winding. If we can eliminate the backoff or keep it to a minimum we will see the flight times increase. To achieve this we very carefully sand the blades of the prop down and test fly the model we now are able to back off less and less. Be careful not to overdo it. If you do than you can still trim the prop for lower ceilings. Ideally the prop will flare and absorb the energy so that no backoff is required. This is much easier said than done. I now have 4 props trimmed out for what I figure should work in any conditions.

At the contest I usually setup the model and figure what time it should do. Knowing the average RPM I estimate the motor size and weight and make up the motor. If I am in a CAT IV site I will make the first test flight with the prop trimmed for that ceiling height. Soon it will be evident if the conditions (temp/humid) agree or not with the combination. If the combination is close I make small changes in the motor and have a fighting chance. If the combination is way-out I then switch to a lower ceiling prop if running out of turns too high up or to a lower flare one if landing with energy in the motor.

I can in no way claim that my prop method is better then other people's. But it has worked for my. The Mylar Doll series has won numerous contest many in very close battle and set 4 Canadian records of which it still holds 2 of them. I hope that the above will be useful to you and if you require further information please do not hesitate to contact me.

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2001/2002 INTERNATIONAL POSTAL CONTEST from 1st Oct 2001 to 31st March 2002

F1L (International Easy-B)
F1M (F1D Beginner/ International Pennyplane)
FAC Peanut Scale
NoCal (profile) Scale with a minimum weight of 6.2 grams without rubber motor and built to FAC rules.

I have assumed that most flyers have regular access to spaces with Category l ceilings (less than 8 metres)and all times will be factored to that height, even though they may have been flown in higher ceilings. Most of the above classes have rules regarding
dimensions, minimum weights and maximum rubber weight. I propose to run the contest on a trust basis and will assume that all flyers will abide by the rules so that
I do not create the problem of requiring the flyer to provide me with a certification by a third party that his models comply with the rules. The contest will start on 1st October 2001 and finish on 31st March 2002. Any flight times from 31st March
should be sent to me as soon as possible after that date.
Entries should include the ceiling height, the flight time and, in the case of the scale events the name of the full-size aircraft that the model is scaled down
from.
The entries can be sent to me by e-mail or fax or snail mail as follows:
e-mail: henderson98@yahoo.com
Fax: (416) 481 0016
Regular mail:
W.Henderson
15 Joicey Blvd.
Toronto, ON
Canada
M5M 2S8

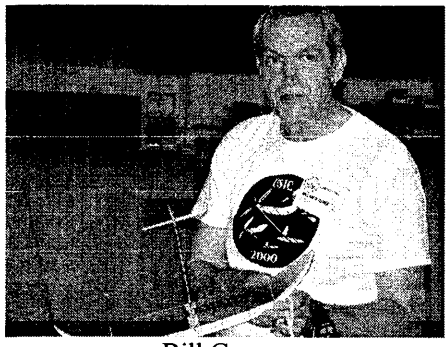
I will advise you later as to which web site will be used to publish the results

FORTY MINUTE CLUB

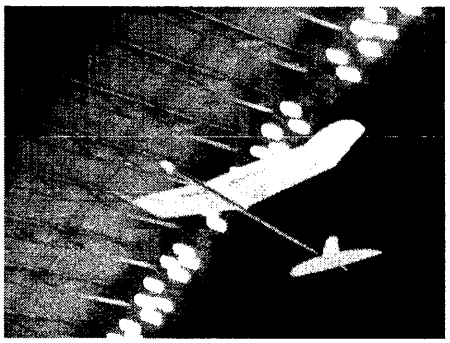
January 2001

NAME	COUNT		CLASS 1	CLASS 2	YEAR	SITE	NAME	COUNTRY	TIME	CLASS 1	CLASS 2	YEAR	SITE
BROWN, STEVE	USA		X		1996	SANTA ANA	ROBBINS, HERB	USA	43:39		X	1995	SANTA ANA
RICHMOND, JIM	USA		X		1996	AKRON	ALLEN, PAUL	USA	43:36	X		1974	SANTA ANA
RANDOLPH, BOB	USA	55:06	X		1993	SANTA ANA	KUJAWA, SYLWESTER	POL	43:35		X	1992	WROCLAW
BROWN, STEVE	USA	53:45		X	1997	SANTA ANA	AMORARITEI, DAN	ROM	43:31		X	2000	SLANIC PRAHOVA
ASLETT, BERNARD	UK	52:22	X		1983	CARDINGTON	MANGALEA, CORNELIU	ROM	43:30		X	1996	MOSCOW, ID
COSLICK, LARRY	USA	52:04		X	1999	AKRON	CUMMINGS, FRANK	USA	43:28	X		1963	SANTA ANA
UNDERWOOD, GARY	USA	51:58		X	1996	LAKEHURST	ATWOOD, BILL	USA	43:17	X		1963	SANTA ANA
GIBBS, BOB	USA	51:53	X		1999	SANTA ANA	THOMAS, MIKE	CAN	43:01		X	1996	MOSCOW, ID
ROBBINS, HERB	USA	51:36	X		1998	SANTA ANA	PLOTZKE, RON	USA	42:53	X		1969	LAKEHURST
KAGAN, JOHN	USA	51:11		X	1999	AKRON	FOSTER, JOE	USA	42:44		X	1987	SANTA ANA
DOIG, RICK	USA	50:41		X	1995	AKRON	SIEBENMANN, DIETER	SUI	42:33		X	1986	CARDINGTON
KOWALSKI, DICK	USA	50:41	X		1976	AKRON	KELLER, PETER	SUI	42:30		X	1999	BORDEAUX
RICHMOND, JIM	USA	50:12		X	1999	AKRON	CALLIAU, LARRY	USA	42:29		X	1985	AKRON
BANKS, CEZAR	USA	49:50		X	1996	MOSCOW, ID	BAILEY, BOB	UK	42:28		X	1998	SLANIC PRAHOVA
ROMAK, BUD	USA	49:35		X	1991	LAKEHURST	DOMINA, DAN	USA	42:25		X	1979	AKRON
RANDOLPH, BOB	USA	49:31		X	1995	AKRON	CANNIZZO, SAL	USA	42:20		X	1983	LAKEHURST
BARR, LAURIE	UK	49:29		X	1996	CARDINGTON	PYMM, DAVE	UK	42:03		X	1986	CARDINGTON
HUNT, BERNARD	UK	49:07		X	1997	CARDINGTON	ROMAK, BUD	USA	42:01	X		1965	MOFFETT NAS
SLUSARCZYK, DON	USA	48:10		X	1995	AKRON	LEONARD, NICK SR	USA	41:50		X	1999	AKRON
BUTTY, RENE	SUI	48:01		X	1996	MOSCOW, ID	OBARSKI, DICK	USA	41:30		X	1981	AKRON
ROHRBAUGH, AL	USA	47:40	X		1997	AKRON	FINCH, TOM	USA	41:27	X		1963	SANTA ANA
TIPPER, JOHN	UK	47:21		X	2000	SLANIC PRAHOVA	KINOSHITA, SATOSHI	JPN	41:24		X	1993	TACHIKAWA CITY
HARLAN, RAY	USA	47:13		X	1980	AKRON	CHAMPINE, BOB	USA	41:23	X		1963	SANTA ANA
GIBBS, BOB	USA	47:03		X	1998	SANTA ANA	RODEMSKY, ERV	USA	41:23		X	1979	AKRON
DOIG, RICK	USA	46:24	X		1983	AKRON	STOLL, ED	USA	41:21	X		1963	SANTA ANA
OTA, KENICHI	JPN	46:16	X		1996	MATUMOTO CITY	HOFFMAN, EARL	USA	41:13		X	1987	SANTA ANA
LOUCKA, LARRY	USA	46:14		X	1995	AKRON	BAKOS, FERENC	HUN	41:10		X	1999	DEBRECEN
CHILTON, STAN	USA	46:10		X	1994	AKRON	KIHARA, KAZUMASA	JPN	41:06		X	1998	MATUMOTO CITY
McGILLIVRAY, JACK	CAN	45:57		X	1996	MOSCOW, ID	RICHARDS, DEREK	UK	41:02		X	2000	SLANIC PRAHOVA
RODEMSKY, ERV	USA	45:50	X		1974	SANTA ANA	ROMBLAD, JONAS	SWE	41:02		X	1999	LAKEHURST
RIEKE, K.H.	GER	45:40	X		1962	CARDINGTON	MATHER, CLARENCE	USA	40:54		X	1974	SANTA ANA
MERKT, THOMAS	GER	45:27		X	1996	MOSCOW, ID	GANSER, RON	USA	40:53	X		1996	AKRON
REDLIN, CARL	USA	45:17	X		1962	CARDINGTON	DRAPER, RON	UK	40:44	X		1962	CARDINGTON
REE, ANDRAS	HUN	45:13		X	1998	SLANIC PRAHOVA	POPA, AUREL	ROM	40:42		X	1996	MOSCOW, ID
ANDREWS, PETE	USA	44:59		X	1979	AKRON	BILGRI, JOE	USA	40:37	X		1965	SANTA ANA
ENOMOTO, HIDEO	JPN	44:55		X	1998	MATUMOTO CITY	NONAKA, SIGEYOSI	JPN	40:36		X	1978	CARDINGTON
MATHER, CLARENCE	USA	44:44	X		1974	SANTA ANA	STEVENS, DARRYL	USA	40:35		X	1986	SANTA ANA
ASLETT, BERNARD	UK	44:37		X	1985	CARDINGTON	SHEPHERD, JESSE	USA	40:33		X	1995	AKRON
DE BATTY, BOB	USA	44:35		X	1996	SANTA ANA	DIHM, JAN	POL	40:21		X	1997	SLANIC PRAHOVA
NICOARA, VASILE	ROM	44:30		X	1996	MOSCOW, ID	LOTZ, RAINER	GER	40:20		X	1996	MOSCOW, ID
HULBERT, BILL	USA	44:27		X	1994	AKRON	GITLOW, LEW	USA	40:15		X	1987	SANTA ANA
HACKLINGER, MAX	GER	44:20	X		1961	CARDINGTON	MOSKALEV, VASILI	UKR	40:15		X	1996	MOSCOW, ID
ANDRE, THEDO	NED	44:01		X	1986	CARDINGTON	KALINA, JIRI	CZE	40:11		X	1975	CARDINGTON
NORE, PENTTI	FIN	44:01		X	1986	CARDINGTON	RODENBURG, OTTO	NED	40:11		X	1986	CARDINGTON
ORSOVAI, DEZSO	HUN	44:01		X	2000	SLANIC PRAHOVA	TRIOLO, JOHN	USA	40:06	X		1974	LAKEHURST
KOPECKY, ERNIE	USA	43:42	X		1963	SANTA ANA	MZIK, LARRY	USA	40:01		X	1995	AKRON

Class 1: Over 65CM Class 2: FAI 65CM 1 Gram

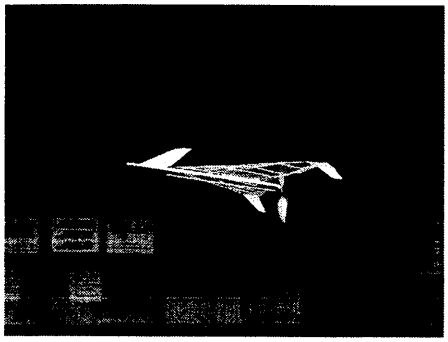


Bill Gowen

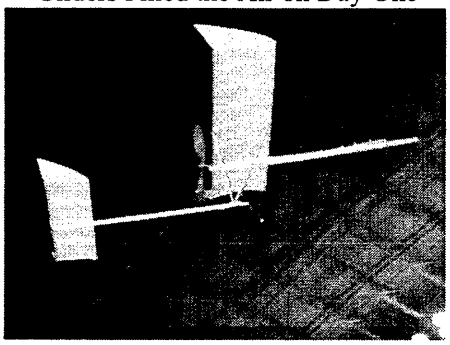


Gliders Filled the Air on Day One

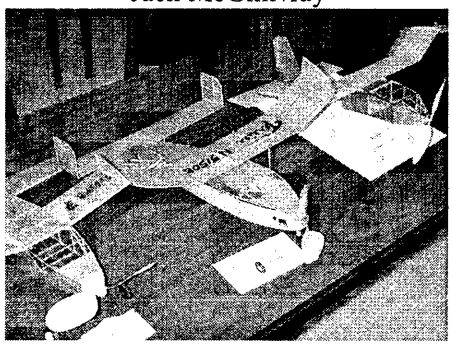
Jack McGillivray



Magic Mystery Ship

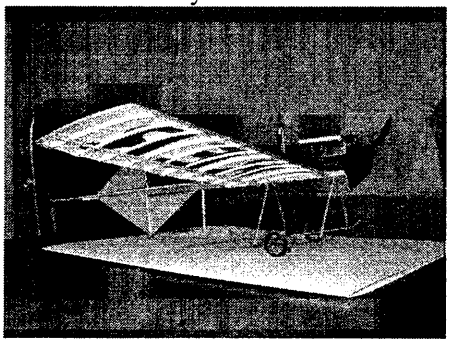


S.O. Creativity was in Abundance

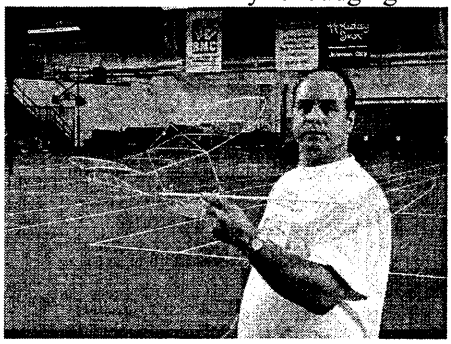


Bostonians Ready for Judging

John Barker



Vernon Neff's 1912 Fokker A

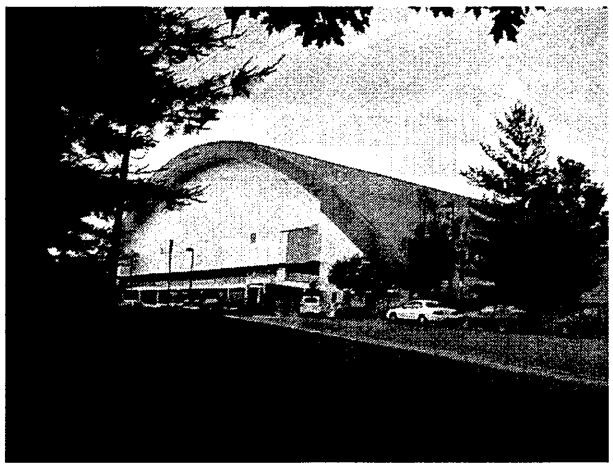


Tom Iacobellis Grabbed a 7th in F1D

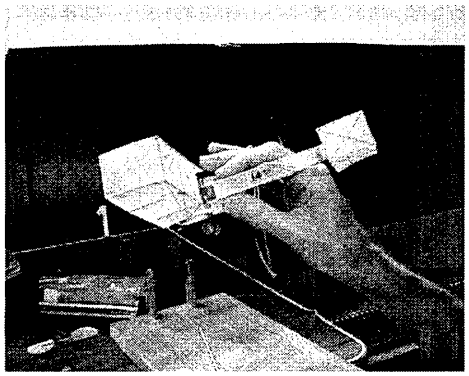
Tom Sanders and the Science Olympiad Invitational

Tim Lavender's Smyrna, Tenn FAC Bunch

Photos on this page courtesy of Steve Gardner

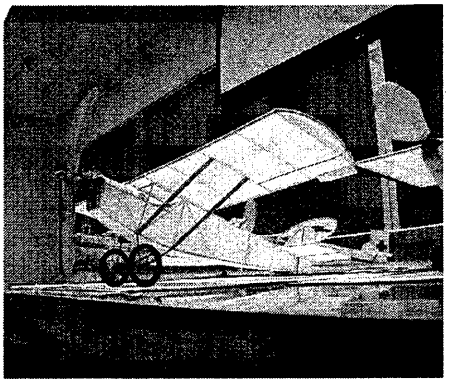


East Tennessee State University Mini Dome

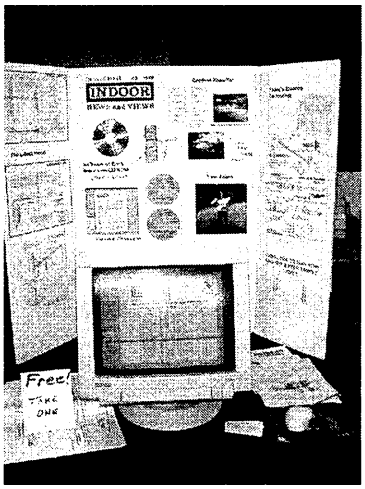


Emil Schutzel and S. Dumont 14 bis

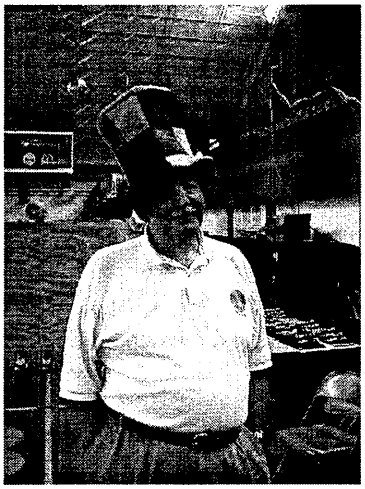
VTO Talks to Local TV Crew



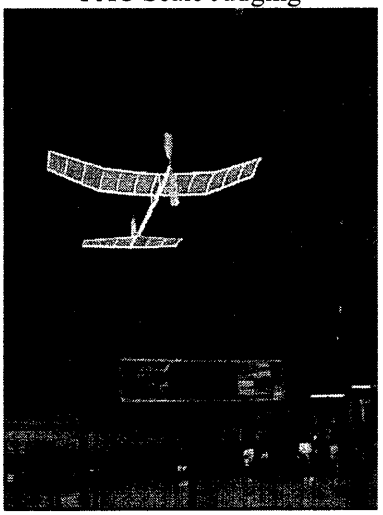
FAC Scale Judging



Carl's INAV Booth & Archive Demo

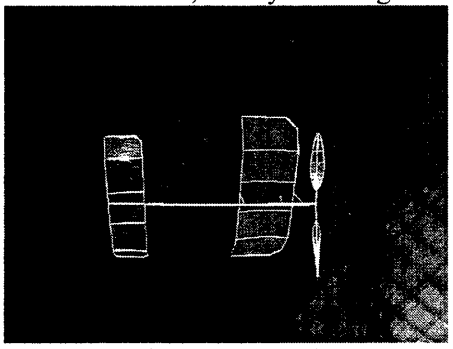


Dave Thomson, Always Smiling CD

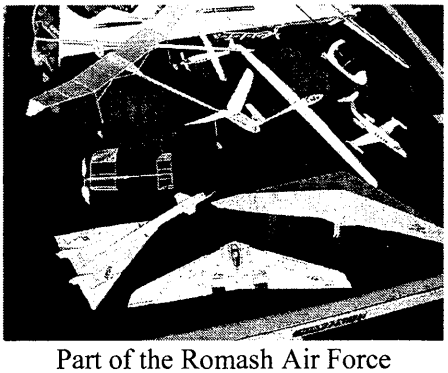


A P-24 Condor Broke 6 Minutes

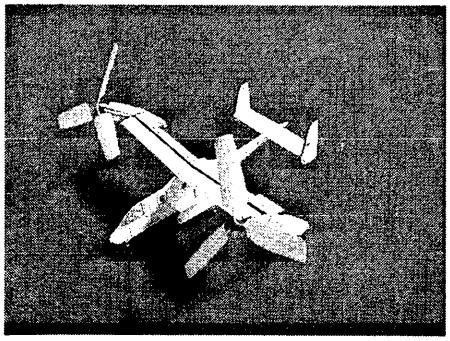
3 Stooges, Rash, Romash, Van Gorder



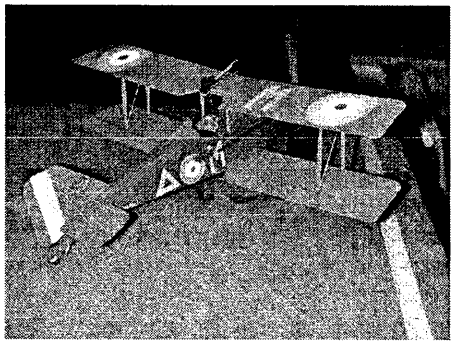
Big Square One?



Part of the Romash Air Force



Rubber Powered Osprey by Romash



Jack McGillivray's SE-5

Colin with F1D

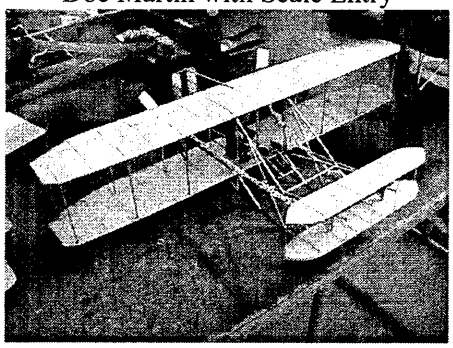
Jim Richmond

John Kagan got Fifth in Bostonian

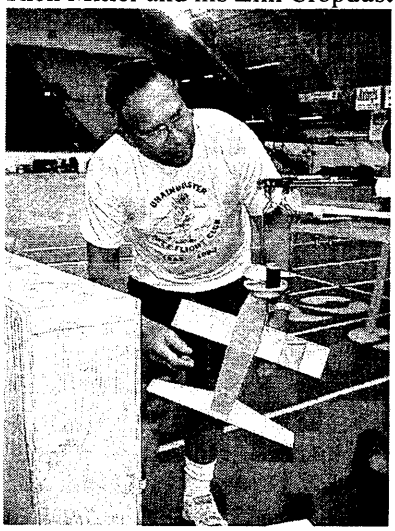
Doc Martin with Scale Entry

Rich Miller and his Zlin Cropduster

Tom Sova readies his F1D

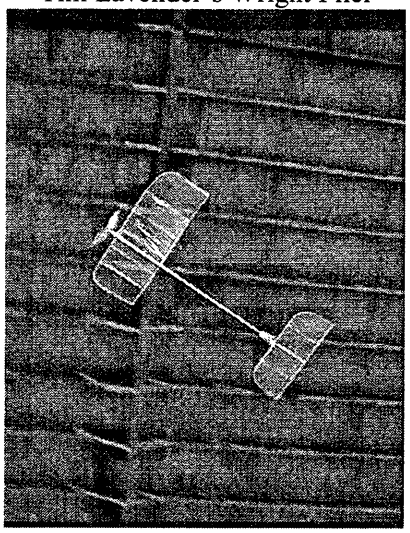


Tim Lavender's Wright Flier



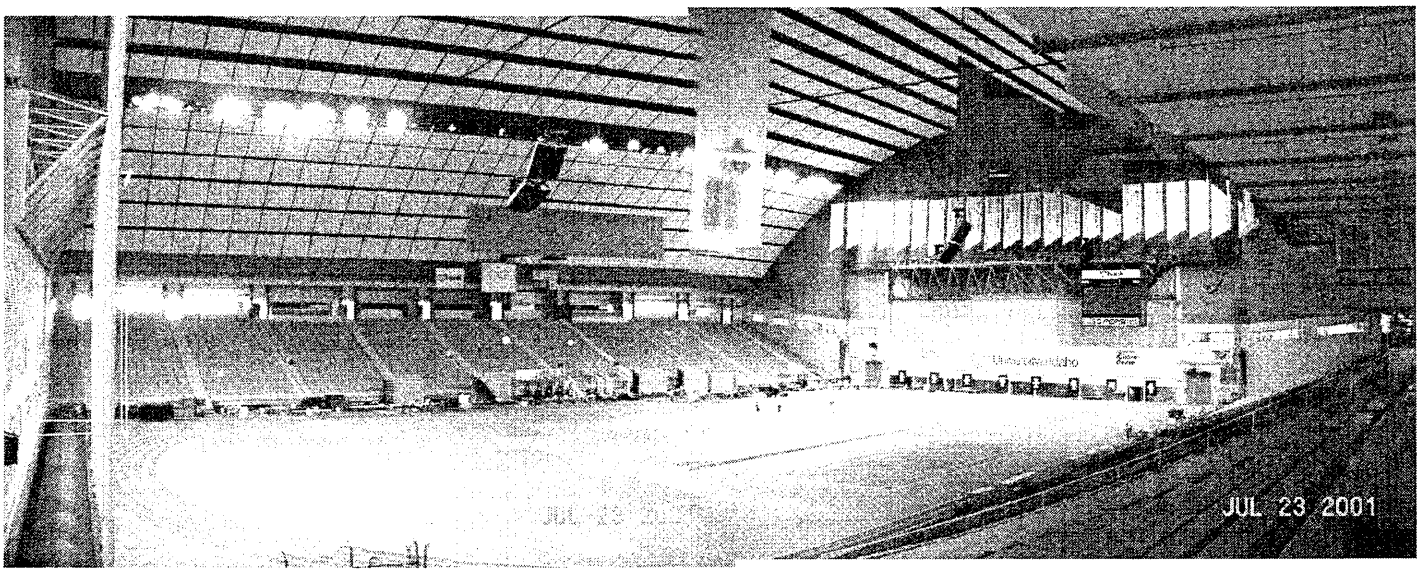
John Diebolt Weighs Bostonian Entry

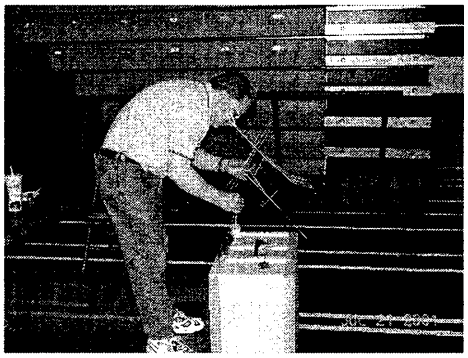
Attractive Model From Smyrna, Tenn



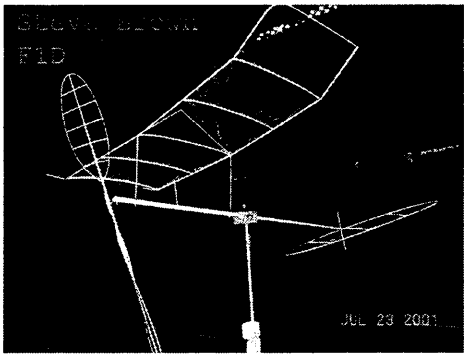
An F1D Floats By

Kibbi Dome Annual, 2001, Moscow, Idaho



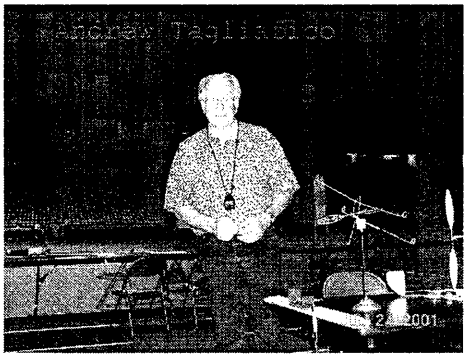


Steve Brown



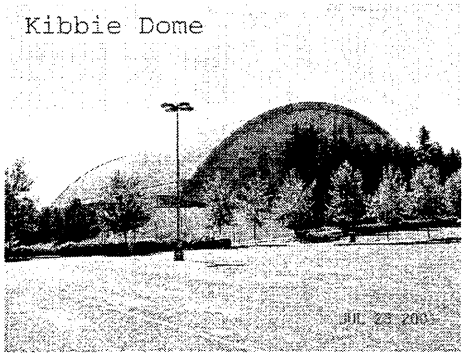
Steve's F1D

Tim Goldstein



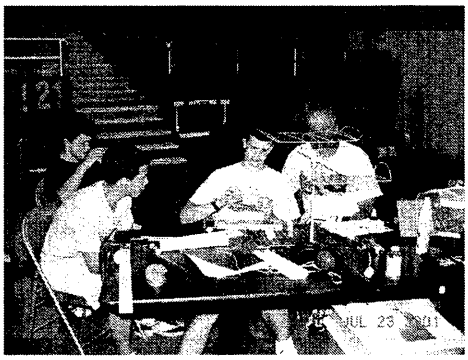
Andrew Tagliafico

Lew Gitlow .

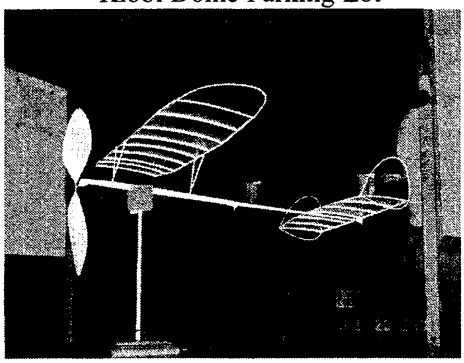


Kibbi Dome Parking Lot

Fred Hollingsworth



The Dona Clan

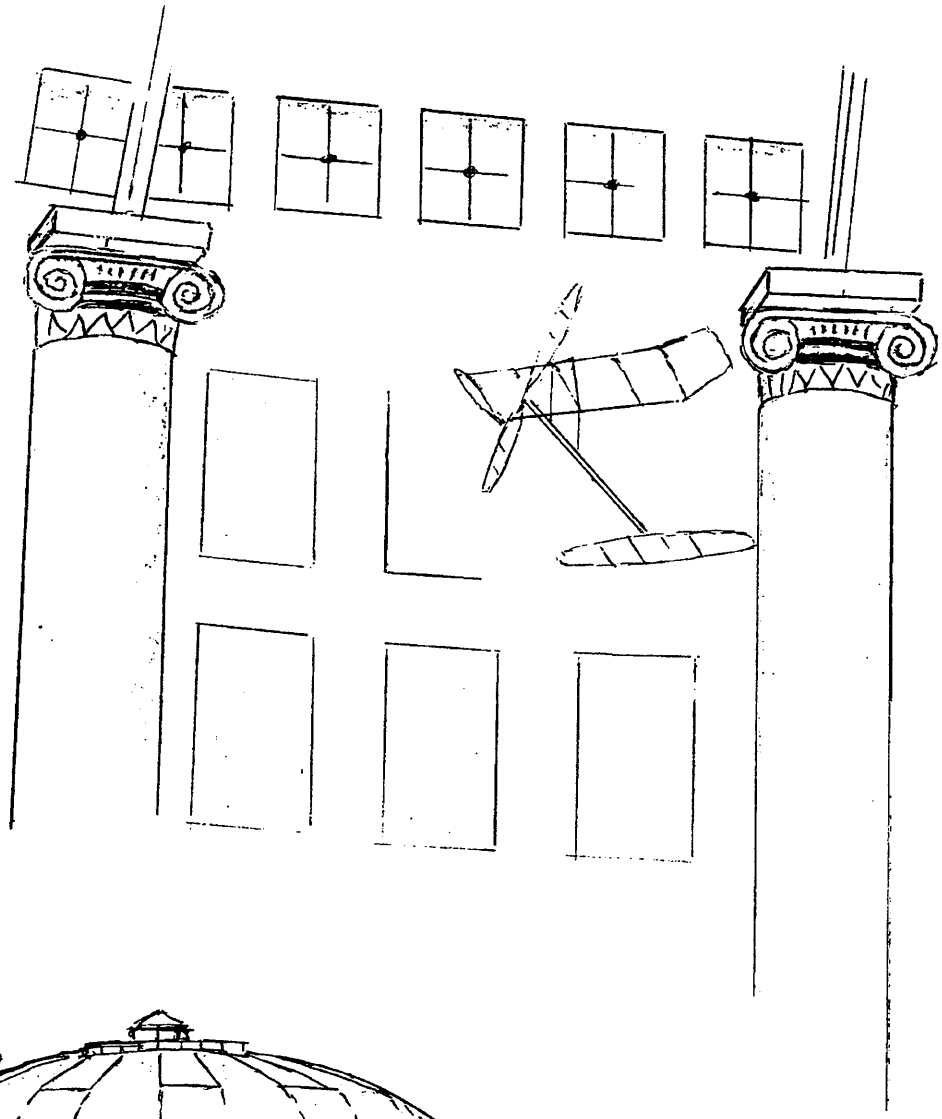


Ed Berry Limited Pennyplane

INDOOR

NEWS and VIEWS

ISSUE # 104



WEST BADEN SPRINGS
INDIANA

From The Editor's Desk

This issue's cover reflects a magic event that I missed, but many were fortunate enough to attend- indoor flying in the West Baden Springs atrium. Flying there was a fixture when Ralph Tenny was editor, but the site had fallen into disrepair for a long time. Thanks to the efforts of Walt van Gorder, modelers were allowed back as part of a 'Fly Me to the Moon' theme weekend.
A second keynote event was the Akron F1D Team Trials, which were flown under nearly outdoor conditions, and also was an outstanding showing by our Junior Team under tough conditions.
A great article by Matt Chalker and photos tell the story. Rounding out the issue are the final installments of the Steve Brown prop article and quarter motor flying by Lt. Col. Bob Randolph.
On Bruce McCrory's initiative, we add a roving column for how-to, opinion and dissent, called Golden Nuggets, as well as reviving the Contest Calender. Let us know what you think.

- Carl Bakay

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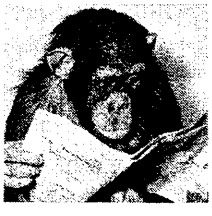

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Cover art by Carl Bakay

Membership Desk, November 2001

It has been a little over a year since I was crazy enough to say that I would volunteer to take over the membership duties of INAV. Little did I know at the time what I was signing up for. I moved the membership record keeping from a 9+ year old DOS program that would not work in Windows of any flavor to a custom written Internet based system, assembled all INAV issues back to December 1960, scanned them, and wrote a custom viewer program, got all INAV subscribers current in there dues, and best of all was lucky to have Carl find me and join INAV as the editor. Because of Carl's help and efforts and with the head start that Steve Gardner gave us we are completing a year with 5 issues of INAV mailed. As best as I can tell this is the most INAV has done since 82! Carl and I have had great support from all you subscribers. Without your efforts to write and draw material INAV would not be the tremendous resource it is. We ask once again for articles, pictures, drawings and tips so we can continue to put out the publication you expect.

Attracting juniors has been an issue for as long as the sport has existed. Ray Harlan told me the reason he got involved in indoor as a junior was that there was no one to compete against so it was easy to win. We are blessed with the interest and excitement that programs like Science Olympiad are creating for our sport. The huge junior turnout we had for the F1D team trials proves that if we can get these kids exposed to the serious duration classes and help them find the resources needed we will add more new fliers than we have ever had before. We have altered the article mix in INAV to include SO plans, articles, and support to better assist this new crop of fliers. We have created a subsidized junior subscription rate to try and get this material into the hands of the junior flier. While this has been successful in that we now have more junior subscribers than at any time in INAV's history we have not done very well in getting juniors to know that INAV exists. That is where all of you come in. We need your help to get the word out to the juniors and to the teachers that coach the science events that INAV exists and is a great resource for them. We need your input on how we can reach out and get these kids started in the sport. I know that every time Carl and I attend an event that has these kids at it and tell them about the information in INAV we get excited new subscribers that wish they had found out about INAV much earlier. Bring your copy of INAV to the contests with you. Let the kids look through it. Tell them how it is a great resource for you (and if it is not please tell us why). It is good for the kids, INAV, and your soul.

Still working on some ideas of how to use the jr fund created by the sale of the INAV CD. Hopefully will have plans in place by the next issue. Vern Hacker has once again stepped up to spearhead the fund raising drive for the jr F1D team to attend the worlds. This is the first time we have a full team and need everyone's support to get them there.

Next issue is planned to be a focus on balsa with articles on cutting, testing, sanding, grinding, finding, and being frustrated with it. We all have experience in this area so share your knowledge and be famous.

Until next issue,
Tim

Ladies and Gentlemen and Donors of all Ages;

For the first time in all the years that I have been modeling we have a complete junior team to compete in Romania next year. Those three are Doug Schaefer from the Dayton, Ohio area, Parker Parrish from the Atlanta Ga. area and Ben Saks from Shaker Hts, Ohio. They along with the five that did not make the team are fantastic people and superior builders and trimmers of models, as witnessed by the times produced in the Akron Airdock over the Labor Day weekend.

This then is a notice that under the aegis of the INAV, the NFFS and the AMA, we are starting a fund to help defray the expenses of this group going to Romania next year. If the rules are followed all donations will be tax deductible.

1] Checks are to made out to the NFFS and noted for the Jr. indoor fund.
2] The checks are to be mailed to Dr. Vernon D. Hacker M.D., 25599 Breckenridge Dr. Euclid, Ohio 44117-1807
3] He will list the donors in his confuser [ed. computer] and send donors a thank you listing it a tax deduction
4] At varying intervals he will forward the collated checks to Homer Smith, Treasurer, NFFS for deposit.
5] All donors will be thanked again in the INAV.

Hack's phone is 216-486-4990. His email address is vhacker@pol.net

RESULTS OF THE F1D TEAM TRIALS AT AKRON, OHIO

2001 USA F1D Junior Team Selection Finals

Contestant	Best	2nd	Total	Fnl	Rgnl	Score
1 Doug Schaefer	29:42	27:55	57:37	1000.0	98.65	1098.65
2 P. Parrish	28:05	26:37	54:42	949.38	100.00	1049.38
3 Ben Saks	27:55	26:51	54:46	950.54	91.37	1041.91
4 M. Chalker	26:38	26:11	52:49	916.69	100.00	1016.69
5 David Rigotti	26:26	25:23	51:49	899.33	89.91	989.24
6 Brian Johnson	25:25	25:23	50:48	881.69	100.00	981.69
7 Joey Sipple	21:06	21:03	42:09	731.56	77.00	808.56
8 Jeff Daulton	23:32	18:03	41:35	721.72	76.20	797.92

2001 USA F1D Senior Team Selection Finals

Contestant	Best	2nd	Total	Fnl	Rgnl	Score
1 Jim Richmond	34:54	34:28	69:22	1000.0	100.00	1100.00
2 L. Cailliau	33:54	33:16	67:10	968.28	100.00	1068.28
3 Steve Brown	33:01	32:31	65:32	944.74	100.00	1044.74
4 D Slusarczyk	32:07	31:15	63:22	913.50	97.08	1010.58
5 Tom Sova	31:12	30:32	61:44	889.96	100.00	989.96
6 Stan Chilton	31:45	28:32	60:17	869.05	100.00	969.05
7 Larry Loucka	29:40	28:53	58:33	844.07	86.41	930.48
8 Bill Hulbert	26:24	26:09	52:33	757.57	76.91	834.48
9 T. Goldstein	26:16	25:22	51:38	744.35	82.74	827.09
10 Rich Doig	26:59	23:18	50:17	724.89	99.72	824.61
11 Larry Mzik	24:27	23:56	48:23	697.50	85.76	783.26
12 Joe Kehr	18:42	17:58	36:40	528.59	95.19	623.78
13 Jerry Combs	14:58	14:57	29:55	431.28	82.56	513.84

THE LATEST ON OUR JUNIORS
from Vern Hacker

Four Juniors and Six Records

For the first time in many years the United States Indoor Championships at Johnson City Tenn, was attended by more kids than the kids from New Smyrna, Tenn.. That group represents a FAC club sponsored by their church and led by their minister. Every year they have come with a variety of models. The quality varies considerably but the better ones are quite competitive. Three years ago a twelve year old young lady won the coconut mass launch. This report is not to be about that group but it is to be about the Junior Cleveland Clowns and their activities during the five day contest. The Cleveland Free Society was very well represented at the open level by at least seven members, including president Vern Neff. The four junior flyers consisted of Dave Rigotti Jr., Alex and Wayne Johnson and Ben Saks, all of whom conducted themselves in a gentlemanly manner Every one of them earned recognition as being excellent competitors and also of being helpful to the others flying in their age group.

I will start with a report about the activity of the youngest of the group, that being Alex Johnson. Alex placed fourth in Unlimited SO [science Olympiad] and third in the limited SO event his times in other events included 10:33 in Penny plane, 11:33 in Limited penny plane. Brother Brian also did well. His 5:42 in the Unlimited SO event was second and he won the F1D event with a record flight of 22.2' and first place among the junior flyers. He also did 11:59 in limited penny plane. The most out standing performances were by Dave Rigotti Jr. His first win was the around the pale race. In this event his time of 3:55 seconds beat all those entered. In SO David took first place in the middle school division, the unlimited division and also first place in the mass launch. It should. be noted at this point that our kids really were the class act in the SO events. To continue with David's story 9:46 in ministick, best Jr and new record; 11 th in limited penny plane with a 13.56 and another record, 15th in penny plane and another record at 13: 31 David also got 12th in F1d and a new Jr. Record of 20.07. His 12th in intermediate stick was again the best Jr. That performance gave David four records. And lots of hardware to take home. Our fourth member of the young Cleveland Clowns Ben Saks entered seven events.. His most notable result was in helicopter. In this he took first place over all and set the record for his age Eleventh over all in FID was good enough to be 2nd in the Jr/Sr class with a two flight total of 39:46. Second place in Jr/Sr EZB was taken with 21:03 and lastly 2nd in Jr/Sr. standard catapault glider.

I would hope that one or more of them will be on the first full junior team to compete in 2002 Slanic, Romania

****

The following will pertain mostly to Science Olympiad Planes although there is some applicability to other models.

It is very common question among the SOers, Why does my plane wobble. The most common problem is an unbalanced prop. The second most common reason is one of the following four problems.
1. If the plane did not always have a wobble then the most likely cause is a bent prop shaft after the plane has hit something. This leads to a prop that will not track properly. Straightening the shaft is required..
2. The shaft not being a tight fit through the hub is another common cause of a nontracking prop. This is especially common when the prop shaft has been reduced in diameter from that comes with. a plastic prop hanger [bearing], or when one uses a cut down 9 inch prop. The cure is to fill the hole in the hub with something relatively soft, such a thin insulation from copper wire or balsa. It is important not to fill the hole with Cyano because it is difficult to drill for the smaller shaft. The drill likes to follow the path of least resistance. And frequently will not go straight through. The insulation or balsa can be glued in place. Don't use too much! !..
3. Also, it is not uncommon to find that the prop shaft is not firmly held in place on the front of the prop. If one is using the common plastic prop hanger as a bearing and there has been a change in the diameter of the prop shaft, a severe wobble can occur if one does not fill and redrill the hole to fit the shaft.
4. The most uncommon causes for wobble are related to either the blades not being at the same pitch or one blade is flaring more than the other. Out of pitch blades can be diagnosed with a pitch gauge and then twisted to match . Asymmetrical flaring of the blades is the most uncommon of all the causes of prop wobble. . For which there is no easy fix. Assuming that you can identify the culprit some glue on the flaring blade can help or scraping the non flaring blade might help. In case of doubt, throw it away.

Build Your Own Micrometer Balsa Stripper for Indoor Models

by Roy Bourke (CAN)
(from SAM 86 Speaks) as printed in Indoor News May 1996

Of all the designs I have seen of strippers for indoor sizes of balsa wood the most accurate is the micrometer type, where sheet balsa is held flat, and a cutter block is passed along a guide bar which is positioned by a micrometer. Ray Harlan [1] markets a micrometer stripper which uses actual 0-1" micrometer barrels to position the guide bar. Most commercial micrometers have a 40 TPI thread on the barrel, which means that one revolution Of the barrel represents 0.025" movement of the guide bar. This is a highly accurate positioning system, but the resolution of 0.001" in the graduation of a micrometer barrel is usually not needed, and of course the range of motion of the guide bar is limited to the 1" range of the barrel. The sketches detail a similar stripper which uses readily available 1/4-20 threaded rod as the micrometer. The 20 TPI rod advances or retracts the guide bar by 0.050" per revolution. Simple dials with Only 10 graduations each yield an easy-to-read scale resolution of 0.005". The dials are fairly large in diameter (compared to a micrometer barrel) so the 0.005" graduations arc spaced widely enough that it is very easy to interpolate a reading to 0.001". And the 4" screw length gives the guide bar a range of motion of more than 3", so a 3" wide sheet of balsa can be stripped without repositioning the sheet.

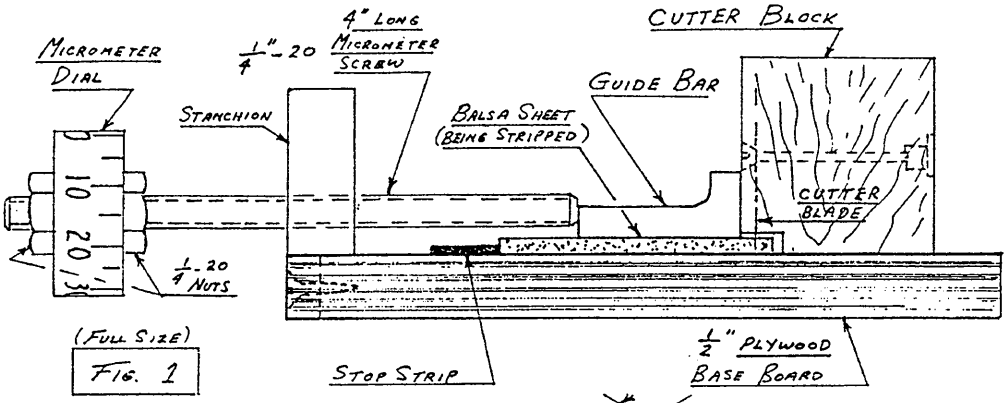
Dimensions of this type of stripper are not at all Critical, and can be adjusted to suit your own preference and the sizes of sheet you are most likely to strip,. The dimensions shown are those of my own stripper, but feel free to change them. The length and width of the base board should be chosen to accommodate the largest balsa sheet you want to work with.

Similarly, the materials used in the construction are somewhat arbitrary. I used aluminum for the stanchions and the dials, but plastic or wood can also be used. If you use wood for the stanchions I would suggest embedding a 1/4-20 nut in each stanchion rather than trying to tap a thread in a wooden hole. The guide bar should be straight and of a stable material like aluminum, so I wouldn't recommend wood for it. Mine was cut from a piece of aluminum angle, but rectangular stock would work just as well .(1/4 x I 1/2; 3/8 x 1 1/2, etc.). The stop strip is simply a thin metal or plastic strip (approx. 0.025" thick) cemented to the base board, against which the balsa sheet is held while stripping.
The only hard part in the Construction is making a dial with 10 evenly' spaced graduations. I used an engraved cylindrical, dial of aluminum only because I had access to the equipment necessary to make them. But a simple disk-type dial in plastic or ply- wood would also work. Graduations could be inked on paper and cemented to the face of each disk.

For the cutter block a variety of blades could be used, but I have found the double-edged blue blade carbon steel to give the thinnest cuts and the most accurate results. The maximum width of the strip and maximum thickness Of sheet balsa are determined by the size of the rabbet Cut into the bottom comer of the cutter block. Some design compromise is necessary here because if too wide a rabbet is cut the block may accidentally rock, and if the rabbet is too high the unsupported part of the cutting blade may bend, producing a wavering cut. If a large range of strip cutting is desired it may be necessary to make more than one cutter block, using heavier blades for the larger strips.

In use, the balsa sheet to be stripped is held against the stop strip, the bar positioned approximately, and a scrap stripped to straighten the edge and register the bar position. Then the micrometers are backed off the required amount for each strip cut. The micrometers can be backed off in differing amounts, producing a tapered strip, very handy for tapered wing spars. If you use tapered sheet balsa you can produce double-tapered wing spars. Also, if you replace the cutter block with a template held against the guide bar you can slide accurate multiple wing ribs using a sharp knife or razor blade against the. template.

1. Ray Harlan 15 Happy Hollow Rd., Wayland, MA 01778, USA.



(FULL SIZE)

FIG. 1

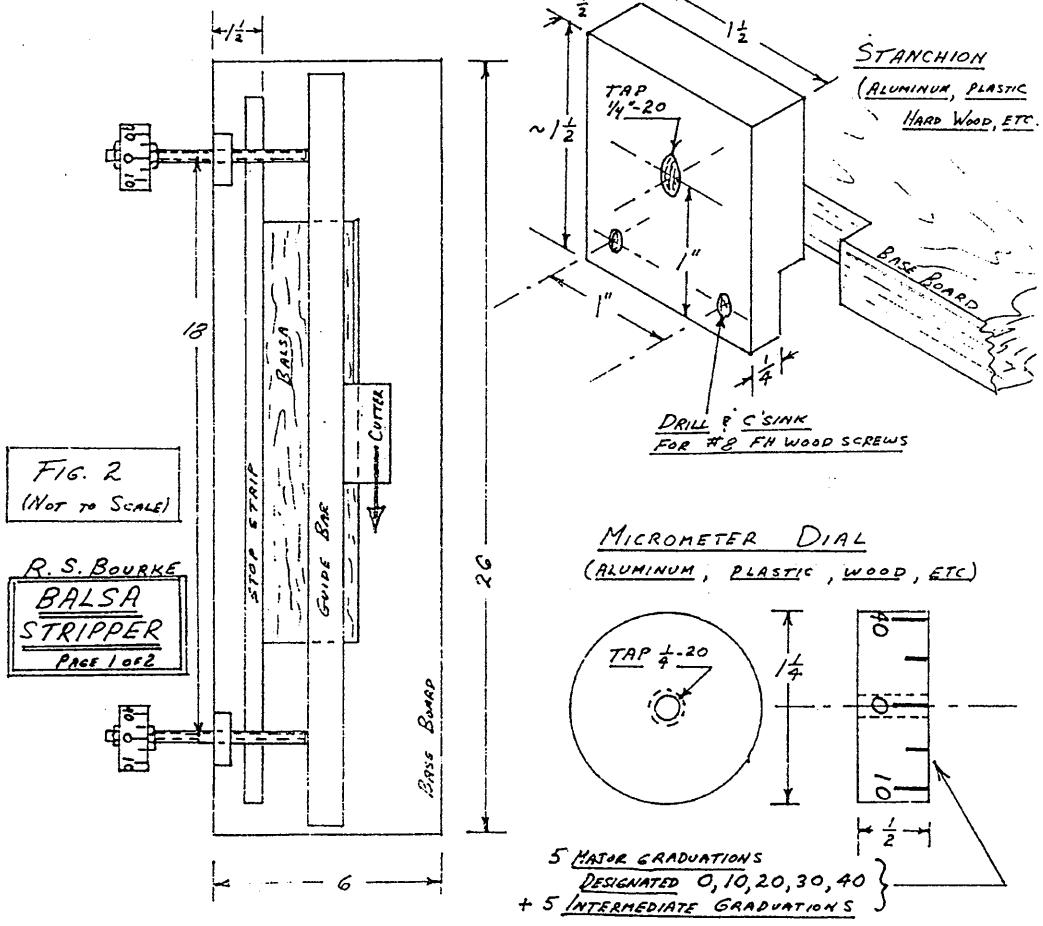


FIG. 2
(NOT TO SCALE)

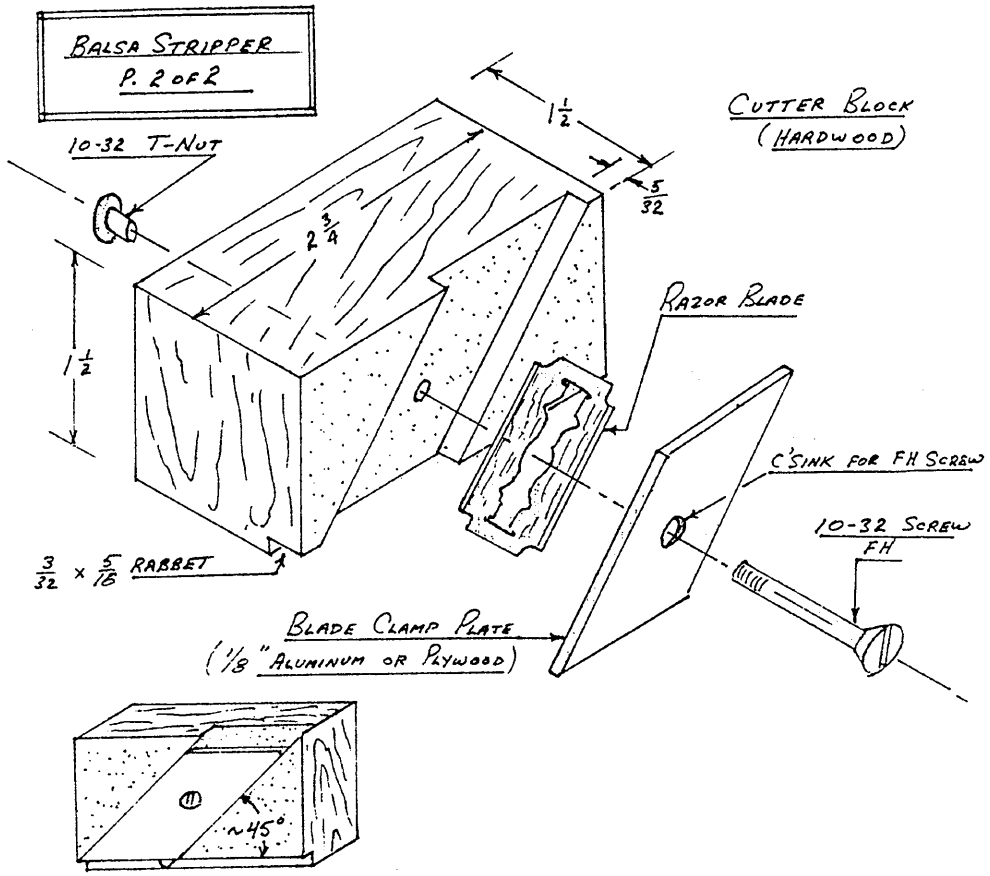
R. S. BOURKE

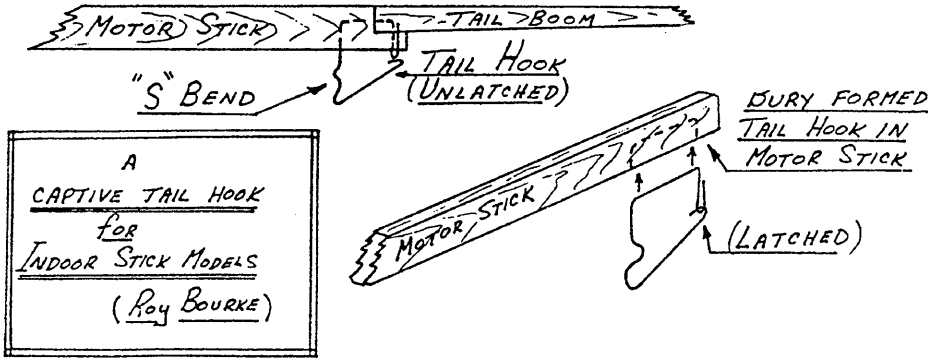
BALSA STRIPPER

PAGE 1 of 2

MICROMETER DIAL
(ALUMINUM, PLASTIC, WOOD, ETC)

5 MAJOR GRADUATIONS DESIGNATED 0, 10, 20, 30, 40
+ 5 INTERMEDIATE GRADUATIONS





A
CAPTIVE TAIL HOOK
FOR
INDOOR STICK MODELS
(Roy Bourke)

THE BRITISH F.1.D. TEAM TRIALS FOR THE 2002 INDOOR WORLD CHAMPIONSHIPS: CARDINGTON: AUGUST 27TH AND SEPTEMBER 9TH.

Nick Aikman

For some time, hanger 1 at Cardington was the spiritual home of U.K. indoor duration flying. Sadly, it is now in a derelict state with many cladding panels missing and from some angles it looks like a sieve. Luckily, duration flying has continued in hanger 2 for the last three years, so access to one of the world's great and historic high sites has continued, during the warm summer months.

Unfortunately, 'shed' 2 is not ideal as it is now two thirds full of tall, full-sized buildings, built for fire research and explosive tests. The remaining area of clear floor space up to the roof is directly behind the main doors and removal of their outer seals together with a constant 8 inch gap down the middle can often produce extremely turbulent flying conditions if the wind is from most directions other than North. On some days, even a Limited Pennyplane finds the going tough!

As usual, the Indoor Nationals took place over our August Bank Holiday, this year Sunday the 26th and Monday the 27th. Although other classes were flown, those entering the trials hoped to spend time on Sunday, fine-tuning F.1.D.'s in preparation for the first contest flights on the following day. The second half of the trials were scheduled for September the 9th, two weeks later.

Bernie Hunt has lead the way developing this class, making a 33 minute flight with 'Big Square' (see INAV 103) last year. Everyone else was therefore playing 'catch-up', both with model design and with construction and effective use of V.P. props that 'Guru' Hunt calculated were necessary for optimum performance. As I came back to F.1.D. this Spring, after a break of fifteen years I was definitely tagging along behind everyone else.

Because of the problems with the doors, little time was available earlier in the year to refine designs built to the new rules. There are now about twenty F.1.D. flyers in the U.K. although only 8 entered the competition. Some flyers made use of smaller halls for trimming and testing. In June, Bob Bailey made flights of 31 and 32 minutes at the annual French International at Bordeaux, under a 30 metre ceiling. Ron Green also joined the new '30 minute' club at Cardington with several flights over the half hour. Both used V.P. props.

So, as the weekend approached, we all watched the weather forecasts anxiously, but I suspect that Laurie Barr, 'Archbishop of Cardington' had a word with a higher power because on both days the air was good by Cardington standards, although slightly smoother on Sunday.

On practice day, it was generally thought that a 2 flight total over 60 minutes would be needed to make the team and also that Hunt, Green and Bailey were still 'ahead of the game'. Derek Richards and John Tipper in particular had problems with V.P. settings while Geoffrey Lefever and I had little V.P. experience and elected to stay with flaring fixed pitch props.

So, on the Monday, battle commenced. Originally 3 flights were planned but the indoor technical committee decided to run 4 rounds of an hour and a half each, in case the second half on September 9th was literally blown away. Indoor technical committee chairman Mike Colling acted as C.D. and all models were weighed and checked dimensionally before each flight. Motors were also weighed retrospectively and included the weight of lube and O-rings.

Round 1 found Ron Green needing to add more ballast to his best model and with only eight of us, the pace was leisurely. As the rounds ticked away, it became obvious that the 60 minute estimate was accurate. Derek Richards lost his baffled expression of the previous day after close examination of his V.P. prop hub revealed that the rear bearing had come loose; once fixed, he quickly made two flights over the half hour.

With considerable sideways drift at most heights and the 'jetstream' down the length of the hanger, only Hunt made a long, no touch flight with exactly 34 minutes – his best yet. Everyone else needed much deft footwork while peering into the gloom up among the rafters and Green, Bailey and particularly Lefever made several excellent steers to save long flights. As hard hats are mandatory fashion accessories to comply with health and safety regulations, lengthy steering is often accompanied by a loud crash as one's headgear falls to the concrete floor.

At the half way stage, after 4 flights, 6 flyers had bettered 30 minutes and 4 had 2 flights over the half hour. On this occasion Ron Green's more intuitive approach gave him the high time of 34.06. exceeding Bernie Hunt's fearsomely analytical 34.00. by 6 seconds. It was felt by most that the trials had probably been decided on that first day unless miraculous conditions materialised 2 weeks later. So, the second weekend of September the 9th arrived and the weather forecast was ominous enough to stop Bernie Hunt and myself from making the effort to go. I decided to save virtually new models for the 'Cargolifter' international in Germany later in the year. Laurie Barr decided to take over as C.D.

In the event, although the conditions were reasonable early in the day, they deteriorated later and made it difficult for anyone to improve their times. The drift was fearsome and unpredictable and much steering was needed to keep models away from the girders.

John Tipper was closest placed to leap-frog into the team. Having reduced the pitch settings on his prop mechanism his model was performing better than before. Unfortunately, a steering misshap at high altitude damaged a wingtip on one good flight and on his last attempt an improvement to 32.38 was not enough to lift him into third place. Geoffrey Lefever was even more unlucky. Having changed to a V.P. prop, one good flight hung right in the apex of the hanger and his other best effort ended high up on the doors, (usually, models are blown away from them!) was ballooned down 50 feet and then still did 26 minutes with a damaged tail. No-one else managed to improve their flight times due to the ferocious drift.

So that was that. The end of the first 55 centimetre F.1.D. trials at Cardington. Bernie Hunt had already stated that he would not be imprisoned in the cold, dark, salt mine again and so was happy to relinquish his place. The team will therefore be Ron Green, Bob Bailey and Derek Richards, with John Tipper as reserve. All are seasoned campaigners at W. Champs level

Some technical details might interest others also battling with the new rules. All models flown were Y2K or Y2K2 covered and all were unbraced. There is no doubt that these 'floppy' wings are much better at handling full torque with virtually no back-off. No models exhibited any sign of the aerobatics reported elsewhere although I provided the only exception and learnt the effectiveness of stick bow in handling power late in the first day. By pruning the stick bracing to give more slack, my earlier staggering climb disappeared and an immediate improvement to a modest 25 minutes was the result. Lefever and Bailey used boron reinforced mainspars while the rest of us relied on stiff wood. Complete wing weights came out between 0.27 and 0.31 grams.

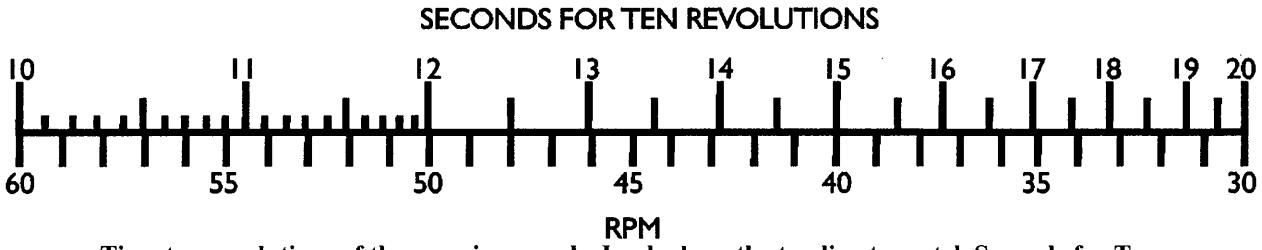
Hunt, Tipper, Richards and Barr all flew variations of 'Big Square' with a fuselage length of around 31 inches. The 'Norfolk Mafia' of Green and Lefever plus Bob Bailey and I flew longer (around 34 inches), more elegant designs with curved, swept outline tails.

All models used underslung tailplanes with tip dihedral, held on posts, to increase the horizontal seperation between wing and tail. Ron Green's winning design was the most extreme in this respect (see plan) with 5 inch wing-posts and 2 inches on the tail. With 9 to 10 inch sticks, an extension of up to 6 inches, full length booms of 17 to 18 inches plus a V.P. prop and plenty of boron reinforcement, light building is needed to get down to weight. Lefever and Green used boron prop outlines and V.P. prop mechanisms also seperated into 2 types. The 'Big Square' contingent used screws for adjustment, together with wound, kevlar thread hinges as developed by Bernie Hunt. The rest used a Basic Steve Brown hub, replacing the top stop screw with a system of rolled tissue tubes of varying diameters, held against the actuator arm on a tiny piece of wire stuck into the hub.

The future of flying in Hanger 1 is in peril as the building is up for sale and all work there has stopped. Sadly, the first report I write about Cardington may also prove to be the last.

RESULTS.					**TOTAL.**	
1.	**Ron Green.**	**31.40**	**"**	**34.06**	**"**	**65.46**
2.	**Bob Bailey.**	**32.35**	**"**	**32.30**	**"**	**65.05**
3.	**Bernie Hunt.**	**34.00**	**"**	**30.33**	**"**	**64.33** *
4.	**Derek Richards.**	**32.17**	**"**	**31.49**	**"**	**64.06**
5.	**John Tipper.**	**30.31**	**"**	**32.38**	**"**	**63.09**
6.	**Geoffrey Lefever.**	**31.01**	**"**	**29.34**	**"**	**60.35**
7.	**Nick Aikman.**	**25.37**	**"**	**22,21**	**"**	**47.58** *
8.	**Laurie Barr.**	**6.36**	**"**	**25.28**	**"**	**32.04** *

- **Flew First four flights only.**



Time ten revolutions of the prop in seconds. Look along the top line to match Seconds for Ten Revolutions, and find RPM opposite, below. Courtesy of Laurie Barr

A Junior's Indoor Story

First, let me introduce myself and give a little background info. My name is Matt Chalker, I'm 16 years old, and live in Centerville, OH, a suburb of Dayton. I've flown AMA event for approx. one year, and Science Olympiad (SO) for about 4 years. Currently, I fly most AMA duration events especially F1D. During the team finals, some of the older guys told me that I should write this, as it shows just how easy it is to get into indoor and hopefully would be a little interesting as well. Maybe I'll look back on it when I'm 50 and remember just how great this time of my life was as well.

The first indoor rubber powered airplane I ever built was for SO, the first year Wright Stuff was an event for SO. That was during my 7th grade year, about 4 years ago. I believe it was a Wright Flyer kit from Midwest Products, which if you have never seen one can be compared to a 10 gram EZB. It is kind of funny looking back on it now, because I remember how the entire year my goal was to get a 1 minute flight. If I remember correctly the best I got was 55 seconds on a stock 6" prop, with a 12" loop of 1/8" rubber. That was the first time our middle school team made it to the national competition, and I remember when going there seeing a lot of models that had chords around 5-6" and absolutely destroyed me in the competition. I had never seen anything like it, and asked many questions (which if you have ever flown with me, you notice that I continue to do). One team that I asked about told me of "a guy out in Oregon who sells stuff for this". Little did I know that this was the beginning of a long career in indoor, assisted by Mr. Lew Gitlow.

The next fall, I phoned up Lew, and throughout several conversations, he taught me many new techniques and also sent me several pennyplane kits and pre-stripped rubber. I built many models out of these kits and finally began to learn about some "real" indoor models. With unpitched, unshaved, 6" plastic props, and a 12" loop of rubber (That was the max) I believe I was doing about 1:40 or so, good enough for 10th place at our nationals that year.

Nationals was held in Chicago that year, and it was the first time I had seen an actual AMA model. The night before the national competition, there is always a large swap meet between all the teams that come. That year it was held in the Chicago museum of Science and Technology. In that museum there is a large atrium/hall in which Tom Sanders flew a ministick. I remember how I was totally amazed by seeing something fly for longer than 8 minutes. Seeing that flight inspired me to order a ministick kit from Lew. I never got around to finishing it, as I could not figure out how to exactly cover with the Mylar film that is included in the kit and got extremely frustrated trying to do it just like tissue covering.

Over that summer, I poked around the Internet, trying to learn as much as possible about indoor. Eventually I found freeflight.org, the NFFS's official web page, which turned out to be a godsend, as it contained many links to different sites. One of the best sites I found was Don Slusarczyk's web page, which worked out well, because I used his SO design extensively.

During the next year, which was my Freshman year in High School, I ended up using both Don's and Lew's design for almost the entire year. By the end of the year I had a biplane that was based on Lew's plans and it ended up doing 3:30 seconds at nationals. Good enough for 7th place that year, to bad they only gave medals to 6th place. Earlier that season I had broken 4 minutes with a model that was based on Don's design at the Nutter Center, one of our local arenas. About a month earlier, I had received Joe Mekina's phone number from another SO kid on the Northmont High School team. This was wonderful, as then he and Bucky Serviates began helping us a lot and I probably wouldn't be involved in F1D now without them.

That summer I built several outdoor models, however I never really competed with them. I did have some fun with them, but not nearly as much as indoor.

The fall of my sophomore year, 2000, I built another ministick and an A-6 from Lew, which I flew quite a bit and had a large amount of fun with. Then it was time for SO again, and this past year I flew mainly Akhiro Danjo's design, or modifications of it.

Perhaps the greatest experience I have ever had in Indoor occurred to me at our Regional SO competition this past year. As I was packing my models up, Mark and Doug Schaefer came over to me and invited me to go to the Flint indoor contest with them. They encourage me to build some EZB's for it and go with them to see the full breadth of indoor. I called up Lew and ordered wood for several EZB's.

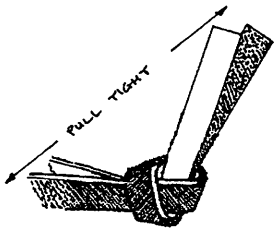
I had about a month to prepare for Flint, so I had the chance to build quite a few models. They included, if I remember correctly, 3 EZB's, a LPP, a ministick, and a new SO model. (I build pretty quickly.) I had a great time up at Flint, and ended up going to Buffalo and USIC with Mark, Doug and Joey Sipple as well. I really can't thank them enough. They, along with Bucky have helped tremendously, and I know for a fact that I wouldn't be into indoor flying.

Hopefully this will inspire a few beginners to do both AMA events and F1D. I built my first F1D for USIC, and that was only about 2-3 months after building my first decent AMA model.

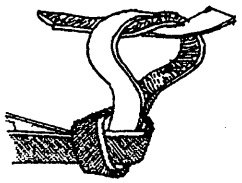
I also have another issue I wish to address, the so-called "Junior Problem". I don't believe there is such a thing. I've read through almost all of the old INAV's on the archive CD, and have noticed that throughout the years, there has always been a "Junior Problem", yet the sport continues and I believe, is about to go through a major growth.

One article stands out in my mind very clearly, the one written by Nick Leonard Jr. I remember the first time reading that, I was very upset as I believe much of what he wrote was completely untrue. What he says about teenagers is not completely true. As a matter of fact, the night before I wrote this, I went to a "dance party" in this case, our homecoming, which I enjoyed thoroughly. Yes, the music was loud, you could feel it, the gym was hot, I was sweating like a pig, the music wasn't what Nick would enjoy, mostly rap, but I, an indoor flyer, loved it. I like my music loud, I like playing Nintendo and Playstation, I am very messy, extremely messy, but I am an indoor flyer. In his article, Nick said that most teenagers are lazy, rebellious, and destructive. This is not true at all. It is just that indoor isn't for everyone, some people enjoy it and others don't. The trick is finding the ones who do enjoy it, not criticizing those who do not. The way I think that we will find other juniors who will participate in indoor is through SO. I urge every indoor flyer, whether you are world class or just beginning, to go out and ask the local schools if they have a Science Olympiad team and ask if you could assist in coaching the Wright Stuff event. I know many, many people are already involved, for this I thank you, but many are not as well, and it would mean so much to many kids if you did this. There are SO teams all across the nation and there is NO better way to get new fliers involved with the sport.

Matt Chalker at Akron



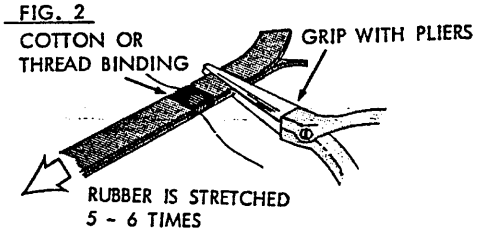
FIRST OVERHAND KNOT



SECOND HALF-HITCH

FIG. 1

FIG. 2



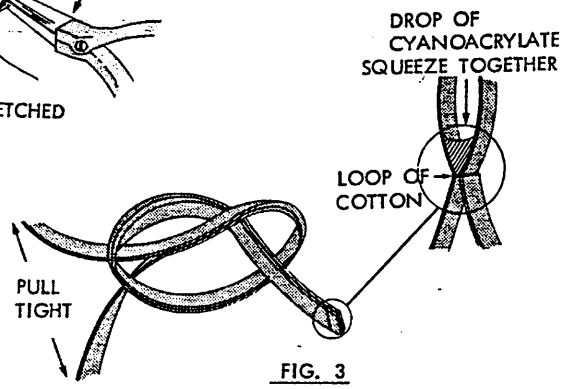


FIG. 3

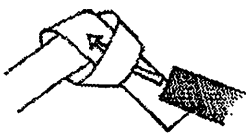


FIG. 4

TAPE KNOT

FROM OCT 2000 "WING-TIP"

•The Finny Plane, by Bill Gowen

In the late Winter of 1997 my son John came home from school one day and announced that I would be a coach for something called Propeller Propulsion in a competition called Science Olympiad. After puzzling as to what this was about for a couple of months and getting no contact from his school, I finally was sent one page of rules for what I was astonished to find out was a competition for indoor rubber powered airplanes. Having left the hobby 35 years earlier, and never competed in indoor competition, I naturally felt that I was supremely qualified to coach this event!

John and his friend Bert were selected to be the propeller propulsion team and we set to work building a plane. We eventually wound up using a Peck ROG expanded to fit the rules and less it's landing gear. The airplane was supposed to weigh 10 grams. We didn't have a scale that would measure anything that light. I think that optimistically the airplane may have weighed 6 or 7 grams. The regional competition had already passed before we got started, so we jumped into the fray at the Georgia State Finals. Someone during the competition told the judge (who didn't check anything else during the competition) that everyone's motors were too long. The rules specified a 12" motor, but this one contestant convinced the judge that this meant a 12" piece of rubber tied into a loop. After cutting all our motors in half, John put up a flight of about 30 seconds and became Georgia State Champion for 1997.

When the 1998 competition rolled around, we knew we were the best and set out to prove it. For the regional competition we had a tiny low wing model that flew for over a minute! About this time I discovered Lew Gitlow's book "Indoor Flying Models" and began to understand that we knew nothing about what we were doing. I designed a new airplane that took maximum advantage of the rules and actually incorporated some indoor principles. John and Bert managed a 2:08 flight to win the state championship for 1998. They were closely followed by a team from Booth Middle School. This was to be our last success against the fine Booth team, coached by Dave Ziegler.

For 1999, I became interested in adapting a successful high performance indoor airplane to the Science Olympiad rules. In Lew's book I found a design for an F1D by Bob Gibbs. The airplane struck my fancy and I drew it up in AutoCAD and scaled it down to fit the SciOly rules. John Barker, who mentored us over the last few months, taught me over the telephone how to build a rolled motor stick. Since the 1999 rules specified a minimum weight of 8 grams, with no chord limit on the wing, this seemed like a good way to save weight. The rolled tubes worked great but caused a great deal of friction with other teams who have insisted to this day that it is impossible for kids to build airplanes with rolled tube fuselages. Fortunately, no one told my kids that they couldn't do it, so they did! The 1999 airplanes were wonderful machines and clearly superior to anything else that we saw. Unfortunately, the state competition for that year was held in a room that featured high power A/C units that ran all day and blew John's airplane out of the air on both his flight attempts.

For 2000, the rules specified a maximum wing chord and limited some of the other dimensions for the airplanes. About the same time, I became interested in indoor endurance airplanes using tip plates on the wing instead of dihedral. It made a lot of sense to me that in an area limited event with a reasonable weight limit that a rectangular wing of maximum area would be the best way to get wing loading down. My understanding of tip plates is that using tip plates on a wing will reduce or eliminate the spanward airflow that causes loss of efficiency at the tips. Also, tip plates would substitute for dihedral by resisting side slipping and thereby providing roll stability. Whether all this actually works or not I'm not in a position to say. However, my experience with flat wings has been mostly positive to date. The sole exception is that I have not been able to make a successful EZB or F1L with this technique.

The 2000 rules did not specify how many wings you could use, so John built a flat wing biplane with tip plates. John had to drop out of the competition due to other commitments. A substitute flyer came in at the last minute and flew the bipe in the state finals. It was a very reliable and competitive airplane but got off course during the first official attempt and landed on the running track at Emory University, 25' above the floor. An attempt at a second flight failed as the airplane was damaged while trying to beat the clock.

After the state finals I was approached by the Chamblee High School team about helping them prepare for the 2000 SciOly Nationals. They built a biplane version of the FinnyPlane and a monoplane version that used a 2-surface airfoil. Glenn Garrett flew the mono FinnyPlane to a second place finish with a time of about 3:45.

For 2001, the rules were changed to require a minimum airframe weight of 10 grams. I felt that a 10 gram airplane probably would be ok with a solid fuselage. I helped two sixth grade girls, Jo Warren and Kara Miller, build a 2001 FinnyPlane as their first model airplane. The airplane was built in 4 hours. It's first fully wound flight was a 2:57 in a 22' flat ceiling gym. I entered this flight in Don Slusarczyk's postal contest for an 8th place finish. The girls took first in their regional competition with 2 identical flights of 2:25. At the 2001 state finals, they had the best two flights of the day but broke the wing during their official attempt. In the 2001 state finals, the Westminster High

School team built a FinnyPlane on their own and did 2:37 for 5th place. Glenn Garrett ballasted his 2000 model up to 10 grams and did 3:02 to become the State Champion. (These 2 times include the 10 second landing bonus).

The FinnyPlane is in some ways the antithesis of what most people recommend as a first model. It has a very long fuselage and a CG that is well behind the wing. However, the model is exceptionally easy to build. The wing and stab ribs are identical. The flat wing simplifies building and covering. The solid tip plates are easy and durable.

The model is also very easy to trim and very reliable. Jo and Kara's model was trimmed in my house and needed no other adjustments until just before the state competition. If the airplane is set up as shown on the plan, all that is left to do is fly it on about 400 turns to set the cruise attitude to almost stalling. When the cruise is set, power can be increased in steps up to the maximum desired level. We have launched the tube fuse version at .9 in-oz of torque and the solid fuse version at .7 in-oz without problems. Rubber used throughout the 2001 season was .093 TanII (5-98). Glenn's airplane would probably have done more time on smaller rubber as it was running out of turns at 3 minutes. The pressures of being a high school Senior kept him from doing the experimentation to get his times up.

Building the Finny

This is a very easy airplane to build, but most first time builders will need some mentoring to be successful. Young builders with an airplane or two in their experience can probably handle it on their own. The local Dunwoody HS team built a Finny with just telephone help after building one plane on their on. I'm going to skip covering techniques and making tissue tubes and maybe some other steps to keep this article from turning into a book.

Glue

I use CA for almost everything. CA is heavy. Weight is not good. The answer? Use only a LITTLE BIT! Use THIN CA! Use FRESH CA! Make some application tools out of scrap wire by cutting pieces 3" or 4" long and bending about ¼" of the end to 90 degrees for a handle. Get some label backing material or other non-stick material and squirt a few drops of CA onto it, making a little puddle. Dip the end of the wire into the puddle HORIZONTALLY. Hold the wire VERTICALLY and you will have a tiny drop of CA at the bottom of the wire. You can place this precisely where you want it to go. The two pieces of wood that you are joining must be touching. You must put the drop of CA directly on the joint line. The resulting joint will be many times stronger than the wood.

The Wing and Stab

Cut all the parts out of 6 pcf maximum sheet wood. Don't buy stripwood. It will be too heavy! Cut out several spars and select the ones that are the most uniform and the strongest. Test the spars by carefully bending them with first one side up and then with an adjacent side up. They will be noticeably stronger in one direction than they are in the other. Turn the spar so that it is stiffest when bending vertically. Mark the top of the spar. If one of your best pair of spars seems stronger than the other, put an additional mark on that spar.

A rib template can be made by drawing a 14" radius arc on a piece of paper, and then gluing the paper to a thin piece of metal. I use aluminum flashing material for this. Cut the sheet metal along the arc (scissors will work on flashing) and smooth the edge with a file. Slice the ribs 1/16" thick along the edge of the template. Tape the plan to a flat surface and place the wing spars on the plan with small weights. Locate the spars with the marked side up! If one spar is stronger, make it the leading edge. Glue the tip ribs in place first and then the intermediate ones. Run a double edge razor blade under the glue joints to separate the wing from the plan.

Cover the wing and stab with LIGHT condenser paper. You can buy this from Don Slusarczyk or Lew Gitlow. The light condenser paper weighs about 2/3 as much as normal condenser paper. Cut tip plates out of the lightest 1/32" sheet you can find and glue to the wing and stab. Glue on wing posts and stab posts, keeping them perpendicular.

The Fuselage & Front Bearing

Tape the fuselage outline to a piece of 1/8" or 5/32" balsa with the bottom edge of the fuselage along the edge of the balsa sheet. Cut along the top outline (the top outline is an arc). Bend the rear hook out of .020 wire leaving the top of the hook straight. Push the wire up through the motor stick, bend the top over as shown and CA into place. Add the scrap of balsa to brace the hook. Cut the tail boom out of the lightest piece of 1/8" balsa that you can find. Glue to the top of the motor stick as shown. Glue on the front stab tissue tube and the front wing tissue tube.

The front bearing can be whatever you are comfortable with. My preference is an aluminum penny plane bearing from Lew Gitlow. You can also use a plastic prop hanger, but these require some modification. If you want to go

this route, cut as much plastic out of the hanger as possible. I remove all of the plastic on the sides except for a thin box to hold it all together. Fill up the prop shaft hole with CA and drill a new hole for an .020 wire prop shaft. Drill this hole so that there will be no downthrust in the bearing when you're done. Shape the front of the fuse so that when the plastic bearing is put on, you will have 2 to 3 degrees of left thrust.

Prop

Use either a 9" grey Peck Polymers prop or a 9" blue prop. Remove as much plastic from the hub as possible and thin the blade until the prop weighs about 2.5 grams. This is the hardest part of the whole building process. I also remove part of the blade toward the center of the prop. Be sure to remove all of the plastic used for the free wheeling mechanism. Glue an .020 wire prop shaft into the prop with CA. Bend the shaft as required to get both blades to the same pitch and to get both blades following the same path.

Final Assembly

Place a tissue tube on the bottom of the rear wing post. Hold the motor stick vertically with the front up. Hold the wing by the front post. Slide the front post into the tissue tube glued to the motor stick. Pinch the rear tissue tube against the motor stick with your thumb and finger and put a TINY drop of CA where the tube touches the stick. When this CA has set, you can release the rear tube and remove the wing from the motor stick. I don't like for wings to fall off so I put a fillet of CA on both sides of both wing tubes. The stab is installed the same way as the wing.

Hold the airplane nose up again and lay a piece of light 1/16" square balsa from the leading edge of the wing to near the bottom of the front wing post. Glue this brace at both ends and trim off any excess wood. Repeat on the other side of the wing. Hold the airplane nose down and lay another piece from the trailing edge of the right wing to the wing post. Glue this piece to the trailing edge only. Carefully sight along the right wing panel and push or pull on the brace until the leading and trailing edges are parallel. Hold the brace in this position and glue the brace to the wing post. Repeat for the left wing panel except that the left brace will be used to pull (or push) washin into the left panel before gluing to the post. Hold the plane level and facing you and check the wing alignment. If it's not right, cut the braces loose and try again. If you set the wing up this way with four braces, it will most likely stay in alignment forever. If the alignment stays put, so will your trim settings!

Flying & Competition Hints

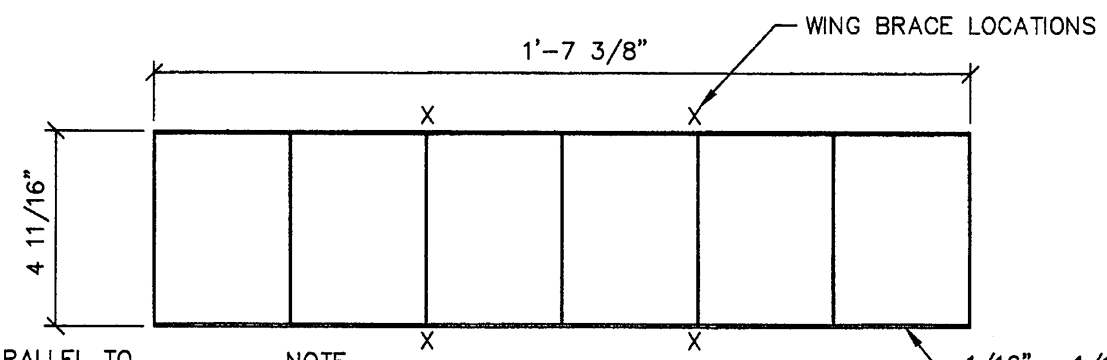
Best results to date have been with .090 rubber. If the wing spars are strong, the Finny will take any torque that .090 rubber can deliver. The flight pattern should stay very stable right up to maximum power.

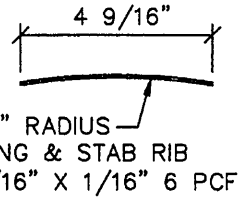
Practice, practice, practice! Find your best rubber, prop, torque, trim, etc. before you compete. Take the airplane to the flying site completely ready to fly. There is usually so much confusion before the event starts that the least amount of trimming that you can get away with is desirable. Always think in turns of simplifying your tasks when you are competing.

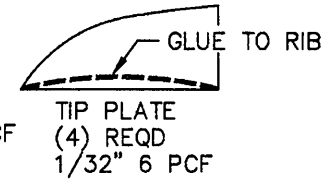
My kids wind motors off the plane using a torque meter. Getting the wound motor on the plane is a potential disaster. After my 6th grade girls lost their state final due to a motor loading problem, I will now teach teams to have ONE person do the motor transfer. It is too difficult for two people to coordinate their movements and accomplish this task without breaking the airplane. Teach your kids to hold the airplane by the nose bearing with the rest of the airplane pointed away from their body at all times. Teach them to walk with the airplane in a flying attitude, again holding it by the nose. If you are able to be with them when they compete, tell them that the number one goal is to enjoy how their airplane flies. If they win something that is just icing on the cake!

The 7 minute time limit for making 2 flights has been changed for the 2002 competition. The new rules specify that the 7 minutes begin when the first flight is launched. Make sure that your judges understand this change. If the airplane gets damaged while preparing for the first flight, you should be allowed time to fix it. If a motor or two break before the first flight, it should not be a cause for panic.

A final note - if you are able to have any influence on the way your local competition is run, I encourage you to push the organizers for permission to waive the 7 minute time limit. Tom Sanders gave me his OK for waving this rule at the Georgia High School finals for 2001. We had a wonderful competition! I will be happy to provide more information to any one wanting it. Bear in mind that even if you are successful in getting this rule waived, you should teach your team to work within the letter of the rules. As they advance through the competiTion it is always possible that at some point they will have to deal with the time limit.







TRIM

SET WING PARALLEL TO BOTTOM OF MOTOR STICK

RAISE STAB TRAILING EDGE 1/4" REFERENCED TO BOTTOM OF MOTOR STICK

CG SHOULD BE AROUND 1" BEHIND WING

2–3° LEFT 0° DOWN THRUST

1/4" STAB TILT (HIGH ON LEFT SIDE)

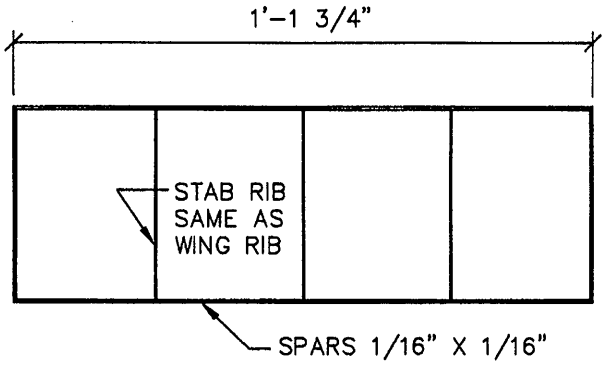
TEST FLY AT ABOUT 400 TURNS

ADD UP TRIM AT STAB UNTIL STALLING OCCURS THEN TAKE UP TRIM OUT UNTIL STALLING STOPS.

INCREASE POWER GRADUALLY. IF PLANE SPIRALS IN AT HIGH POWER ADD MORE WASH–IN TO LEFT WING

NOTE

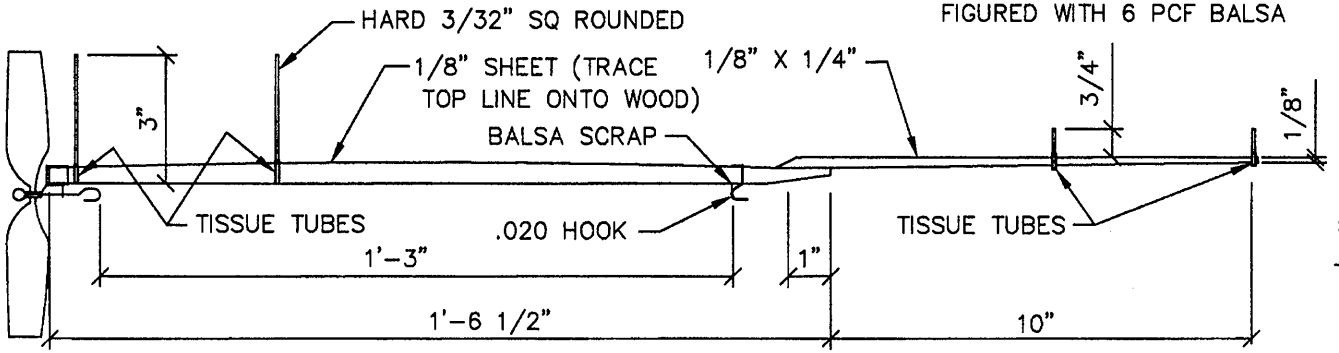
USE 1/16" SQ. BRACES FROM L.E. AND T.E. TO WING POSTS. SET INBOARD WING AT 1/16" TO 1/8" WASHIN WHEN GLUING BRACES.



MOTOR – 15.5" .090 TAN II

PROP – 9" GRAY PECK OR
9" BLUE CUT
TO 7 3/4" MAX AND
THINNED TO 2.0 GRAMS

ALL WOOD WEIGHTS ARE FIGURED WITH 6 PCF BALSA

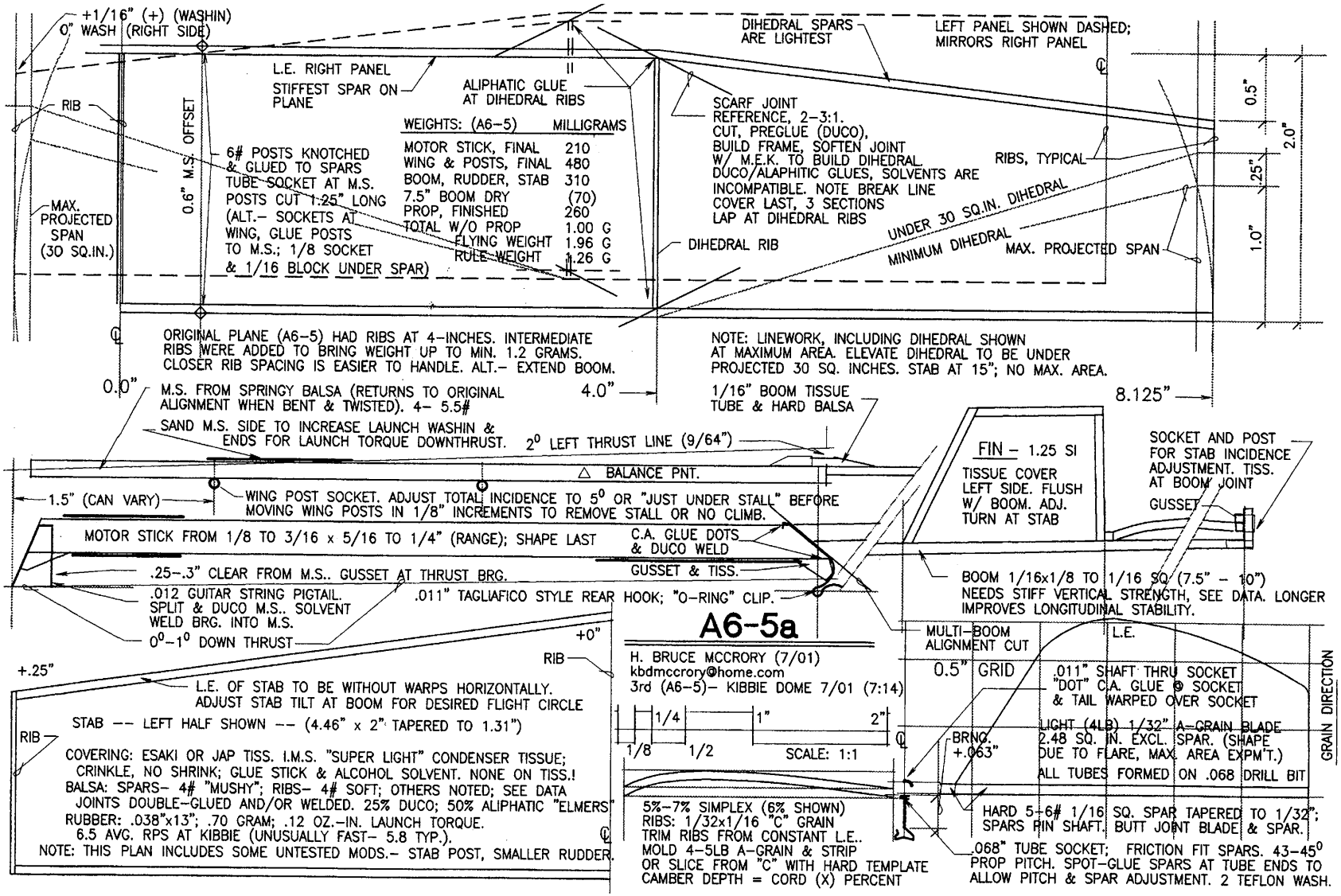


TARGET WEIGHTS (GRAMS)	
WING WOOD	.4
GLUE AND COVER	.5
STAB WOOD	.3
GLUE AND COVER	.3
MS	2.0
BOOM	.4
PROP ASSY	2.5
TIP PLATES	1.4
POSTS AND BRACES	.5
LANDING GEAR	.5
TOTAL	8.8

"FINNY PLANE"

DESIGNED AND DRAWN BY
BILL GOWEN

SCALE 1" = 4"


+1/16" (+) (WASHIN)
0" WASH (RIGHT SIDE)
L.E. RIGHT PANEL
STIFFEST SPAR ON PLANE
ALIPHATIC GLUE AT DIHEDRAL RIBS
DIHEDRAL SPARS ARE LIGHTEST
LEFT PANEL SHOWN DASHED; MIRRORS RIGHT PANEL
RIB
0.6" M.S. OFFSET
6# POSTS KNOTCHED & GLUED TO SPARS
TUBE SOCKET AT M.S.
POSTS CUT 1.25" LONG
(ALT.- SOCKETS AT WING, GLUE POSTS TO M.S.; 1/8 SOCKET & 1/16 BLOCK UNDER SPAR)
WEIGHTS: (A6-5) MILLIGRAMS
MOTOR STICK, FINAL 210
WING & POSTS, FINAL 480
BOOM, RUDDER, STAB 310
7.5" BOOM DRY (70)
PROP, FINISHED 260
TOTAL W/O PROP 1.00 G
FLYING WEIGHT 1.96 G
RULE WEIGHT 1.26 G
SCARF JOINT
REFERENCE, 2-3:1.
CUT, PREGLUE (DUCO),
BUILD FRAME, SOFTEN JOINT
W/ M.E.K. TO BUILD DIHEDRAL.
DUCO/ALAPHITIC GLUES, SOLVENTS ARE INCOMPATIBLE. NOTE BREAK LINE
COVER LAST, 3 SECTIONS
LAP AT DIHEDRAL RIBS
RIBS, TYPICAL
0.5"
2.0"
.25"
1.0"
UNDER 30 SQ.IN. DIHEDRAL
MINIMUM DIHEDRAL
MAX. PROJECTED SPAN
MAX. PROJECTED SPAN (30 SQ.IN.)
DIHEDRAL RIB
ORIGINAL PLANE (A6-5) HAD RIBS AT 4-INCHES. INTERMEDIATE RIBS WERE ADDED TO BRING WEIGHT UP TO MIN. 1.2 GRAMS. CLOSER RIB SPACING IS EASIER TO HANDLE. ALT.- EXTEND BOOM.
NOTE: LINEWORK, INCLUDING DIHEDRAL SHOWN AT MAXIMUM AREA. ELEVATE DIHEDRAL TO BE UNDER PROJECTED 30 SQ. INCHES. STAB AT 15"; NO MAX. AREA.
0.0"
M.S. FROM SPRINGY BALSA (RETURNS TO ORIGINAL ALIGNMENT WHEN BENT & TWISTED). 4- 5.5#
4.0"
1/16" BOOM TISSUE TUBE & HARD BALSA
8.125"
SAND M.S. SIDE TO INCREASE LAUNCH WASHIN & ENDS FOR LAUNCH TORQUE DOWNTHRUST.
2° LEFT THRUST LINE (9/64")
△ BALANCE PNT.
FIN - 1.25 SI
TISSUE COVER LEFT SIDE. FLUSH W/ BOOM. ADJ. TURN AT STAB
SOCKET AND POST FOR STAB INCIDENCE ADJUSTMENT. TISS. AT BOOM JOINT
GUSSET
1.5" (CAN VARY)
WING POST SOCKET. ADJUST TOTAL INCIDENCE TO 5° OR "JUST UNDER STALL" BEFORE MOVING WING POSTS IN 1/8" INCREMENTS TO REMOVE STALL OR NO CLIMB.
MOTOR STICK FROM 1/8 TO 3/16 x 5/16 TO 1/4" (RANGE); SHAPE LAST
C.A. GLUE DOTS & DUCO WELD
.25-.3" CLEAR FROM M.S.. GUSSET AT THRUST BRG.
GUSSET & TISS.
BOOM 1/16x1/8 TO 1/16 SQ (7.5" - 10") NEEDS STIFF VERTICAL STRENGTH, SEE DATA. LONGER IMPROVES LONGITUDINAL STABILITY.
.012 GUITAR STRING PIGTAIL. SPLIT & DUCO M.S.. SOLVENT WELD BRG. INTO M.S.
.011" TAGLIAFICO STYLE REAR HOOK; "O-RING" CLIP.
0°-1° DOWN THRUST
A6-5a
H. BRUCE MCCRORY (7/01)
kbdmccrory@home.com
3rd (A6-5)- KIBBIE DOME 7/01 (7:14)
MULTI-BOOM ALIGNMENT CUT
L.E.
0.5" GRID
.011" SHAFT THRU SOCKET
"DOT" C.A. GLUE @ SOCKET & TAIL WARPED OVER SOCKET
LIGHT (4LB) 1/32" A-GRAIN BLADE
2.48 SQ. IN. EXCL. SPAR. (SHAPE DUE TO FLARE, MAX. AREA EXPM'T.)
ALL TUBES FORMED ON .068 DRILL BIT
GRAIN DIRECTION
+0"
RIB
+.25"
L.E. OF STAB TO BE WITHOUT WARPS HORIZONTALLY. ADJUST STAB TILT AT BOOM FOR DESIRED FLIGHT CIRCLE
STAB -- LEFT HALF SHOWN -- (4.46" x 2" TAPERED TO 1.31")
RIB
COVERING: ESAKI OR JAP TISS. I.M.S. "SUPER LIGHT" CONDENSER TISSUE; CRINKLE, NO SHRINK; GLUE STICK & ALCOHOL SOLVENT. NONE ON TISS.!
BALSA: SPARS- 4# "MUSHY"; RIBS- 4# SOFT; OTHERS NOTED; SEE DATA
JOINTS DOUBLE-GLUED AND/OR WELDED. 25% DUCO; 50% ALIPHATIC "ELMERS"
RUBBER: .038"x13"; .70 GRAM; .12 OZ.-IN. LAUNCH TORQUE.
6.5 AVG. RPS AT KIBBIE (UNUSUALLY FAST- 5.8 TYP.).
NOTE: THIS PLAN INCLUDES SOME UNTESTED MODS.- STAB POST, SMALLER RUDDER.
1/4
1"
2"
1/8
1/2
SCALE: 1:1
BRNG. +.063"
HARD 5+6# 1/16 SQ. SPAR TAPERED TO 1/32"; SPARS PIN SHAFT. BUTT JOINT BLADE & SPAR.
.068" TUBE SOCKET; FRICTION FIT SPARS. 43-45° PROP PITCH. SPOT-GLUE SPARS AT TUBE ENDS TO ALLOW PITCH & SPAR ADJUSTMENT. 2 TEFLON WASH.
5%-7% SIMPLEX (6% SHOWN)
RIBS: 1/32x1/16 "C" GRAIN
TRIM RIBS FROM CONSTANT L.E..
MOLD 4-5LB A-GRAIN & STRIP OR SLICE FROM "C" WITH HARD TEMPLATE
CAMBER DEPTH = CORD (X) PERCENT

A6-5a

DATA

PART/DESCRIPTION	SIZE	DEFLECTION*/ Stiffness Coef.	(A6-5)	PIECE WEIGHT	PART WEIGHT
WING 5a2 Complete			(480mg)		.48g
L.E. Spar	9.5"x.067x.066; 4.52lb	1.1"/SC-82		.05g	
T.E. Spar	8.375x.0625x.065; 4.47lb	1.1"/SC-70		.04g	
Dihedral Spars (4)	4.5x.063x.065; 4.12lb	---/SC-63		.08g	
Ribs at 2" (5)	.033x.063 3.46lb			.03g	
Framed Weight				.18g	
Covered (Jap. Tissue)	.0083g/sq. in. x 31 SI=.257g			.46g	
Posts (other balsa)	1.25"x.065x.066; 8.4lb			.02g	
STAB 5a2 Complete					.22g
L.E. Spar	9.5x.066x.065; 4.66lb	1.3/SC-66		.05g	
T.E. Spar (Best at wing LE)	9.0x.065x.065; 4.03lb	1.0/SC-92		.04g	
Ribs at 2" (3)	.033x.063 3.46lb			.02g	
Framed Weight				.08g	
Covered (Jap. Tissue)	.0083g/sq.in. x 15 SI=.125g			.22g	
BOOM 5a2 Complete	7.75x.0625x.133-.110-.075 (equal meas.)		(B.R.S-310mg)		.09g
Blank	7.75x.0625x.133;	V-.3, H-.9	(70mg)	.05g	
Rudder	.01g; Incidence Post- .066x.065x.25; 4.8lb			.01g	
PROPELLER 5C Complete	(Mine are larger than the average.)		(5b-260mg)		.24g
Blades (2.47 sq. in. ea.)	.032 thick; 4.9lb "A" grain – try for 4 lb.			.17g	
Spar (other balsa)	6.0x.063x.065; 4.8lb			.04g	
Shaft & Hub/Socket (Socket is the hub; balsa chips may be used as shims.)				.03g	
MOTOR-STICK 5a2 (trimmed)	.087x.110-1.29x1.83-1.05x1.55		(210mg)		.17g
Blank (other-3/16 "A")	5.875x.133x.183; 4.02lb			.15g	
Steel, Tissue, Socket, gussets				.05g	
TOTAL WEIGHT – Trimmed	(with Jap tissue!!! A personal goal.)		(1.26g)	-N/A-	1.20g Yes!

*Deflection in inches using 480 mg rubber band; based on "The Hobby Shop EZB", INAV #90.

TARGET/WEIGHT ESTIMATES (Above wood is weak, intentionally. 4.5-5 lb with lighter tissue is better.) M.S.- .17-.25g; Wing- .39-.49g; Prop.- .23-.28g; Stab- .18-.24g; Boom/Rudder- .09-.15= 1.06+ g. Try to keep plane, less prop., under 1.00 gram. Jap & domestic tissue is heaviest at .008+ gram/square inch. Condenser Tissue is lightest at .0036g & .004g. All but "other balsa" was from a quarter sheet at 4.02 lb density. Slicing & sections varied density from 3.5 –4.7lb. Hunt/Taylor stiffness coefficient (SC) test ranged 67/quarter sheet to 50–90 for parts. Poor!

DESIGN- Target was 8:1 wing aspect ratio, minimum weight in wood, long tissue span and simple, knockdown for storage. Have fun, change it. Experiment. Projected wing area is most critical. Plan, calculate, and record; it's part of building. Standardize materials. A6 was my first plane. It taught me a lot without being a finicky subject.

It's easier to draft plan on bond than copy. I glue it to FoamCore board, cover with kitchen wrap; then using stripped ½"x1/16 balsa strips outline the frames using map pins. As spars are cut and final weighed, each is pressed to outline using scrap balsa and pins. No pins through structure! All but prop is built on the plan. Plastic wrap prevents gluing to board and Exacto knife pops spars from outline frame.

CONSTRUCTION- Weight goal is 1.2 grams (less than a standard 1-7/8" paper clip at 1.24g), or slightly under. Targets are ranges. Focus heaviest weight to wing's leading edge post, and lighter moving away. Weight is hardest thing to overcome. Trust the weight, deflection and density. I changed how I moved and touched. It's weak wood but a strong plane due to required 1/16" minimum spars and tissue. Deflection is a way to describe member stiffness and select better wood parts. MOTOR-STICK wood is critical. It must be light, yet stiff, springing back to original shape when bent and twisted. STRIP wood for waste and several planes, sorting for weight and stiffest for wing main spars. Wood is standard hobby shop material. Tube sockets are 1"-1.5" jap tissue rolled on .068" diameter drill bit using Duco cement. Posts are chamfered at tip and twist-trimmed into the sockets. Lick the post tip for tight fit. Weight (grams) / avg. inch volume x 3.81 = density in pounds.

MECHANICALLY, the prop shaft/thrust bearing fit must be frictionless. A smooth, unbound shaft/bearing fit will haul a barge competitively. After forming and before mounting, test both bearing and shaft by "flick-spinning". Clamp wire bearing with tape and shaft when mounting to M.S. to prevent the wire legs from bending.

TOOLS- include double-edge razors, steel rule, dial calipers (indispensable), cheap stripper, 80, 180, 400 grit sanding blocks and balance beam scale accurate to 5 mg. I've never used a commercial thrust bearing. I have my own way of building thrust bearings but INAV #101 has several good methods, or buy from Harlan & IMS.

Disclaimer: This design represents a level of experience of less than two years. Opinions, errors, and techniques are subject to preferential change -- and welcome. Good flying, Bruce McCrory

THE F1D CHALLENGE
By Lt. Col. Bob Randolph

Partial Motor Test Flights from July 1993 INAV

I have to credit the former World Champ and microfilm supplier Erv Rodemsky for getting me interested in partial motor testing in about 1983. I use this technique extensively, and make very few non-official full motor flights. This saves time, rubber, and models. In my opinion, it is the "Royal Road" to successful FAI and other indoor model flying. I also use it when I fly cabin and mini-stick very successfully.

The basic concept is quite simple. For example, a quarter-sized test motor requires a test stick that is exactly three-fourths of the distance between hooks, and that is weighted to exactly three times the lubed weight of the quarter motor. Since only one-fourth of the full motor turns can be put in, the model should climb to one-fourth of the full-motor altitude and one-fourth of the full flight time.

The good news is that four times as many test flights can be made. The bad news is that any errors you induce through inaccurate procedure or faulty estimation of altitude will be compounded.

Make a ¼ test stick that is 3/4ths of the distance between the hooks of your model. I suggest you also make a balance with moment arms in a 3 to 1 ratio to be able to quickly add the right amount of clay to the ¼ test stick to match the ¼ motor you fly. Incidentally, always use lubed test motors for the balance and always center the clay on the mid point of the test stick. Failure to do this will affect the model balance, or worse, crush your motor stick.

We are trying to determine the optimum motor that will result in the most time for the existing temperature and conditions. After you find the optimum motor, back off turns and launch torque, you can expect that a full motor of 4 times the length and weight will fly close to 4 times the altitude and duration achieved. Since Cat I and II require ceiling scrubbing and beam tapping for competitive flight times, I will cover my modified test stick procedures in a future article.

The following is how I flight test a new ship. I make up 8-10 ¼ test motors (use one o-ring) close to the best guess as to the right length and thickness. Let's say this is a 4" loop of 0.070" Tan. I would also make a 4" 0.068" and 0.072", plus a 3.5 " and 4.5" of these same thickness. Balance the test stick for the motor to be used and put in 100 turns. Adjust wing incidence under this cruise power. Adjust circle size if required and check on the ship's cruise altitude. If not enough nose up, adjust more negative incidence in the stab. This will mean readjusting wing incidence. You are looking for a floating cruise where the nose stays up to load the prop and reduce its RPM. Too much will produce a mush requiring more cruise power.

Peak ¼ motor flying time will require a fully broken-in motor, but I must admit I break in these little motors by flight tests. You do not want to out climb the site, so start out with all the turns it will take, but back off so that the launch torque is 25 units. If this is still too much power, use your steering pole to prevent out-climbing your site. Better to only climb half way up and keep increasing launch torque slowly. You can't really tell if a motor is the right size until you reach full height. Upon landing, the turns remaining will indicate if you have too much or too little power. A non-VP prop should have about 1/3 row of knots left. A good VP prop will have very few turns left. For either type of prop, going deadstick before reaching the floor means the motor is too powerful. Whether to correct this by reducing the thickness or increasing the loop length depends on the flight time you achieved. Keep in mind that we are seeking flight repeatability, so you must be precise in your winding and test stick technique. I like to use several motors of the same size as they can rest and recover fully between flights. The three most important factors for FAI flying are practice, practice, and practice.

F1d Prop Construction, continuted

by Steve Brown

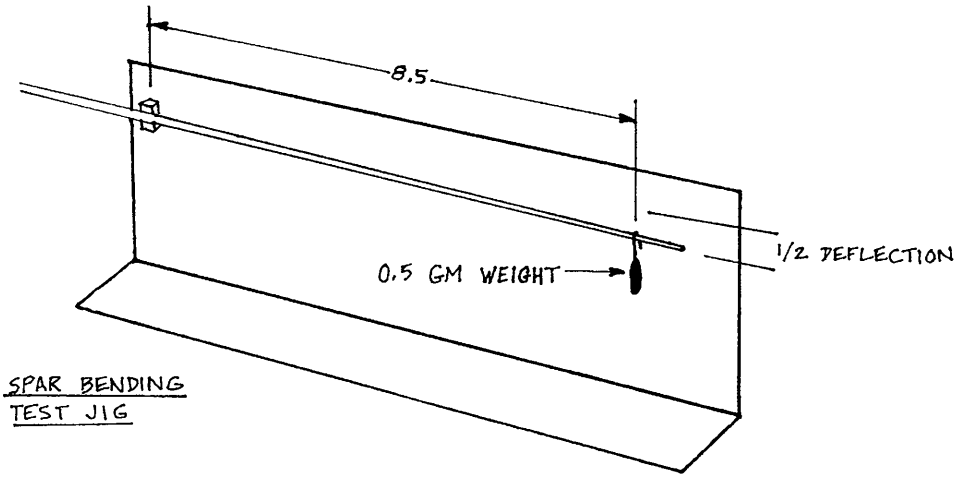
Prop spar

Cut the spars in matched (side-by-side, similar sized) pairs from a pre-tapered sheet of 5.5 lb. "A" or "AB" grain balsa. The easiest way to do this is to obtain 12" tapered wood from IMS. Only a few of the sheets will be suitable. All are tapered too much for F1d prop spars, so you'll need to sand them to the appropriate dimensions. You can cut the spars with the Harlan stripper, or, as I do, by "eye" using a heavy metal straightedge.

Once you have several matched pairs of spars cut to roughly similar sizes, orient the spars with the narrow dimension front-to-back and the wide dimension on the sides. This orients the grain structure for maximum front-to-back stiffness. Cut a diagonal joint either by eye or using the Mini Miter Box described by Bruce Kimball in INAV #102. Glue the spar pairs together with unthinned aliphatic resin glue applied with a toothpick. Using aliphatic resin glue for this one joint will later allow you to soak out a bent prop shaft with acetone without running the risk of dissolving the joint.

Once the center splice has dried (2 to 3 hours) locate and mark the center of the splice with a felt tip pen. Then place ink marks at 2" intervals on both spars from the center to the tip. Begin sanding using 320 grit paper on a 1" X 5" sanding block. Sand the wood on all 4 sides until the cross sectional dimensions at corresponding 2" intervals on each side are the same when measured with a dial thickness gauge. Each spar is slightly different, but I typically start with a dimension of about .068 X .075 at the center and taper to .035 square at the tips.

Once you have the spars tapered equally on both sides place the spar with the narrow dimension oriented top / bottom into a test jig as shown.



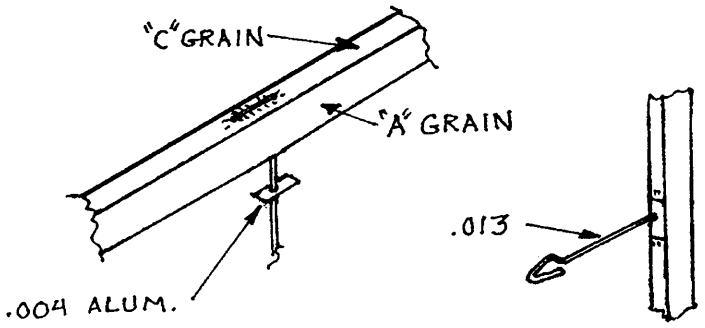
This jig is described in detail in Larry Coslick's "Hobby Shopper EZB" article in INAV # 90. Hang a 0.5 gm. weight exactly 8.5" from the center. Look for deflection of about ½" at 8.5". Sand the spar lightly until you get exactly the same deflection on both sides. You may need to reduce the center section to induce more bending. Spars that bend excessively (more than 3/4) will probably be too soft.

For fixed pitch props drill a .012" hole through the exact center of the spliced spars. I intentionally drill this hole slightly undersized for a .013" prop shaft. Cut a piece of .013" music wire about 1.5" long and form a 90 degree bend at one end. Be certain the leg is bent 90 degrees and is at least 0.2" long.

[For VP props don't install a prop shaft. Proceed at this point to construct your VP mechanism with these spars. Cut and discard the spliced joint area. Once both spars are installed into the VP mechanism go to Assembly, below.]

Cut a large piece of aluminum from a soft drink can and sand both sides with 220 grit paper to remove the paint. Drill a .013" hole in the aluminum. Using scissors cut a rectangular plate from the aluminum with the hole in the center. The exact size of the plate isn't critical, but I typically make them about .060 wide X 0.1 long. Finish the plate by squeezing it lightly with flat-jawed pliers to flatten it and deburr the edges with a file or sanding block. The plate will greatly strengthen the joint between the shaft and spar and will also function as a bearing surface.

Insert the prop shaft through the hole in the spar and place the plate on the opposite end. Apply Ambroid or Duco liberally to the shaft, the bent leg of the shaft and to the back face of the plate before pressing everything together. Apply moderate pressure to the bent leg area to slightly imbed the leg into the wood of the spar. Immediately check the shaft with a triangle or square to assure it is at exactly 90 degrees to the prop spar. Reorient and apply extra glue as needed. Allow to dry for 30 minutes. Recheck for squareness, then re-apply more glue to the shaft leg and around the edges of the plate. The strength of this joint is critical – it's not the place to save glue weight.



HUB DETAILS

Allow this structure to dry for an hour. Then bend the prop hook shape and cut off the excess wire. Before bending the hook I put a thrust bearing (Harlan) on the shaft and mark the point of the first bend on the wire 1/16" behind the pigtail of the bearing. Be careful when "eyeballing" the position of the first bend, since it's all too easy to make the bend in the wrong place and later find that it's not long enough to fit in the thrust bearing.

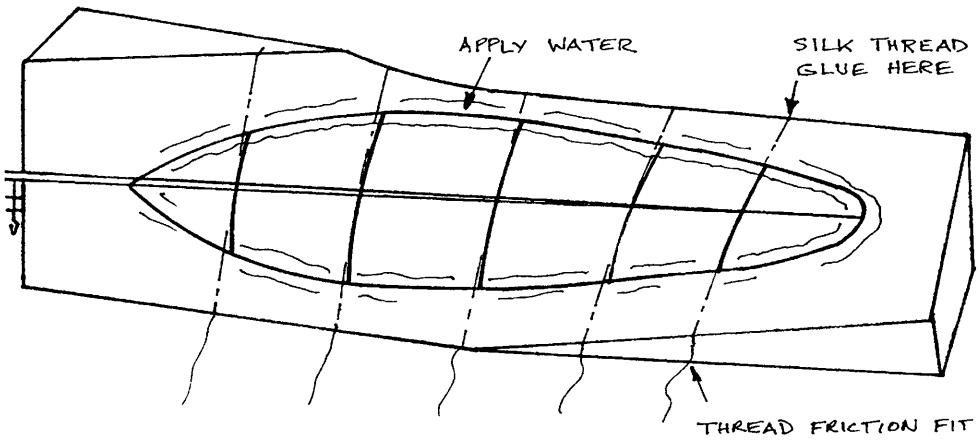
I use the classic "Richmond" hook shape, but a "S" shape will work as well. If you use a "S" hook it may be easier to form the "S" hook first and then insert the shaft into the spar and bend the 90 degree "leg." I've experimented with many hook shapes and have never seen any advantages to any particular shape beyond ease of rubber hook-up.

Assembly

Shim the block under the front or back edges to place the 45-degree point for the desired "pitch" (measured with a triangle and a square) and then set the adjustable shaft stop to 90 degrees with a square. Place the spar on the block and secure the shaft against the stop with masking tape if you don't have a spring retainer on the stop.

Lightly tape the spar to the block with 2 or 3 pieces of 0.1 X .75 strips of low-tack masking tape (blue painter's tape or drafting tape). Make sure it is straight. The spar should lie flat against the block for its entire length. You may need to reposition the pivot of the rotating prop shaft mounting to assure the spar will lay flat against the block. Cut the spar to the desired length using the reference ink marks on the block face.

Place the blade outline on the spar. Beginning at the tip, align the centerline ink dot on the outline with the "line" formed by one edge of the spar and double glue the tip and each rib station working from the tip to the hub. Press the outline to the block face as you glue. This will form the helix.



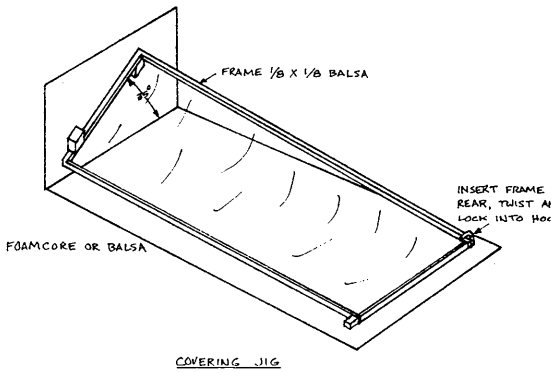
GLUE OUTLINE TO SPAR & FORM HELIX

Allow 30 minutes for the glue to dry once all the rib stations have been glued. Then, using a ¼" round soft bristled brush loaded with water, paint water over the outline, but not the ribs. Soak the wood thoroughly. Caution: Blot any excess water from the tip with a Kleenex. Do not allow water to puddle at the tip or it may cause the outline to soften and kink. Draw the threads over the rib stations and secure the structure to the block face with gentle downward pressure. Dry at least 3 – 4 hours. The longer the structure is allowed to dry while it is "strapped" to the block by the threads, the better. Then complete the second blade.

Covering

I use a "wet" covering method since I am used to working with microfilm. Larry Coslick has described a "dry" covering method using spray glue in previous issues of INAV.

I use a prop covering jig as illustrated. The jig can be constructed of any available material, such as foam core, balsa or corrugated cardboard. Make the frame out of 1/8" or 5/32" square balsa. Reinforce the corners with balsa gussets. I usually make several of these frames since they are easily broken and having more than one speeds the covering process.



COVERING JIG

Unroll Y2K or Y2K2 plastic film on a flat sheet of the yellow foam rubber used in furniture. This will minimize the strong static attraction that characterizes the thin plastic films. The plastic should be as flat and taut as possible. Spray one side of the wood frame with 3M 77 glue and place it on the plastic film. Cut with a 15 – 25 watt soldering iron or cautery. Place the plastic covered frame in the jig. Twisting the frame will create a lot of slack.

It is critical that the wood outline of the prop, the tops of all the ribs, and the tip and hub points of the outline be very wet. Using a ¼" soft bristle brush, wet the outline with saliva or "sticky" water (water mixed 50/50 with white wine or water with some egg white mixed in). Plain water does not secure plastic well. Move rapidly – all of the top and sides of the outline must be wet simultaneously. Immediately place the wet outline face down on the plastic film. Press it down lightly and make sure that the entire outline is in contact with the film.

Wait 2 to 3 minutes then cut the covered outline free of the frame with a soldering iron or cautery. Cut from tip to hub, cutting one side, then the other. Leave a tiny portion of the tip uncut to prevent the outline from flipping up out of the jig. Make certain the film is cut at the hub end (bump it lightly with the iron to be sure) then finally melt the uncut portion at the tip.

Seal the edges of the plastic to the outline sides by working saliva under the edges with a loaded brush. Then place the wet, covered prop blade back on the prop block. Draw the threads over the rib stations and dry for at least 3-4 hours. Repeat for the other blade.

Excess slack can be removed by drawing a small brush loaded with "sticky" water or saliva over the rib stations. Do this after everything has dried thoroughly.
Finally, place the new prop on a pitch gauge and tweak the spar as needed to assure that the blade angles are identical for both sides. Check the prop in the field when flying. Props always move as weather conditions change and you should check pitch at least once every flying session. Add one .050" diameter Teflon washer to the shaft before flying.
This article includes techniques developed by Cezar Banks and Bob Randolph.
Write or email me at the addresses below with any questions:
Steve Brown, 297 Hartman Ct.
San Dimas, CA 91773 stbrown@hotmail.com

Catapult Glider Launching

Theories

By Kurt Krempetz

In my pursuit to get a catapult glider flight time up, it was clear to me that getting to the top of the ceiling of a building I was flying in was very important. I always noted that all the gliders that were turning the best times were launched and transitioned very close to the ceiling. I started thinking about some of the basic fundamental laws of physics, trying to understand how to get the gliders higher. Was it just getting a stronger rubber band or stretching the band out further? Maybe it was the weight of the model? Did the strength or flexibility of the model have any effect? Did the drag of the model matter? These issues still puzzle me today, but I believe I am starting to understand the parameters better. With experimentation and applying some fundamental laws of Physics I believe I am starting to appreciate the parameters that matter. Understanding these parameters/issues should help us get better flight times, something we are all trying to achieve. The theories I present below may not be correct; I don't claim to be a theorist. One of the reasons for this article is to get feedback and find possible errors in my thinking. So any constructive comments you have are appreciated. My e-mail is krempetz@home.com.

First lets imagine "the perfect launch". I envision it as the glider going straight up vertically from my hand to the ceiling and just an inch below the ceiling it runs out of speed and comes to a stop. Just as it stops the model does some sort of snap and....now it is flying level and at its gliding speed. If you told me this is possible a few years ago, I would have thought your were crazy. But at my first catapult glider contest I watched in amazement as Bob Warman consistently had his model performing "the perfect launch".

Now I started to think about the perfect launch and how it related to simple physics. To start the model has no energy. You stretch the model and rubber band out and now all the energy is stored in the rubber band. You release the model and the energy from the band gets transferred into the model, mainly into kinetic energy or motion. Then as the model is climbing it is being resisted by gravity and drag. So if I assume all the energy in the rubber band gets converted into kinetic energy and that in turn gets converted into potential energy, I can use some simple physics equations to predict what the model should do. Note I ignored drag, basically because I didn't know how include it. I get back to drag later. Remember high school Physics?

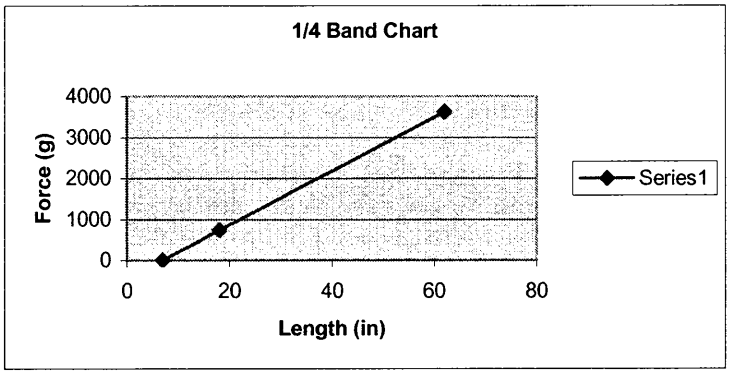
Potential Energy equation:	E=m*g*h; where E=energy, m=mass of model, h=height
Kinetic Energy equation:	E=1/2*m*v**2; where E=energy, m=mass of model, v=velocity
Work equation:	E=F*d; where E=energy, F=force of the Rubber Band, d=distance.

As an example I will use my Modified Upsweep glider I flew at the NATS 2001 in Johnson City, Tn. The mass of the model was 11.3g, and I used two ¼" bands- 7" loops to get in close to the ceiling. Actually hit the ceiling a few times, 116 ft. You can also relate height to velocity by setting the potential energy equation=kinetic energy equation and get:

h=.0334*v**2 where h=height in ft, v=speed in mi/hr.

Plugging in some numbers say 100 mi/hr as a launch velocity; h=.0344*100*100=344 ft. Maybe my estimate for launch velocity is wrong and I will assume 60mi/hr. Then h=.0344*60*60=123 ft. Interesting note is mass drops out of the equation. Personally I think the glider max. speed is in the 100-150 mi/hr but maybe I am wrong. But lets continue with this logic. Next I could measure the energy in a rudder band, right? I took one ¼" band with a 7" loop and hung some weights on it then measured the distance the band stretched from the weight.

Below is the data;



The energy in the rubber band is the F*d. Since the force is changing with distance the energy is the integral or area under the curve. For a straight line which my band data happen to be close to, the area under the curve is a triangle or 1/2*(F2-F1)*(d2-d1). Plugging in the numbers I find E= .5*(3624-0)*(62-7)=99660g-in. Now I used two bands at Johnson City so I double the Energy and get 199320 g-in.
Now using the potential energy equation I can predict the height of the model:

h= .08*(E/m); where h is the height in ft,
E is the energy in gram-inches,
m is the mass of the model in grams.

Plugging in the numbers simple physics predicts h=.08*(199320/11.3)=1411ft This is clearly off by a factor of 10. You can also use the kinetic energy equation to predict the velocity: v=1.58*(e/m)**.5 where v=speed in miles per hour,E=energy in gram-inches, and m is the mass of the model in grams.
Plugging in the numbers v=1.58*(199320/11.3)**.5=210mi/hr. Again seems too high.
Remember I ignored drag, and this factor is a logical explanation for the numbers calculated above being off so much. Actually if you believe the calculations are correct then drag in the dominant factor. I found that very interesting and have worked very hard on reducing the drag in my models this past year.

Junior F1D Team Finals, Akron, OH 2001
by Matt Chalker

This was my first experience as a Team Finalist for F1D models, and I have to say, I had probably enough different experiences and learned enough for 10 team finals. Before I went, I read several other people's articles on their experiences and they helped calm my nerves when bad things happened, and trust me, they happen. So hopefully, this will help other future finalists out as well.

First, a little about the site. For anyone who hasn't been there before, the air dock is absolutely amazing. I had never even seen a blimp hanger before, let alone fly in one so it was quite awe inspiring. It is 179' high, 1175' long, about 250' wide and dirty as all get out. It has a lot of character as well as size. There are huge piles of stuff sitting on the ground that look like they have been there since the 60's and some of it probably longer. And the dirt layer makes it impossible for people like me to walk around barefoot, so alas, I had to wear shoes that weekend, which was quite the disappointment. Also, every day there are quite a few doors/large gaps that need to be closed off to make the site less turbulent. Not much though, as several of us learnt in the morning hours.

Test flying on the first day proved to be fruitless, as we could actually feel the wind on the ground. Steve Brown actually mentioned to me that he had never seen the air so bad in the dock. Around the time the rounds began at 12 or so, the air had calmed down some and most people began test flying and because of this late start, most people didn't get first round flights off. I personally just put up a full-motor test flight and had someone else time it so it would be counted as official.

The largest problem I had was stalling on launch, from a motorstick that was quite a bit to strong. Steve showed me how to loosen the bracing wire and bend some downthrust into a Harlan bearing. That extra downthrust helped immensely and allowed me to post a 22:22 in the 2nd round, amazing how just that little bit added almost 7 minutes to my time! The model still had some issues with stalling on launch however, and I kept fighting with it the entire contest and not until the final day did I have enough.

Meanwhile, over in Camp Schaefer, Doug was hard at work (as usual), posting a 27:43 in the 2nd round and a 29:42 in the third round, which at the time was tied for the high time of the contest, with Larry Cailliau. Absolutely amazing, but if anyone I would expect Doug to do it, as he can do some amazing things with a little balsa wood and some plastic.

For my third round I added a little extra downthrust, decreased my rubber size and ended up posting a 26:03. The model climbed to around the 5th level catwalks, maybe a little less, which is about 150' high. It deadsticked and landed with about –40 turns on the rubber, so I had some improvements to make, but at least I didn't have any damage to repair, but several others didn't fair quite as well. I forget who had what damage when, but there was quite a few destroyed models, or in Jeff Daulton's case, model parts, many model parts ☺.

Sunday morning, the second day, the air was still quite turbulent, but not quite as much as the day before and several of the more adventurous fliers (including myself) put up some scary test flights. That morning John Kagan, our hardworking CD, showed up with a pretty hoarse voice. There must have been something with the dirt or in the air, as I wasn't feeling 100% that weekend either. But anyways, he had a hoarse voice and it was slightly humorous because he wouldn't admit that he was getting sick although it was blatantly obvious that he was.

As the day went on, the air got considerably better although the drift was still present. I put up a pretty early official flight that round, as I was trying to avoid the mass herd of models in the air, and the shortage of timers that occurs towards the end of the rounds. This was a BAD idea. I thought the big drift was only on the lower levels, but as I discovered, this is wrong. I launched relatively close to the east wall, thinking the drift was towards the west wall, which it was, up until 75 feet. Once the model got above 75 feet, it tried to play tag with the east wall and see

just how close it could fly to it without getting hung. Quite a few people were watching that flight and some said that it actually flew between the girders on one of the circles. I missed several steering attempts, as the model was at 140 foot and over a large pile of boxes and junk on the floor. I eventually caught it with my balloon, just in time because on the next circle it probably would have hit that crane jutting out of the side of the wall. Once I had it, Tom Sova led me through the mass of junk on the ground, which I couldn't have done without his help. I moved it to the middle of the hanger, and it ended up landing at 27:something and minus the prop stop it was 26:38, so a good time, but a terrifying flight. Maybe that taught me not to launch during high drift times.

If I remember correctly, shortly after that flight landed, Steve Brown launched the most interesting/funny/scary flight of the weekend. He told me that he was getting a little frustrated with his model not climbing like it should, so he took 2 turns off the high pitch screw and 1 turn off the pre-load screw, this is where ½ turn is quite a bit to take off. To say the least, the model got quite well acquainted with the roof. I think it was at the roof in 3 or 4 minutes, and stayed there for at least 15 minutes, hitting it a lot during that time. Eventually Steve did a 170-foot steer, which is amazing how easy he made it look. The rubber fell off the model at 110 foot and who knows at what level it deadsticked at.

For my 5th round, I tried to repeat the round before, but without the walls or balloons becoming involved. I couldn't quite achieve that, and landed with a 23:18.

Around the same time as the 5th round, I began talking to a lot of people and I noticed that, unlike everyone thought would happen from the rules change, there were a lot of really creative and different designs. For example, Tim Goldstein had a braced-unbraced model. Similar to putting Boron on a wing spar, but using a technique somewhat similar to motorstick bracing. Another thing I noticed was a large number of beautiful models, and my personal favorite was Larry Cailliau's, which I thought looked absolutely perfect with it's crinkled Y2K2 that had a pretty much solid gold coloring. The point of my talking about talking to people is that it is important, but it distracted me from MY model, and hurt me in the next round.

I put up a few half-motor flights as well, and began to get frustrated. My RPM went up by almost 20 and the duration was shortened by a lot. I put up a flight towards the end of the round just to have an official, but it deadsticked at 19 minutes with the same rubber and prop that had done over 26 minutes. I got confused and had no idea what to do. I went back to my grandparent's house to try to figure it out, and the only thing I could think of it that I must have accidentally bumped the incidence down a little, causing it to not hang on the prop correctly. On Monday I put the incidence back into the wing and it flew just like it should. A good reason to remember to put that re-stickable glue on the wing posts every time you fly.

For the first 2 flights on Monday I increased the pitch on my prop and by the end of the 8th round was putting up 14+ minute half motor flights. I was looking forward to trying to play with Doug on having the high time for juniors in the contest, but then the final round happened to my model.

I wound up a well broken in motor with enough turns for 29-29:30, hoping to deadstick and glide for a little while. I launched and had some of the same trouble I had all weekend, no turn on the launch. It actually flew straight across the width of the hanger, all the time me not worrying about it because before it had always pulled out of it and started its turn. Instead, this time it ran straight into the wall, but as luck would have it, it just bounced off and flew back out of the wall in the opposite direction. It was over one of the indoor buildings now, and of course it got its turn back, so I couldn't catch it with my balloon, letting it fly back into the wall again. It got stuck right on the ridge where the clam shell doors met the walls of the hanger at 2:30, so I had to wait until Parker landed to see if I would make it on the team. And once he landed, I dropped into 4th place.

I went over to talk to Bill Hulbert about climbing onto the building to retrieve my model, and he said just as long as someone watched me. Mark Schaefer was watching me, and just as I got to the top of the staircase Jeff Daulton walked in with my model (sort of) in his hands. I didn't understand how he retrieved it, but he didn't really retrieve it. Apparently they saw it fluttering around in the wind outside, and picked it up. I couldn't believe that my model had flown/gotten sucked outside! After some more investigation, I discovered that there was a large gap between the clamshells and the wall where a rubber skirt used to be. It was about 1 foot wide and I assume the model was sucked through this gap. Many people were saying they had never heard of a model flying out of a building before, especially a F1D, especially at Akron.

To say the least, the weekend was quite the experience and I learned a ton there. The thing I have to say is that Indoor Modelers are quite possibly the most hospitable people out there. Steve Brown helped me a ton, even to the point of his not putting up a flight in one round. I couldn't be flying without all the help I have received. All of the adults are completely accommodating and wonderful. Also, the competition from the juniors is fierce and the three who made the team are wonderful builders, flyers and good friends of mine. Everyone who competed did a great job, and I have to compliment them all as everyone made excellent progress and I'm already looking forward to trying to make the adult team in future years.

FINISHING INDOOR HAND LAUNCHED & CATAPULT GLIDERS

•BY BOB WARMANN

Why should a finish be put on an indoor balsa glider flight surfaces? Not for protection but rather for drag reduction at launch velocity and the increase in altitude attained from the launch. The desired finish will eliminate all peach fuzz like fiber from the surface, seal pores, fill grain cavities and not increase weight significantly. The method to be described meets all of these requirements without requiring an additional ton of elbow grease. Really find it difficult to believe it took me 60 years of building gliders to discover that my furniture finishing technique could be used on balsa wood.

My finishing method requires changes in the wing and tail fabrication. They involve the thickness and degree of smoothness of wing, horizontal and vertical stabilizers. Surfaces are all finished to a dimension, which is 0.015 of an inch thicker, than the desired finished thickness. Example: the wing trailing edge is to be 0.020 inches thick, make it no thinner than 0.035 inches. Finish sanding all fabricated components with 220 grit sandpaper. The rough surface will make the final finishing easier. Wings, which have bass wood or bamboo leading edge reinforcement or were constructed of several pieces of wood glued together should have excess surface glue removed. Use a solvent to soften glue and a single edge razor blade as a scraper to remove the softened glue before sanding of wood with 220 grit paper. Tip: small vertical stabilizers are difficult to hold while sanding; leave a handle on it by not cutting bottom edge of vertical stab from sheet until part is finished and ready for attachment to the glider. The flying surfaces as now sanded are ready for finishing.

The glider finishing method I use is a variation of the woodworker finishing technique called "French Polishing". Surfaces to be finished are wet sanded with the finishing solution used as the sanding lubricant. The wet sanding will produce a slurry consisting of the solution and abraided wood particles. The slurry is produced by removing 7 to 8 thousandths of an inch of wood from the surface. Sanding both surfaces in thus manner will result in a 15 to 16 thousandths of an inch reduction in the part thickness. It now conforms to the desired finished thickness. The slurry produced by wet sanding with successive grits of paper will be worked into all indentations in the wood. The slurry functions as wood filler, however, when dry, it will only require a light sanding with 600 grit paper to complete the finishing. Polishing with 1600 grit paper can be done but I usually quit with 600 grit.

The finishing solution used must be compatible with adhesives used to assemble the glider. Wet sanding must be done on a clean, flat, hard surface that is resistant to the finishing solution. I have found glass to be the most satisfactory. Sandpaper must be backed with a flat firm block. Mine are fabricated from extruded aluminum rectangular pipe. Glue a different grit paper to each surface. Undercambered wings require a block with some curvature to work the concave surface. Blocks using glass bottles or wood trim moldings are satisfactory. I use oak door threshold stock for mine, but only use undercambered wings for lower ceiling gliders. The finishing solution used consists of polyurethane and mineral spirits mixed in approximately equal parts. Depending on the polyurethane used, the mixture may require adjusting. The polyurethane I used was purchased at the local paint store, McClosky brand. Use the gloss finish and only enough to bond the slurry to the surface after drying. Polishing solution can be applied to surface with cloth, tissue or brush before wet sanding.

Try the method on a vertical stabilizer first. The step by step method of finishing is as follows: 1.

Apply urethane-mineral spirit solution to one side of stab, completely covering surface.

2. Use a 330 grit block. Wet sand in circular pattern the complete side. Remove approximately 0.005 inches of thickness and work slurry into wood grain. Should the slurry become too thick, add more solution.

3. Use a 400 grit block. Wet sand in circular pattern the complete side. Remove approximately 0.001 inches of thickness. Should the slurry become too dry, you will start rolling small hard balls of material, which will groove wood. Should this happen, apply more solution and continue sanding.

4. Use a 600 grit block. Wet sand in circular pattern but with light pressure. Try to work only the slurry and not remove surface wood. Stop sanding before surface is dry enough to allow rolling of slurry in small rolls or balls. Complete sanding by removing excess slurry with several strokes with grain.

5. Repeat steps 1 through 4 for other side of stab.

6. Allow 4 hours for finish to dry.

7. Dry sand both surfaces and edges with 600 grit block.

8. Lightly sand with 1600 grit (surfaces and edges).
9. Repeat steps 1 through 8 for 'wing and vertical stab. Leave handle on vertical stab until finished. Leave wing flat until finishing is complete.

This finish has not resulted in any problems in gluing parts with nitrate, butyrate, cyanoacrylate, epoxy, or aliphatic resin glues. When attaching wing to fuselage I remove finish from the bottom of the wing, (sand flat at dihedral joint).
What does the finish weigh? I have no idea. However, this is the only method I have ever used where the finished glider component weighs less after finishing than its original weight. You can verify this by weighing piece parts before and after finishing.
My gliders are finished by this method but I stop at Step 7. Finishing beyond this point really does not result in any increase in performance.
Here are a few tips for those individuals who must have that mirror like finish: and all glider components to size using your own method but stop at 400 grit paper. Save all your sanding dust. Now do Step '1, then sprinkle sanding dust lightly on solution applied in Step 1. Skip to Step 4 and complete procedure through Step 9. You will now require a hook and loop hand-sanding block, a foam pad and a 4000 grit Abralon pad. Use the hook and loop hand block with the foam interface pad, the Abralon pad applied over both and charged with the polishing solution. All that is required now is a ton of elbow grease. Abralon is available from Mirka Abrasives Inc. (800-843-3904) and from Woodworkers Supply Inc. (800645-9292).

2001/2002 INTERNATIONAL POSTAL CONTEST from 1st Oct 2001 to 31st March 2002

The postal contest we have been holding across Canada for the last six years, no longer achieves its original objective of attracting interest from across the country.
I have decided to give it one more try and will accept entries from around the world. To do this I will keep the pure duration events as FAI events and include two scale events that appear to be popular outside N. America.

Thus the events for the 2001/2002 season are;
F1L (International Easy-B)
F1M (F1D Beginner/ International Pennyplane)
FAC Peanut Scale
NoCal (profile) Scale with a minimum weight of 6.2 grams without rubber motor and built to FAC rules.

I have assumed that most flyers have regular access to spaces with Category I ceilings (less than 8 metres) and all times will be factored to that height, even though they may have been flown in higher ceilings. Most of the above classes have rules regarding dimensions, minimum weights and maximum rubber weight. I propose to run the contest on a trust basis and will assume that all flyers will abide by the rules so that I do not create the problem of requiring the flyer to provide me with a certification by a third party that his models comply with the rules.
The contest will start on 1st October 2001 and finish on 31st March 2002. Any flight times from 31st March should be sent to me as soon as possible after that date.
Entries should include the ceiling height, the flight time and, in the case of the scale events the name of the full-size aircraft that the model is scaled down from. The entries can be sent to me by e-mail or fax or snail mail as follows:

e-mail henderson98@yahoo.com
Fax (416) 481 0016
Regular mail W.Henderson
15 Joicey Blvd.
Toronto, ON
Canada M5M 2S8
I will advise you later as to which web site will be used to publish the results.

The following sign-up list was sent to us by Dave Thomson, and we thought it would be of interest.

AMA SINCE 1936

EVENT PARTICIPATION LIST
FORM 11

Event Name Demonstration - West Baden

Sanction No. 01-2014 Date(s) 11-12 Aug 01 No. of entries - this event _____

PLEASE PRINT ALL INFORMATION LEGIBLY

	Name	Place	AMA #	Address
1.	JAMES I. MILLER		89382	1076 RELEI DR FAYETTEVILLE OH 45118
2.	Vince E Sadwick		617491	68 Woodside Dr Bergen NY 14416
3.	DOUG BARBER		56270	MAPLE SHADE NJ
4.	BILL GOWEN		615737	2105 HERITAGE HTS, DECATUR, GA 30033
5.	DAVID ARONSTEIN		97976	16620 SW 130 ROSE HILL KS 67133
6.	Tom Sova		473169	5325 Westcroft Sylvania OH 43560
7.	Fred Tellier		MAC 9125	3160 Sussex Cut Wildsur Dr
8.	Roy White		6300	1026 Cedar Catawissa Mo.
9.	Mark Schaefer		721320	6654 Georgetown Perrysburg, OH 43551
10.	Doug Schaefer		680152	
11.	Walter P Van Boskirk		19912	5669 VICTORY VIEW LN OIN. OHIO 45233
12.	LONNIE H. KINDER		45633	P.O. Box 208 WINDFALL IN, 46076-02
13.	LES HALLGARTH		319629	547 GLEN ECHO DR, ANDERSON, IN 46012
14.	G.R. NOLIN		12306	663 WOOD HILL DR. FAIRBORN OH 45324
15.	Jeff Daulton		711773	7620 West Von Dette Cir. Centerville, OH 45459
16.	Moe Whittemore		34457	23485, 700W, New Palestine IN 46163 OH
17.	Larry Loucka		12210	3398 OROSEQ100 TR Wilcoughby Hills
18.	Larry Mzik		9687	117 Sycamore Dr Painesville O.
19.	Joey Sippel		714758	2026 East St. Rt. 36
20.	David Thomson		8410	5432 Hafft Rd Cincinnati OH 45247
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CD INSTRUCTIONS

Submission of this form by the Contest Director is necessary for compliance with insurance requirements. This information can aid you in your promotion of future events and settlement of any event problems. The Contest Director retains the copy and returns the white original sheet(s) within seven (7) days to AMA Headquarters, attached to Form 10.

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The Symposium is presented annually by the National Free Flight Society. The primary purpose of the Symposium is to promote and encourage the investigation, discussion, and documentation of the technical and theoretic side of free flight. Papers addressing historical, administrative, documentary, and philosophical aspects of the sport are also welcome. Outstanding models and modelers are honored.

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UPCOMING CONTESTS FOR 2001/2002

2001/2002 INTERNATIONAL POSTAL CONTEST from 1st Oct 2001 to 31st March 2002
F1L , F1M , FAC Peanut Scale, No Cal (profile) Scale
(see complete details on this postal contest on page 27 in this issue)

CONNECTICUT - NORWICH
Nov 11 & Dec 1 Norwich FAC Indoor Flying Session at Teacher's Memorial JHS, 9 am to 2 pm.
Contact John Kaptonak 860-442-9003

FLORIDA - TAMPA AREA
Dec 1-3 MIAMA Meet - Florida State Fairgrounds Exhibit Hall, 45 ft ceiling, US 301 and I-4
Dec 8-9 Ditto Flying Session
Dec 29,30 MIAMA Meet – Delta Indoor King Orange, Tampa, FL, Rich MacEntee 813-729-1524

FLORIDA – ST. PETERSBURG

February 2,3 MIAMA Meet - 230ft Tropicana Dome, St. Pete, FL. All AMA/FAC Events. No trophies-just challenge. No pre-registration. Snailmail info: send #10 SASE 34 cent stamp to Dave Linstrum 4016 Maguire Blvd Apt 3314 Orlando Fl 32803 (407) 894-3097 Online:per AMA District I thru IV NewtB newtsworld@aol.com V-VII RikC gdnchoate@aol.com IX-XIII & Canada/Overseas davidlinstrum@cs.com Include snail address & phone in email. 3rd annual meet in awesome public site. Practice for 2002 Jr & Sr F1D Team pending USIC Style Race to Roof Event Call MIAMA Hotline Doc Martin (305) 858-6363 Jan 26 to confirm before traveling.

GEORGIA – ATLANTA
Nov. 10 TTOMA Indoor Meet – North Springs High School, Sandy Springs, GA (not confirmed)

IDAHO – MOSCOW

July 27 – 30 Kibbie Dome Indoor. A 4-day contest with the Wally Miller EZB contest (1.2 gm) flown in the middle of the main event. All AMA and FAI events flown. This is a world class 145' ceiling site. Normally an FAC contest is held at the same time. CD Andy Tagliafico at 503-452-0546

MASSACHUSETTS – CAMBRIDGE
Evening Indoor at MIT –Flying from 6 pm to 10 pm at MIT's Dupont Gym, the corner of Vassar and Massachusetts Ave. in Cambridge, Mass. Call Ray Harlan at 508-358-4013. Nov. 3, Dec 8, Jan 5, Feb 2, March 2, April 6, May 4

NEBRASKA – BEATRICE
Nov 17 Nebraska Indoor Championships, sponsored by the Nebraska Free Flighters Club, for EZB, Ltd. PP, Kit Plan Scale, Bostonian, Unlim. Cat. Glider, HL Glider, MiniStick, Peanut. Site: City Auditorium. John Pakiz CD, 4411 Parker St., Omaha, NE, 68111. Ph 402-556-1432.

NEW JERSEY – LAKEHURST
Indoor Flying at Lakehurst – The East Coast Indoor Modelers (ECIM) have the use of Hangar #1 every week from sunup to sundown. The hangar is 800 ft. long by 250 ft., and 180 ft. high. To join ECIM. Contact Rob Romash at 856-985-6849. E-mail cgrain1@yahoo.com . Dues are $15 a year with a current AMA card.

OKLAHOMA – OKLAHOMA CITY
Okie Fliers Indoor Schedule. All events held at the National Guard Armory, 200 NE 23rd St., Oklahoma City.
Nov. 10, 2001 -- 14 g. Bostonian, WW-II No-Cal Mass Launch, Junior's Choice
Dec. 16, 2001 -- 7 g. Bostonian, WW-II No-Cal Mass Launch, Junior's Choice
Verify site access by phone before leaving home: Heith Leafdale 405-722-2767 Mike Buchanan 405-381-2474

TENNESSEE – JOHNSON CITY
May 30 – June 3 AMA/NFFS Indoor Nationals, Johnson City, TN. Flying is in the MiniDome fieldhouse of East Tennessee State University. No Contest Director as yet. Stay posted.

WASHINGTON - SEATTLE
The Boeing Employees Free Flight Model Flying Club (Hawks) have published their Northwest Indoor Flying Schedule. Events alternate between the Everett and Oxbow Recreation centers at the Boeing plant. Contact Keith Varnau in Seattle, WA at 425-717-5669 or 425-885-2335 evenings.

GOLD NUGGETS

KNOW YOUR TORQUE METER

By: H. Bruce McCrory, kbdmccrory@home.com

Eighteen months ago I quickly learned that three things are necessary for rubber-powered flight. They are: first, a device that provides sufficient forward thrust to overcome the physical properties that prevent a plane from staying in the air, e.g., propeller, articulating wing. Second, rubber with the appropriate energy, expressed as torque, to drive the thrust device. And, third, an airfoil that takes advantage of the thrust to provide lift and stability sufficient to keep the other two from going out of control, or falling to the ground. Physics and aerodynamics simplified.

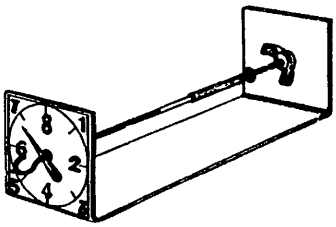
At first, rubber sectional area and length fed to me by others were enough to keep my planes in the air. The torque meter was simply a hook for the other end of my rubber loop and the dial graduations provided a means to prevent over winding and breaking the rubber once I figured out where on the dial it usually broke. I began collecting rubber, and the different batches responded differently in turns, energy, breaking point and flight times. The torque meter was growing into the most important piece of equipment I had – and I couldn't communicate intelligibly with anyone about rubber or energy. Cross section, length, turns, and weight weren't enough – without time consuming testing, which didn't help – to be able to fly the torque dependant classes like EZB or F1-D.

I needed to be able to read my meters in standard measures of force. For me this was inch-ounces of torque. For most of the world, it was metric grams-centimeters of torque. I contacted Jim Jones, the manufacturer of my meters. Even he said the standardized graduations were not important, but I knew better. He gave me the information I needed.

Simple. Anyone can calibrate any meter. All it takes is 15-minutes, a couple strips of 1/8-inch hard balsa, some modeling clay, thread and a scale.

I'm not a machinist, nor a physicist and this may not be exactly correct. Torque is a measure of energy (rubber energy) as mass/force against a material of known torsion strength that will bend and return to the same pre-bent state when the force is released. The only caveats are that the indices (dial face graduations) be the same angle for 360-degrees and the force not extend beyond 360-degrees. Greater stress will damage the tension material's structure (usually music wire) and subsequent readings will be in error.

For convenience, I will use inches and ounces, and my Jim Jones meters.



My meters have eight standard, numbered graduations in 360 degrees (0 is also 8) and ten fractions between the numbered grads. To start the calibration with everything being equal – zero – I needed a lever arm that balanced so I could add weight to one end that would spin the weighted end 360 degrees.

Two strips of hard balsa about 1/8 inch square exactly twice the length in inches as there are the number of graduations are needed. It's 16-inches for my meters. Mark the exact mid point of the strips. Glue the two strips together keeping glue away from the center. The center is slipped over the meter's hook, between the strips, and centered on the torque wire shaft that the pointer is attached to. Glue a strip of thread to one end of the balsa lever so it hangs over the end. Weight in the form of clay will be attached to the thread to make the arm turn 360 degrees.

Mark the zero point of the meter when it is at rest (with no load). If the pointer is adjustable, set it to zero. If the meter is home-built, with no zero adjustment, the pointer is on the zero setting; mark it as zero and determine the number of equal graduations you want, remembering to make the lever arm twice the graduations, in length. Don't get carried away, ten is plenty.

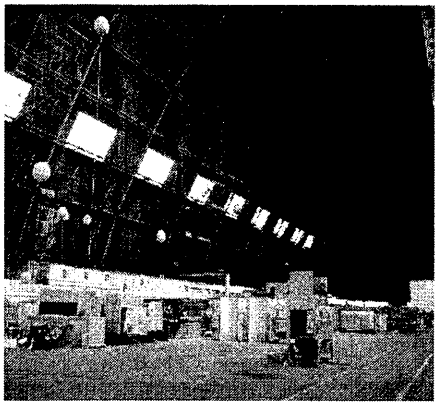
Force the balsa arm over the hook and center the mid-mark on the shaft center. Wedge the arm so it won't slip. My meters rotate clock-wise for indoor flying. The right side of the balsa balance arm has the thread. Hopefully the balance arm is balanced, but you probably will need to add weight to one arm to balance the pointer at zero. Rotate the meter in the opposite direction the pointer will turn for readings, or the arm with the thread. When you add weight it is best to have the "weight arm" ultimately at horizontal when the pointer turns the full 360 degrees. Weight or clamp the meter down.

Twist the arm with the thread in the direction it should read. For me, that is clockwise. Add clay weight until the pointer rests on zero, 360 degrees. Remove and weigh all the clay from the thread. As necessary, convert the weight to ounces.

This weight is the inch-ounces for one graduation. To get the actual inch-ounces of torque, multiply the dial reading by this weight. For example, the weight required to read number eight (360 degrees) on my Jim Jones "A" meter at eight inches is 0.0963 ounces. A torque reading of 6.5 on the dial face is: 6.5 x 0.0963 = 0.6256 inch-ounces (in.oz.). This meter is used for mini-stick, A6 and EZB. A meter reading up to 1.0 inch-ounce will handle nearly everything flown indoors. If I had a home-built meter, I would add the actual torque directly onto the dial face. As it is, I memorized the factor and multiply.

Now, I can communicate with the rest of the world, know what total energy of rubber means, and wind my EZB's to .12 inch ounces and fly competitively. HBM, 10/14/01.

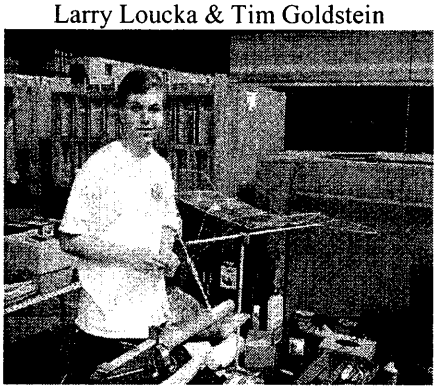
F1D Team Trial, Akron, Ohio 2001


Akron Air Dock is 1145 Ft Long


Larry Loucka & Tim Goldstein

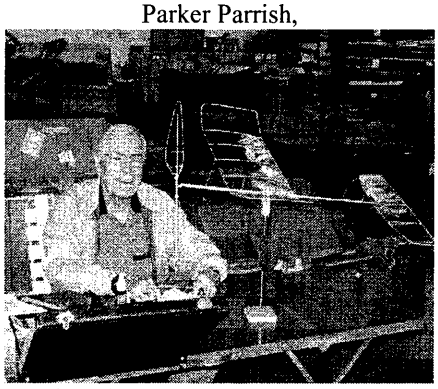

Junk Everywhere

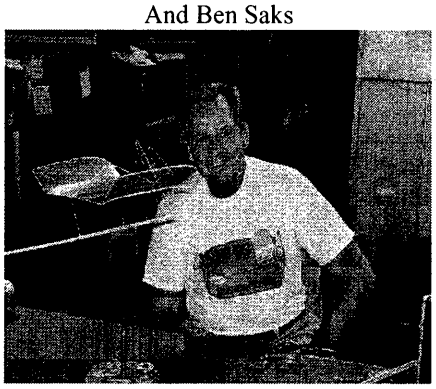

The Junior Team: Doug Schaefer,


Parker Parrish,

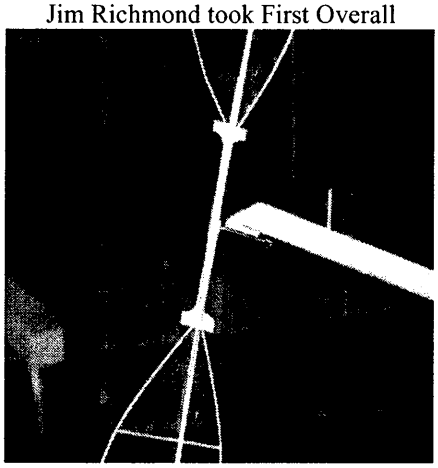

And Ben Saks


Joe Kehr


Jim Richmond took First Overall


Larry Cailliau is in Second


Steve Brown grabbed Third Place


Jim's V D Prop


Fifth Place Junior Dave Rigotti