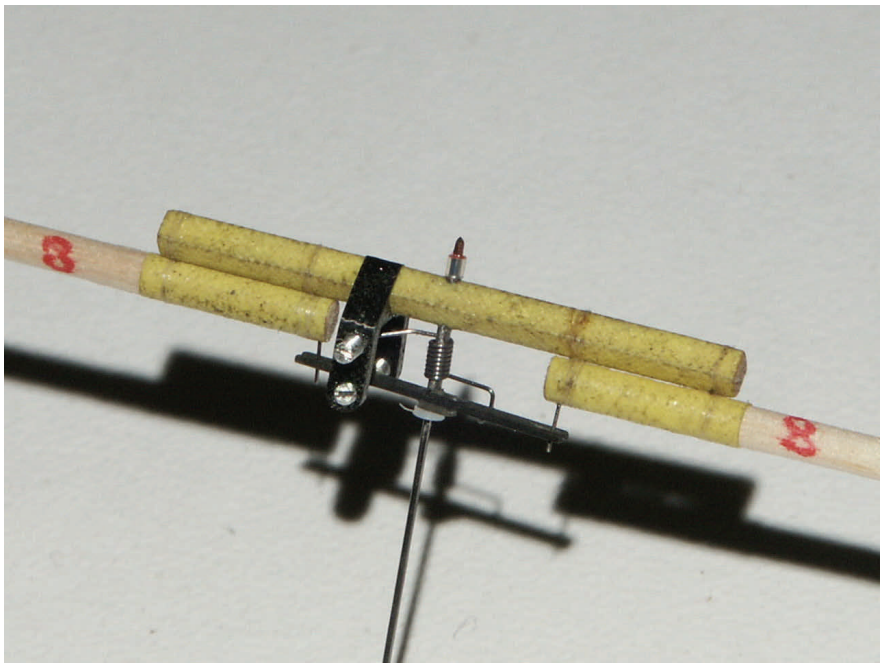
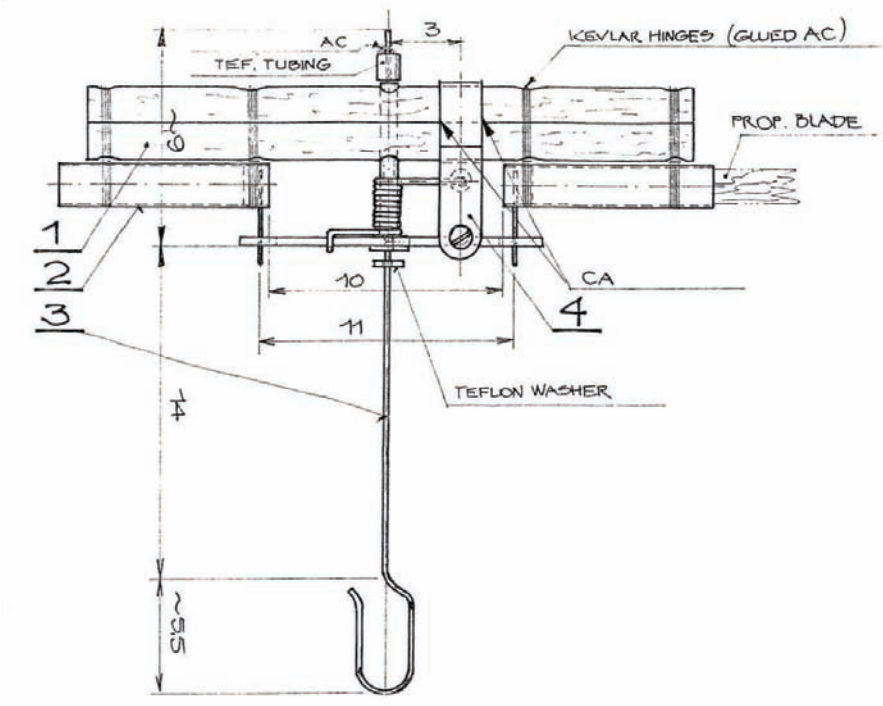
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Issue #124 2010

# The Issue that Never Was





# From the Editor's Desk

Gentlemen,

I saw in the latest INAV the articles by John Lenderman. I do not know if you are aware of this. Chris Borland emailed me recently that John passed away at the end of November. Chris Borland wrote on December 2, 2008:

" You probably haven't heard yet, but John Lenderman passed away this week from a massive stroke. He did recover enough to talk about his models and say goodbye to his family. Information on services hasn't hasn't come out yet."

Although I had seen John at a few indoor events since we started flying, I had not spoken with him until this past summer's Kibbie Dome meet. He was a very gracious man who was especially nice to my daughter and showed much enthusiasm for flying, both his own and that of others. I am sure that many fliers, especially those on the west coast, will miss him.

Leo Pilachowski
Bloomington IN
leoP@lyradev.com

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# Make invisible repairs to model parts

**Larry Coslick**

I use this repair method for just about any repair job on an indoor model and it makes the lightest and neatest repair. I use thinned down carpenters glue (Aliphatic) with saliva and a small 10/0 artists brush. Place a small dab of glue on a piece of masking tape and mix it with the same amount of saliva. Light stab outlines break easily and if the film is holding the break together, place the thinned glue on the face and bottom of the outline. The mixture is very thin and will soak into the balsa easily even though you may not be able to open the break. If the stab has folded and the film is intact, carefully place the folded part back to its original position. Take the smallest amount of glue and place it between the break and align the two ends. Do one break at a time. There's no need to pre glue and it will only take about 10 minutes for the glue to dry at 70 degree F. Another advantage is that the break can be manipulated after it sets for around 4 minutes. I try to keep the glue away from the inside of the outline to keep from getting the glue on the film. If glue gets on the film use a clean damp brush to remove the glue. I don't use Aliphatic on areas that are laced with Boron.


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# Use a heat gun to change the parameters of your plastic SO prop blades

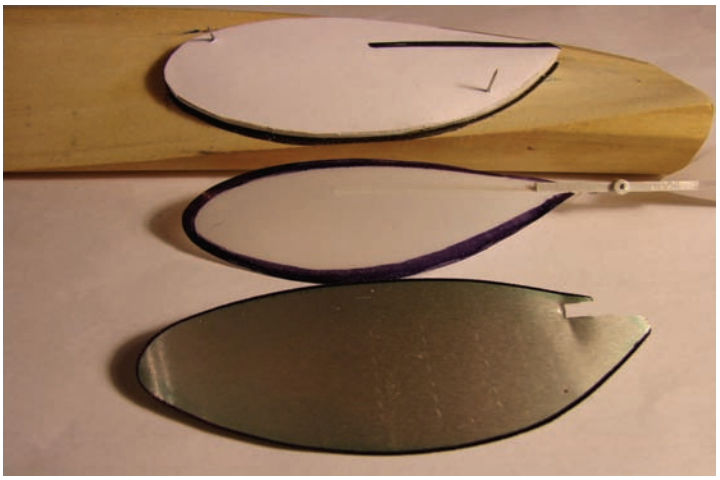
**Larry Coslick**

The plastic prop that was used for this project was purchased form FAI Model Supply, Part # SOP95A, 9.5" wide blade version. The blades were cut down to 3.5" long and 1.4" at its widest point. A poster paper template of the new blade shape was made and traced on the original blades, then cut out with scissors.

Any pitch block can be used for this procedure as long as the chord width of the block will accommodate the blade width of your prop.

To change the shape of the plastic blades a camber form is made out of ¼" 5-5.5# A grain balsa. Trace the outline of the prop blade on the balsa and make it at least 1/8" larger on all of its edges then boil the form in a covered sauce pan for 25 minutes. Make a protective cap out of 1/16" hard balsa and strap the cap and camber form down to the pitch block. You really have to pull hard on the strapping twine to get the form to conform to the pitch block.

After the camber form has dried, sand an airfoil on the form and the ¼" thickness along the leading and trailing edges allows for changes to the tip and hub angles so that they can be washed out if desired. The blade camber was reduced by 50%.



**[1]** This shows the order of placing the prop and aluminum cap on the camber form. The cap is made out of aluminum flashing material which most hardware stores carry. There are 2 alignment holes in the cap that match the pins on the camber form. Make the aluminum cap at least 3/32" larger on all of its edges than the prop blade because the heat for the 1000 watt Hanger 9 heat gun will melt any plastic that is not covered by the cap. Color was added to the prop outline and camber form for contrast. The black line on the camber form shows the groove for the plastic prop spar to set in. The placement of the aluminum cap in the picture make it look larger than it actually is.



**[2]** Everything is tightly tied together with 6' of twisted nylon multi-purpose twine  Make sure that the outside edges of the cap are laying flat against the camber form, because a small kink in the blade could occur if a section is raised.  Place 3 plies of aluminum foil over the prop hub to protect the plastic hub from the heat. Place the heat gun on high and watch the heating element until it glows orange. Use a stop watch to time the procedure, then place the nozzle 1" away from the cap and go over the entire cap for 15-20 seconds, no more. Let the cap cool to room temperature and the prop blade will conform to the camber form with no spring back.

# Spincast reel winder

**Dennis Tyson**

So I am out fishing with my Dad in Lake Okeechobee a couple weeks ago, and we were catching a few, most of all enjoying the scenery. After deciding that I wasn't going to take any Crappie on my fly rod due to the water temps I picked up one of Dad's rods and started doing a little casting. Somewhere in between the alligators surfacing, and the Water Moccasin skimming along, my eye caught a hawk. He was way up there circling and I was winding. So naturally, as any self respecting indoor flyer would have done, I began to think about flying. I have been teaching a new crop of students in our newly acquired flying site and was short on winders so winders were on my mind anyway. I thought to myself, "this sure is a smooth reel." And then the light-bulb went off and here we are. We now have a smooth ball bearing winding device with a ratio of 4.1 to 1. Sure, it may not be the most convenient number to crunch but it's close and for those who like to wind slowly, this is just the ticket.

First order of business when I got back to Michigan was to find a suitable reel. After a couple stops, Gander Mountain had just the one. It is a Daiwa GM40 Spincast Reel. It took a little searching to find one that went the right direction when winding with the right hand. And as an added bonus it has a lock that can be disengaged if backing off a few winds is necessary. The lock really helps with making the transfer of the motor to the plane. This reels drag knob comes right out of the throat and is the device the holds everything together. There are a number of ways to accomplish this but here is my way with all of the usual disclaimers.

Start by removing the gold front cover and take all of the line off of the reel. The good news is nothing is modified that doesn't allow it to be returned to it's original intended use. Now remove the drag knob from the center shaft so you can see the diameter of the circles you will have to bend into some 1/32 music wire to fit around the drag adjust plate. It is cone shaped and silver, right under the knob. I tried one piece of wire but wasn't happy with how it centered while winding so I decided two was better. I bent two pieces that come out from under the knob, bend up and around it and then bend over the top of it to center on the shaft. I then soldered the two of them together after wrapping a little fine copper wire around them. You can see from the photo that the loops on the bottom of the hook just overlap and go in opposite directions. Then all that is left to do is place the wire over the drag adjusting plate, tighten the drag knob, (tight enough to eliminate any drag slip) and there you have it.  A simple, locking, ultra smooth, compact winder that is ready to spin some motors. And all for the incredibly low price of $20.00.  No kidding, that was it! I am extremely satisfied with it and look forward to getting a little more time on it this week. I have a new EZB and a Ministick that can't wait to test the boundaries of the church gym we fly in. Feel free to contact me if you have any questions.





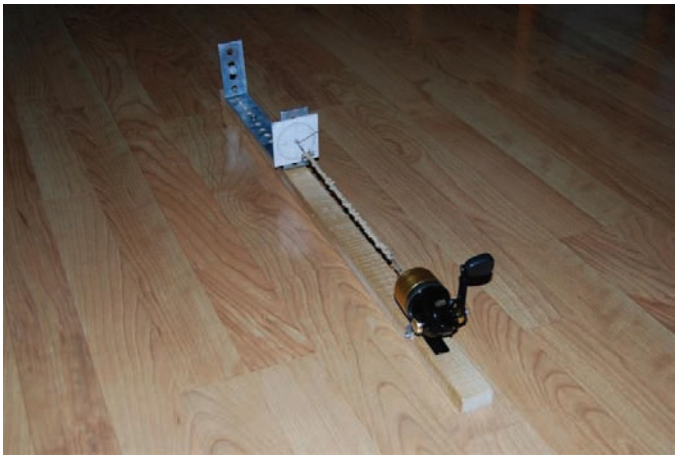


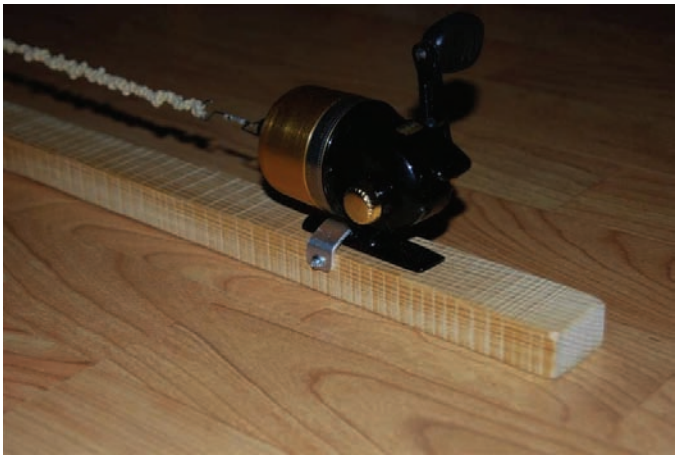


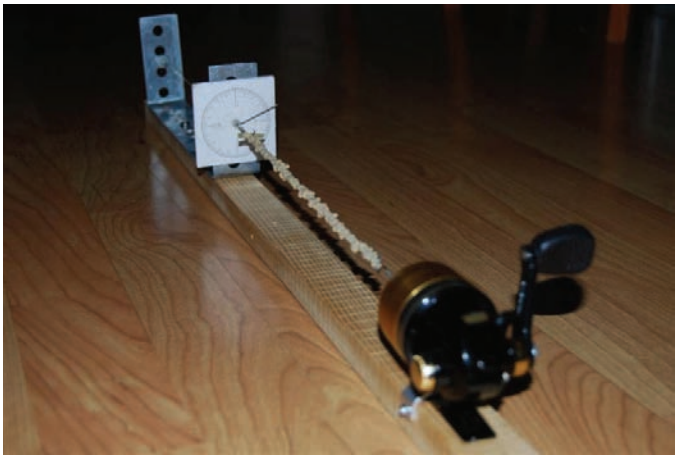








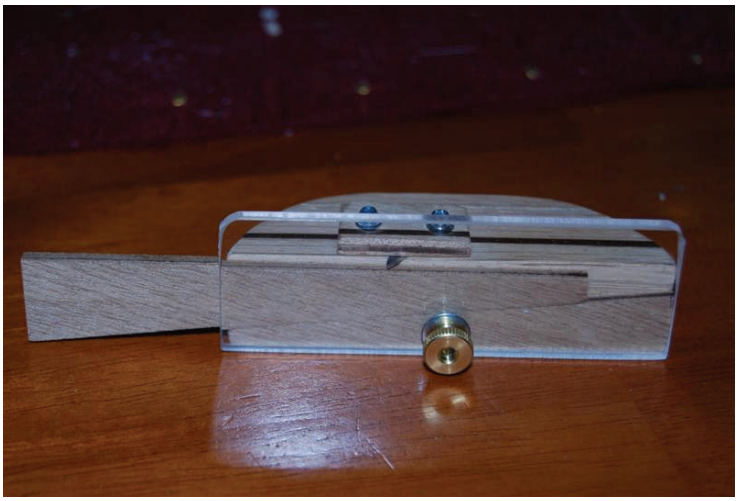


# Gardner-Style Balsa Stripper

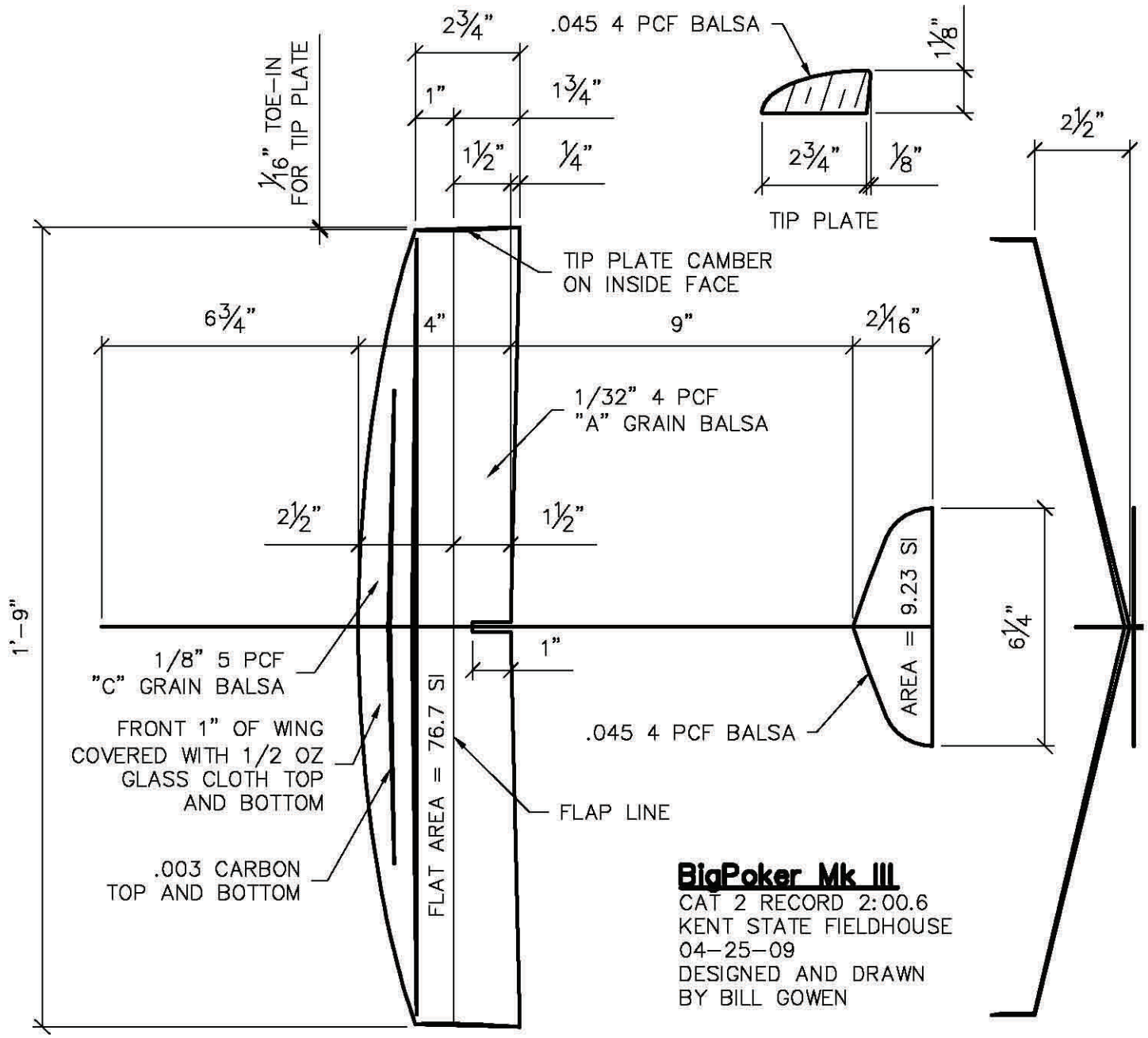
**Dennis Tyson**

Dennis sent in a few pictures of his Gardner-style stripper that he built.  Pictures should make it self-explanatory if you want to build one of these great tools.








2¾"
.045 4 PCF BALSA
1⅛"
1/16" TOE-IN FOR TIP PLATE
1"
1¾"
1½"
¼"
2¾"
⅛"
TIP PLATE
2½"
TIP PLATE CAMBER ON INSIDE FACE
6¾"
4"
9"
2 1/16"
1/32" 4 PCF "A" GRAIN BALSA
2½"
1½"
1'-9"
1/8" 5 PCF "C" GRAIN BALSA
1"
AREA = 9.23 SI
6¼"
FRONT 1" OF WING COVERED WITH 1/2 OZ GLASS CLOTH TOP AND BOTTOM
FLAT AREA = 76.7 SI
.045 4 PCF BALSA
FLAP LINE
.003 CARBON TOP AND BOTTOM
BigPoker Mk III
CAT 2 RECORD 2:00.6
KENT STATE FIELDHOUSE
04-25-09
DESIGNED AND DRAWN
BY BILL GOWEN
HIGH POINT OF FUSELAGE
9¾"
1'-0 1/16"
7¼"
1½"
1 9/16"
1 7/16"
℄ (2) 4-40 NYLON WING BOLTS
5/16"
.020 4 PCF BALSA
3/16"
⅛"
FOAM UNDER WING
FUSELAGE FROM 1/8" 5 PCF BALSA
TAPER TO 1/16" THICK AT REAR
NO TAPER AT FRONT
FUSELAGE REINFORCED WITH .025 CARBON ROD EACH SIDE AND .020 CARBON ROD TOP AND BOTTOM. RODS TAPER TO TAIL.
BALSA AND CARBON RODS WRAPPED WITH ½ OZ GLASS CLOTH APPLIED WITH THINNED DUCO CEMENT

# Calculate the Radius of Circular Arcs

**Roger**

Here's a simple little formula that's easy to use to figure out the appropriate radius of the circular arc when cutting or bending wing and stab ribs.

The underlying math is a bit involved, so I've simplified the formula to
R = k*C
Where R = the required rib radius
k = a unitless factor shown below
C = chord of the flying surface

If you want a
1% camber, then k = 12.50
If 2% camber, then k = 6.263
If 3% camber, then k = 4.183
If 4% camber, then k = 3.148
If 5% camber, then k = 2.525
If 6% camber, then k = 2.113
If 7% camber, then k = 1.821

So, for example, if you want a 6% camber on a 5" chord, then the radius is
R = 2.113 * 5 = 10.565"

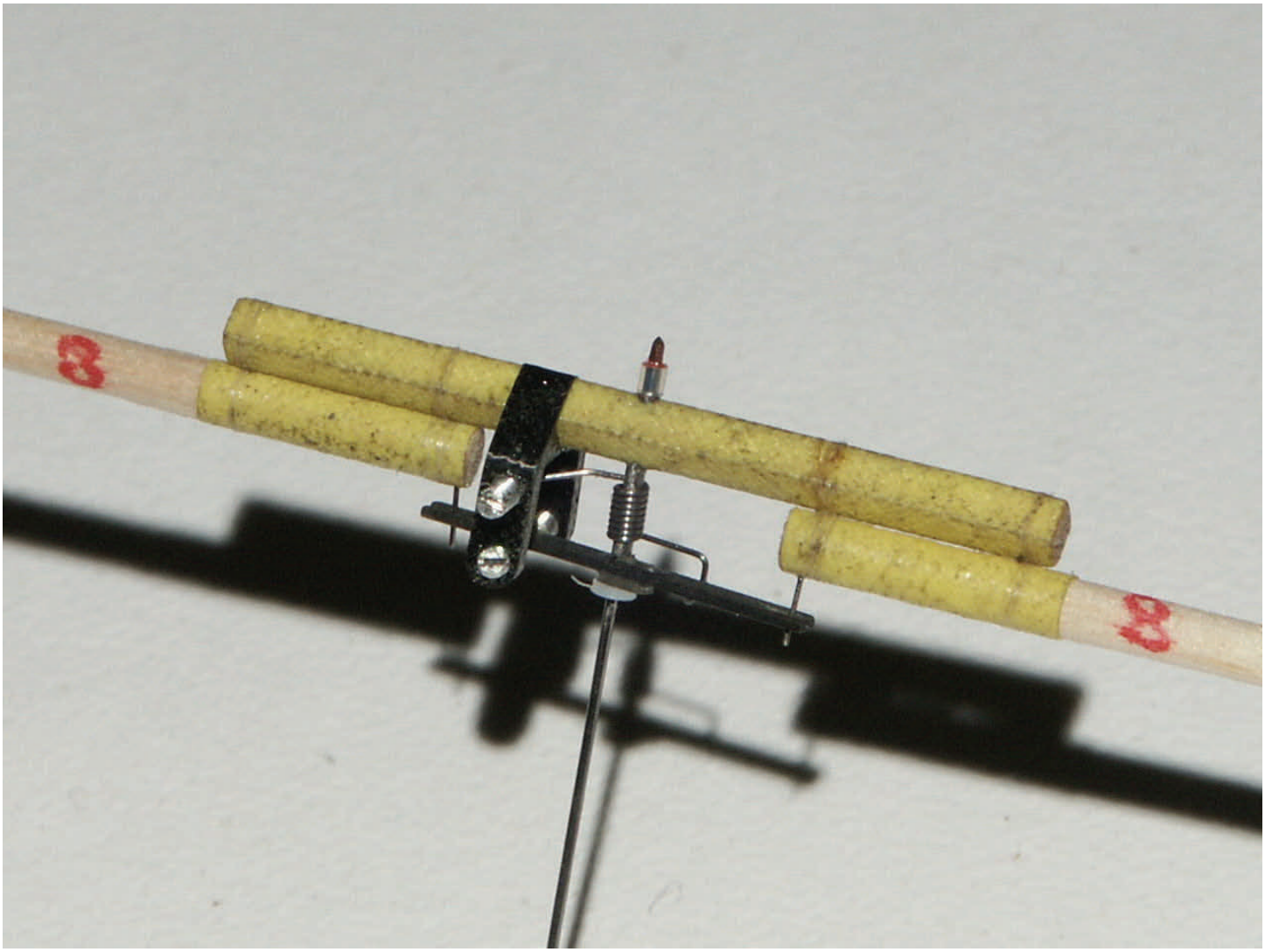
10.5" would be plenty close enough.

This works in either inch or metric systems as long as you are consistent and measure the chord and radius in the same system.

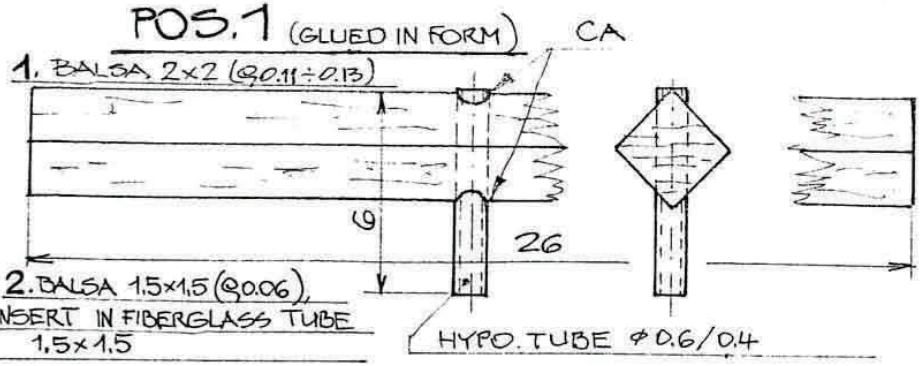
Another little detail of interest:
Wood design handbooks for full sized aircraft all say that to maintain material strength you should never build with wood with grain that inclines at a slope of more than 8 to 1 relative to the length of the wood. It appears logical to use the same limit for our little aircraft. That slope of tan-1 of 1/8 = 7.13 degrees. That angle is exceeded when the camber line increases to a little over 3% of the chord. Therefore for maximum strength all ribs of any size that exceed 3% camber should be cut straight and then bent, not cut curved.

# Treger's VP Prop

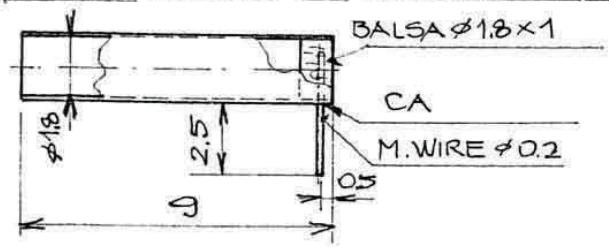
**Nick Aikman**



## POS.1 (GLUED IN FORM)

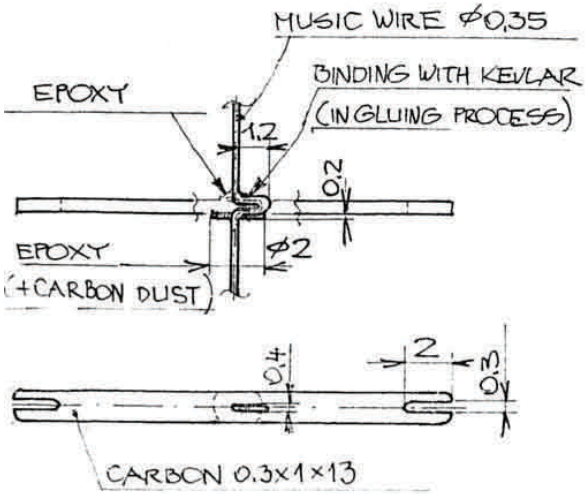



## POS.2. FIBERGLASS OR PAPER TUBE

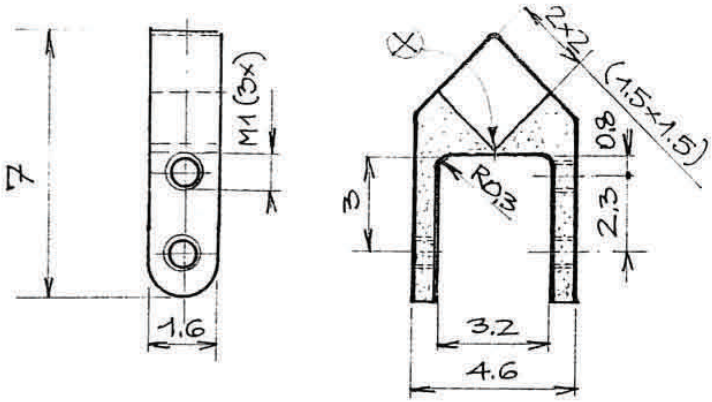



## POS.3 DRIVER AND PROPSHAFT

(GLUED TOGETHER IN FORM)



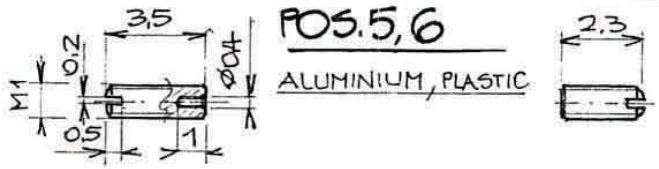

## POS.4




X – PLACE FOR CUT – TO EASIER PLUGGING ON TO POS.1

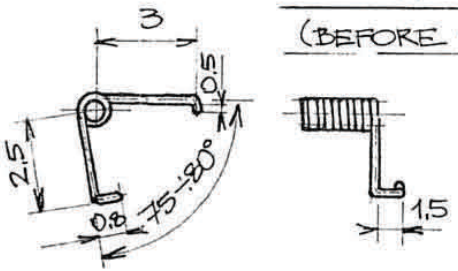
## POS.5,6

ALUMINIUM, PLASTIC




## POS.7

(BEFORE FITTING)

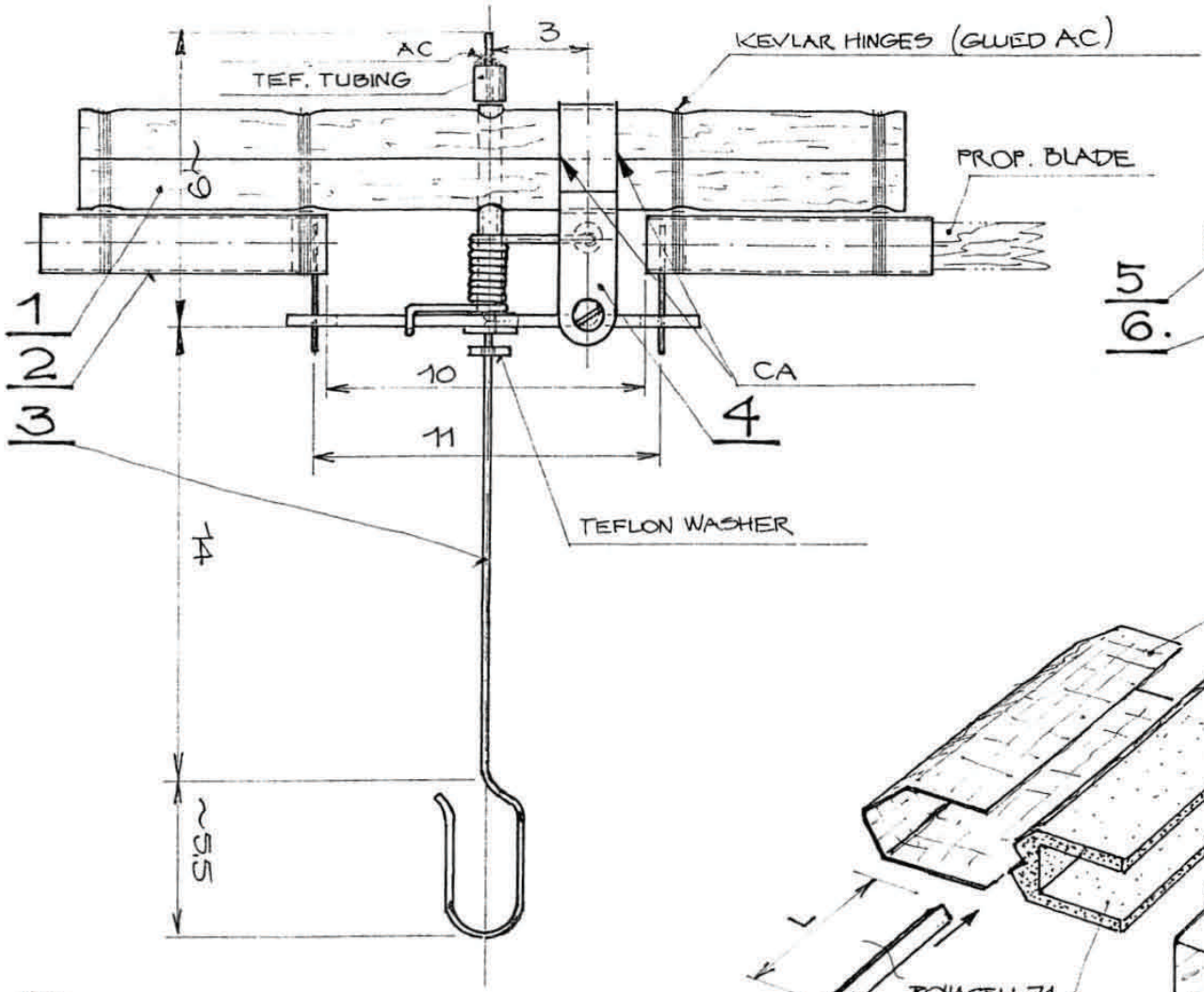


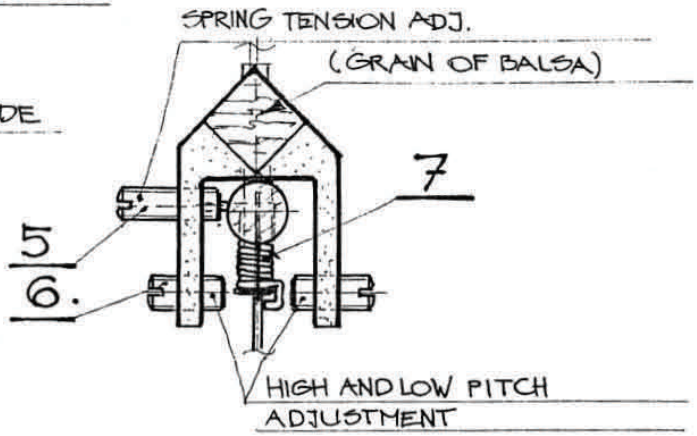

SPRING: MUSIC WIRE ⌀0,2, 3.5 TURNS ON ⌀1 MANDREL, OR 8.5 TURNS ON ⌀0.6 MANDREL

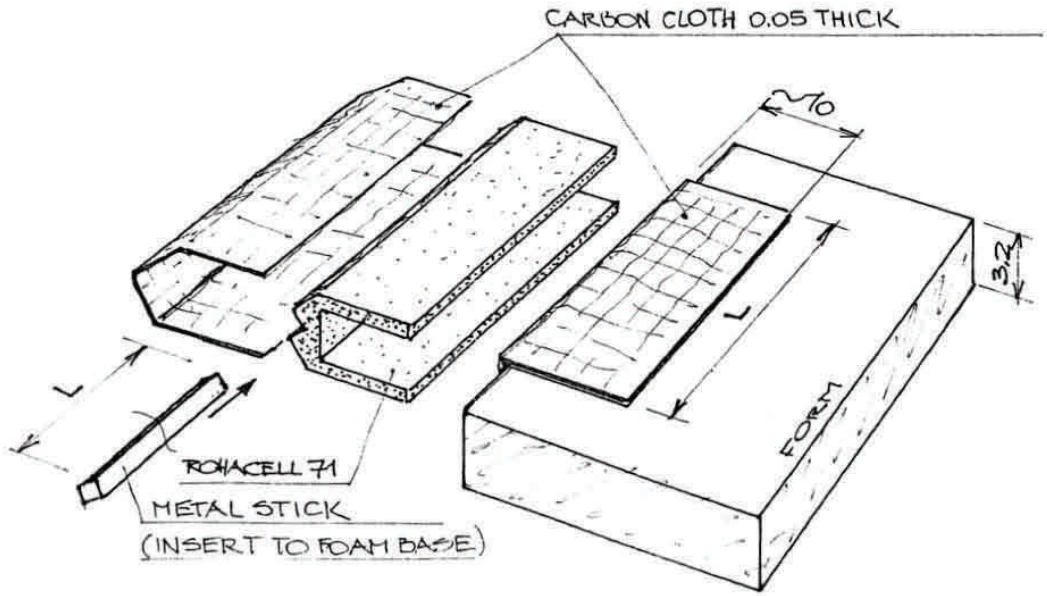
# VP PROP HUB

(DIMENSIONS IN MM)

IVAN TREGER (SK)




AC - ACETON GLUE (THINED)

CA - SUPER THIN CA-GLUE

ROHACELL - TECHNICAL FOAM (AIRCRAFT)

M1 - METRIC SCREW

ϱ - SPECIFIC WEIGHT $g/cm^3$

## MAKING THE COMPOSITE SCREW HOLDER (POSITION 4

1. LAMINAT. PROCESS IN PLASTIC SOCK IN VAKUUM
2. REMOVE THE METAL STICK
3. CUT WITH HIGHSPEED DIAMOND CUTTING WHEEL TO LENGHT

# Category I Standard Catapult Glider

**Tem Johnson**

Enclosed is a plan for the low ceiling Standard catapult glider I've used for the last three years. The small group of indoor flyers in this area have the opportunity to fly under ceilings ranging from 171/2' to 261/2' twice a month from October to April. So this plane has gotten a workout.

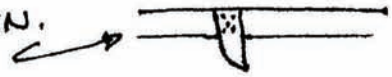
Sink rate is about 0.80' per second, Can usually get 55 - 60 second totals (two flights) if the ceiling is at least 24'. Best total to date is 80.4 secs in a 24' site - yes, there was a bunch of lift.

Assembled with my usual assortment of glues -carpenters (yellow) for the wing blank lay-up, Elmer's white for the dihedral and wing pylon joint, and thinned plasticized Duco to attach the tail surfaces.

Bunt pattern for catapult - launch at high angle. I fly it as a handlaunch glider also - 24 - 25 sec a flight in 171/2'. That's about as high as I can throw.

FUSELAGE ASSEMBLY SEQUENCE FOR HIGH CEILING INDOOR CATAPULT GLIDERS

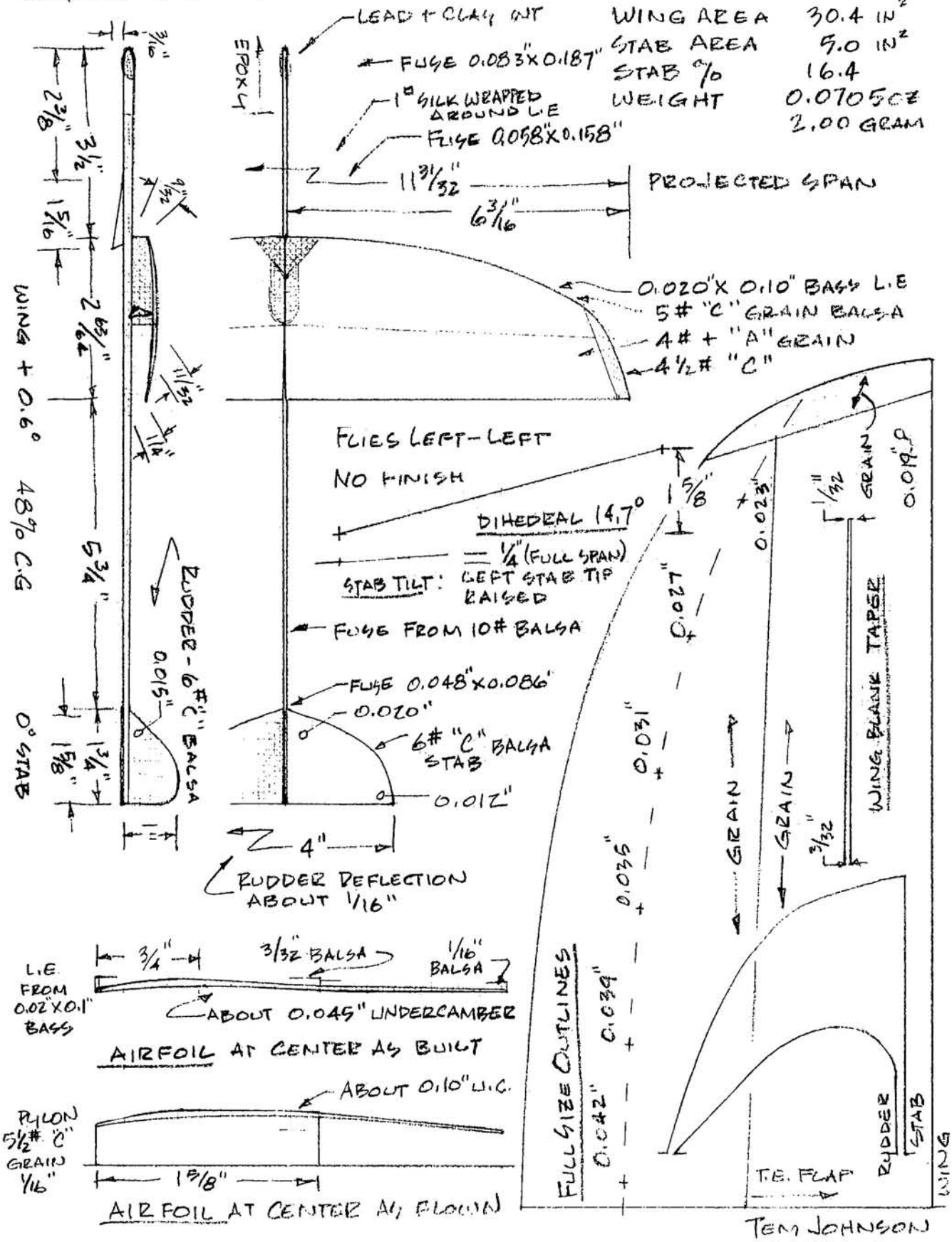
1. CUT BLANK FROM 3/32" THICK 6 TO 7# BALSA - ABOUT 18" LONG TAPERED FROM 5/16" WIDE TO 3/16" WIDE.
2. SLOT FOR 1/32" PLY CATAPULT HOOK & GLUE HOOK IN PLACE WITH C.A. TOP OF HOOK SHOULD HAVE 4 OR 5 SMALL HOLES DRILLED THROUGH FOR GLUE TO KEY IN.



3. TAPER THICKNESS FROM WING TRAILING EDGE TO TAIL DOWN TO 1/16".
4. CUT TWO 1/2" X 18" STRIPS FROM CARBON FIBER SHEET.
5. TAPE FUSELAGE BLANK TO BUILDING BOARD. PUT C.F. IN PLACE OVER IT AND TAPE ONE END DOWN.
6. LIFT C.F. BACK & RUN A BEAD OF C.A. (I USE "JET" MEDIUM) DOWN THE FUSELAGE. PUT C.F. IN PLACE & PRESS DOWN BY RUNNING YOUR FINGER ALONG THE FUSELAGE. WEIGHT TO HOLD THE ASSEMBLY TOGETHER AND LEAVE TO DRY 10 TO 12 HOURS. PLACE WAX PAPER APPROPRIATELY TO AVOID UNWANTED GLUE JOINTS. PROTECT YOUR FINGER WITH WAXED PAPER.
7. TRIM FIRST SIDE AS CLOSE AS POSSIBLE WITH SCISSORS. REPEAT STEP 6 FOR THE OTHER SIDE & AGAIN TRIM WITH SCISSORS.
8. SAND THE TOP & BOTTOM FLUSH WITH 100 GRIT PAPER. GET THE TOP EDGE STRAIGHT & FUSELAGE DEPTHS PER PLAN. GLUE CROSS GRAIN 8 TO 10# 1/32" THICK FOR ANTI-CRUSH ON PULL TAB.
9. DO A PROOF TEST WITH AT LEAST 3 LOOPS OF 1/8" RUBBER.
10. FINISH - CUT NOSE TO LENGTH, GROOVE FOR WING, PUT EPOXY ON NOSE.

# CATEGORY I STANDARD CATAPULT GLIDER

COMPLETE 4-26-97



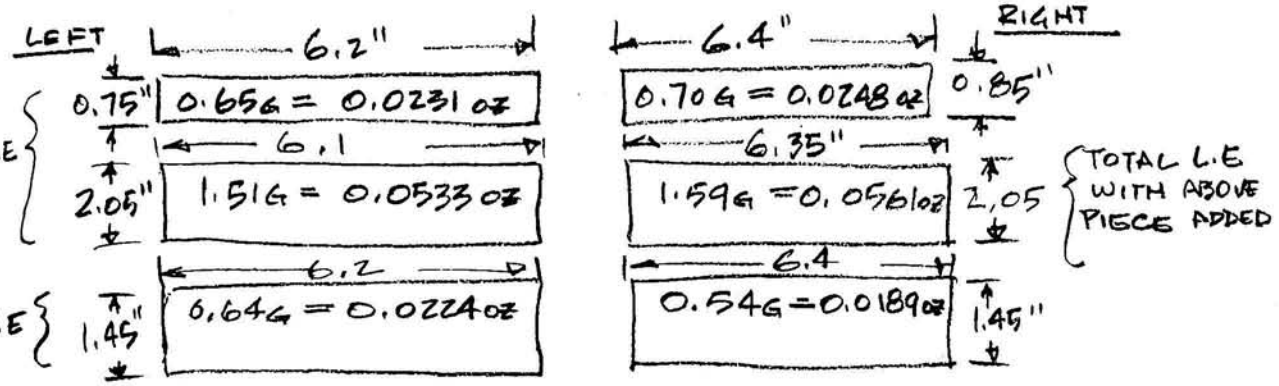

TEM JOHNSON

4-26-00

# 136 CATEGORY I CATAPULT GLIDER – STANDARD CLASS

WEIGHTS:

WING: LE FROM 3/32 X 3 X 48 5# "C" GRAIN (18.2G = 0.642oz)
TE FROM 1/16 X 3 X 36 4#+ "A" GRAIN (6.2G = 0.219oz)
TIPS FROM SCRAP 4 1/2# "C" GRAIN




| | |
|---|---|
| BLANK WITH L.E – OVERSIZE | 3.40G - 0.1198 oz |
| ✓ BOTTOM SANDED SMOOTH - APPROX CHORD | 2.84G - 0.1003 oz |
| ✓ TAPERED | 2.40G - 0.0846 oz |
| ✓ T.E SHAPED | 1.98G - 0.0698 oz |
| ✓ L.E SHAPED – TOP FINISHED | 1.53G - 0.0550 oz |
| ✓ L/C SANDED | 1.19G - 0.0418 oz |
| WING CUT TO SIZE – DIHEDRAL GLUED | 1.16G - 0.0410 oz |
| ✓ SILK REINFORCEMENT ADDED | 1.19G - 0.0420 oz |
| PYLON FROM 1/16 5 1/2# "C" GRAIN – FINISHED | 0.04G - 0.0015 oz |
| WING/PYLON ASSEMBLY | 1.28G - 0.0451 oz |

STAB & RUDDER: FROM 0.057" 6# "C" GRAIN

| | |
|---|---|
| STAB BLANK | 0.32G - 0.0114 oz |
| ✓ SHAPED | 0.10G - 0.0034 oz |
| RUDDER BLANK | 0.11G - 0.0040 oz |
| ✓ SHAPED | 0.04G - 0.0013 oz |
| ✓ TRIMMED | 0.02G - 0.0006 oz |

FUSELAGE: FROM 3/32 X 1/4 X 36 = 2.15G 10#- (CHAMPION)

| | |
|---|---|
| SIDE PROFILED | 0.48G - 0.0168 oz |
| THICKNESS TAPERED | 0.29G - 0.0101 oz |
| TRIMMED TO SIZE | 0.28G - 0.0099 oz |

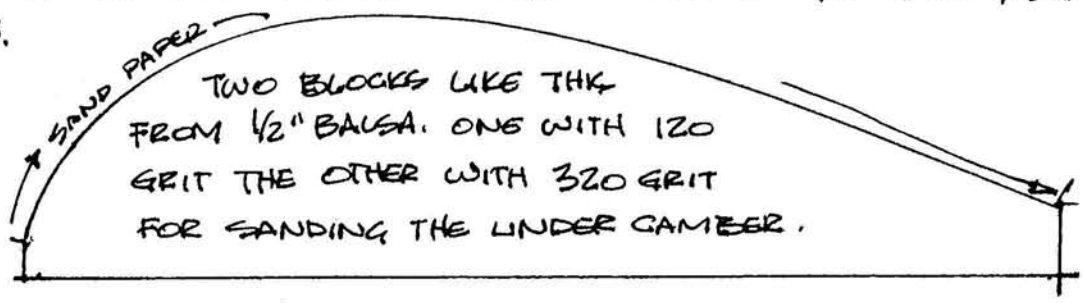
ASSEMBLIES

| | |
|---|---|
| WING/PYLON | 1.28G - 0.0451 oz |
| STAB/RUDDER/FUSELAGE | |
| COMPLETE AS FLOWN 4-27-97 | 1.98G 0.0697 oz |
| (C.G AT 47% ANGULAR DIFFERENCE 1.2°) | |

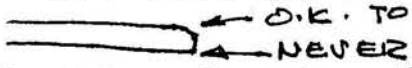
# CONSTRUCTION & FLYING SUGGESTIONS

TEM JOHNSON 2005

## TOOLS

1. A FLAT, SMOOTH, HARD SURFACE TO WORK ON. I USE A 12"×24" PIECE OF GLASS.
2. SANDING BLOCKS FROM PINE - 1½" × ½" × 5" WITH SAND PAPER GLUED ON THE WIDE SURFACES. USE GRITS 100, 120, 220, & 320
3. 


## BUILDING THE WING

1. LAY UP THE BALSA PIECES WITH THINNED TITEBOND II (YOU COULD USE DUCO OR SIMILAR WELL PLASTICIZED) I LIKE TO HAVE THE BLANK 1/16" → 3/32" OVER WIDE & ¼" → 3/8" OVER LENGTH.
2. CUT THE LEADING EDGE TO PLANFORM SHAPE & GLUE ON THE BASS WOOD LEADING EDGE STRIP, AGAIN USING TITEBOND II.
3. SAND THE BOTTOM SMOOTH
4. TAPER THE TOP SURFACE.
5. MARK THE TOP SURFACE WITH DOTS AT EACH OF THE THICKNESS GAUGING POINTS ALONG THE HIGH POINT USING A FINE POINT ROLLERBALL PEN.
6. SHAPE THE TRAILING EDGE. CHECK THE THICKNESS FREQUENTLY USING A DIAL CALIPER. IT'S TOUGH TO GET BOTH WINGS THE SAME SO LET ANY EXCESS THICKNESS, 0.001" → 0.002", BE ON THE INNER (LEFT) WING
7. SHAPE THE LEADING EDGE. CHECK THE THICKNESS.
8. SAND IN THE UNDERCAMBER. AGAIN, CHECK THE THICKNESS.
9. TRIM THE TRAILING EDGE SO THAT THE WING CHORD IS JUST UNDER THE MAXIMUM 3" ALLOWED. IT'S O.K. TO BREAK THE TOP CORNER BUT NEVER THE BOTTOM CORNER 

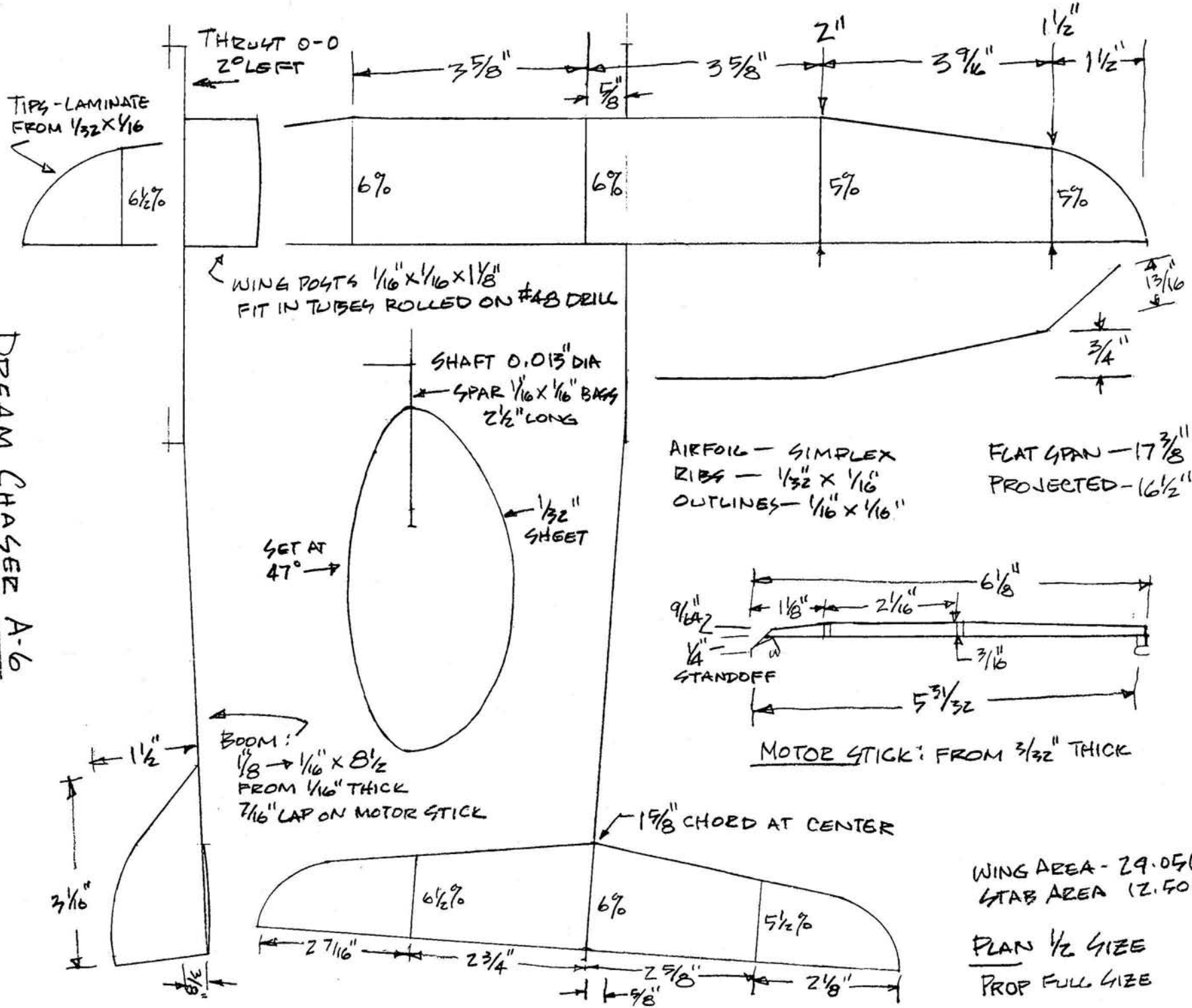
10. CUT WING PANELS TO LENGTH & BEVEL FOR DIHEDRAL. TRY ASSEMBLY (NO GLUE) TO MAKE SURE SPAN DOES NOT EXCEED 12"
11. GLUE DIHEDRAL JOINT USING ELMER'S WHITE GLUE, PUT GLUE SKIN 3/16" → ¼" EITHER SIDE OF JOINT. ADD THE 1" SQUARE SICK REINFORCEM WITH THINNED & PLASTICIZED DUCO.
12. MAKE SURE THE WING TRAILING EDGES DON'T INTERFERE WITH EACH OTHER WHEN FLEXED. ADD THE PYLON.

## FLYING

1. TAPE THE WING IN PLACE WITH MASKING TAPE.
2. ADJUST WING INCIDENCE BY SANDING BOTTOM OF THE PYLON.
3. USE A 7" → 8" LOOP OF 0.026" → 0.035" RUBBER FOR CATAPULT.
4. CATAPULT LAUNCH AT A NEAR VERTICAL ANGLE. BUNT CLIMBING PATTERN.

# DREAM CHASER A-6

TEM JOHNSON




WING AREA - 29.05 (PROJ)
STAB AREA 12.50

PLAN ½ SIZE
PROP FULL SIZE

DRAWING: TEM JOHNSON

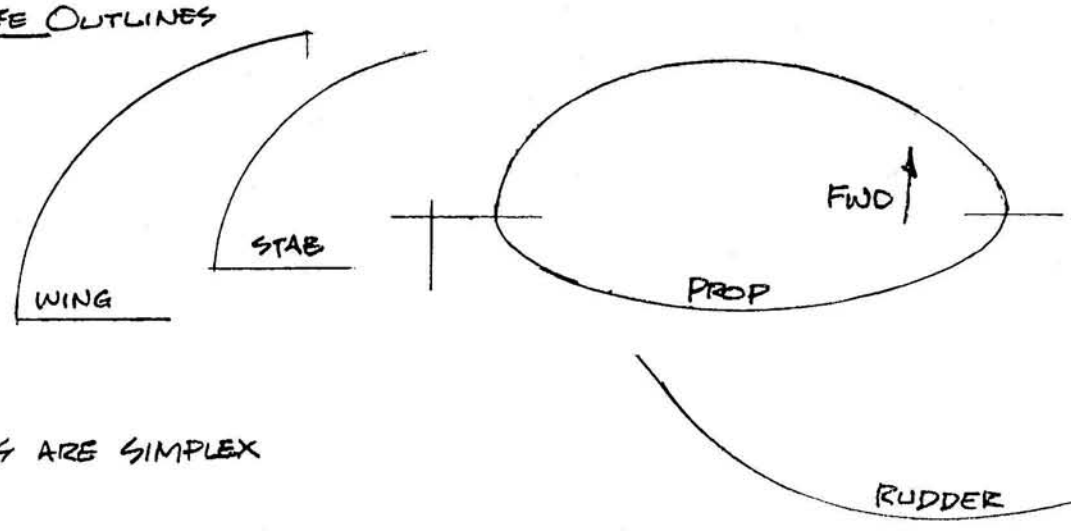
"DREAM CHASER" A-6 TEM JOHNSON

WEIGHTS

| | |
|---|---|
| WING: SPARS FROM 4# "A" GRAIN | |
| RIBS FROM 5# "A" GRAIN | |
| TIP OUTLINE FROM 5# "A" GRAIN | |
| FRAME - DRY | 0.20 G |
| ✓ - COVERED | 0.33 G |
| ✓ - " - WITH POSTS | 0.35 G |
| STAB: WOOD AS WING | |
| FRAME - DRY | 0.12 G |
| ✓ - COVERED | 0.19 G |
| BOOM: FROM 5#+ "B" GRAIN | |
| BOOM/RUDDER - DRY | 0.10 G |
| - - - COVERED | 0.13 G |
| BOOM/RUDDER/STAB ASSEMBLY | 0.32 G |
| MOTOR STICK: FROM 8# "C" GRAIN | |
| COMPLETE WITH WIRE BEARING & TUBES | 0.27 G |
| PROP: 2 BLADES FROM 4½# "A" GRAIN | 0 21 G |
| SPAR FROM 1/16" X 2½" WITH HOOK | 0 07 G |
| ASSEMBLED | 0.28 G |
| TOTAL - READY TO FLY | 1.22 G |

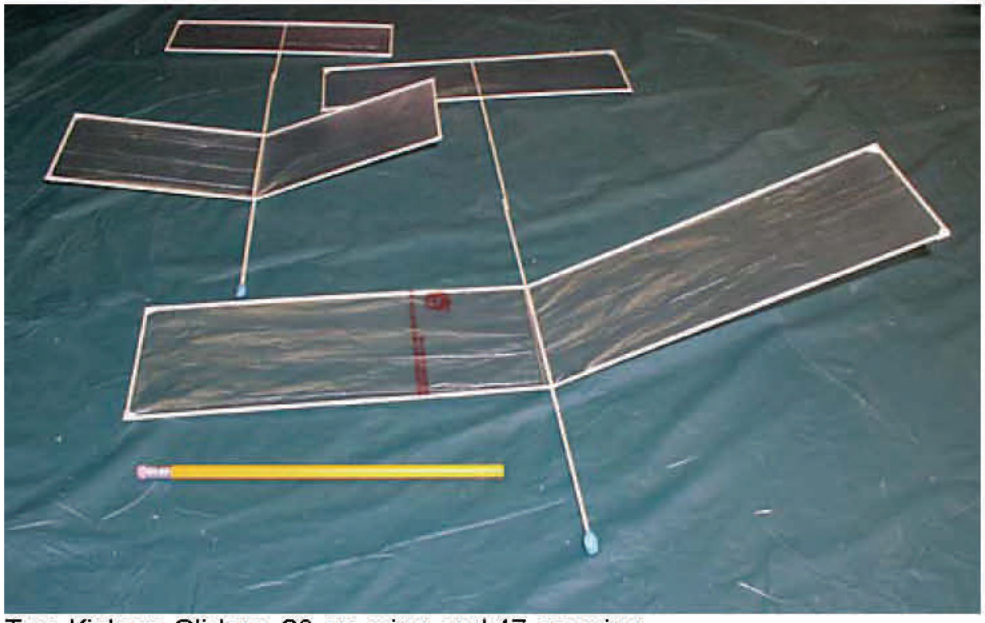
DESIGN FROM EMIL SCHUTZEL SLIGHTLY MODIFIED - WING MOVED FORWARD AND SMALLER STAB. EMIL'S DESIGN INSPIRED BY ANDREW TAGLIAFICO'S "SLUGGER"

FULL SIZE OUTLINES




AIRFOILS ARE SIMPLEX

**The Kisloon Glider**
By Chuck Markos and Tim Gebhardt



Two Kisloon Gliders, 28 cm wing and 47 cm wing

**Introduction**
This glider was developed to fill a need observed by the author from his experience with the Science Olympiad Balloon Launched Glider as the event supervisor at the Illinois state finals competition as well as at regional competitions over two years since the event has been in existence. The great majority of the models brought to the competitions simply did not fly. Aerodynamic faults of construction integrity, overweight structure, mis-alignment of flying surfaces and improper balance contributed to their failures. Most of these faults could have been easily fixed. I have helped many a competitor in practice sessions to correct such faults to transform a seemingly hopeless glider into a well-behaved one in a matter of minutes. To test the viability of this glider, a clinic was held on the evening before the 2007 state competition at the University of Illinois ROTC armory. Seven teams showed up to construct and fly the glider. The seven models were completed in less than one hour and test flown to times greater than 90 seconds in the armory under its 95-foot ceiling. That performance was better than 30 of the 43 teams who competed the next day.

The basic construction technique for this glider follows from that of a well-known beginner's model, the Delta Dart, also known as the AMA Cub. The glider is built directly on the covering by gluing sticks of wood to transparent plastic covering placed over the plans. The paper gussets at the wing and stabilizer corners are from the technology used on the Delta Dart. One notable feature of this glider is the absence of a vertical fin . It was left off to make construction as simple as possible. Flight testing indicated that a fin was not necessary for stability, but may be of service to help control the glide circle. The glider will fly in a circular pattern because of small warps that occur during construction of the wing and stabilizer. Some earlier developmental designs were built using tissue paper (wrapping paper) and a glue stick to attach the balsawood strips, but were a bit overweight. Use of a glue stick for plastic covering is not recommended as the covering will not be permanently attached to the wood.

One of the seemingly immutable laws of competition model aircraft is that the more times the same model is built by the same person the better it gets . This holds for so-called experts as well as rank beginners. One attraction of this glider is that the material expense is so minimal that literally dozens can be built once the balsawood and adhesives are in hand. A more important consideration, however, is that the student has the opportunity to gain some learning through experimentation. For example, design parameters to arrive at a glider within the mass specification (currently no less than 2 grams) can be investigated by weighing its component parts before construction and deciding where mass can be reduced and where it should not be reduced from the results of the previous glider. A second avenue of scientific investigation is in the optimization of flight by changes in mass distribution, flight path, and modes of launch from resting on the balloon to free flight. If the student has more than one glider, differences in their performance characteristics offer opportunities for investigations on a scientific nature. The mandatory flight log for the event encourages such investigations. However, just keeping a bare flight log will not be sufficient. The student should be encouraged to make each flight an experiment by intentionally changing some aspect of the model or the launch method.

The two most critical mistakes that I have observed are that students:

Do not pay attention to the balance point (also known as the center of gravity) of the model (it's shown on the plan)

There is no angular difference between the wing and the stabilizer

If the wing trailing and leading edges are on the (presumably) straight fuselage, the trailing edge of the stabilizer must be a little higher than its leading edge when the tailboom is attached to the fuselage. If the student wants to design his own airplane, the proper center of gravity can be calculated from an internet site: http://adamone.rchomepage.com/cg_calc.htm. You can also find the site by typing "aircraft center of gravity" into your favorite search engine. Once the center of gravity is set, only very small changes should be made to adjust the flight.

Construction of this glider will take about one hour. Make sure you have all the parts, adhesives and tools ready before you start

**Index**

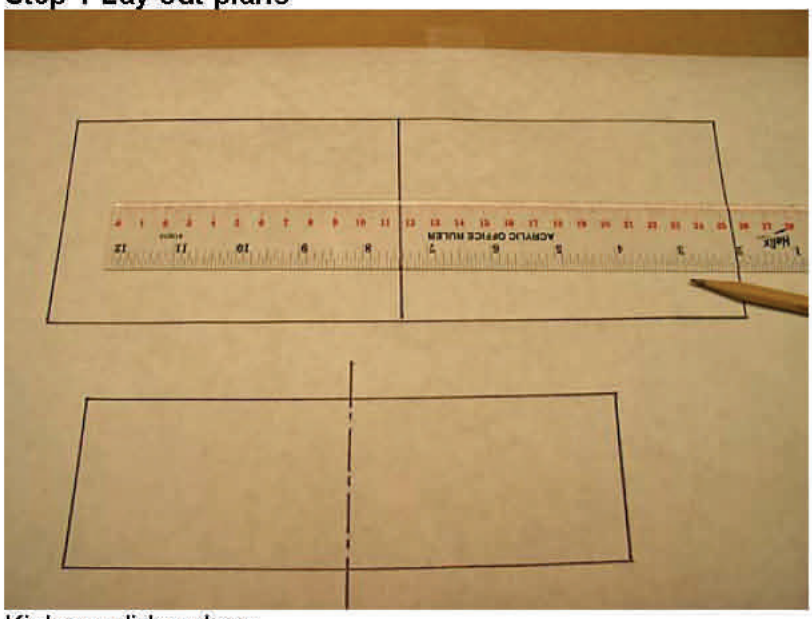

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Design your own glider
List of Materials

**Materials**

The links in this list are direct links to the items as listed on Amazon.com.

- Balsawood 1/16" sq, 1/8" x 1/16" (see note 1 under step 3)
- Metal straight edge
- Weldwood Non-Flammable Contact Cement
- Container to mix the contact cement with water
- Super Glue (Loctite brand) (brush-on bottle is best)
- 5-minute epoxy glue
- Toothpick for mixing epoxy glue
- Glue stick
- Common straight pins (4)
- Corrugated cardboard (2 sheets bigger than the plans)
- Single-edged razor blade
- X-acto knife with No 11 blade (optional)
- Plastic bag from produce supplies at grocery store (the lighter the better) (do not use household plastic wrap...it is much too heavy)
- Foam from meat tray or egg carton for spreading glue
- Felt tipped pen
- Modeling clay
- Scissors
- A box to store and carry your model. This one fits into a copier paper supply box
- Fiber reinforced strapping tape
- Masking tape
- Nylon fishing line (10 - 12 pound test)
- Helium-filled 24-inch plastic balloon
- Helium tank
- Fishing reel with line

**Step 1 Lay out plans**



Kisloon glider plans

A reduced-size plan is attached to these instructions. Since the size of the Science Olympiad airplanes are changed from year to year, you may want to change the size of the model to suit the current specifications. All that is necessary is to draw two rectangles, one for the stabilizer and one for the wing (with a line bisecting the wing at the center for the center rib). Make sure that the centerline of the stabilizer is indicated by a dotted line. Wood thicknesses remain the same...only the lengths are changed to fit the new plans.

**Notes about provided glider plans**

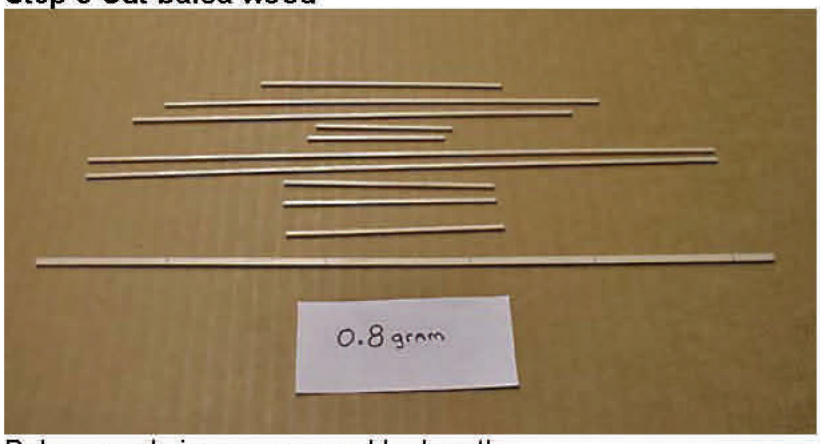
You can get a copy of the plans by clicking this link.
To convert the Kisloon to the Kisline towline glider click here for instructions.
When printing the plans make sure to set "Page Scaling" to "None" in order for the gussets to print to scale.

**Step 2 Obtain a box**




Find, buy or make a box big enough to hold your finished model. The 28 cm winged glider fits into a copier paper box.

**Step 3 Cut balsa wood**




Balsa wood pieces arranged by length

For the glider as shown on the plans cut 1/16" square balsa to the following lengths: 28 cm (wing spars, 2 required), 9 cm (wing ribs, 3 required), 20 cm (stabilizer spars, 2 required), 6 cm (stabilizer ribs, 2 required) and 11 cm (tailboom). Place the three wing ribs side by side to make sure they are of equal lengths, exactly...same for the stabilizer ribs. Mark a few "dots" on one surface of each piece so you can make sure the glue is applied to only that marked surface in step 6 below. Use a felt-tipped pen to mark the dots. The wood for this model (including the fuselage stick...step 14) should not weigh more than one gram. Note that the dimensions of the glider are defined by the pre-cut wood lengths. As such, the only function of the plan drawing is to make sure the corners are square.

**Notes:**

1. Most balsawood sticks you can buy are quite heavy wood. To keep your glider lightweight it is best to buy a sheet of 1/16" balsa and strip the wood using a metal straight-edge and a razor blade: Hold the metal straight edge firmly on the wood while a sharp blade is drawn next the straight edge (see note 3 below). A sheet of 1/16 x 3 x 36 should weigh no more than 12 - 14 grams. The weight of the wood for this glider can vary from as little as 0.7 grams to more than 2 grams depending on the density of the wood selected. Light is better than heavy. Appropriate density of the balsawood should be in the range of 0.15 to 0.20 grams per cubic cm. Use the heavier, stronger wood for the fuselage. The lightest wood should be for the shortest pieces...the ribs for the wing and stabilizer. Most balsa wood of 1/16" nominal thickness ranges from 0.65" to 0.70" in thickness. Conversion to metric units is therefore about 0.15 cm for thickness. Since balsawood is sold in sheets and sticks that are measured using inches, strict adherence to the metric system will require some conversion factors.

2. Balsawood sheets are not of uniform density. Holding a sheet of balsawood up to a light source will illustrate areas that are more dense (darker) and less dense (lighter). Use the more dense wood where greater strength is required.

3. Most novices find that a hobby knife (X-acto) with a number 11 blade is easier to use than a razor blade for stripping balsawood. The problem with a razor blade is that beginners find it difficult to hold the blade vertical while cutting. However, hobby knife blades are not as sharp as razor blades. The stripping technique will require several cuts

along the firmly held metal straight edge until the cuts completely remove the strip. If a single cut is forced by pressing the blade, the wood strip will often be distorted.

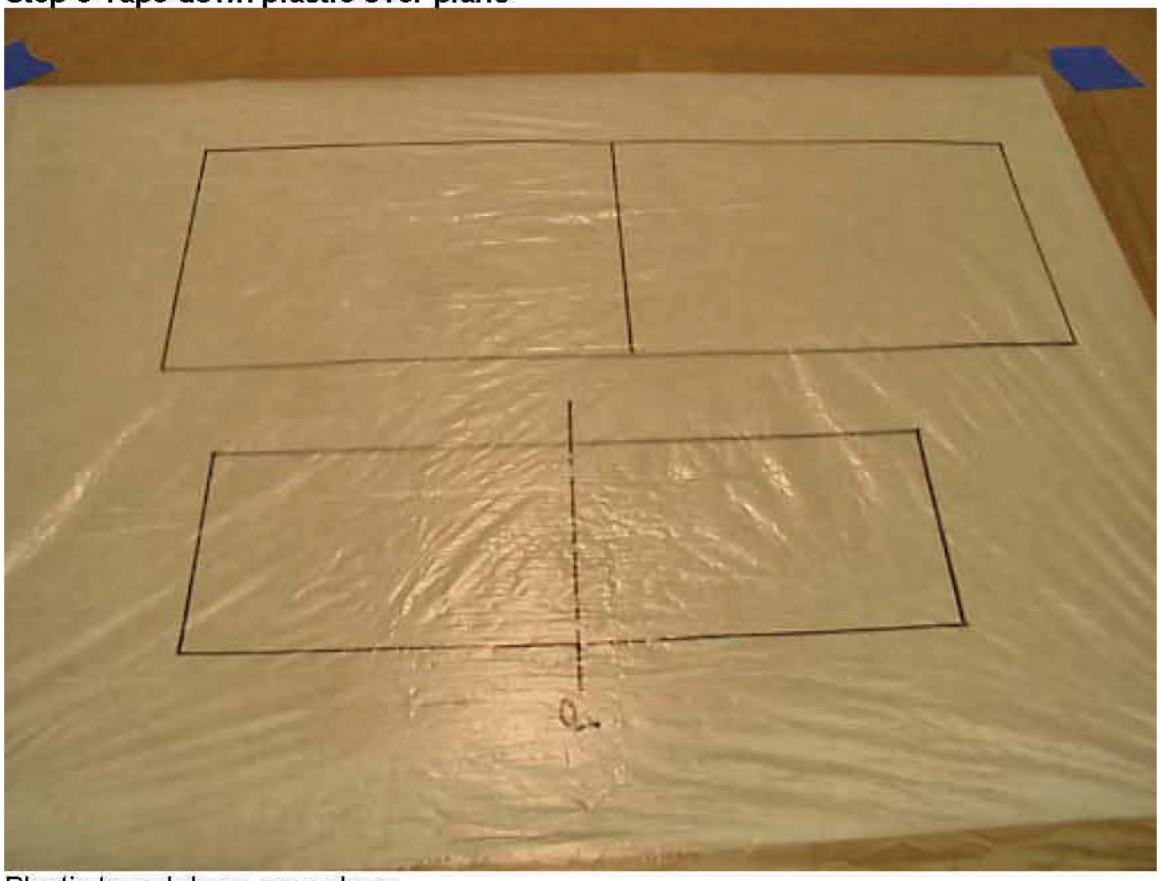
It is not important that all strips of wood are exactly the same width, but it is important that each strip is consistent in its width. Place cardboard or poster board under the balsa to protect your work surface. Start by cutting the 36-inch sheet to the longest length required for construction, 31 cm.

4. Instruction step 3 lists lengths of balsa wood that are specific for the glider shown on the plans. If the glider is re-designed to a different size, then the lengths will be different. Suggested lengths for a glider for the 2008 competition rules are: Wing spars (four @ 23.5 cm), wing ribs (three @ 9 cm), stabilizer spars (two @ 26 cm), stabilizer ribs (two @ 7 cm) and tailboom (one @ 24 cm). The fuselage stick remains the same, 31 cm.

**Step 4 Remove the gussets from the plans**
Cut out the section (dotted line) showing full-sized paper gusset and fin pattern from the plans.

**Step 5 Tape plans to cardboard**
Tape the plans to a piece of cardboard (two thicknesses of cardboard are recommended so that pins pushed in will hold).

**Step 6 Tape down plastic over plans**



Plastic taped down over plans


Plastic produce bag from grocery store

Tape thin plastic over the plans.
This plastic will become the covering for the glider when it is finished. It is not used to protect the plans as is often the case. You can also hold the plastic in place with pins at each corner. The covering for this model is from a grocery store produce bag. Look for the HDPE logo on the bag. The bag should weigh about 2 grams for a 16.5" x 12" size. Split the bag and use only one sheet of plastic. The covering will add about 0.25 grams to the total mass of the 28 cm wing glider and about 0.5 grams to the 47 cm glider.

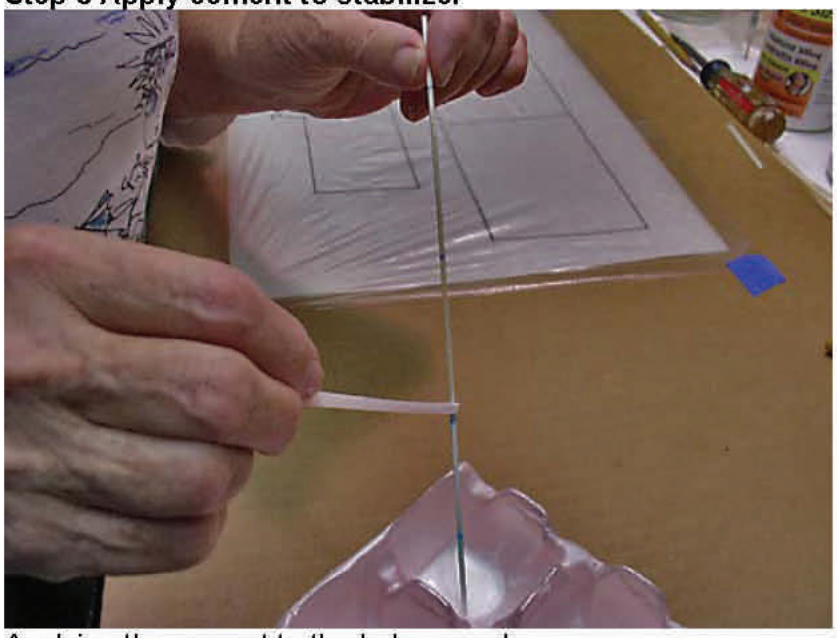
**Step 7 Mix water-based contact cement with water**



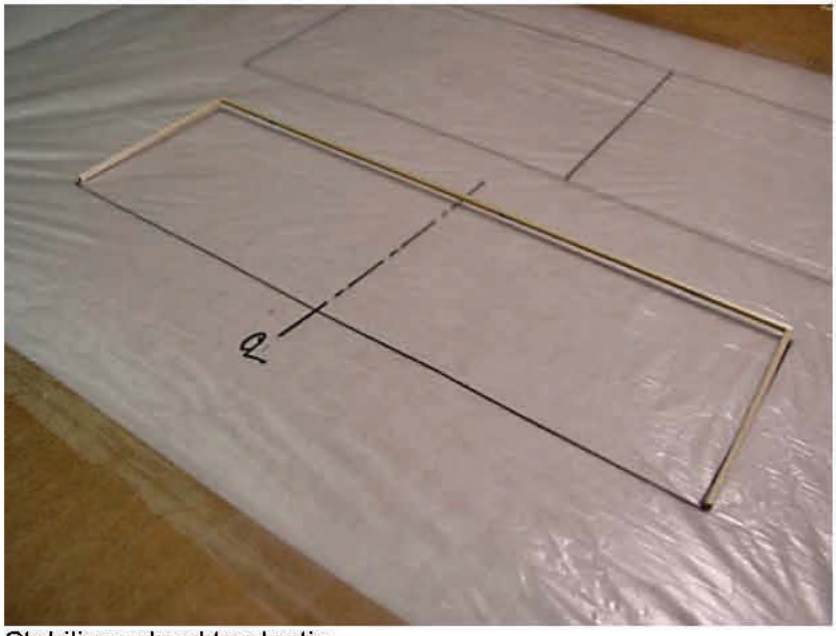
Recommended brand of water-based contact cement

Mix some water-based contact cement about 50/50 with water to make it thinner. Contact cement can be very messy to work with. It cannot be completely removed from most surfaces. It comes in a rim-sealed paint can. Very little cement is needed to complete the model. To avoid filling the rim of the can with cement, remove some cement from the can with a scrap of polystyrene and place it in a container (egg carton shown). Mix in a little water and discard the scrap polystyrene.

**Step 8 Apply cement to stabilizer**



Applying the cement to the balsa wood



Stabilizer glued to plastic

Use a thin scrap (about 0.5 by 7 cm) of polystyrene plastic (from a grocery store meat tray or egg carton) as glue applicator. Apply the thinned contact cement to one surface of a stabilizer spar (make sure there are no gaps) and immediately place it on the plastic covering the plan where the stabilizer is shown. Add the two stabilizer ribs at the ends (no rib in the center) the same way and finally the second spar so there is no gap between the spars and the ribs. Scraps of polystyrene are used instead of a brush to apply the contact cement because it will be impossible to clean the brush after it has been used with the cement.

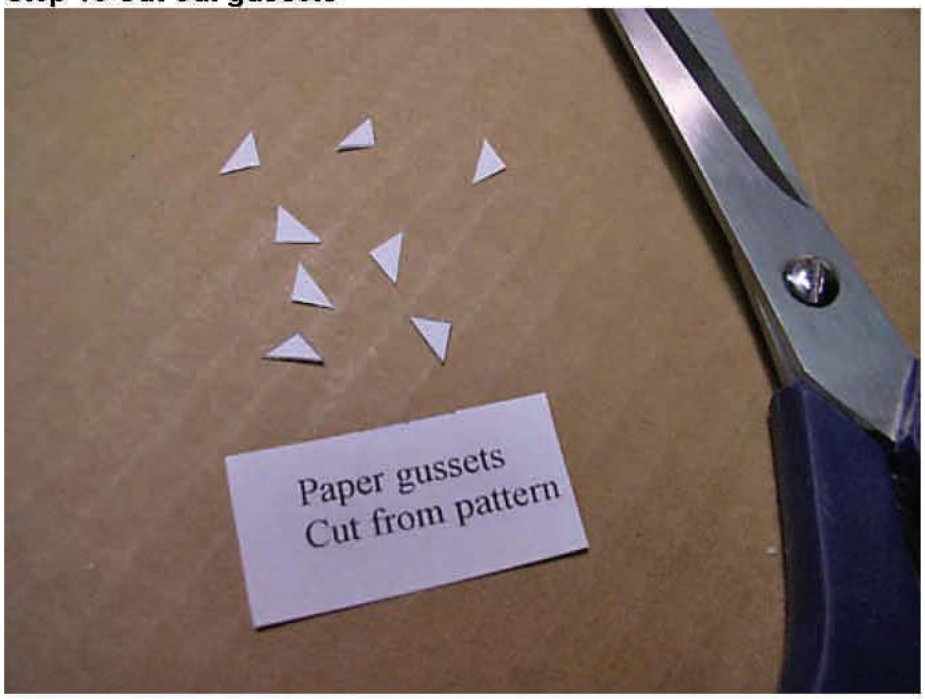
**Step 9 Apply cement to wing**



Stabilizer and wing glued to plastic

Construct the wing in the same manner as the stabilizer: First one spar, then three ribs and last the second spar. In a few minutes, the glue will form a bond between the covering and the wood. If the wood curls a bit and separates from the covering, just push it down gently until it stays put. For the 47 cm wing glider, the leading edge and trailing edge spars are in four equal lengths, joined at the center, but not glued together.

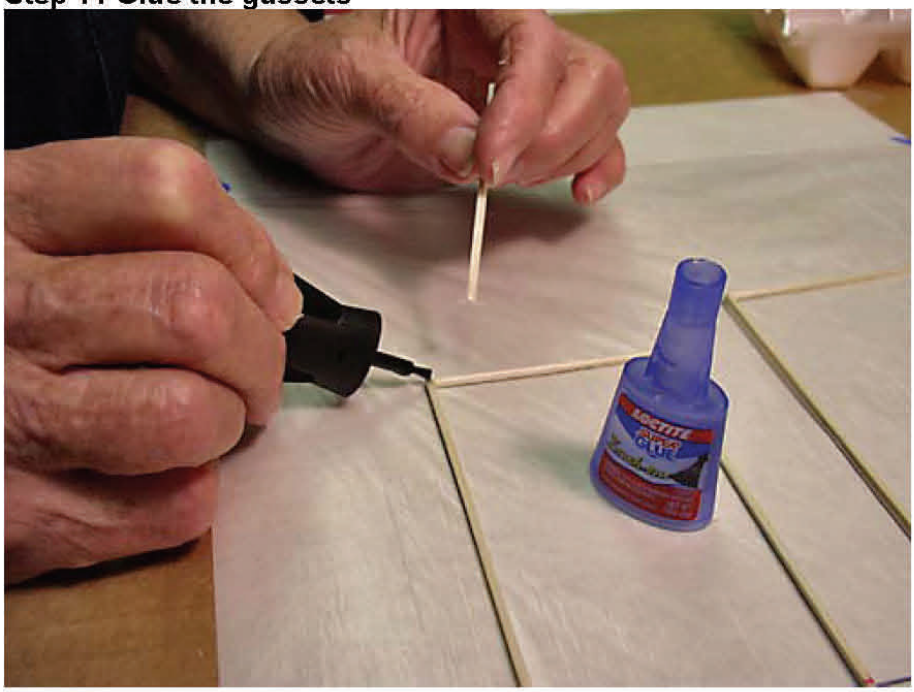
**Step 10 Cut out gussets**




Paper gussets from pattern

Cut out the eight small triangles from the paper gusset pattern. Put them in a safe place so they do not get lost. It is not absolutely necessary to use the provided pattern. Just cut out four squares of paper, 0.6 cm (actually 1/4") on a side and then cut each one on the diagonal to provide two triangles.

**Step 11 Glue the gussets**




Gluing the gussets

Use the end of a scrap of balsa wetted with saliva (just touch the end of the stick to your tongue) to pick up and place a paper gusset. Brush a small amount of Super Glue into a corner and quickly place the paper gusset on the glue. The glue will set up in a few seconds. If you wait too long to place the gusset on the glue, it will not stick to the paper. The brush-on Super Glue is the only brand that is compatible with those of limited building skills. Other types may result in large excess of glue being used, spills and fingers being stuck together.

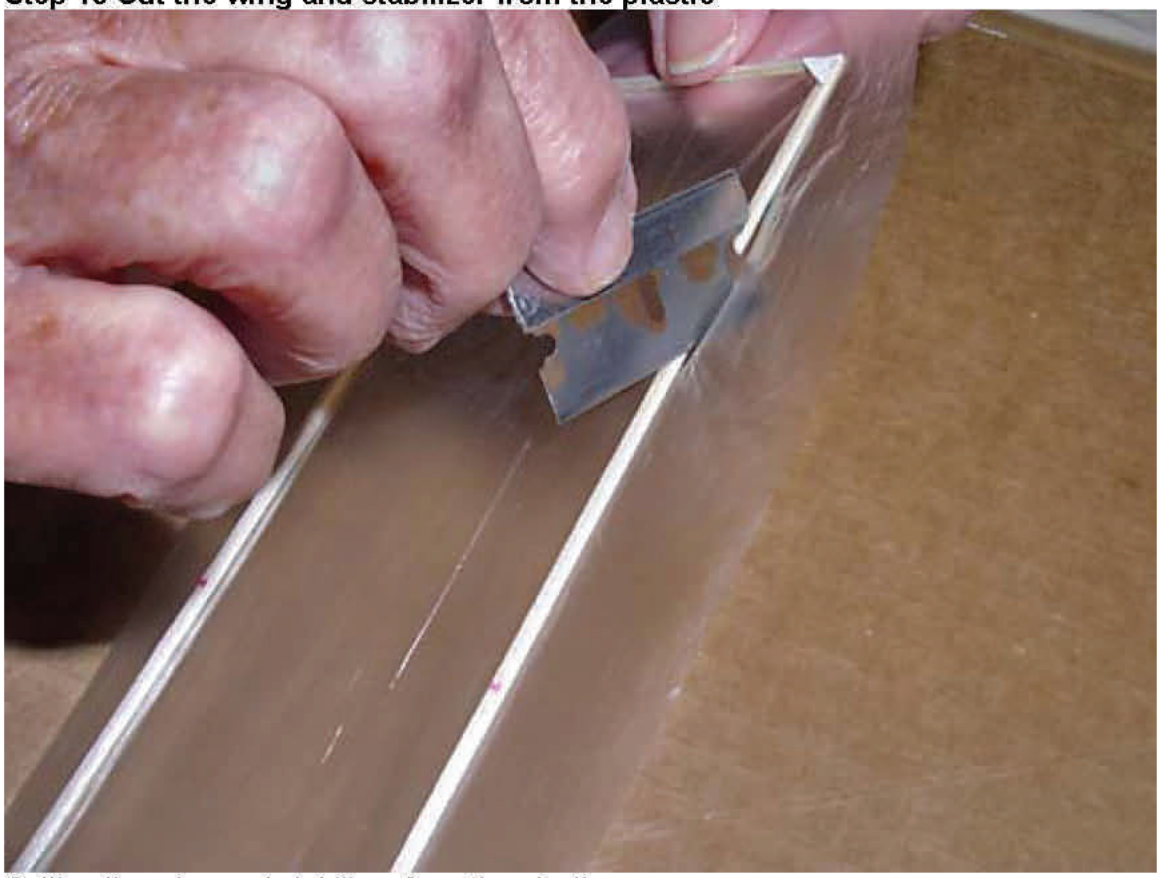
**Step 12 Glue the rest of the gussets**




Recommended glue for gluing the gussets

Repeat step 11 until all the corners of the stabilizer and wing have gussets in place. There are no gussets at the center of the wing. Mark the stabilizer's spars at the center line shown on the plans. The stabilizer will be glued to the tailboom at those marks.

**Step 13 Cut the wing and stabilizer from the plastic**



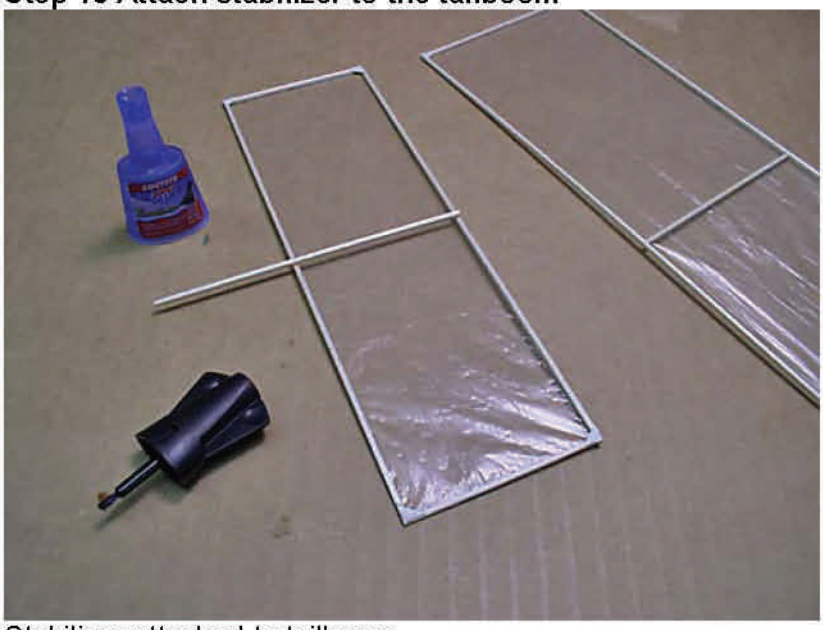
Cutting the wing and stabilizer from the plastic

Cut out the wing and stabilizer from the covering plastic: First make a rough cut to leave about 2-5 cm excess around each. Pick up the structure and finish the trimming of the excess covering with a sharp (new) single edged razor blade. Use the corner of the blade. Move your holding hand frequently so that it is always close to the blade. Always cut away from the hand holding the piece. Start the cut in the middle and work towards the ends. Keep the uncovered wood side facing your eyes.

**Step 14 Prepare the fuselage**

The fuselage stick is prepared from 1/8" x 1/16" balsa, 31 cm in length. If you have very soft balsa, the stick can be 1/4" by 1/16". Make a mark on the fuselage 11 cm from the front. The tailboom is 1/16" square, 11 cm in length.

**Step 15 Attach stabilizer to the tailboom**



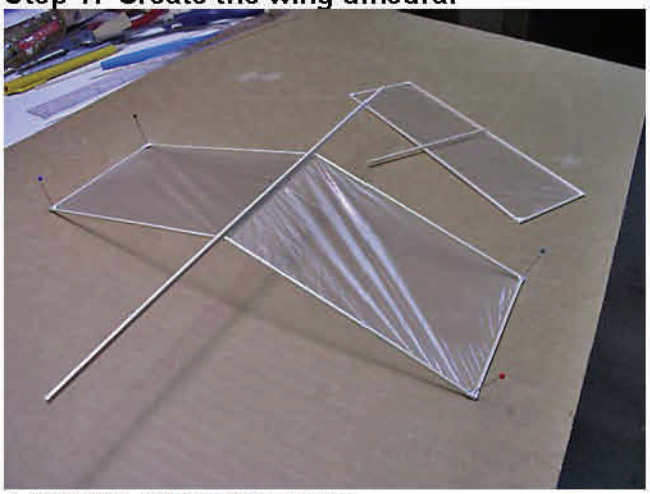
Stabilizer attached to tailboom

Use the brush-on Super Glue to attach the stabilizer to the tailboom at the center line marks on the wood of the stabilizer.

**Step 16 Prepare wing dihedral angle**

To form the wing dihedral angle, cut part way (less than half) through the wing spars at the location of the center rib. Crack the spars so that the wing bends at the center rib. Take care that the spars are not completely broken away. For the 47 cm wing, the two halves are already cut through.

**Step 17 Create the wing dihedral**



A tent-like fold in the wings

Make a tent-like fold in the wing with the covered side down on the cardboard by placing pins through the paper gussets at the four corners of the wing tips. The center should be elevated by 3-4 cm.

**Step 18 Glue the fuselage to the wing**



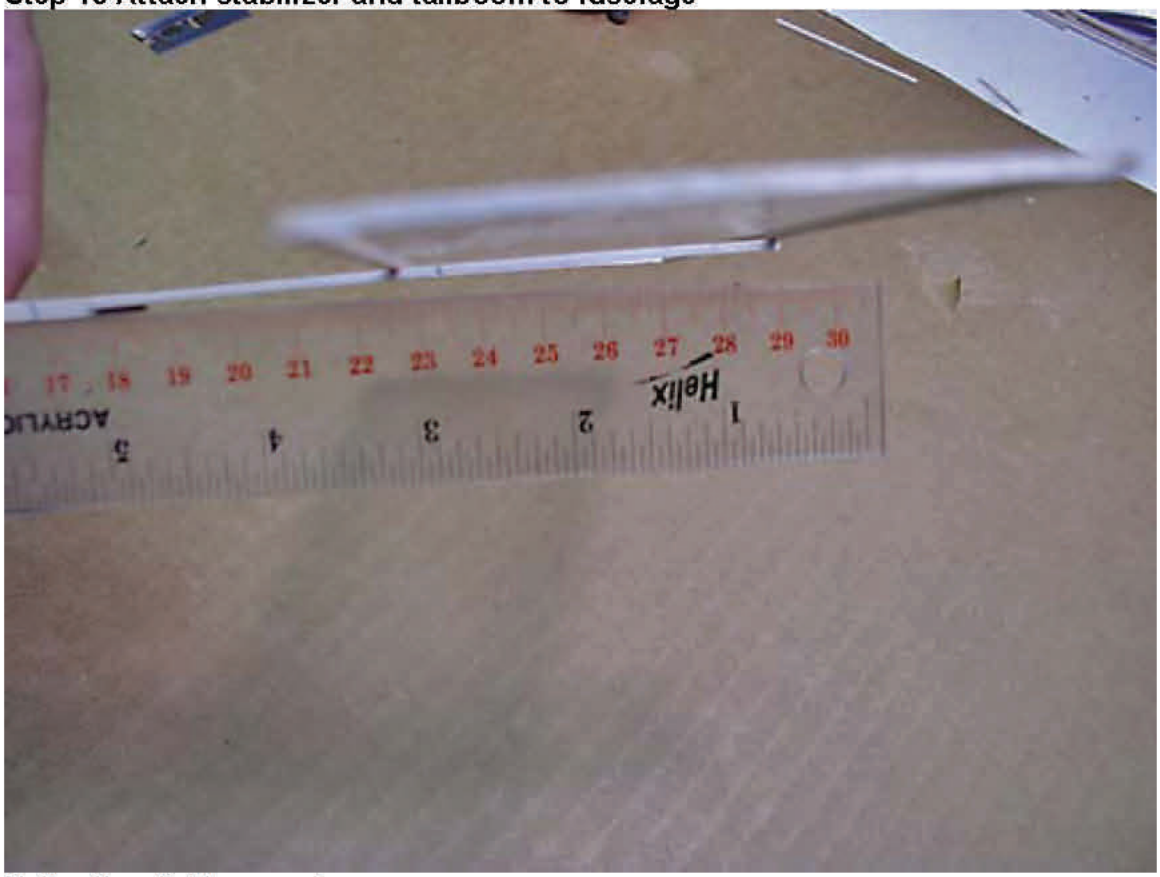

Mixing epoxy

Put a gob of mixed 5-minute epoxy glue on the two wing spars where they were cracked and place the fuselage onto the glue with the narrow part of the fuselage into the glue. One of the glue joints should be at the 11 cm mark you made on the fuselage. When the glue is completely cured (15-20 minutes) remove the pins holding the wing tips.

**Note:**

Be careful to measure approximately equal amounts of the epoxy resin and hardener on a non-porous surface (use a portion of your polystyrene egg carton). Stir the two parts thoroughly. If the glue is not thoroughly mixed, it will not harden properly. A common cause of incomplete mixing for small quantities is that the mixture of resin and hardener on the mixing stick are either not mixed or that they are in unequal proportions. About halfway through the mixing process, the mixing stick should be wiped off onto the mixing surface. Recombine the portion that was wiped off with the mixed puddle remaining on the mixing surface. Epoxy glue is used for this connection because it will fill the gaps left by cracking the wing above and also the gap where the angled wing parts are not in contact with the fuselage. Wait at least 15-20 minutes before picking up the assembly. Otherwise the epoxy will not harden sufficiently to keep the angles as they had been set. Freshly mixed epoxy is quite fluid and the fuselage stick will tend to fall over. The best technique is to place the fuselage onto the wet epoxied joint then remove it and set it aside until testing the excess shows it to become thick. Replace the fuselage on the thickening epoxy and it will stay where it is put.

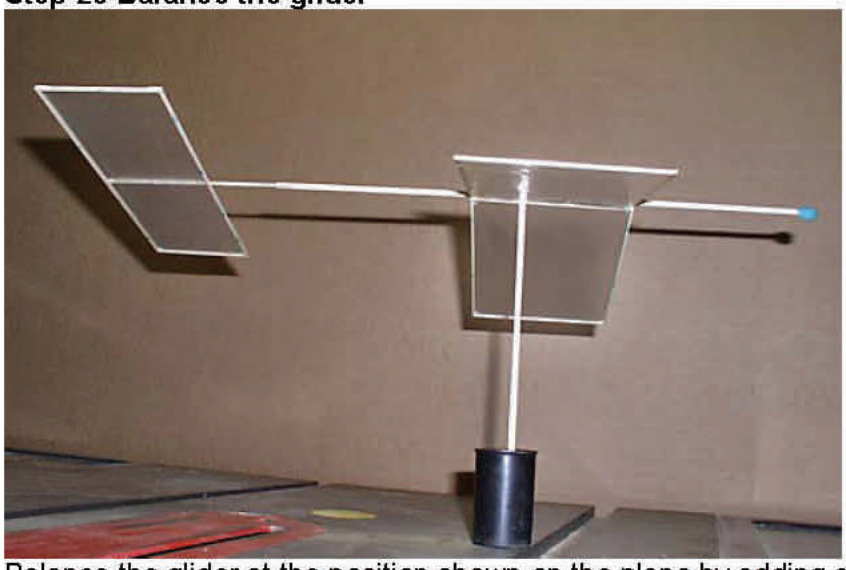
**Step 19 Attach stabilizer and tailboom to fuselage**




Notice the slight up-angle

Glue the tailboom and stabilizer assembly to one side of the fuselage with a slight "up" angle to the tailboom. Use Super Glue. The stabilizer covering should be topside.

**Step 20 Balance the glider**



Balance the glider at the position shown on the plans by adding clay to the front of the glider (fuselage nose).

**Step 21 Two Kisloon Gliders, 28 cm wing and 47 cm wing**



Two completed gliders: 29 cm wing and 47 cm wing.

**Step 22 Testing the glider**

Test fly the glider for a smooth flight. Release it very gently, do not throw the glider unless you want to break it. Adjust the glide by adding or removing clay.

**Step 23 Adjust glider flight**

If the glider needs adjustment of the flight path circle, cut out the paper fin and glue it to the fuselage in front of the stabilizer. Use a glue stick. The circle can be adjusted by bending the aft portion of the paper fin. The fin may also be glued near to the nose of the glider. Doing so will keep the glider lighter in weight because some clay can be removed from the nose to compensate for the weight of the paper fin.

**Flying the balloon launched glider**

The balloon-launch rig starts with a 24-inch plastic balloon filled with helium from your local party store. A yoke is constructed from fishing line taped to the perimeter of the balloon at three equally spaced points. Tie a loop in the fishing line to make sure it is not easily dislodged from the tape. Use fiber-reinforced tape. Hold all three lengths of line between your thumb and forefinger and adjust their lengths until the balloon is level. Tie a knot at that point. Attach the yoke to a second line on a fishing reel. To keep the model from prematurely flying off the balloon surface, a ring of paper about 30 cm in diameter and 3-4 cm wide is taped to top of the balloon. It takes some practice to raise the balloon and glider smoothly to maximum altitude. Jerky stop-and-go raises should be avoided. One member of the team advises the balloon raiser when to stop raising the balloon and release the model into free flight. Extra helium for re-fills and top-ups can be purchased from party supply stores or from Wal-Mart.

The room in which you fly the glider should be free of all drafts. If it is a school gym, ask the school custodian to turn off the HVAC fans for the duration of your testing. Close any access doors to hallways to avoid spill-over drafts. Super light-weight gliders will be tossed around by the HVAC as though they were in a violent storm. No useable information will come from testing in such conditions.

The longest flights are obtained removing nose weight until the glider has just a slight stall, then adding just enough weight back to the nose to give a smooth flight path. A smooth flight path indicates that the airplane is in "trim." A second consideration is that the flight circle should be as wide as the room will allow without hitting the walls. A good rule of thumb is that the flight path circle diameter should be about 1/3 of the shortest dimension of the room. The adjustments mentioned in this paragraph are best made by hand-gliding the model. Some practice is necessary to get a smooth release. That is, the release should be with the same speed that the glider wants to fly and also at the same attitude (nose down just a bit). If you release too slowly, the model will dive before attaining its best flight speed. If you release the model faster than it wants to fly, it will stall and then dive before it starts flying. If the launch attitude is too much nose down, the glider will dive for a while at a speed higher than its normal flight. If the glider is launched too much nose up, it will stall before reaching its normal flight. Once the proper hand-launch technique is mastered, timed flights from hand-gliding the model can be used to judge the optimum trim of the glider. The student may notice that the glider's trim may change as the flight circle diameter is changed. The explanation for this is that as the circle gets smaller, the amount of lift generated by the wing decreases. (The inside wing is flying slower than the outside wing and generates less lift.)

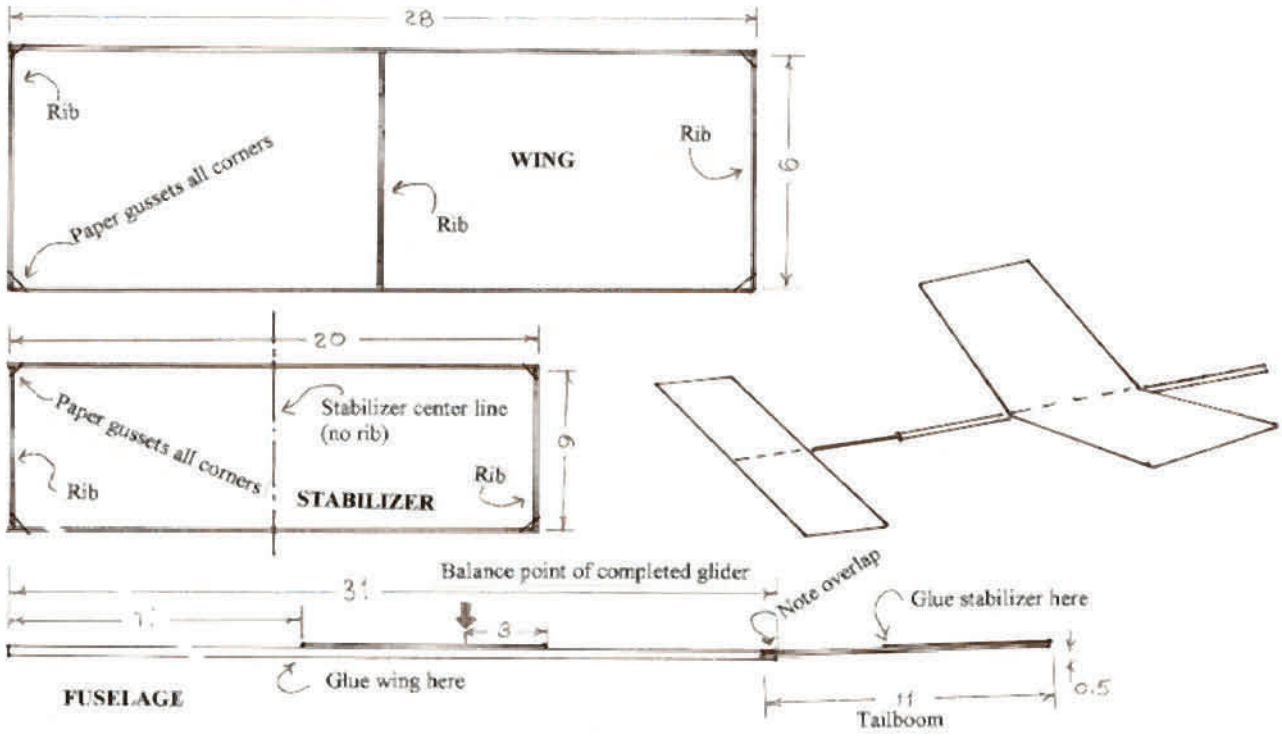
There are three required elements of the flight log: Height at launch, Mass at launch and Flight time. A fourth element of the student's choosing is also required. Suggestions for this fourth element are: Flight circle diameter, Transition loss (height lost before smooth flight is attained), Adjustment changes (rudder bending, center of gravity shifts), Pilot of the glider, and Flight Description (stall, dive, hit the wall, hit the basketball backboard, etc).

**Design your own glider**

Once the student has gained familiarity with the construction and flying of this glider, it may happen that he/she wants to make some improvements. There are some design parameters inherent in this glider to which attention must be paid. The first rule is to keep it light... chose materials wisely and reduce the total number of parts. Each weighs up a little until the expected enhancements are countered by too much overall mass. For example, a better airfoil might improve the lift generated by the wing, but the extra curved ribs necessary to form a better airfoil will add significant mass. Pay close attention to the amount of adhesive used. The mass of adhesives to build a model can be a significant contribution to its overall weight, that's why the contact cement used for attaching the wood to the covering plastic is thinned with water. The second rule is to pay keep a slight angular difference between the wing and stabilizer. Gliders that have a 0-0 setting between wing and stabilizer tend not to recover (make a transition) from the initial launch resulting in a severe dive to the floor. The third rule is to keep a reasonable distance between the wing and stabilizer. The effectiveness of the stabilizer is increased as both its surface area and distance from the wing increases. The forth rule, if your glider is designed to come apart for storage and carrying in a box, is to make sure that it goes back together so that none of the alignments are changed. Very small changes in alignment can make dramatic differences in the glider's performance. The last rule is to plan your measurements so the size of the glider does not exceed specifications for the event. Make sure that the wing and stabilizer dimensions are safely less than the maximum allowed. For example, if you draw a plan with a 10.0 cm wing chord, it is very difficult to assure that no parts of the wing will exceed that dimension...better to plan for 9.5 cm. Even a very small deviation in excess of the 10 cm chord will cause disqualification.

One of the most important considerations for designing your own glider has nothing to do with the construction of the glider. You must have a box big enough for carrying the glider. The best boxes have removable tops. Flapping tops in the wind will not protect your glider from damage. Cardboard is a suitable material for a box. You can obtain large cardboard boxes and cut them to a pattern for the size you need. Use the Weldwood contact cement undiluted to glue the cardboard tabs together.
Sources of information, glider kits and exotic materials (super light coverings) can be found in links associated with two websites: Freeflight.org and IndoorDuration.com. If you have questions you may contact me at cmarkf1@aol.com. If you wonder where the name Kisloon came from, it is a combination of a well-known acronym in engineering: Keep It Simple and the suffix of the word Balloon.
Have fun!

Related Links
Freeflight.org
IndoorDuration.com




**Kisloon Glider**
Chuck Markos 2007

Balsawood sizes: 0.15 cm x 0.15 cm
(wing, stabilizer, tailboom), fuselage is 0.15 cm x 0.3 cm.

Plans are half-scale except for Fin and Paper Gussets
All dimensions are in centimeters.

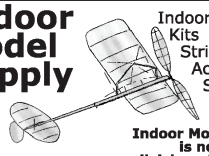
Cut on dotted line and save

FIN

Paper gussets
Cut from pattern

# Contest Results


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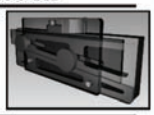
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**Featured Products**

Jones Balsa Stripper



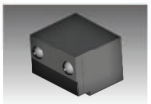
Cut strips from sheet
Make Custom sized sticks
For Indoor and Mirco RC
1/8"x1/8" maximum

Esaki Tissue



Esaki Japanese Tissue
7 Traditional Colors
Red/Black Checkered
Silver Esaki is Back!

Blade Holder for Micrometer Style Balsa Stripper



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**Supplies for Indoor FF**

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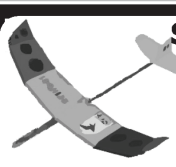
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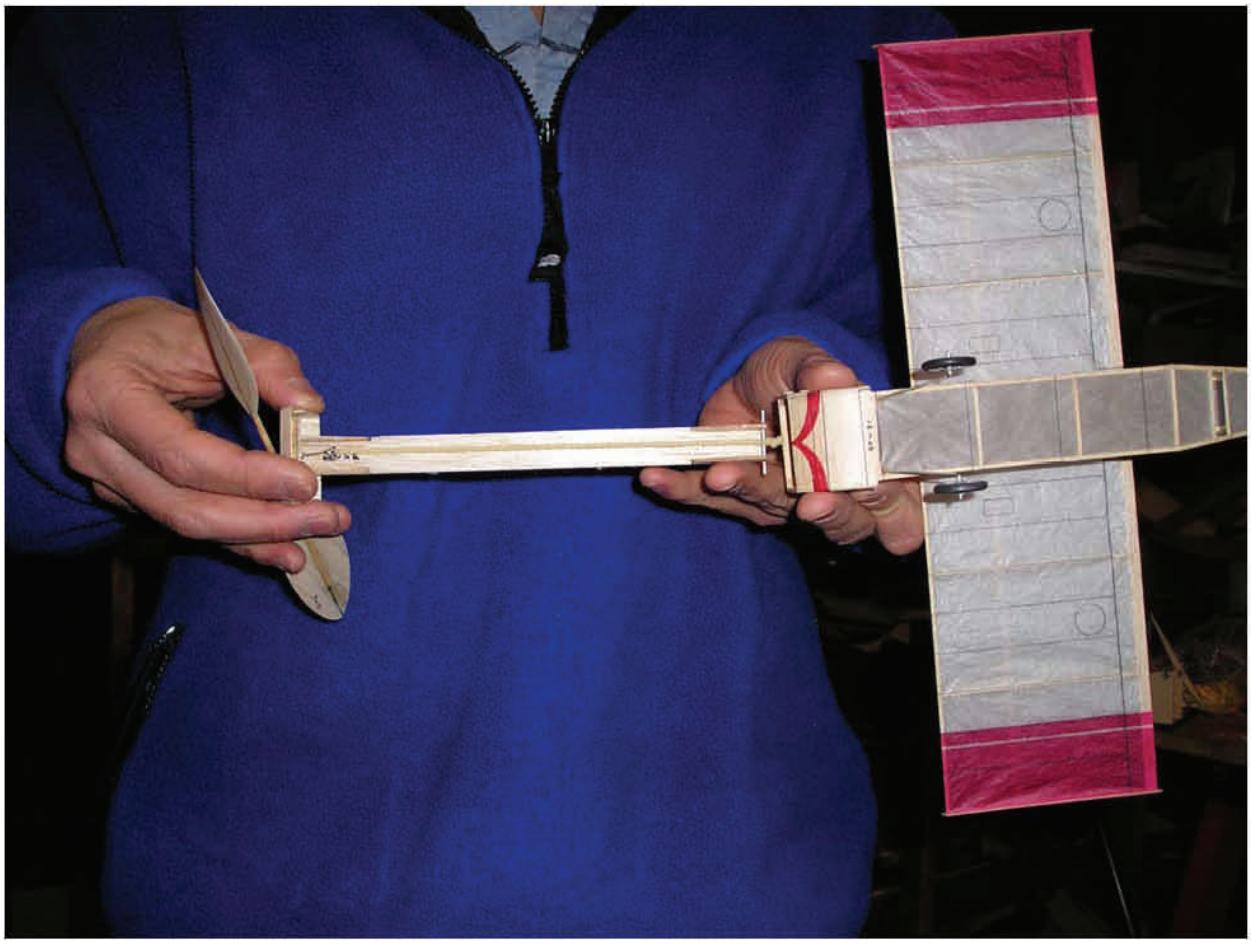
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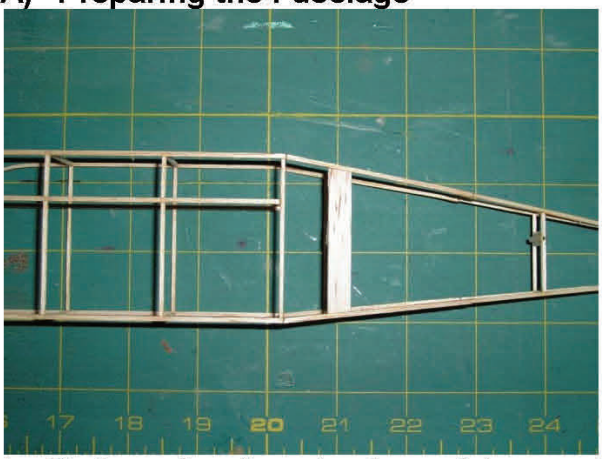
# Loading Sticks for Scale Models

Steve Fujikawa
steve_fujikawa@verizon.net



Motor breakage accidents resulting in torn tissue and broken structure are commonplace when using a stooge to wind scale models. If your free time is as scarce as mine, you want to avoid making extra work for yourself when the motor inevitably breaks; creating shreds of tissue and balsa shards! Many fliers use blast tubes but I find them awkward with all the winder extensions and torque meter modifications necessary. A better (and more aesthetically appealing) method is to wind off the model on the comfortable environment of your winding stand and then transfer the motor to the plane using a Loading Stick. The stick holds the nose block, motor and peg securely as they are inserted in the plane. It's then easily removed prior to flight. This article describes a Loading Stick that I've used with success for many years. It's easily adapted to square or round section fuselages of any dimension including Bostonians and Manhattans. All of my enclosed fuselage models are built this way and I can't remember the last time I had to patch tissue. I hope that this technique saves you as much repair time as it has me!

## A) Preparing the Fuselage



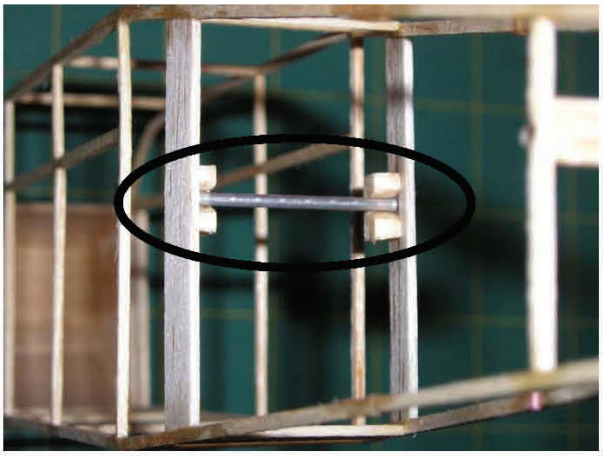
**1.** The Lacey fuse shown has the usual sheet wood peg supports installed. However, they are not drilled through for the peg.



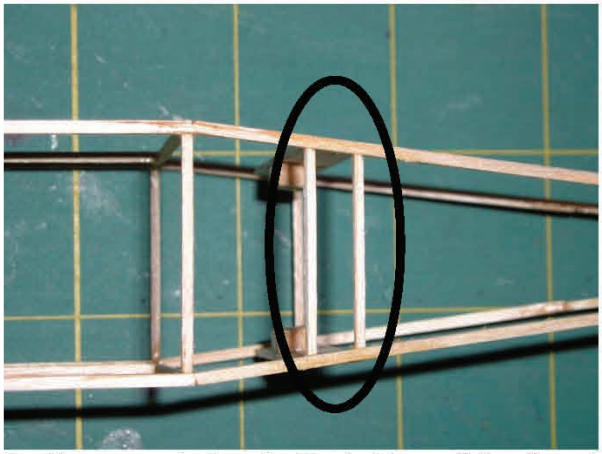
**2.** Instead, fabricate two V blocks as shown from 3/32" light balsa.



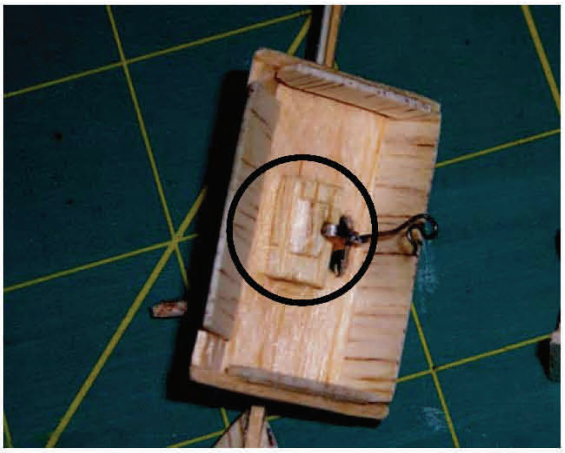
**3.** Install the V blocks at the locations as you would the peg. Harden the blocks with CA.



**4.** The peg will be a 1/16 aluminum tube which should fit squarely in the bottom of the V. The fit should be slightly loose but not sloppy.

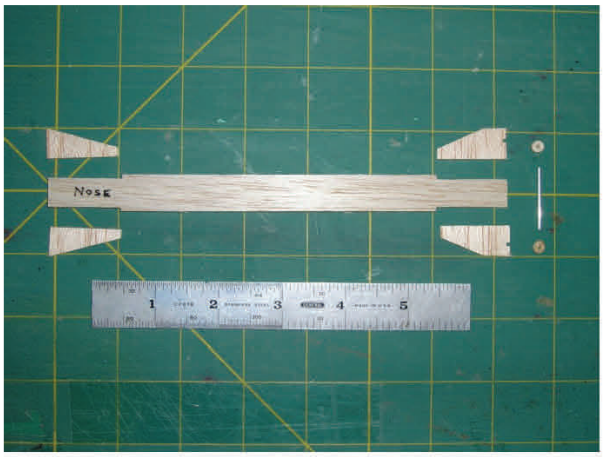


**5.** Frame a window in the bottom of the fuse to allow viewing of the insertion of the peg.

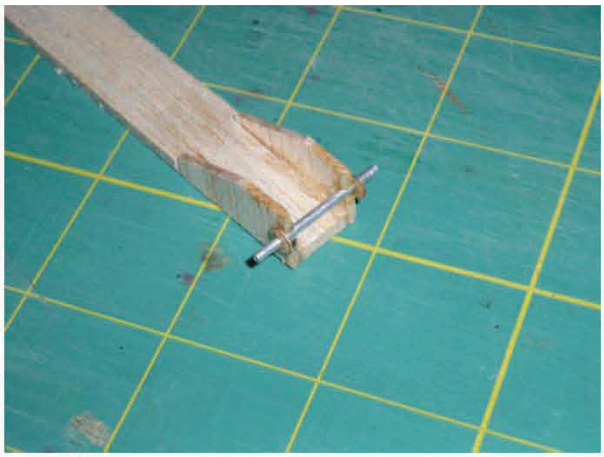


**6.** The loading stick will fit the nose block key. Since the Lacey has a large nose, I made a sub key specifically for the loading stick.

## B) Making the Loading Stick



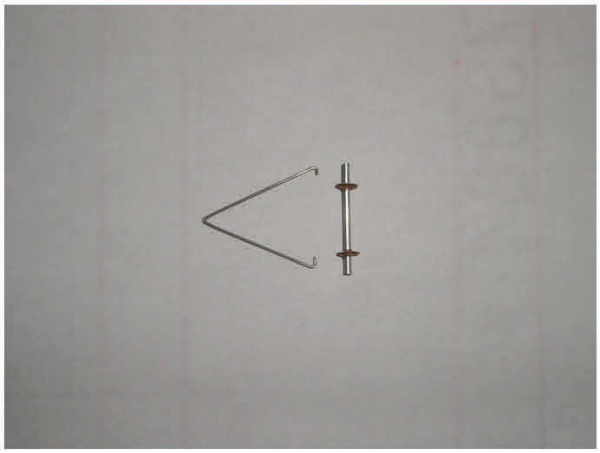

**7.** Components of the stick, about 1" longer than the hook to peg distance. The uprights support the nose block and the peg under tension of the wound motor. Glue the supports to the stick and harden everything with CA. Make two 1/64" ply washers with 1/16" holes to position the peg on the rear supports.



**8.** With the stick assembled, the peg seats in the rear upright notches with the disks set just outside the supports. Glue the disks to the tube with CA. , making sure everything is a slightly loose fit, which facilitates removal during loading.



**9.** The front supports fit the nose block key. I prefer to have the stick fit upside down on the nose so that the motor and peg are visible from the bottom of the plane during loading.



**10.** Make a yoke out of 0.025" wire to attach the peg to the torque meter. The yoke is a spring fit on the peg.

## C) Winding



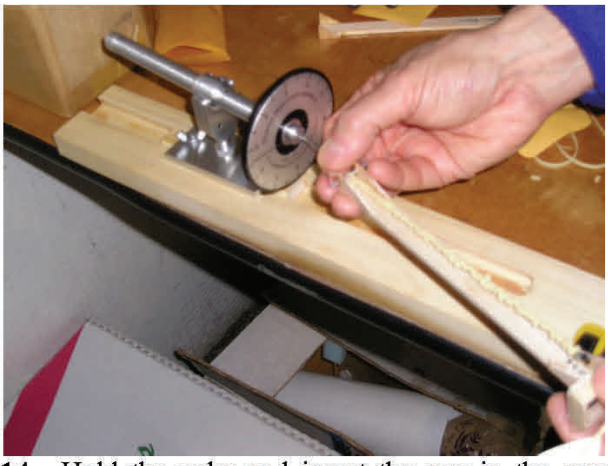

**11.** The yoke holds the peg on the torque meter during winding.



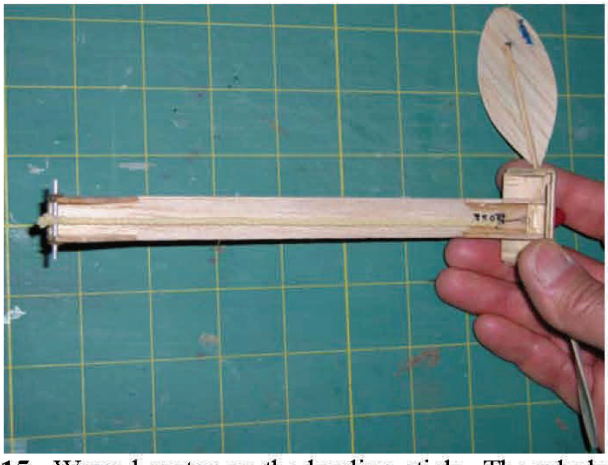
**12.** Begin transferring the motor by putting the o-ring on the hook.



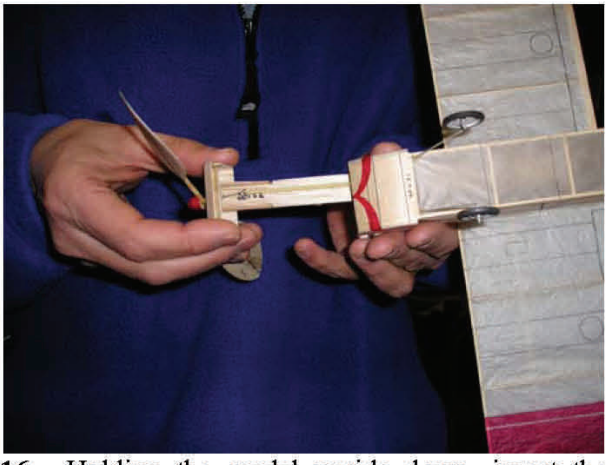
**13.** Insert the front supports in the motor block key.



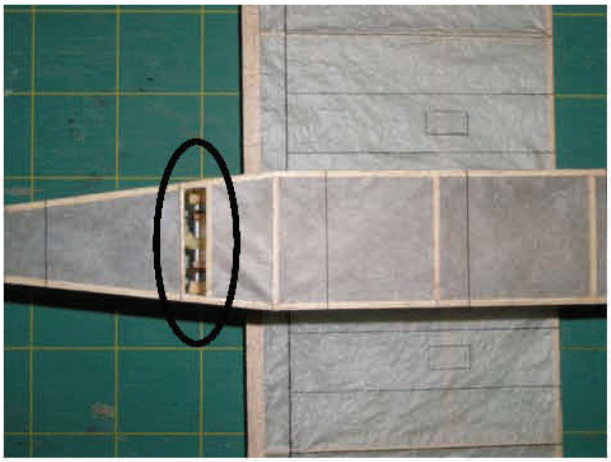
**14.** Hold the yoke and insert the peg in the rear notches. Remove the yoke.



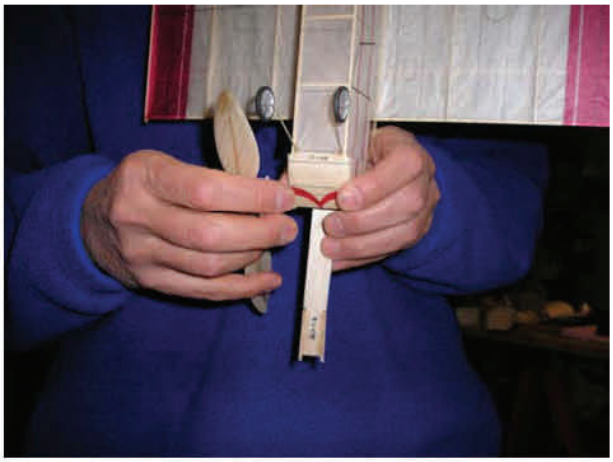
**15.** Wound motor on the loading stick. The whole thing is held together by motor tension.



**16.** Holding the model upside down, insert the stick in the fuse.



**17.** Looking through the window, position the peg in the V blocks. Be sure that it is seated squarely. The window can be covered with a bit of tissue and repositionable glue stick for scale judging.



**18.** Pull the nose block off the front of the stick, stretching the motor to disengage the key. Hold the model vertically, shake gently, and allow the stick to fall out. Seat the nose block and go fly!

**Eenvoudige Zes – 'Simple Six' in Dutch**

**An A-6 Kit Review, by Carl Bakay**

## Part I – What is Out There

Indoor fliers are often the ultimate scratch builders, mostly of necessity. All other aspects of our hobby have kits galore to offer, and this has been so since the Cleveland days of the 1930's. Powered by rubber, glow fuel, electric, choose from scale, fun fly, gliders, pocket rockets, helicopters, ornithopters, made from paper, balsa, foam, fiberglass and plastic, you can take your pick. But when you get to low and slow (my particular favorite), the choices for quality kits are few.

I have been through my share of indoor kits, and the contents are often a skimpy selection of 1/16" square balsa, some yellowed condenser paper , a prop bearing, wire, and some 1/32" or thinner sheet stock for making a flat propeller blade. Up until now it has been easier to enlarge a magazine plan at Kinkos, strip your own wood, buy some nose bearings from Ray Harlan, and you can build half a dozen models for a few dollars.

There are two exceptions to this generalized tirade of mine. First, Ikara makes beautifully crafted RTF indoor models. My favorite is the 7.5 " span Butterfly, but there are a whole series, and though a bit on the heavy side, this makes them sturdy, and they fly in your living room or gymnasium, out of the box. Their Superdog is a pennyplane ARF kit advertised as 5 grams (3.2 is the rules minimum) The propeller is molded white plastic, tons lighter than the Peck varieties, and otherwise sane modelers have been known to buy the seven-inch span Ikara Butterfly for the two propellers that come with each, and leave the model on the shelf. To find out more, go to FAI Model Supply at www.faimodelsupply.com .

The second is the large selection of Science Olympiad models available from science education leader Pitsco, http://shop.pitsco.com/store/ , featuring Ray Harlan's Sorcerer SO kit, and others. Another very good choice is Peck Polymers at http://www.peck-polymers.com/store/ , where you can get Cesar Bank's Leading Edge A-9 kit, along with all of the other great Peck kits and supplies. These two world-class models will do 5 to 6 minutes with careful building and trimming, and good rubber cutting and winding skills. My Leading Edge does 4-6 minutes in the Wal-Mart parking lot in the dead air of 6:00 am, but I did replace some of the wood with better material I had on hand. This plane, and many of the winning SO designs, use 12" Ikara props, cut down and often re-pitched.

## Part II - Beginnings

The A-6 model had its origins with the Orbiteers in California. In a letter to Roger Schroeder, Clarence Mather described the origin and philosophy of the model:

*Dear Roger,*

*The San Diego Orbiteers held their meetings in a small recreation center gym, and decided to do some indoor flying after the business meetings. A couple of us had some indoor experience, but most of the other members felt overwhelmed by indoor models and did not participate. I decided to create a model that used materials familiar to everyone and would be small, simple to build, and sturdy enough to survive most of the banging around that would occur. No special indoor materials were allowed.*

*Thus 1/16 square strips and 1/32 sheet were the minimum sizes to be used. The "A" part of the name is from the old AMA Class A model of 30 square inch maximum wing area. The span was not limited so that some experimenting could be done. A high aspect ratio might be more efficient but would weigh more because of the longer spars required. Similarly the tail boom length was not limited. AMA limits stab area to 50% of the wing's, or it must be counted as wing area. Perhaps it would have been better not to limit the area of the stab. As Dave suggests, tandems might be fun to experiment with. The added weight of the large "second" wing might cancel out the added lift, because the rear wing cannot produce as much lift as the front. The flat sheet prop blades make the prop easy to build. The prop shaft and tube sizes specified produces an easily built, smooth working front end. The six inch motor stick and prop diameter produces a well-proportioned model. The wire wing mounts are not required. I use them on the plan so that trimming a model could be done easily -- CG position, incidence and washin can be adjusted with no cutting or gluing.*

*I built and tested a model before we announced the event. Then plans were included with a newsletter. Fudo Takagi and I agreed to provide rubber for anyone who wanted it, and we came with several sizes. So, a modeler could have a model to fly with little effort and cost. And it can be carried in a small box. The event meets our goals very well and flies three or four minutes in a small gym. That is long enough to be rewarding.*

*Clarence Mather*

The original rules were:

No special indoor materials
Maximum 30 square inch wing area
Maximum 15 square inch horizontal tail area.
Maximum six inch motor stick.
1/16 x 1/16 inch minimum wing and tail spar dimensions.
1/16 x 1/32 inch minimum wing and tail rib dimension.
Maximum six inch prop diameter.
1/32 inch minimum prop shaft diameter.
Prop must have flat 1/32 inch sheet balsa blades.
or be an unlightened commercial plastic prop.

Contest Rules Added Later

Minimum weight 1.2 grams (w/out motor)
Best flight of six. Highest time wins.
No sanding spars or ribs for lightness



Figure 1
The Author's Mather A-6 Does 2-3 Minutes

Just as with No-Cal, Science Olympiad, EZB and other "beginner" events, the A-6 soon became hotly contested. Higher aspect wings, as Clarence predicted, became the hot ticket, and eight to ten minute times are not uncommon in large rooms such as Kibbie Dome or Johnson City.

**Part III - The Kit**

So your author was thrilled to find an A-6 kit for sale from Shorty's Basement for $20.00 plus shipping. (www.shortysbasement.com ) Designed by Czechs Jiri Kalina and Ondrej Mitas, the photo of the contents showed a lot of nice stuff in a sturdy box (Figure 2), including full size plans, condenser paper, finished prop with shaft and bearing, finished motor stick with front bearing and rear hook, and pre-cut ribs, spars, and tail boom. To get you flying right away, two 30" strips of Tan Super Sport are included for trimming and practice,

and two slightly wider strips for serious flying. There was also a color photo page of assembly instructions, typed instructions in Dutch (I think) and another set in English.

Best as we can tell, Shorty is a girl named Carol Kane, who had my kit on the way before I had time to lick a stamp and mail the check. The kit box is made from FedEx cardboard turned inside out – pretty sturdy stuff, and Carol put it in another sturdy box with loads of packing peanuts, so the kit arrived in pristine condition. As an extra touch, the kit is in a zip lock bag, which prevents any tiny pieces from slipping out.

As soon as my kit showed up at my door, I did something I tell others to do, but almost never do myself – read the instructions. In it, the designers said, "Building this model takes only an hour or two. All of the really difficult work, like building the propeller and fuselage, are already done." Well - I didn't believe THAT. So just to see, I kept track of my building times, and I found they fell into 30 minute segments. Sure enough, after an hour and a half at the workbench, I was done. Before I started, however, I measured and weighed all of the parts to get an idea of the wood densities used. Wood selection was excellent, and the technical details are given at the end of the article. This was not counted in the building time, but I recommend it highly.



Figure 2 – A Complete Kit



Figure 3 – After the First Half Hour

In the first half hour, the 1/16" x 1/32" ribs were cut apart and trimmed to length, and the 1/16" square spars cut apart. The plan was ironed to get out any small wrinkles. The covering was crushed into a ball, flattened out and ironed. No waxed paper was used, rather a white candle was rubbed on the plan where the glue joints would be, which worked out well. Titebond was used for all joints, although the designers suggest model cement. In either case, it is useful to have something that can be de-bonded later for repairs – water for the Titebond and acetone for the model cement. Figure 3 shows the progress made after 30 minutes, with wing and tail built flat and covered, and the boom attached to the motor stick.

The second half hour was spent blocking up the wing and tail. There are two ways to build a wing like this, and the instructions call for making the center panel first, covering it, and then building the end panels, add dihedral, and cover these. I used the EZB method of building the entire wing flat, covering using glue stick and condenser paper provided, then slitting the paper at the dihedral ribs and adding 30 mm (about 1-1/8 ")

# Beginner's Corner III

**Carl Bakay**

In the second installment of this column, we built the Denny Dart Mark III, by Neil Dennis. The Mark I and Mark II are pretty much the same, except the Mk I has a longer wingspan, and the plan has to be cut and glued together to build it. It was thought this extra step could be difficult for some beginners. The Mk II uses a shorter, 12-inch wing spar, and the whole wing outline fits on one piece of paper with no cutting and pasting. The keep the area the same, the chord is increased (the distance from the leading edge to the training edge).

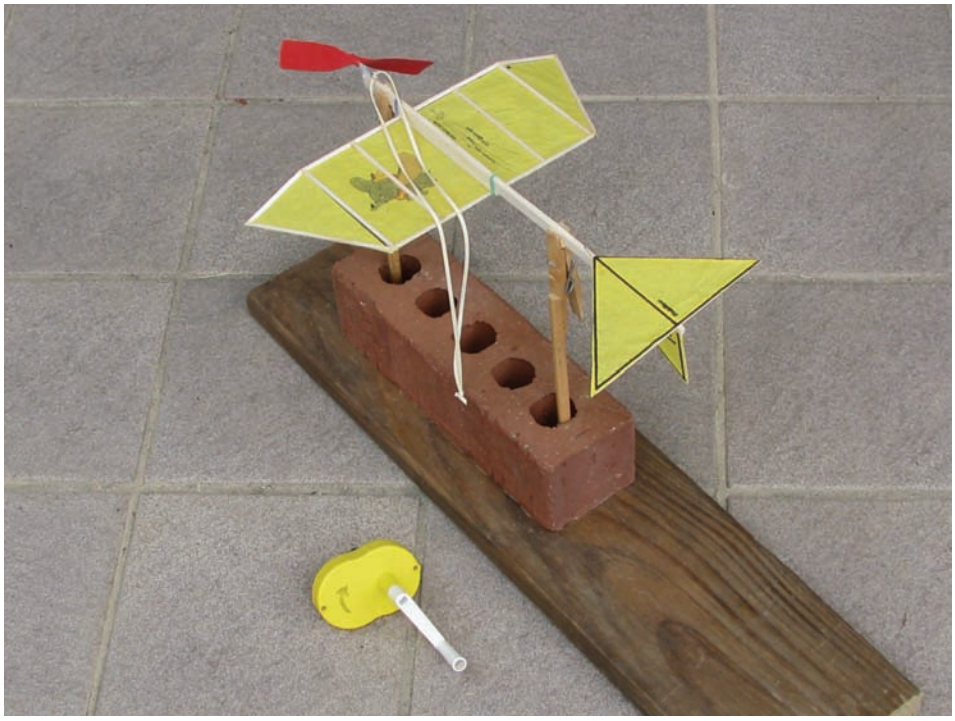


**Figure 1**

Neil recommends making up a 10" loop of 3/32" rubber for outside, and a 15" or longer loop for indoor flying. You can get these models to fly by just winding with your finger, but it is hard to get more than 500 turns in the motor this way, and bunches of knots always result. With either motor, you need a stooge. A stooge is just what the name implies, someone or something dumb enough to just hold the airplane steady, while you wind the motor.

I do a lot of my fun flying on the way to work, in the often dead calm of a 6 am Louisiana morning. Sometimes it's a bit humid, but that doesn't matter as long as there is no mist in the air to make the covering soggy. My stooge is made out of a brick and two ¼" wooden dowels, with clothes pins glued securely on their ends. While building foam models for indoor and outdoor R/C, I discovered Goop, a very sticky, all purpose adhesive. It is th e same stuff as silicone tub and tile sealer, but stickier. You can get it at any craft store or home improvement center. Sand the ends of the dowels flat to mate to the clothes pins, and attach with small dab of Goop, and clamp tight. After an hour or two, remove the clamps, smear a liberal amount of Goop in two of the holes in the brick and set the dowels in the holes. When all of this cures (best to let sit overnight) you will have a nice stooge . As an extra feature, I glued the brick to a board for more weight, and to allow me to set it on the hood of my car. Figure 1 shows the stooge and a Denny Dart ready for winding.

As for putting in those turns, you can use a hand drill with a hook clamped in the bit. But this is slow going at only 3 ½ turns per crank, and the winding hook may slip out of the bit under tension, with disastrous results. Figure 2 shows a 5:1 Peck Polymers winder, part number PA009, which will do the job nicely for only $9.00. To speed things up even more, KP (Knight & Pridham in England) has yellow 1:10 and 1:15 ratio winders at the same Peck Polymers site at the end of this article.  We always carry two around, in case one breaks or gets stepped on.
In Figure 1, note the direction arrow I drew on the winder.



**Figure 2**

Place the model upside down in the stooge, hook up the motor, and back up about 3 to 4 feet to start winding. First put in about 100 to 150 turns (20-30 cranks on the handle), walking in as you wind, and test fly by gently launching level or pointed slightly up. Slide the wing back if the

model stalls, forward if the model dives, and repeat at the same number of winds until you get a nice steady flight. Mark the wing position on the motor stick with a Magic Marker. Now do the same thing at 250 turns and 500 turns, until you get a smooth climb and glide. When the motor is broken in after several flights, you should be able to get 1000 to 1100 winds in a 10” motor, 1500 to 1600 winds in a 15” motor, to give long and satisfying flights.

The Mark IV introduces the builder to curved ribs and curved, laminated tips. This leads to a lighter and stronger model. The cambered wing and curved wingtips and tail are much more efficient. Many aviation historians maintain that the British Spitfire and Hurricane were so fast and maneuverable due to their beautifully elliptical flying surfaces. Lucky for us, this also translates into great flying at walking speed in the indoor world.

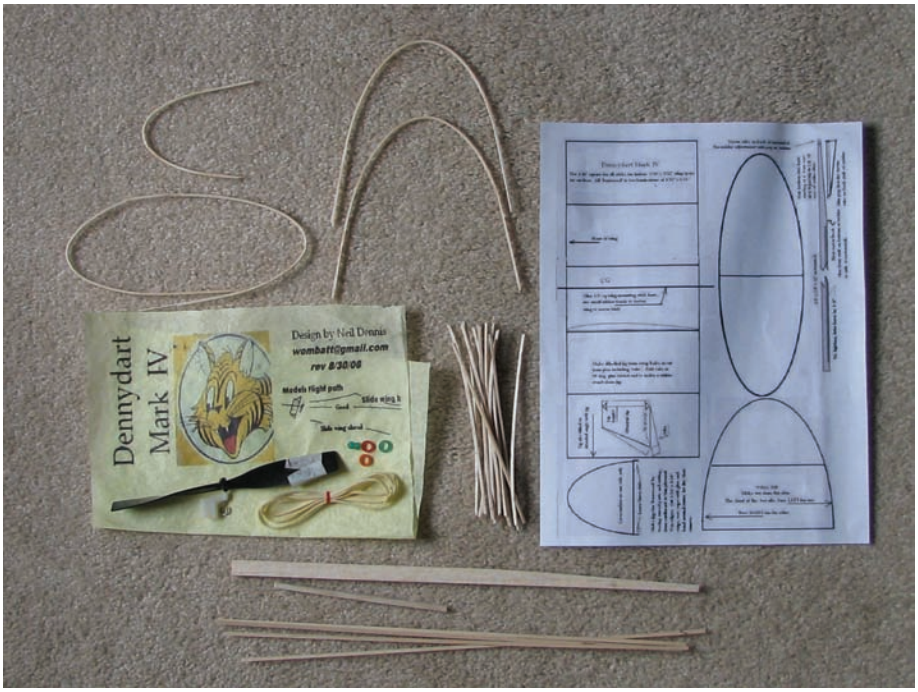



**FIGURE 3**

The kit comes with everything shown is Figure III. The ribs are already steamed into a curved airfoil, and the laminated flying surfaces already done. But to build more on your own, Neil tells us how its done, step by step. So let’s assume you had to make all of these yourself.

Start by tracing the wing and tail outlines on a piece of corrugated cardboard, or ¼ “ pine shelving material (Figure 4). The result will look like Figure 5. The cut the pieces out, as shown in Figure 6, and wax the edges with a candle. Now take two pieces of 1/32” x 1/16” strip and soak in water for 5 to 10 minutes. Then lightly coat one piece with Titebond or Elmers Carpenters Glue, place the two together, and wrap around the form. Have some 1” pieces of masking tape ready to hold snugly in place.

The ribs are made from 1/16” square strip, cut to the approximate length ahead of time. Trace the camber outline on a piece of 2” lumber, and cut out with a bandsaw. Boil the rib sticks for 5 minutes and clamp to the form with tape. You can either let it sit an hour or two, or zap in a microwave for 4 minutes on medium heat. Be sure to let the pieces cool before taking off the form. Cut the ribs to length before assembly. Construction from here is the same as the Mk III.

The performance of a model of this type is always hampered by unnecessary weight. Use glue very sparingly in assembly. Choose spars ahead of time that are light but stiff. Usually stiffness goes hand in hand with density, but you can find a compromise. Use white instead of colored tissue, and condenser paper is the best of all. The heaviest item is the propeller, and the second heaviest is the motor stick. You can replace the prop with a much lighter 6” Ikara. These come in indoor Butterfly RTF models, where you get two for each model, or you can buy then individually for $2.00 each. They not only will save weight, but it will grab more air and turn more slowly. Both choices are shown with the finished model in Figure 8. And remember, always store your indoor models in a shoebox with the wing off. I left one of my fun fliers on top of my dresser last summer, and my mother-in-law tossed a stack of underwear on top of it. You can’t be too careful.

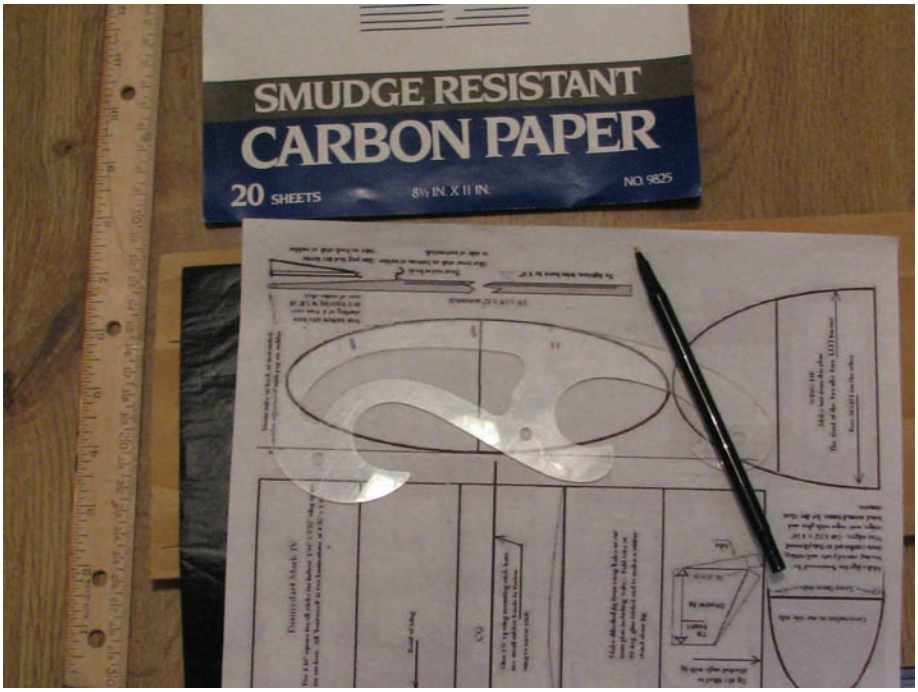



**FIGURE 4**

When hooking up a fully wound motor, see if the motor stick bends or flexes at all. If it stays absolutely straight, there is more wood there than you need. Sand 1/32” off one side, and cut 1/16” from the top. Remove as much as you can from the tail boom section, behind the rear hook. Your times will go up.

In the next installment of Beginner’s Corner, we build a competition pennyplane, so called because the weight cannot exceed that of on old style Lincoln cent of 3.2 grams. We will explore such topics as wood density and stiffness, making a can-formed propeller, and covering with film.

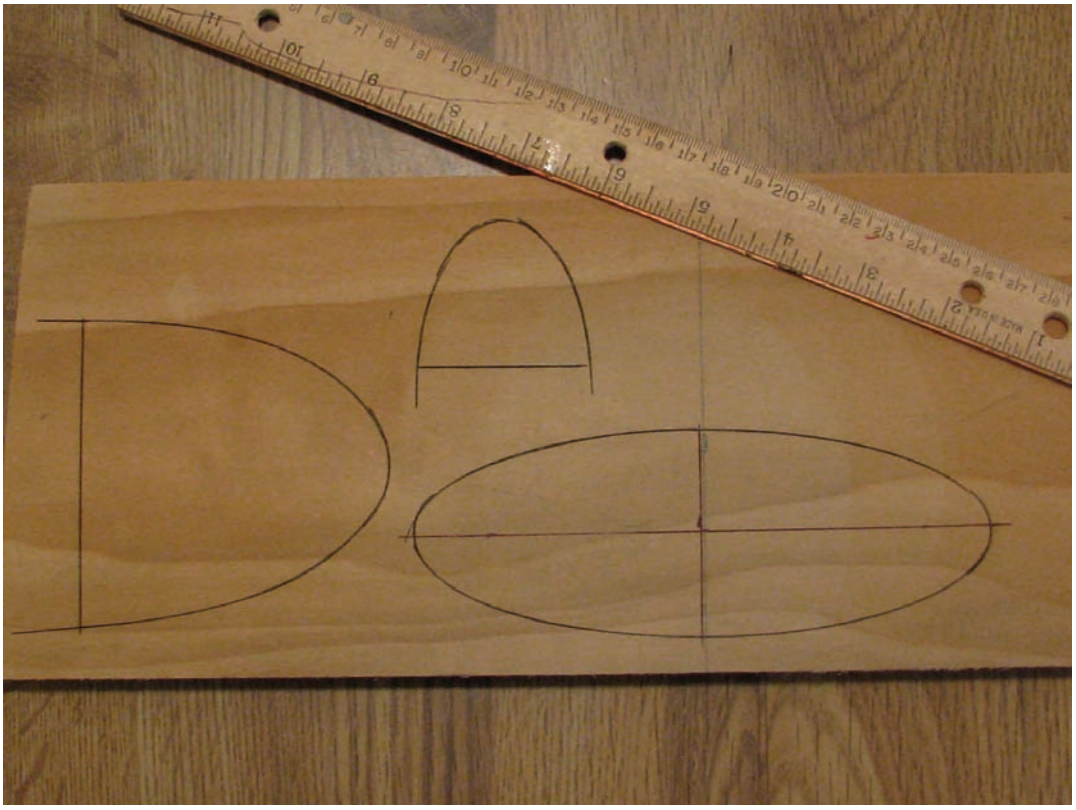


**FIGURE 5**

Denny Dart Kits
Neil Dennis
7940 Cadwell Rd.
Bliss, New York 14024
(716) 322-7596

A2Z All-In-One site by Tim Goldstein
www.peck-polymers.com/store/
A2Z tools, Peck Polymers kits and supplies, indoor balsa, winders, much more

Micro Mark
340 Snyder Avenue
Berkeley Heights, NJ 07922-1538
Order Toll Free 800-225-1066
catalog at www.micromark.com

Ikara props and RTF indoor models
http://www.faimodelsupply.com/fai-ikara.htm



**FIGURE 6**

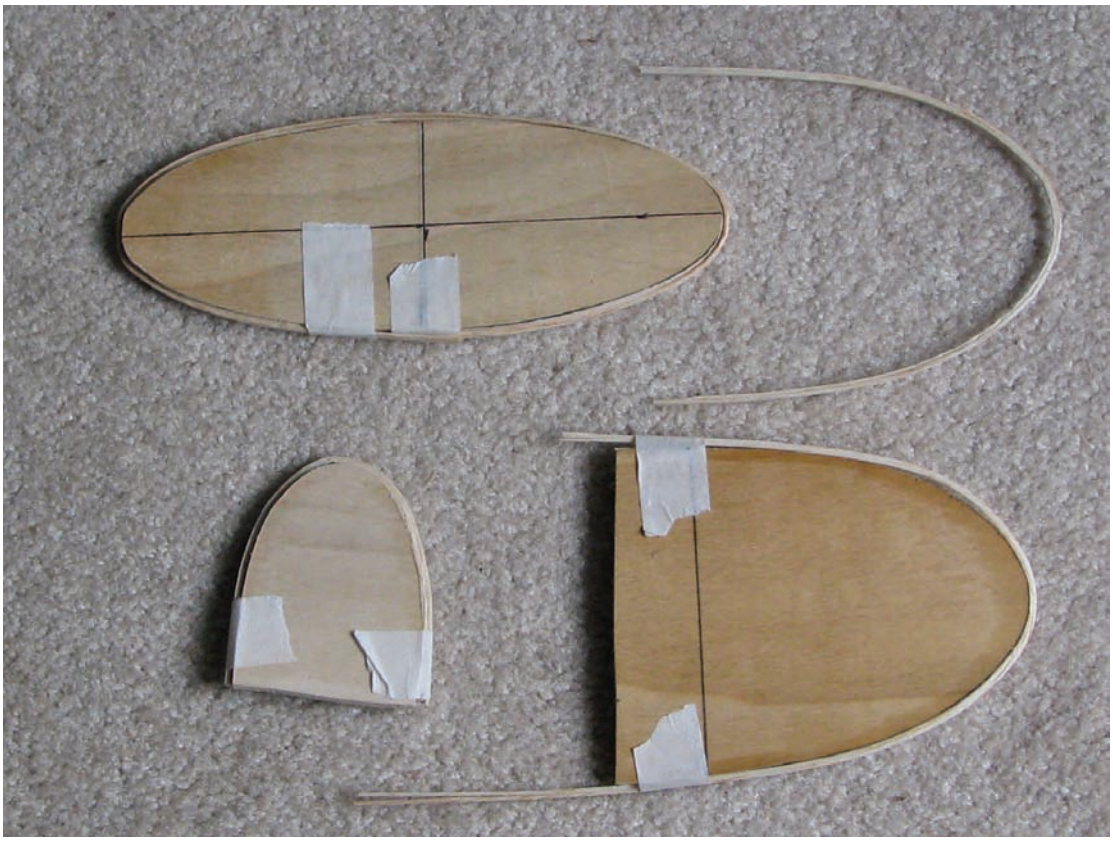


**FIGURE 7**

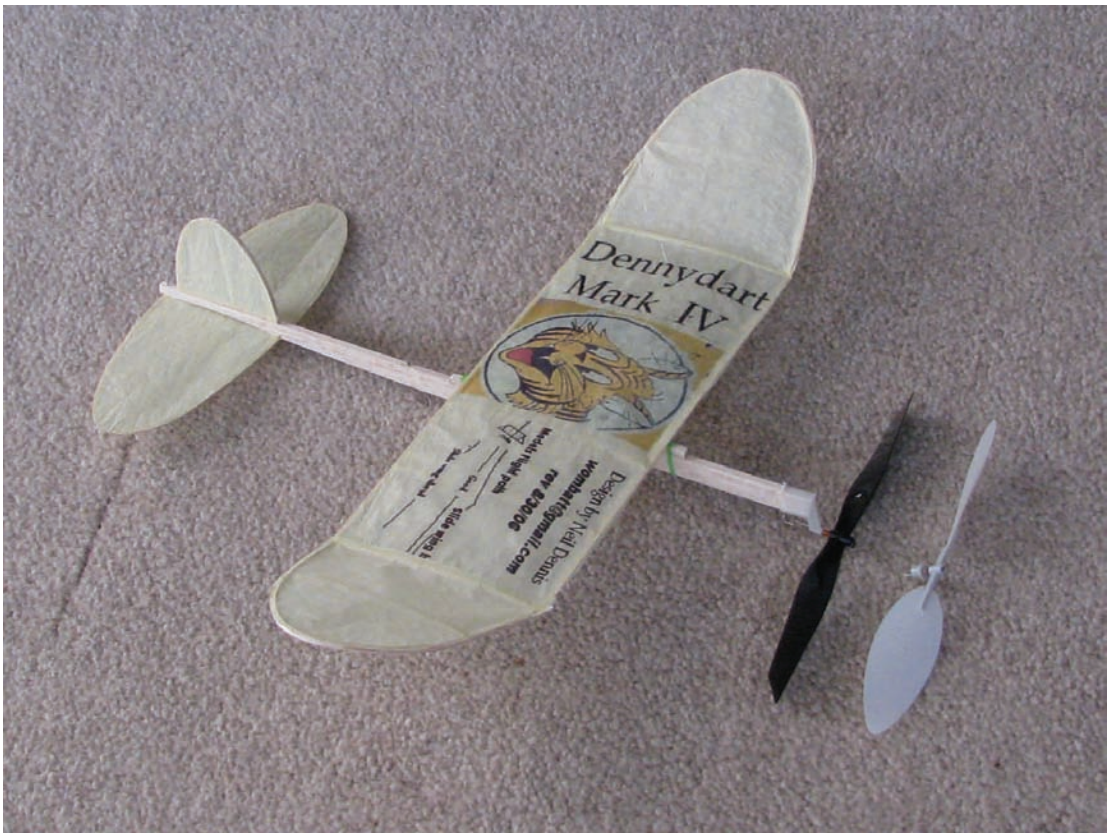



**FIGURE 8**

# 2009 EUROPIAN F1D CHAMPIONSHIPS

| F1D | | FAI European Indor Models Championship | | | | | | | Serbia- Belgrade 2009 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Name | Nation. | Licence | 1 round | 2 round | 3 round | 4 round | 5 round | 6 round | Total |
| 1 | TREGER Ivan | SVK | SVK-18-04 | 24:22 | 35:11 | 34:30 | 34:03 | 33:06 | 31:41 | **1:09:41** |
| 2 | ORSOVAI Dezso | HUN | HUN-0027 | 29:25 | 00:23 | 32:58 | 34:14 | 33:06 | 34:25 | **1:08:39** |
| 3 | SCHRAMM Lutz | GER | GER-2196 | 13:49 | 32:47 | 34:40 | 22:45 | 33:39 | 00:31 | **1:08:19** |
| 4 | BARBERIS Didier | FRA | FRA 551 | 32:09 | 33:48 | 33:57 | 32:42 | 32:59 | 21:23 | **1:07:45** |
| 5 | MANGALEA Corneliu | ROU | ROU 133 | 33:55 | 33:25 | 32:23 | 00:05 | 32:41 | 31:50 | **1:07:20** |
| 6 | SUKOSD Zoltan | HUN | HUN-0321 | 05:29 | 33:14 | 33:18 | 31:10 | 29:24 | 30:08 | **1:06:32** |
| 7 | REE Andras | HUN | HUN-0030 | 01:15 | 32:43 | 32:00 | 01:49 | 15:52 | 12:53 | **1:04:43** |
| 8 | MIDIĆ Slobodan | SRB | F-101 | 30:39 | 32:07 | 31:20 | 31:49 | 30:05 | 32:19 | **1:04:26** |
| 9 | CIAPALA Edward | POL | POL-0203 | 30:18 | 32:10 | 32:14 | 29:17 | 30:36 | 00:00 | **1:04:24** |
| 10 | KAPLAN Mikita | CZE | 1016 | 31:54 | 26:40 | 31:34 | 18:18 | 25:37 | 29:49 | **1:03:28** |
| 11 | BENNS Mark | GBR | GBR-072513 | 28:32 | 31:00 | 07:34 | 32:11 | 30:28 | 30:57 | **1:03:11** |
| 12 | CHAMPION Robert | FRA | FRA 339 | 29:14 | 30:04 | 30:52 | 32:02 | 14:31 | 30:20 | **1:02:54** |
| 13 | RICHARDS Derek | GBR | GBR-065309 | 25:49 | 27:23 | 31:14 | 31:35 | 29:41 | 30:42 | **1:02:49** |
| 14 | POPA Aurel | ROU | ROU 135 | 29:07 | 30:27 | 27:16 | 30:08 | 28:39 | 32:19 | **1:02:46** |
| 15 | MARILIER Thierry | FRA | FRA 971 | 30:28 | 31:56 | 19:30 | 08:40 | 22:37 | 27:23 | **1:02:24** |
| 16 | BUNDESEN Uwe | GER | GER-3252 | 30:10 | 04:03 | 28:39 | 31:13 | 27:14 | 28:53 | **1:01:23** |
| 17 | KAPLANOVA Klara | CZE | 1017 | 27:45 | 29:37 | 31:19 | 29:40 | 24:51 | 29:19 | **1:00:59** |
| 18 | SCHOENFELDER Karl | GER | GER-2192 | 30:47 | 27:19 | 29:15 | 29:51 | 29:29 | 01:40 | **1:00:38** |



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | MILIĆ Slobodan | SRB | F-049 | 28:16 | 05:12 | 26:55 | 30:23 | 12:19 | 17:23 | **0:58:39** |
| 20 | VINS Karol | SVK | SVK-522 | 27:25 | 29:42 | 26:42 | 28:21 | 18:51 | 11:01 | **0:58:03** |
| 21 | MARKEIEWICZ Jerzy | POL | POL-0053 | 28:15 | 29:07 | 27:19 | 26:35 | 24:15 | 26:19 | **0:57:22** |
| 22 | AMORARITEI Dan | ROU | ROU 136 | 26:59 | 27:54 | 25:47 | 28:13 | 15:27 | 28:47 | **0:57:00** |
| 23 | SHAW John | GBR | GBR00680 | 25:02 | 28:38 | 27:10 | 24:54 | 28:06 | 11:55 | **0:56:44** |
| 24 | MANIERI Fabio | ITA | 15244 | 23:39 | 27:27 | 26:55 | 27:41 | 25:40 | 20:27 | **0:55:08** |
| 25 | CINERT Zdenek | CZE | 1018 | 23:55 | 26:18 | 25:04 | 23:04 | 12:13 | 21:31 | **0:51:22** |
| 26 | LAĆIMIĆ Lazar | SRB | F-138 | 22:45 | 25:43 | 25:15 | 18:34 | 21:18 | 23:48 | **0:50:58** |
| 27 | ROGOWSKI Mariusz | POL | POL-1637 | 23:16 | 24:21 | 24:09 | 20:34 | 10:17 | 24:53 | **0:49:14** |
| 28 | BERTOLANI Benito | ITA | 4189 | 14:57 | 15:08 | 17:46 | 26:12 | 01:07 | 21:37 | **0:47:49** |
| 29 | BENDONI Gabrio | ITA | 4246 | 04:08 | 16:23 | 16:03 | 22:40 | 22:12 | 16:33 | **0:44:52** |

| F1D Jun | FAI European Indor Models Championship | | | | | | | | Serbia- Belgrade 2009 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Name | Nation. | Licence | 1 round | 2 round | 3 round | 4 round | 5 round | 6 round | Total |
| 1 | KAPLANOVA Gabriela | CZE | 1019 | 30:22 | 28:03 | 31:46 | 28:05 | 00:00 | 28:49 | **1:02:08** |
| 2 | MARILIER Hugo | FRA | FRA 700 | 29:20 | 27:43 | 30:45 | 30:08 | 28:47 | 19:52 | **1:00:53** |
| 3 | KLIMES Jiri | CZE | 1020 | 26:12 | 28:42 | 12:16 | 18:20 | 27:26 | 26:40 | **0:56:08** |
| 4 | TRAUTSOLT Jean | FRA | FRA 575 | 19:52 | 28:03 | 27:20 | 26:30 | 28:03 | 26:51 | **0:56:06** |
| 5 | MARILIER Lucas | FRA | FRA 755 | 24:55 | 24:13 | 23:33 | 28:03 | 25:00 | 18:30 | **0:53:03** |
| 6 | GORALCZYK Szymon | POL | POL-5349 | 10:06 | 26:18 | 23:15 | 24:16 | 22:51 | 25:44 | **0:52:02** |
| 7 | KLIMES Petr | CZE | 1021 | 25:11 | 26:29 | 25:27 | 25:01 | 24:32 | 00:00 | **0:51:56** |
| 8 | MURAS Krzysztof | POL | POL-5328 | 22:16 | 26:35 | 23:37 | 14:37 | 22:34 | 25:18 | **0:51:53** |
| 9 | PUODZIUNAS Laurynas | LTU | LTU 673 | 21:24 | 24:33 | 14:40 | 26:03 | 19:06 | 00:09 | **0:50:36** |
| 10 | DEDILIUC Cosmin | ROU | ROU 16 | 20:12 | 11:45 | 21:45 | 22:44 | 25:53 | 24:25 | **0:50:18** |
| 11 | DEMIDOWICZ Tomasz | POL | POL-6119 | 24:17 | 25:08 | 24:45 | 23:49 | 23:55 | 23:41 | **0:49:53** |
| 12 | SEPRODI Atilla | ROU | ROU 15 | 21:27 | 24:20 | 09:42 | 21:29 | 19:58 | 25:22 | **0:49:42** |
| 13 | MORARU Eduard Mihail | ROU | ROU 700 | 22:16 | 22:20 | 22:29 | 23:34 | 19:07 | 15:36 | **0:46:03** |
| 14 | SALKAUSKAS Martynas | LTU | LTU 631 | 15:56 | 18:39 | 15:08 | 24:13 | 21:30 | 17:56 | **0:45:43** |
| 15 | DEVEIKIS Jonas | LTU | LTU 556 | 19:48 | 18:43 | 18:28 | 19:04 | 21:25 | 22:19 | **0:43:44** |



# FAI European Indor Models Championship

## Team Results

**Serbia - Belgrade 2009**

| Class | Nationality | Total | Count Of Compet. |
|---|---|---|---|
| | 0 | | |

### F1D

| | | | |
|---|---|---|---|
| **1** | **HUN** | 3:19:54 | 3 |
| **2** | **FRA** | 3:13:03 | 3 |
| **3** | **GER** | 3:10:20 | 3 |
| **4** | **ROU** | 3:07:06 | 3 |
| **5** | **GBR** | 3:02:44 | 3 |
| **6** | **CZE** | 2:55:49 | 3 |
| **7** | **SRB** | 2:54:03 | 3 |
| **8** | **POL** | 2:51:00 | 3 |
| **9** | **ITA** | 2:27:49 | 3 |
| **10** | **SVK** | 2:07:44 | 2 |

### F1D Jun

| | | | |
|---|---|---|---|
| **1** | **CZE** | 2:50:12 | 3 |
| **2** | **FRA** | 2:50:02 | 3 |
| **3** | **POL** | 2:33:48 | 3 |
| **4** | **ROU** | 2:26:03 | 3 |
| **5** | **LTU** | 2:20:03 | 3 |

# 2009 Dorcol Cup

| F1D | FAI International Open Indoor Models Cup XVI "Dorcol Cup " | | | | | Serbia- Belgrade 2009 | | |
|---|---|---|---|---|---|---|---|---|
| | Name | Nation. | 1 tour | 2 tour | 3 tour | 4 tour | 5 tour | 6 tour | Total |
| 1 | Lutz Schramm | GER | 13:24 | 33:04 | 35:25 | 10:05 | 36:06 | | 1:11:31 |
| 2 | Ivan Treger | SLK | 33:09 | 32:33 | 32:25 | 36:09 | 32:28 | 29:02 | 1:09:18 |
| 3 | Didier BARBERIS | FRA | 32:41 | 27:56 | 33:27 | 35:13 | 33:58 | 32:26 | 1:09:11 |
| 4 | Orsovai Dezso | HUN | 32:15 | 17:08 | 22:58 | 27:43 | 34:01 | | 1:06:16 |
| 5 | Popa Aurel | ROU | 30:41 | 33:58 | | 25:17 | 32:14 | 24:24 | 1:06:12 |
| 6 | Mark Bens | GBR | 32:31 | 00:00 | 00:00 | 30:21 | 08:16 | 33:25 | 1:05:56 |
| 7 | Derek Richards | GBR | 31:38 | 32:19 | 29:00 | 32:55 | | | 1:05:14 |
| 8 | Mangalea Corneliu | ROU | 26:07 | 32:19 | 32:09 | 30:05 | | | 1:04:28 |
| 9 | Thierry MARILIER | FRA | 30:34 | 30:20 | 24:25 | 14:00 | 30:04 | 14:16 | 1:00:54 |
| 10 | Sukosd Zoltan | HUN | 02:47 | 30:37 | 27:24 | 29:32 | 27:21 | 25:43 | 1:00:09 |
| 11 | Andrs Ree | HUN | 18:52 | 30:00 | | 30:01 | 04:29 | 29:34 | 1:00:01 |
| 12 | Mikita Kaplan | CZE | 28:35 | 29:42 | | | | | 0:58:17 |
| 13 | Simon Gyula | HUN | 27:13 | 28:56 | 11:36 | 28:34 | 28:20 | 25:14 | 0:57:30 |
| 14 | Klara Kaplanova | CZE | 26:55 | 28:07 | 29:01 | | | | 0:57:08 |
| 15 | Robert CHAMPION | FRA | 24:24 | 25:08 | 22:57 | 27:07 | 27:02 | 29:10 | 0:56:17 |
| 16 | Karol Vins | SLK | 24:22 | 28:32 | 26:13 | 15:06 | 26:00 | 25:18 | 0:54:45 |
| 17 | Geoffrey Lefever | GBR | 25:30 | 24:16 | 26:10 | | | | 0:51:40 |
| 18 | John Shaw | GBR | 24:45 | 19:56 | | | | | 0:44:41 |
| 19 | Zdenek Cinert | CZE | 12:38 | 22:36 | | 21:57 | 20:55 | 08:26 | 0:44:33 |
| 20 | Amoraritei Dan | ROU | 24:47 | 15:53 | 10:04 | 07:18 | | | 0:40:40 |

| F1D Jun | FAI International Open Indoor Models Cup XVI "Dorcol Cup " | | | | | Serbia- Belgrade 2009 | | |
|---|---|---|---|---|---|---|---|---|
| | Name | Nation. | 1 tour | 2 tour | 3 tour | 4 tour | 5 tour | 6 tour | Total |
| 1 | Hugo Marilier | FRA | 29:17 | 28:47 | 18:30 | 29:27 | 28:18 | | 0:58:04 |
| 2 | Gabriela Kaplanova | CZE | 26:10 | 27:11 | 13:00 | | | | 0:53:21 |
| 3 | Jean Trautsolt | FRA | 22:43 | 25:03 | 17:43 | 25:58 | 27:06 | 26:11 | 0:53:17 |
| 4 | Lucas Marilier | FRA | 24:24 | 26:22 | 26:34 | 24:26 | 24:38 | | 0:52:56 |
| 5 | Klimes Petr | CZE | 22:49 | 22:56 | | 23:55 | 21:23 | 22:40 | 0:46:51 |
| 6 | Moraru Eduard Mihailu | ROU | 20:46 | 23:20 | 18:33 | 09:03 | | | 0:44:06 |
| 7 | Klimes Jiri | CZE | 16:00 | 20:55 | 21:02 | | | | 0:41:57 |

| Open 350 | FAI International Open Indoor Models Cup XVI "Dorcol Cup " | | | | | Serbia- Belgrade 2009 | | |
|---|---|---|---|---|---|---|---|---|
| | Name | Nation. | 1 tour | 2 tour | 3 tour | 4 tour | 5 tour | 6 tour | Total |
| 1 | Mark Bens | GBR | 28:10 | 26:16 | | | | | 0:54:26 |
| 2 | Peter Ing | GBR | 17:32 | 17:12 | 07:30 | | | | 0:34:44 |
| 3 | Zdenek Cinert | CZE | 15:16 | 16:12 | 03:17 | 15:48 | 14:57 | 15:27 | 0:32:00 |
| 4 | John Shaw | GBR | | | | | | | 0:00:00 |

