#52

Indoor Flight International

APR 00

THE LATEST NEWS AND INFORMATION ON INDOOR MODEL AVIATION.

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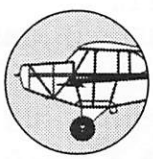
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Introducing the New Indoor News

The name is different but this is really the 52nd issue of Indoor News. It was Thedo's suggestion to change the name. His reasoning was pretty simple: "Indoor News" was a little vague (news about what? indoor soccer? indoor wind surfing?) and it was always confused with the other excellent newsletter, Indoor News and Views.

I have to admit, I was a little apprehensive about changing the name. I had other things planned and didn't want to do too much at once. However, I asked a few subscribers and they seemed to like the idea. The change of editors, I suppose, was also the perfect time to do it. It all made sense and in the end, I decided to go for it.

Coming up with names was difficult. I had a few ideas but none of them fit and in the end it was the one that Thedo had suggested that stuck: Indoor Flight International. It was a bit long, but it was catchy and it described the newsletter perfectly.

What about the other changes? The look is different but I've tried hard to keep the same general style as before. More importantly I've tried to keep the international flavour that has always been associated with Indoor News.

Subscription rates have increased somewhat. Some of it is inflation, the old rate had not been changed in eight years, but most of it covers the expansion to **a full six issues per year**.

Production of the newsletter is now entirely digital. Theoretically, going digital, should make it higher quality because every copy is an "original". Future issues will also be cheapier, taking less time to produce. I apologize for taking so long with this one but I had a number of things to work out, especially with the new digital process, and I wanted to do it properly. Future issues will be out every two months.

It looks like I've run out of room! I will have to introduce myself next issue. Look for it at the end of June.

Thanks to everyone who contributed this time around. Be sure to let me know what you think!

- Peter Kearney

Thanks Thedo!

Jorgen Korsgaard (Germany) started Indoor News way back in 1984 making this its sixteenth year in production.

Thedo tookover in 1992 and expanded 4-5 issues/ year, producing a total of 33 issues in the last seven years. Having just completed my first issue, I definitely have a new appreciation for the many hours of work and energy he must have put into it over the years!

So, Thedo, from all of the subscribers, I wish to thank you hartily for your tremendous contribution. Now if only we could get him flying F1D again...

Contributions Needed

You've heard it many times, I'm sure, but the newsletter will not survive without your support.

Contributions in the form of photographs, drawings, articles, tips, tricks, contest announcements, contest reports, comments and suggestions will be greatly appreciated!

F1D Rules Revised at CIAM Meeting

At the march 2000 CIAM meeting the new F1D rules were amended to include changes submitted by Andras Ree of Hungary. Andras writes "The aim of the amendment was to tune the new formula before the minimum four year rule freeze comes into effect. Biplanes have been banned, a max. wing chord and max. stab span have been added and the rubber weight has been increased to 0.6g (half of the model weight as it is in F1M).

Reason: last season's experiences and discussions concerning the new rules revealed a need to modify them somewhat to meet their original aims. The 200 mm (wing chord) may bother some who like larger chord models but it is better to add this restriction now than have to wait four years. The idea is to keep the models small and help those wanting to use plastic covering."

3.4 CLASS F1D - INDOOR MODELS

3.4.2. Characteristics of Indoor Models **amended to read:**
The span of the monoplane model shall not exceed 550 mm and **the** chord of the lifting surfaces shall not exceed 200 mm.
The tail span shall not exceed 450 mm.
The weight of the model without rubber motor shall not be less than 1.2 grams.
The weight of the lubricated rubber motor **shall not be more than 0.6 grams.**
These restrictions do not apply to open record attempts.

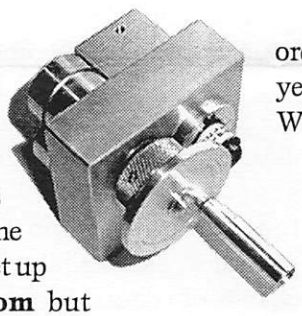
The larger rubber limit was a good move but fewer people seem to like the chord limit. Many believe it will result in less design freedom and "square" models. Time will tell.

The most surprising new rule is the limit on the stab span. This was a last minute addition to prevent a proliferation of tandem models. The rule itself was not surprising but it did cause a bit of a controversy: it was so "last minute" that few people knew about it before the meeting. A number of active fliers expressed concern that the rule was passed without any sort of discussion. Could some sort of system be devised to discuss proposals? Any ideas?

For the moment the rules are here to stay, the last opportunity to submit changes was Nov. 15th 1999. The rules come into effect Jan. 2001 and cannot be changed again until 2005.

Bob Oppegard

Bob Oppegard recently lost his battle with cancer and passed away on Feb 25th at the age of 74. Bob is world renowned among indoor enthusiasts for the superb rubber strippers he designed and manufactured over the years. Each of these little jewels is a memorial to the man, his skills, his love of craftmanship and his devotion to the indoor modeling community.



I'm sure Bob would be very pleased to hear that one of his relatives has resumed producing the little gems. A website has been set up at **www.rivalaeronautics.com** but ordering/pricing info is not yet online. No computer? Write to them at:

Rival Aeronautics
509 Nelson CT.
Center City, MN
55012 USA
Ph: (651)257-3169

Ron Williams Book Not Available

News spread quickly that Ron Williams book "Build and Flying Indoor Model Airplanes" was available on Amazon's UK website, amazon.co.uk. Unfortunately it was all a mistake.

The book was originally listed as "in stock" with a delivery time with of 4-6 weeks, but neither Amazon nor the publisher were able to produce any copies. All orders were cancelled and e-mail was sent explaining error. By the sounds of it, quite a few people ordered the book and Amazon probably lost a bundle of money.

Maybe someday an enterprising individual will secure the rights and publish a new edition. Until then, you can always try your luck on Ebay (the online auction site). An old edition just went for 58$ US! If you aren't rich, try your luck at the local library; some of them have copies.

My own copy is well worn and tattered around the edges. A new one sure would be nice!

Colophon

Indoor Flight International is published six times a year and covers all types of indoor models from peanut to microfilm. Texts can be sent in English or French and word processed documents can be sent on floppy disk (3 1/2 or 5 1/4) in any text format. Computer drawings should be in Autocad .dwg (saved as Autocad v14 compatible) or .dxf formats and if you are no draftsmen, I can do the drawings.

Payment of subscriptions should be in the form of an international money order in Canadian dollars, Canadian or US cash. If you know of other suitable payment methods, please let me know.

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A New Technique: Chalking Tissue

By Scot Dobberfuhl (USA)

If you've built and covered a couple models, you know that Japanese tissue comes in a very basic range of colours. Worse yet, white Jap tissue becomes transparent beige with the first coat of dope. That's just fine for a Pioneer model, but less than ideal on a Mr. Mulligan. While airbrushing represents an obvious solution, it's also potentially messy, time consuming, and expensive.

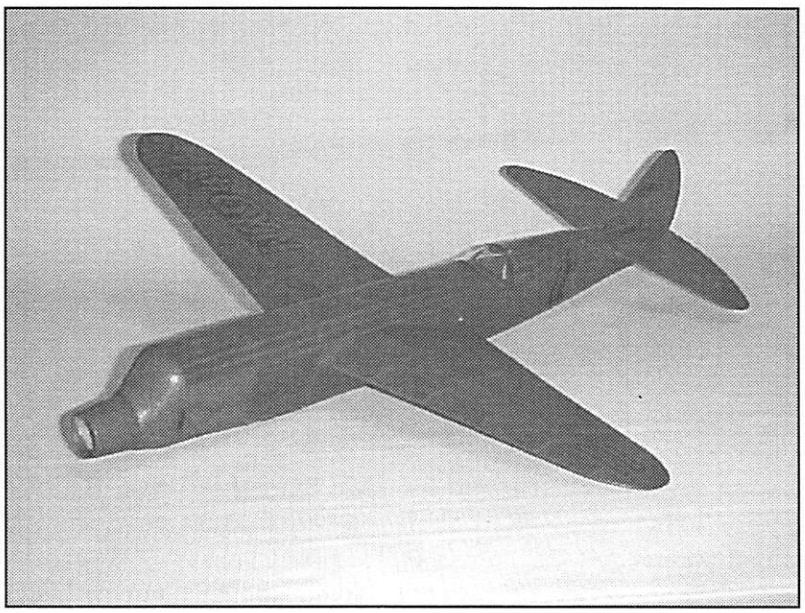


Photo By Scot Dobberfuhl

Photo: Scot's Mr. Smoothie covered with chalked tissue. The black and white picture doesn't do it justice... the model is a very bright orange-red. Scot used orange chalk on red Esaki tissue. The process also got rid of the bluish hue often found in red Esaki.

Fortunately, there's a better way: With a set of soft pastels, you can transform the standard seven tissue colours (red, orange, yellow, blue, green, black and white) into a staggering array of colours, ranging from pale blues and grays to shocking shades of purple and chartreuse.

Materials:

Artist Pastels are at the heart of this process. A well-stocked art or craft supply store will have several brands to choose from. Most university bookstores carry pastels for students taking art classes. If you're desperate or want to get started immediately, the local Wal-Mart may even carry a few brands (mine does).

Common names include Alphacolor, Talens-Rembrandt, Windsor & Newton, Conte, Carre, Yarka, Pastello, Holbein, and Prismacolor Nu-pastels. These vary in price and quality and are sold in sets or individual sticks. In my opinion, the best value for your money are Prismacolor Nu-pastels, but don't get too hung up on a specific brand. My first tries were with Alphacolor pastels; a set of 12 basic colours costs less than $8.00 at my local Wal-Mart.

Individual sticks are sometimes available for as little as 50 cents, and broken bits or leftover sticks can sometimes be found in closeout bins near the pastel display.

IMPORTANT: Don't go home with oil pastels or water-colour sticks by mistake.

Esaki Tissue is the standard Japanese tissue available from Peck-Polymers, Aerodyne, and many other sources. Unfortunately, chalking doesn't work as well on the popular True Olde World tissue available from Micro-X. Its relatively open weave makes it too porous for effective chalk treatment.

Glass, Foam-Core Board, or Newspaper will be used to make the smooth work surface needed for chalking. If you use glass or foam-core, make sure it's completely free of grit and dried glue. Otherwise the tissue WILL tear when you go to rub chalk over it (guess how I know this?) You can also cover your work area with several sheets of newspaper to create a smooth, pliable surface but cover over it with a sheet of white shelf paper to keep any ink from rubbing off on your tissue.

Facial tissue, Toilet Paper or Paper Towel is used to work the pigment into the Esaki after you apply the chalk.

Krylon Crystal Clear #1301 is an acrylic coating that has replaced nitrate dope in my workroom. Look for it at the hardware store. It's easily applied, water-resistant, available in a glossy and satin formula, and does not exhibit any nasty shrinking tendencies.

The Basic Process:

This is where the real fun begins! Chalking tissue is odourless and painless but it can get dusty so I'd wear something other than a white oxford shirt.

First Grab a sheet of Esaki from your stash (I happened to choose red) and cut a bunch of sample swatches. They don't have to be huge – 2" x 4" is enough. Put the swatch rough side up on the glass or newspaper

and grab any colour from your pastel box. Rub the chalk over until the tissue is thoroughly covered. Smooth and blend the pigment by gently rubbing with a wad of tissue paper. Brush away any remaining loose chalk and you'll have a dull and dusty looking piece of tissue. This is what you want. Write the chalk colour or number somewhere on the swatch and tape it shiny side up to a piece of white bond paper.

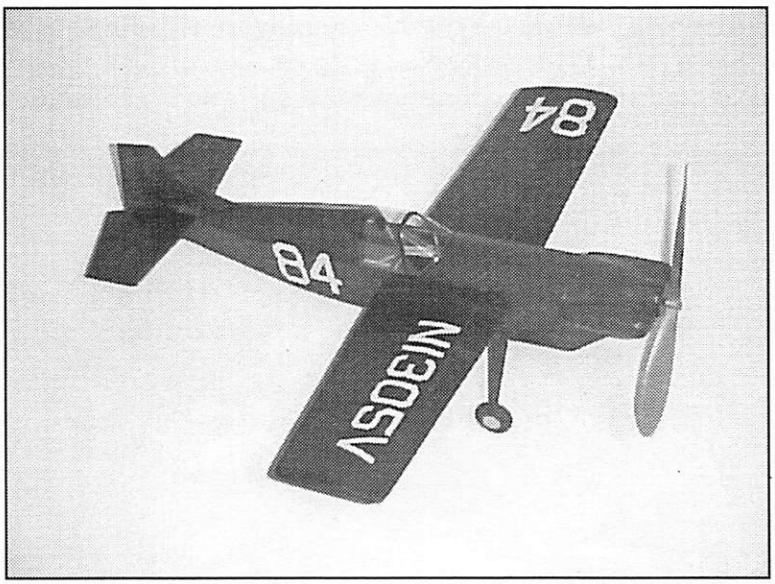


Photo by Scot Dobberfuhl

Photo: Scot's Thompson-Balbonie Special is a deep, rich maroon colour. Blue and brown chalk on red esaki.

Repeat the process again with various different colours. Be bold! Use the royal purple on red tissue... don't shy away from the blacks and grays! If you've got chartreuse, use it on the red tissue, never mind if you think it will clash. What you're doing here is creating a palate of colours as a reference for future projects. Don't limit yourself to what you know will work, it is often the unlikely combinations of chalk and tissue that yield the most surprising results.

Once you have all your swatches taped to the white bond paper, add a "control" sample of unchalked Esaki. Here's where the fun starts. Spray the swatches with Krylon and watch the colours emerge!

If everything goes as planned, you'll end up with a range of hues from orange to brown to burgundy – NONE of which had I imagined were lurking in a sheet of red Esaki tissue.

Green chalk on red tissue creates a brown that might be just perfect for that WW-I model. Brown chalk on red tissue makes a rich mahogany perfect for the "plywood" fuselage on that Ansaldo SVA-5. Orange chalk on red makes a vibrant red-orange that cries out for a Mr. Smoothie racer. Red chalk on red tissue makes . . . red, but compare your chalked swatch of red to the unchalked "control" sample. Notice the difference? Remember to save the samples you've created for future reference.

While any colour in the spectrum is possible with the right combinations of chalk and tissue, here are, the most easily achieved results.

More intense and opaque colours: Yellow chalk on yellow tissue makes a gorgeous Cub yellow. White chalk on white tissue makes a noticeably brighter and more opaque white. You get the idea.

Slight colour shifting to achieve linen shades for antique ships or the grays and light blues found on so many military schemes. Start with white tissue and use the subtle shades of chalk. When you spray the tissue with Krylon, the white turns nearly transparent and the pigment really shows through.

Covering/Sealing:

Once you've found the chalk/tissue combination you want, make enough tissue to cover your model. Simply follow the steps above using a piece of tissue large enough for your project. DON'T spray your tissue sheets with Krylon yet; wait until the tissue is on the model. Your chalked sheets will look dull and dusty, and a little chalk might rub off on your fingers but don't worry, covering with chalked tissue is not really any different than covering with regular tissue.

I prefer to cover with a purple UHU glue stick, rubbing alcohol, and Krylon because this is what works for me. Thinned white glue, glue pens, and dope/thinner will probably work too, but test cover a sample framework just to be sure. I cover my models with wet tissue, and the chalk isn't affected at all. I place the piece of tissue on a towel shiny side up and mist it with rubbing alcohol, then place it on the model. Here are a few things to keep in mind:

Be sure the chalked surface of the tissue is facing in and the shiny side is facing out.

Purple UHU can bleach some chalked tissue, particularly light blue. Check a sample to be sure.

Once the model is covered and you've eliminated all the wrinkles (or most of them), spray the model with Krylon to bring out the colours, seal the surface, and lock in the shrinkage. Several

very light coats, misted on, are always better than one thick one. If sprayed lightly, Krylon tends to sit on the surface ; the rich colours of the pigment come through, and the overall effect is more opaque than transparent. If sprayed thickly, the Krylon will saturate the tissue which becomes translucent/transparent.

Tips and Tricks:

Don't try for drastic colour shifts. Turning white tissue into dark blue will take a lot of time and chalk, and the end results are more likely to be blotchy or uneven.

Blend different colours of chalk to create an even wider range of pigments. Rolling a paint bottle over a pastel stick will crush it into dust. I created a deep maroon tissue by rubbing a brown and blue chalk blend into red tissue and adding small amounts of white or black dust to the mix can brighten or intensify colours.

Dye tissue with Pantone or similar inks or bleach tissue in the sun to create a different range of base colours to work from. This is especially true for green, blue, and orange. Tape the it to a piece of foam-core and put it outside in a sunny place for a few hours or tape it in a sunny window until it's sufficiently faded (Be ready to answer questions from curious neighbors).

Bleach the tissue using a 3:1 water/Clorox solution. Green Esaki turns yellow and blue Esaki turns white. The bleached areas can then be brightened or shaded with chalk to arrive at the perfect lightweight camouflage scheme.

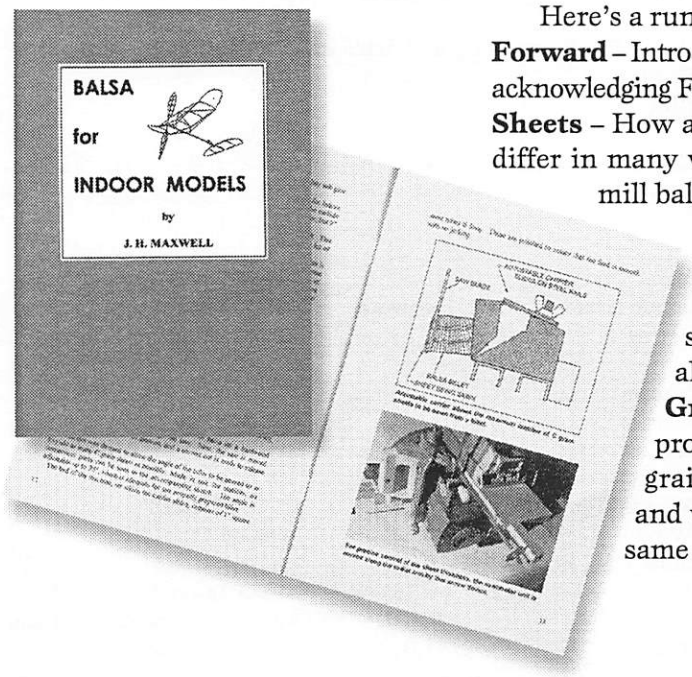
Coloured pencils are excellent for adding fine details in logos or for drawing pinstripes around registration numbers. If you do this on the backside of the tissue, the colours will shine through after spraying. It will look like they are embedded in the tissue. Watch the scale judge try to figure out how you did it!

Thanks and acknowledgements go to Chris Parent, for discovering and perfecting most of these techniques, and to Larry Marshall and Rich Weber for sharing their chalk expertise with me.

Balsa for Indoor Models

Joe Maxwell is well known for his "Aids for Advanced Aeromodellers" but recently he has been phasing out his products.There are a few reasons for this: the struggle to find decent balsa and fewer people building their own models, for example, but the main reason was that he wanted to spend more time producing a few small books.

His first book, "Balsa for Indoor Models", is a 48-page booklet packed with everything you ever wanted to know about balsa. Joe has really put together an amazing collection of facts, history and practical knowledge that could only come from his immense experience going back more than fifty years.



All the basics are covered: cutting indoor grade balsa, testing it and selectring the best sheets but the book is not just for indoor fliers, it will be of interest to any modeler who uses balsa. For anyone interested in cutting their own wood, the chapter on sawing is worth the price of the book all on its own.

Here's a rundown of the chapters:

Forward – Introducing indoor balsa and acknowledging Frank Zaic's influence.

Sheets – How and why Indoor sheets differ in many ways from run-of-the-mill balsa stock.

Density – Low density balsa is essential but scarce, and why sheet markings are not always reliable.

Grain – The origins and properties of A, B and C grains. How they differ, and why C grain is not the same as quarter grain.

Strength and Stiffness – Stiffness is more important than strength. Two ways of testing stiffness, how it varies with density, and its influence on structural design.

Sawing – Produce your own Indoor sheets, for better grain and less expense. A description of the methods used by the author.

Measuring – Recommended apparatus for weighing and measuring Indoor sheets.

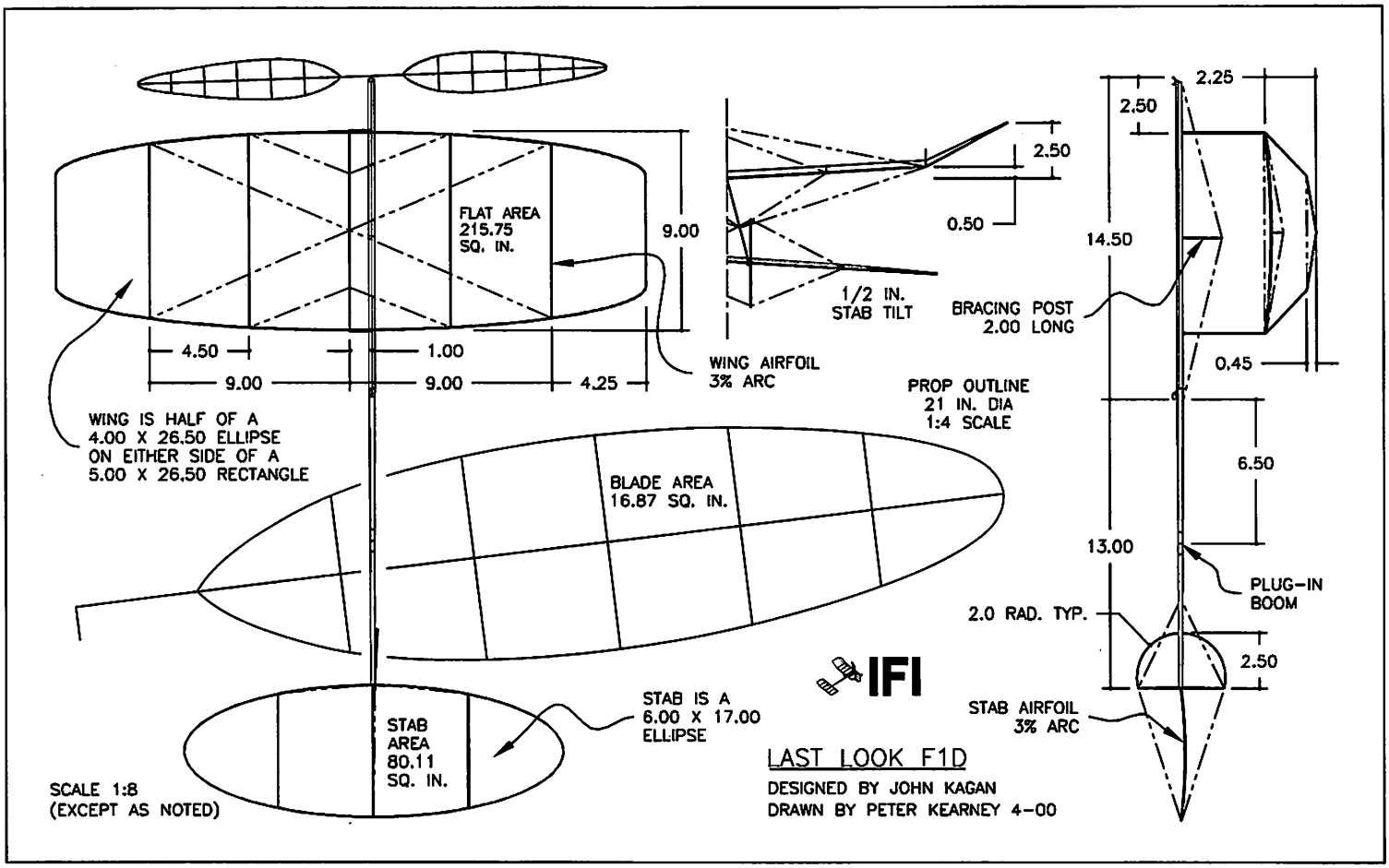
Sources – Balsa trees grow on both sides of the Pacific Rim so why is it so difficult to get good indoor balsa?

The Background – An account of the experience which, he believes, qualify the author to write this book.

The price of the book is £7.50 post free in the UK, £8.00 in Europe and £8.50 for the rest of the world (or 15$ in U.S. bills NOT a check)

Send your payment to:

Joe Maxwell
11 Windsor Place
Stirling, Scotland
FK8 2KY



Motor Stick	**Density/Grain**		**Size**
Tube	4.6#	C	.0125 X .212 ID X 14.50
			.004 Boron at 0, 90, 180, 270
Rear Web	5#	C	.020 X .500 X .375
Rear Hook			.013 Music Wire
Front Web	5#	C	.020 X 0.500 X Tube Dia.
Prop Hanger			Harlan
Front and Rear "Floor"	4.6#	C	.0125 X .125 X .750
			Glue on outside of tube.
Bracing Post	6-7#	B	.048 Sq. - > .040 Sq. X 2.00
			Slit to fit over boom
Wing Tubes	Tissue		.060 ID X 0.375
Bracing			.001 Tungsten
Boom			
Tube	4#	C	.008 X .255 - > .135 X 13.00
Rear Cap	4#	C	.008
Joiner Tube	4#	C	.008 X 1.00
			Cut boom at 6.50
Wing			
Spar	5.1#	A	.034 X .042
Tip	5#	A	.032 X .036
Cabane	4.5#	A	.033 X .035 X 2.625 (4 Pieces)
Posts	5#	B	.034 X .055 X 4.00
			.003 Boron on sides
Compression Ribs			
Rib	5#	C	.024 X .064
Bracing Post		B	.024 Sq. X .500
Wire			.0003 Tungsten
Middle Ribs	5#	C	.024 X .048
Bracing Wire			.0007 Nichrome

Stab	**Density/Grain**		**Size**
Outline	5#	A	.027 X .040
Center Rib	5#	C	.024 X .045
Outer Ribs	5#	C	.024 X .038
Fin			
Outline	4.5#	A	.024 Sq.
Post	5#	B	.028 X .050 - > .040
Prop (See Steve Brown articles in INAV issues 89 and 95)			
Outline	5#	A	.024 Sq.
Ribs	5#	C	.025 Sq.
			6% Arc
Center Spar Yoke	4.5#	A	.075 X .100 - > .040 X 1.25
Spar	5#	B	.075 X .080 - > .025 Sq.
Shaft			.013 Music Wire
			Shaft loops around yoke
Yoke			.011 Music Wire
Screw Arm	Basswood		.033 X .095
Spring			.009 Music Wire, 8 Turns
Motor			
Size			.069 X 17.00
Batch			10/97

Weights (gm)		**1st USIC 1999**
Wing	0.305	Johnson City, TN
Stick + 1/2 Boom	0.350	48:48 and 44:41
Stab/fin + 1/2 Boom	0.165	**1st US Team Trials 2000**
Prop	0.220	Akron Airdock Akron, Ohio
Total	1.040	51:11 and 49:50

New Source for 00-90 Screws

The 00-90 screws used on V.P. props have become harder to find since Small Parts Inc. stopped carrying them a year ago.

Fortunately, a new supplier has been found by the name of Microfasteners. They cater primarily to the hobbyist market and now carry both 00-90 and 0-80 screws, thanks to indoor flier Tim Goldstein.

The available types are 00-90 x1/2" slotted binder head or 0-80 x1/2"slotted pan head nylon screws. Both are a bit long and should be trimmed to length, but it is not a big problem.

The 0-80 size is perfect for heavier models such as F1M or Pennyplane. Some even prefer them for F1D due to ease of adjustment and larger surface area for torque arm contact. The only drawback is the need to partially drill out the center to keep the weight down.

Whichever type you choose, you can't go wrong with the price:10 screws for only $3.50 or $3.05 respectively.

When ordering quote part numbers NBB00908 and NBP0008 and don't forget to include a few bucks for postage.

Microfasteners
100 Hillcrest Road
Flemington, NJ 08822 USA
Ph:1-800-892-6917or 908-806-4050
info@microfasteners.com
www.microfasteners.com

A source for inexpensive taps is:

Special Shapes
P.O.Box 7487
Romeoville, IL 60446 USA
Fax: 630-759-1978 Ph: 630-759-1970
info@specialshapes.com
www.specialshapes.com

00-90 and 0-80 taps are $2.65 and a tap handle is $4.95. They also carry 00-90 and 0-80 screws in steel and brass.

2000 Canadian Team Trials

Report by Bill Henderson (CAN)

In order to allow modellers from across the country to have an opportunity to fly, the team trials were organised on a decentralised basis across the country. Flights could be made any time between the beginning of October to the end of November in sites local to modelers. Due to the larger interest in this event in the Toronto area, a four-night schedule was established, using the main gymnasium (Cat. I site) of C.W. Jeffreys Collegiate Institute. Three modelers, Vlad Linardic, and Mike Thomas from Toronto and Fred Tellier from Windsor all flew in Toronto. Edmund Liem from Vancouver completed his three flights locally in British Columbia.

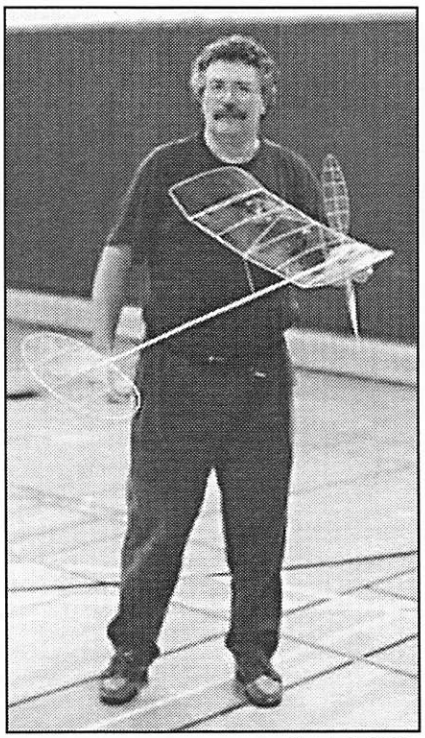


Photo by Fred Tellier

The Toronto area trials were organised according to F1D competition rules (i.e. two timers per flight, six flights to be completed and the total of the best two flights to count as the final score.) The final results were as follows (only top two flights shown):

Name	Flt. 1	2	Total
F. Tellier	32:30	30:51	63:21
V. Linardic	29:33	24:58	54:31
M. Thomas	26:28	26:10	52:38
E. Liem	20:19	19:20	39:39

MikeThomas has declined to be a member of the team, so the team will consist of Fred Tellier, Vlad Linardic and Edmund Liem.

Results from the 2000 US Team Trials

Lockheed Martin Airdock Akron, Ohio Sep. 4-6 1999

Name	Flt. 1	2	Total
J. Kagan	51:11	49:50	101:02
L. Coslick	52:04	47:09	99:13
J. Richmond	50:12	45:52	96:04
D. Slusarczyk	47:54	47:35	95:29
C. Banks	45:51	44:21	90:12
R. Doig	41:56	38:15	80:11
N. Leonard Sr.	41:50	35:43	77:33
N. Leonard Jr.	38:54	37:08	76:02
B. Hulbert	37:55	33:40	71:35
T. Vallee	34:29	34:21	68:50
L. Mzik	35:02	32:49	67:51
L. Loucka	38:22	00:00	38:22

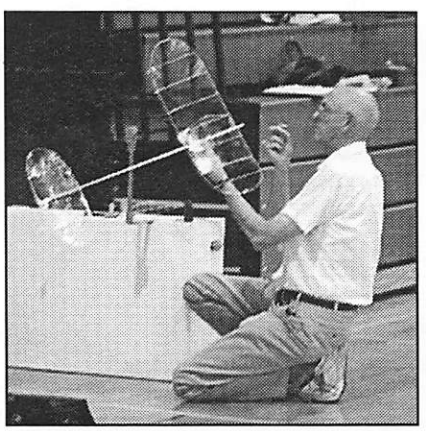
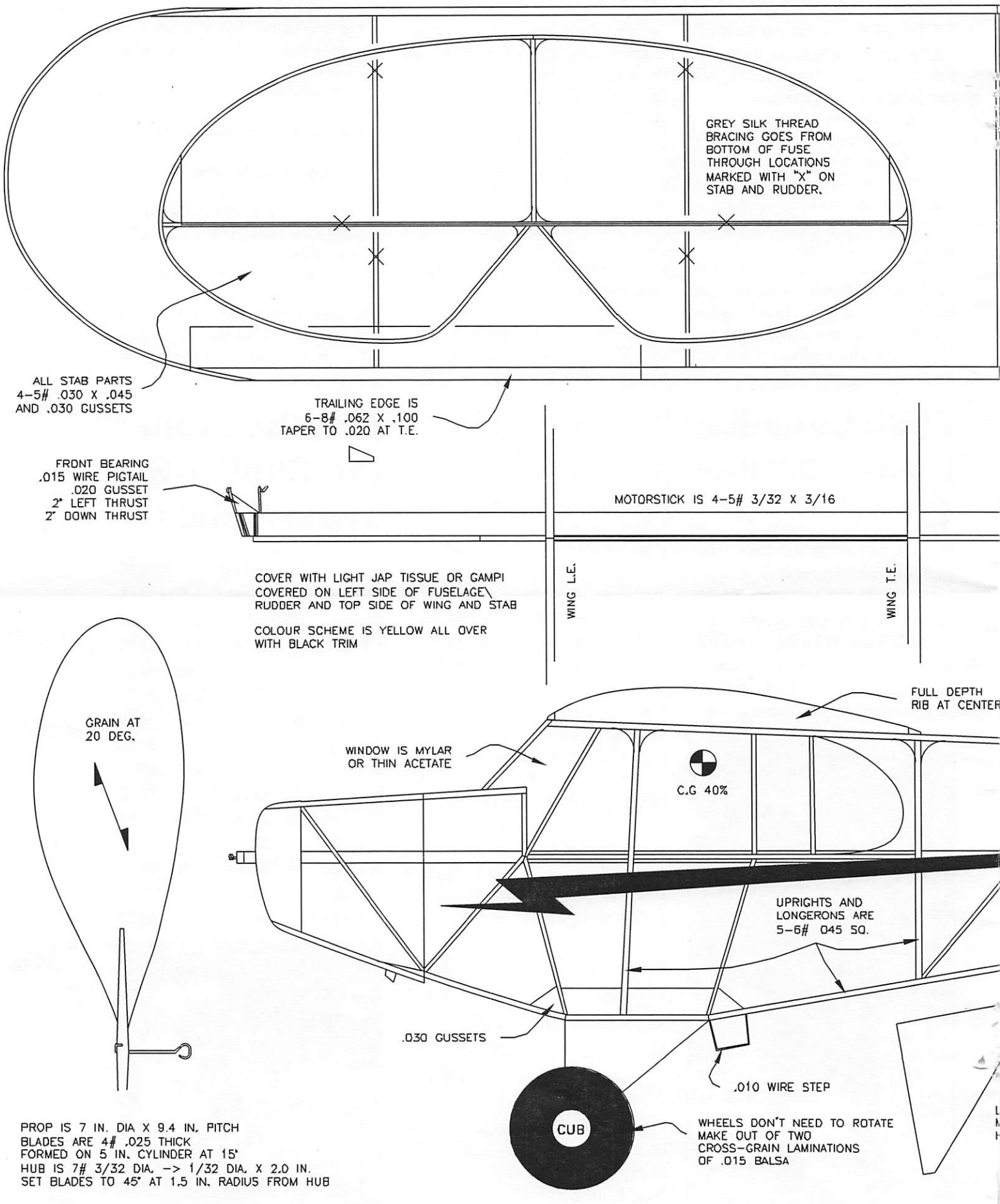
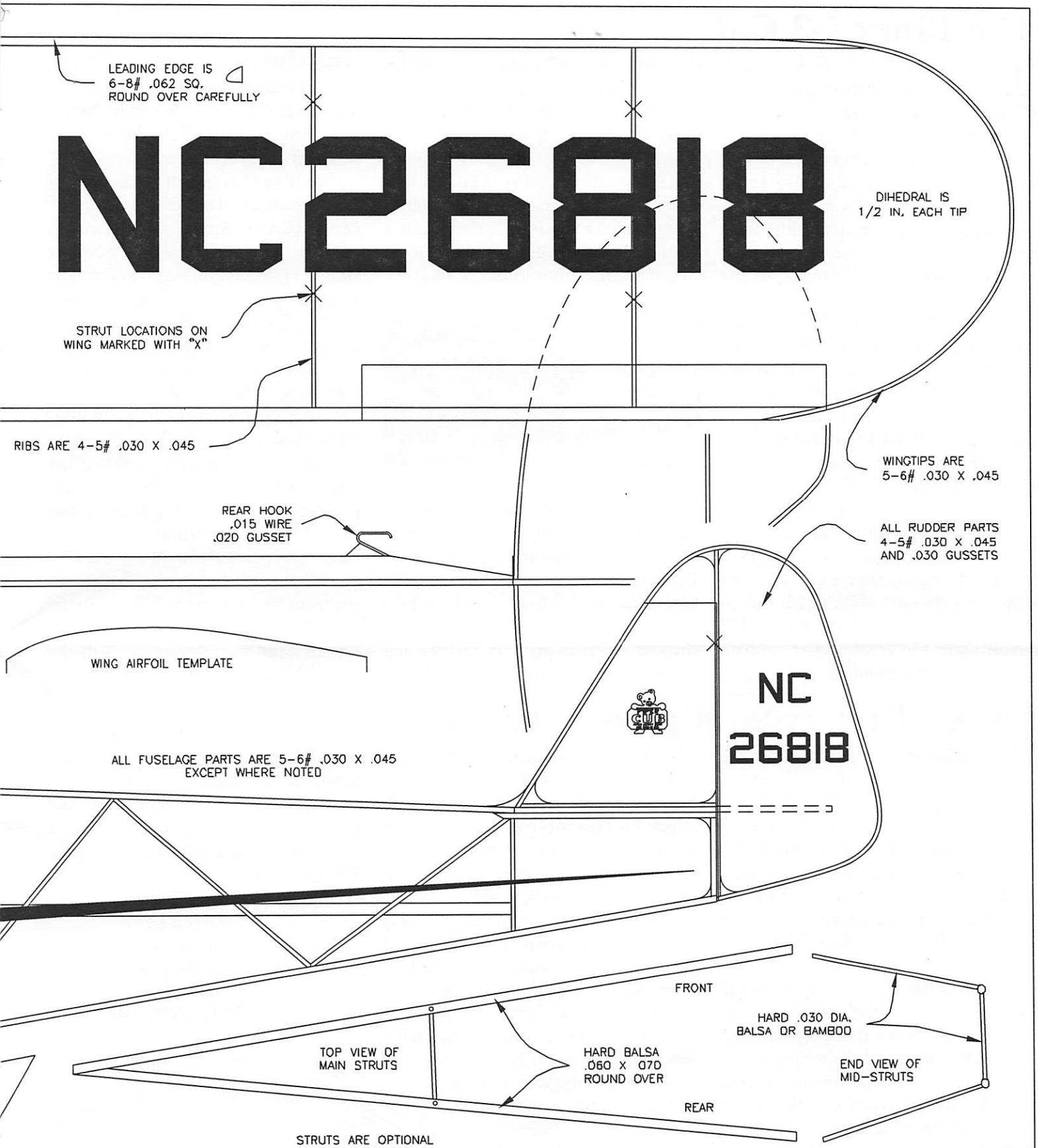


Photo by Fred Tellier

Left: Fred Tellier with winning model.

Right: Mike Thomas prepares his model.


GREY SILK THREAD
BRACING GOES FROM
BOTTOM OF FUSE
THROUGH LOCATIONS
MARKED WITH "X" ON
STAB AND RUDDER.
ALL STAB PARTS
4-5# .030 X .045
AND .030 GUSSETS
TRAILING EDGE IS
6-8# .062 X .100
TAPER TO .020 AT T.E.
FRONT BEARING
.015 WIRE PIGTAIL
.020 GUSSET
2° LEFT THRUST
2° DOWN THRUST
MOTORSTICK IS 4-5# 3/32 X 3/16
WING L.E.
WING T.E.
COVER WITH LIGHT JAP TISSUE OR GAMPI
COVERED ON LEFT SIDE OF FUSELAGE\
RUDDER AND TOP SIDE OF WING AND STAB
COLOUR SCHEME IS YELLOW ALL OVER
WITH BLACK TRIM
GRAIN AT
20 DEG.
FULL DEPTH
RIB AT CENTER
WINDOW IS MYLAR
OR THIN ACETATE
C.G 40%
UPRIGHTS AND
LONGERONS ARE
5-6# 045 SQ.
.030 GUSSETS
.010 WIRE STEP
CUB
WHEELS DON'T NEED TO ROTATE
MAKE OUT OF TWO
CROSS-GRAIN LAMINATIONS
OF .015 BALSA
PROP IS 7 IN. DIA X 9.4 IN. PITCH
BLADES ARE 4# .025 THICK
FORMED ON 5 IN. CYLINDER AT 15°
HUB IS 7# 3/32 DIA. -> 1/32 DIA. X 2.0 IN.
SET BLADES TO 45° AT 1.5 IN. RADIUS FROM HUB


LEADING EDGE IS
6-8# .062 SQ.
ROUND OVER CAREFULLY
NC26818
DIHEDRAL IS
1/2 IN. EACH TIP
STRUT LOCATIONS ON
WING MARKED WITH "X"
RIBS ARE 4-5# .030 X .045
WINGTIPS ARE
5-6# .030 X .045
REAR HOOK
.015 WIRE
.020 GUSSET
ALL RUDDER PARTS
4-5# .030 X .045
AND .030 GUSSETS
WING AIRFOIL TEMPLATE
NC
26818
ALL FUSELAGE PARTS ARE 5-6# .030 X .045
EXCEPT WHERE NOTED
FRONT
HARD .030 DIA.
BALSA OR BAMBOO
TOP VIEW OF
MAIN STRUTS
HARD BALSA
.060 X 070
ROUND OVER
END VIEW OF
MID-STRUTS
REAR
ANDING GEAR PATTERN
AKE GEAR OUT OF
ARD .030 SHEET
STRUTS ARE OPTIONAL
IF USED MAKE ALL
WING RIBS FULL DEPTH
CUT STRUTS EXTRA LONG
AND TRIM TO LENGTH
DURING ASSEMBLY
IFI
PIPER J-3 CUB NO-CAL
DESIGNED AND DRAWN
BY PETER KEARNEY

The Piper J-3 Cub

The history of the Cub dates back to the late 1920s when two brothers, Gilbert and Gordon Taylor, designed a two-seat monoplane called the Chummy.

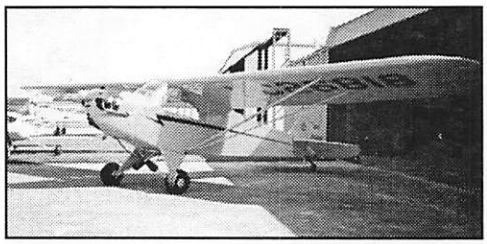
One of the stockholders in the company was an oilman named William T. Piper. He believed the Chummy was too expensive and inefficient and sponsored the development of a small plane to sell for half of the Chummy's $3,985. The E-2 was born.

Fitted with a two-cylinder, 20-hp Brownback "Tiger Kitten" engine, the E-2 was a flop. Testing revealed it was barely able to take-off and without a suitable powerplant, the Taylor company went bankrupt in 1931.

Piper bought up the assets for $761 and kept Taylor as chief engineer. Later that year, Continental came out with a 37-hp A-40 and, with the new engine, twenty-two E-2s were sold by 1935.

The following year, Piper hired an engineer by the name of Walter Jamouneau to make a number of changes to the E-2 resulting in the greatly improved J-2 (J being for Jamouneau). Taylor detested the changes and left that year to start his own company, Taylorcraft.

The J-2 brought Piper Aircraft some success but it was Jamouneau's next project, the J-3 that ensured Piper's place in aviation history. Among other things, the J-3 featured a new steel tubing frame, bucket seats, brakes, and a steerable tail wheel, features seldom found on light aircraft of the time.



Production of the J-3 began in 1938, selling for only $1300. Just prior the United States entering World War II, sales skyrocketed with the organization of the Civilian Training Program (CPT). The CPT had selected the Cub as their primary trainer and by 1941, four out of five pilots flying in World War II were trained on them.

The Cub also saw action during the war, rendering valuable service as the L-4, O-59 and NE-1, in observation, liason and ambulance roles.

Civilian Cub owners took part in the war as members of the Civil Air Patrol (CAP). Among other chores, they patrolled U.S. coastal waters for German U-boats and survivors of their attacks. By the time the navy took over in 1943, CAP members had flown more than 86,000 missions.

Piper resumed manufacturing the familiar yellow and black J-3 after the war and by the time production ended in 1947, 14,125 J-3s had been built. In all, eleven models of the Cub were produced but none were more successful or more popular than the J-3. So popular in fact that, to this day, small planes are sometimes referred to as "Piper Cubs".

Where did "Cub" come from? The company'ss accountant Gilbert Hadrel heard the E-2 was powered by a "Tiger Kitten" and said "Why not call the plane the Cub?". The name stuck.

Derek Richards' Bigfoot F1M (UK)

The relatively simply rules for the F1M class allow for all sorts of interpretations and shapes. While it is certainly possible to make a very elegant, high performance model, it is also possible to create a simple, robust design, suitable for the beginner or clubroom flier, without compromising too much. Derek's Bigfoot F1M is one such model.

Construction is pretty straightforward: For simplicity a solid motorstick is used and the smaller than usual prop will keep the weight down and the torque at low levels. The only real deviation from standard indoor practice is the use of formed ribs rather than sliced ones. The diagram at the right shows how to setup the jig. Once the rib stock is formed, ribs can be sliced off quite easily with a stripper or by hand using a ruler to temporarily flatten the sheet.

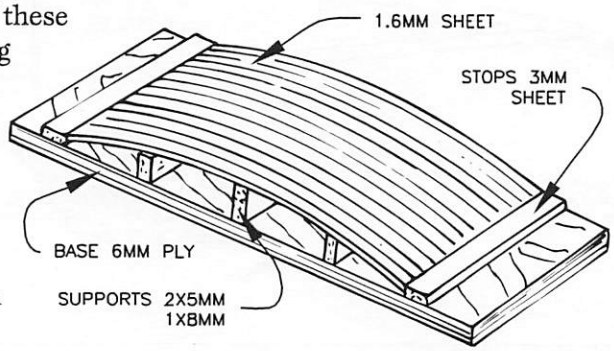
The only drawback to formed ribs is their tendency to flatten out over a long period of time. To reduce the effect, I suggest drying the wood in an oven set to 200 for 20 minutes; It is really the heat, not the soaking, that will cause a permanent set.

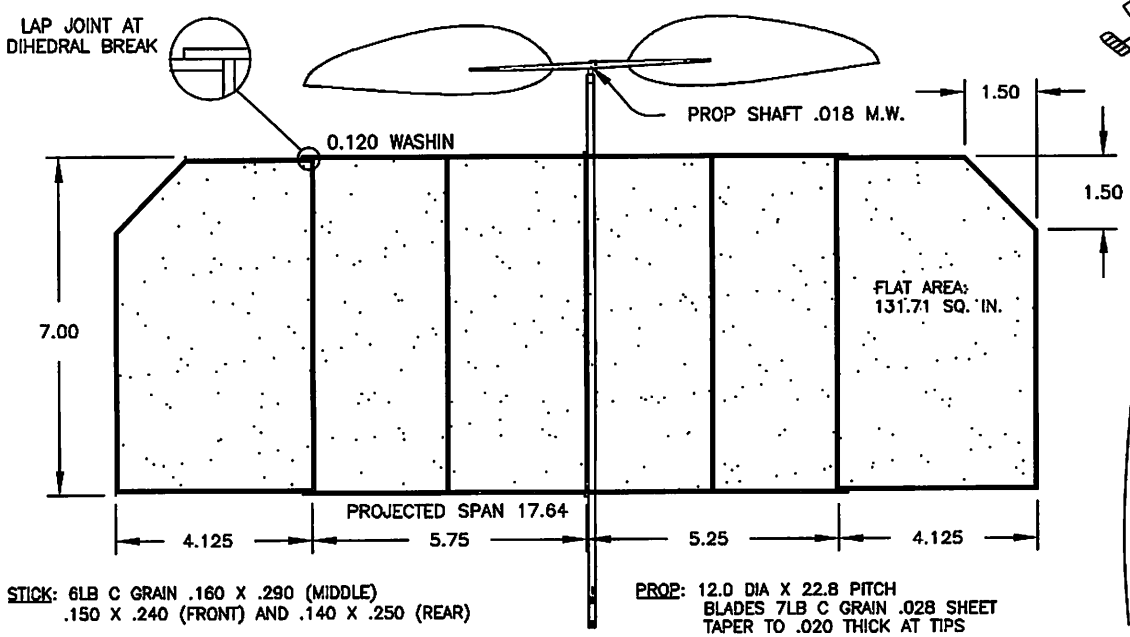
Select your wood carefully. Sticking close to the densities on the drawing will get you to the minimum weight but, more importantly, choose wood that is as stiff as possible even if a little heavy.

Any beginner, with a little help, should be able to build on of these in a few evenings. Knowing Derek, Bigfoot is probably a top performer so don't be too surprised at the results!

If you would like to build one, John Tipper of F1D Indoor Supplies (in the UK) has put together a starter pack consisting of: wood for the propeller, covering material, a front bearing, wire for the prop shaft and rear bearing plus a teflon washer for the prop. Price is £5.00 inc postage. Write to him:

John Tipper
23 Green Lane
Chichester
West Sussex
PO19 4NS
Tel 01243 773346





STICK: 6LB C GRAIN .160 X .290 (MIDDLE)
.150 X .240 (FRONT) AND .140 X .250 (REAR)

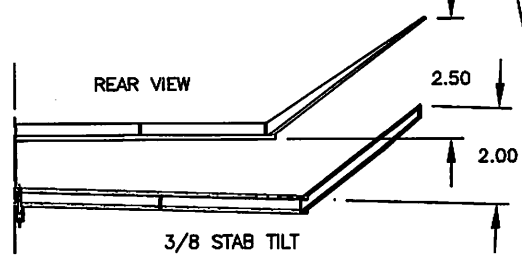
BOOM: 6LB C GRAIN .110 X .210 → .070 X .120

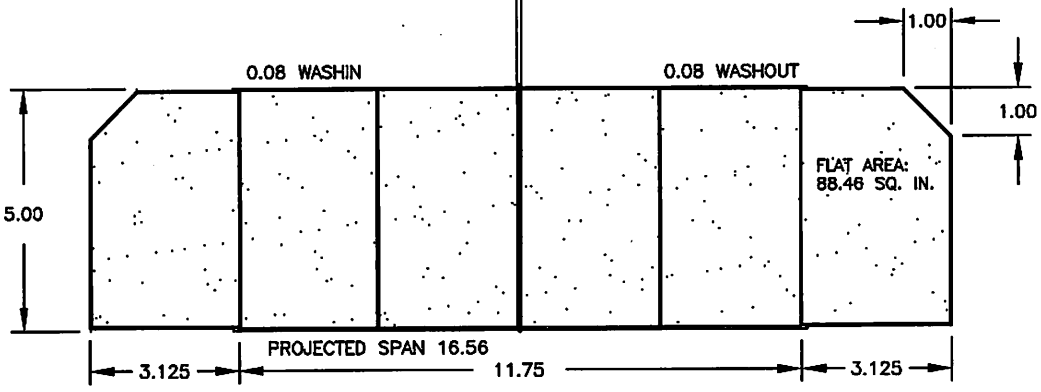
WING: SPARS 7LB B GRAIN .050 X .110 → .050 X .090
TIP SPARS 6.5LB B GRAIN .050 X .065 → .050 X .055
TIP RIB 6.5LB B GRAIN .050 X .055 FLAT
CENTER AND DIHEDRAL RIBS 6.5LB A GRAIN .050 X .067
MIDDLE RIBS 6.5LB A GRAIN .040 X .087
POSTS 7.5LB B GRAIN .065 X .065

STAB: SPARS 7LB B GRAIN .045 X .075 → .045 X .055
TIP SPARS 6LB B GRAIN .036 X .050 → .036 X .040
TIP RIB 6LB B GRAIN .036 SQ. FLAT
ALL OTHER RIBS 6.5LB C GRAIN .032 SQ.
POSTS 6.5LB B GRAIN .055 X .055

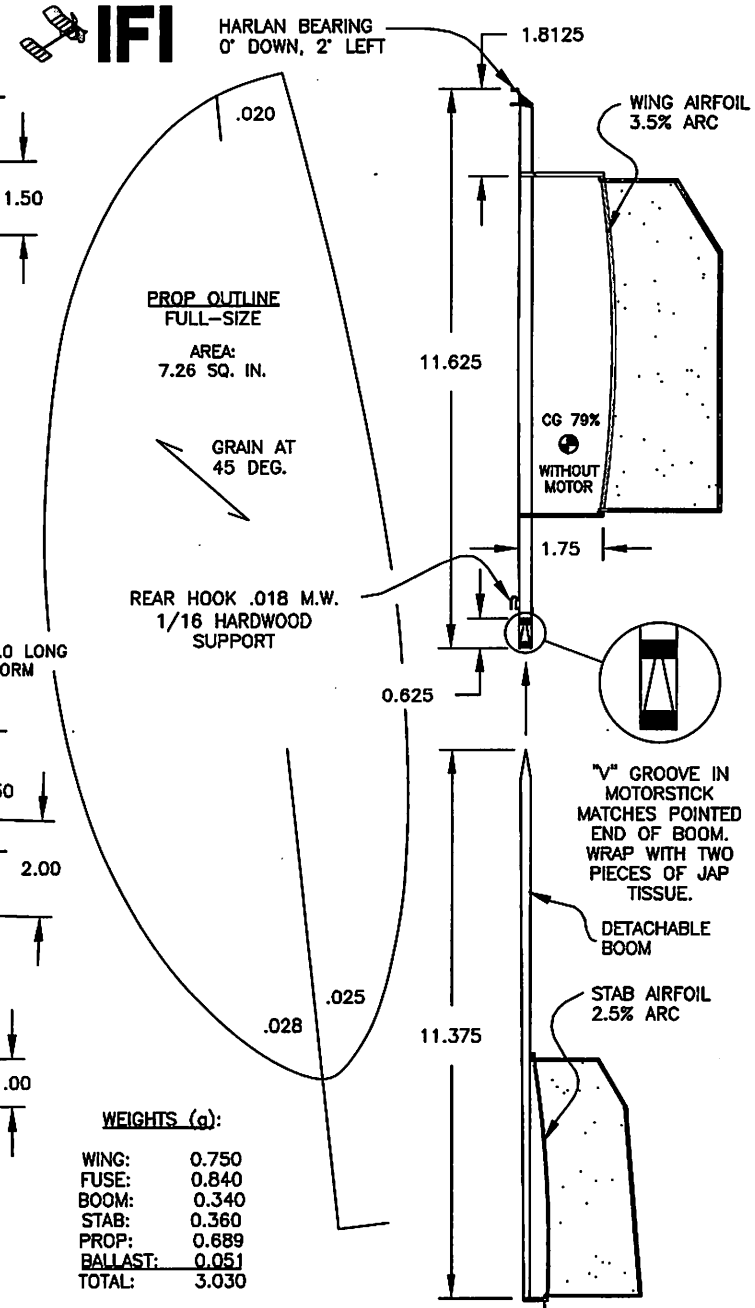
COVERING: POLYMICRO

PROP: 12.0 DIA X 22.8 PITCH
BLADES 7LB C GRAIN .028 SHEET
TAPER TO .020 THICK AT TIPS
SPAR 8.0LB B GRAIN 1/8 → 1/32 DIA. 5.0 LONG
BLADES FORMED AT 15 DEG. ON 5.0 DIA FORM
SET TO 45 DEG. AT 3.625 RADIUS





SCALE 1:4 (EXCEPT AS NOTED)
ALL DIMENSIONS IN INCHES

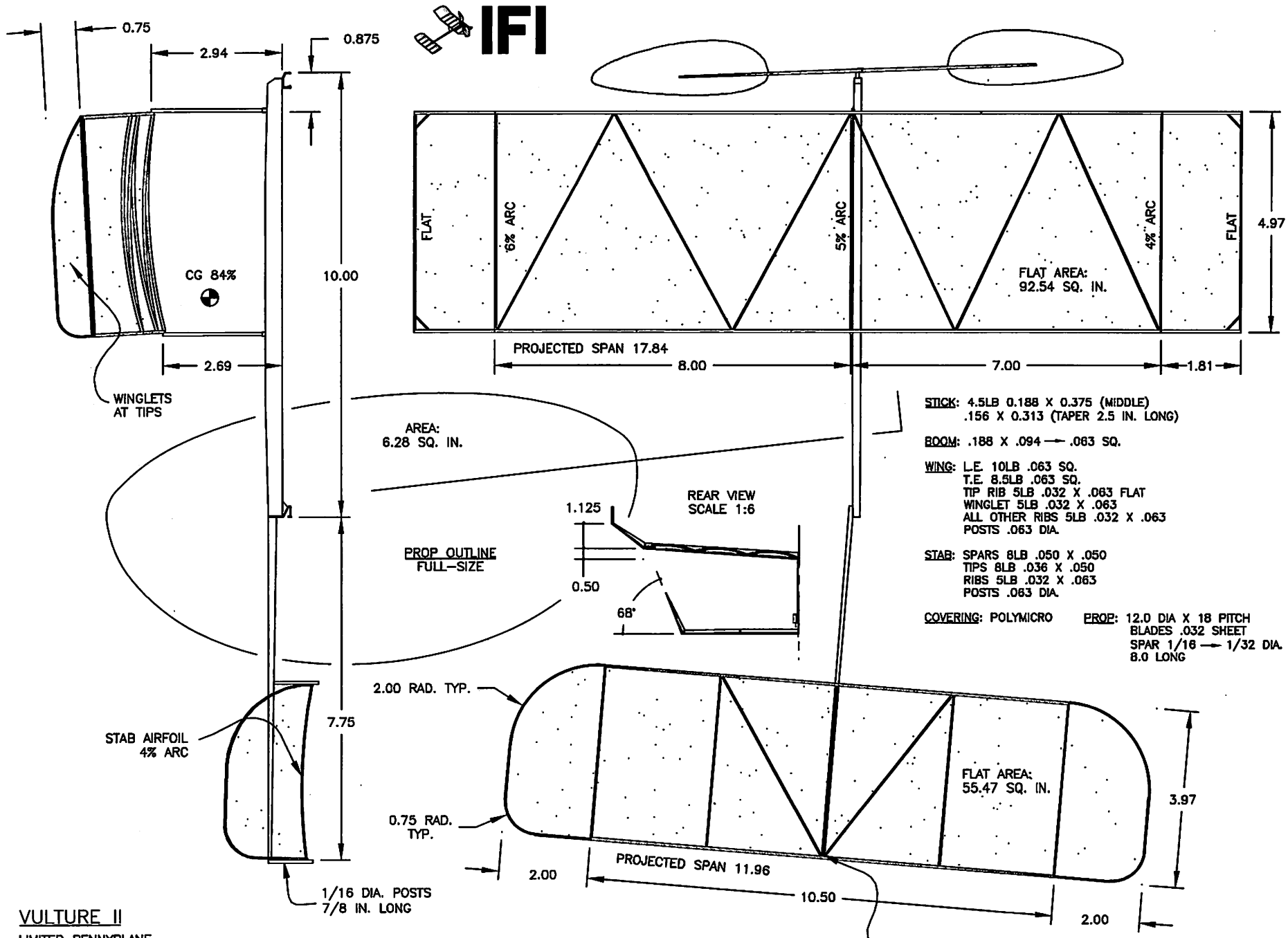


WEIGHTS (g):

WING:	0.750
FUSE:	0.840
BOOM:	0.340
STAB:	0.360
PROP:	0.689
BALLAST:	0.051
TOTAL:	3.030

BIGFOOT F1M

DESIGNED BY DEREK RICHARDS
DRAWN BY PETER KEARNEY 5-00



STICK: 4.5LB 0.188 X 0.375 (MIDDLE)
.156 X 0.313 (TAPER 2.5 IN. LONG)

BOOM: .188 X .094 → .063 SQ.

WING: L.E. 10LB .063 SQ.
T.E. 8.5LB .063 SQ.
TIP RIB 5LB .032 X .063 FLAT
WINGLET 5LB .032 X .063
ALL OTHER RIBS 5LB .032 X .063
POSTS .063 DIA.

STAB: SPARS 8LB .050 X .050
TIPS 8LB .036 X .050
RIBS 5LB .032 X .063
POSTS .063 DIA.

COVERING: POLYMICRO

PROP: 12.0 DIA X 18 PITCH
BLADES .032 SHEET
SPAR 1/16 → 1/32 DIA.
8.0 LONG

VULTURE II

LIMITED PENNYPLANE
DESIGNED BY STEVE DONA
DRAWN BY PETER KEARNEY 4-00

KIBBIE DOME ANNUAL – JULY 25-26 1999
3RD PLACE – 14:06

SCALE 1:3 (EXCEPT AS NOTED)
ALL DIMENSIONS IN INCHES

Vulture II Ltd. Pennyplane (USA)

Steve Dona is a regular flier at the Kibbie Dome on the US West Coast. He was nice enough to supply me with a number of plans for future issues including this one, his Limited Pennyplane, a model sporting some unusual features:

Steve writes, "This plane was designed to provide a ROCK steady platform for propeller testing. Some of my former designs had wing leading edge diving problems which led to the development of the diagonal rib structure. In addition the spars on the wing and the stab leading edge are STIFF. I have noticed that many modelers are building a strong wings but the stab twists on the climb-out. This robs the model of that all important initial burst." Steve continues, "The prop is a new departure for me. It uses an idea from Fred Hollingsworth (from Vancouver Canada). He believes the center 1/3rd of the prop is merely drag and can be eliminated without any loss in performance.

To date I have built three of these new style props and the results have been exciting. Because of the reduced drag, they require much smaller rubber. I have been using .073 to .075 tan II, 20" long with this model, much smaller than with standard "wide blade" props. As a result, the model climbs much better and has no torque problems."

Steve placed third at last year's Kibbie Dome Annual with a time of 14:06. John Lenderman set a site record of 16:22 for 1st place.

2000 F1L/F1M Postal Contest

This year's F1L and F1M postal contest, sponsored by Don Slusarczyk, has been extended until the end of May 31st.

Not many people have entered yet. If you thought it was over, get out there and fly... you still have time!

Note: Don's address was incorrect in the last issue (No. 51) so if you tried to enter, you might want to send it again. The correct address is:

Don Slusarczyk
868 Eaglewood Dr
Willoughby, OH 44094 USA

A complete listing of the results can be found on Don's website at **http://www.corecomm.net/dslusarc** and you can reach him by email at **dslusarc @core.com**

The current **F1L** leaders are:

1.	Akihiro Danjo	18:56	1716.50pts.
2.	Paul Squires	14:32	1399.86pts.
3.	Bill Long	14:32	1354.13pts.

The current **F1M** leaders are:

1.	Akihiro Danjo	16:41	1512.51 pts
2.	Tsumu Tanaka	12:34	1155.69 pts
3.	Toshiaki Okada	11:38	1104.72 pts

Millenium International Ornithopter Postal Contest

This year, for the first time in almost two decades, builders of flapping-wing aircraft have an opportunity to compete internationally.

Sponsored by the Ornithopter Society, the Millenium Ornithopter Postal Contest will run throughout the year 2000 with two different categories: An open category for any flapper-propelled aircraft and the Flapper Lift category for aircraft that meet certain restrictions on fixed wings (see rules).

Entries must be received no later than Feb 15, 2001 and should include: 1. An entry form signed by the contestant and contest director (or some other witness?) and 2. A three-view drawing or photo of the model.

Send your entries to:
Nathan Chronister
P.O. Box 376
Arkville, New York, USA 12406

The **RULES**:

1. Model mut be propelled solely by flapping wings or small flapping fins.
2. All flights must be flown indoors and launched by hand within two meters of the floor.
3. Model must be powered by a rubber motor.

If the entry is for Category B, then the following *additional requirements* must be met:

1. 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.
2. All wings must have the same flapping rate and roughly the same range of motion.

Section 1: (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:
(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.
Signature: _____
Date: _____

1st Indoor Model Association Contest - Japan

Report by Akihiro Danjo (JPN)

The competition took place at the 20m high Todoroki Arena in Kawasaki city on Dec. 5th with three classes being flown: F1L, F1M and Ornithopter. It was mild for December (outside temp 10 – 14 deg C) but we were plagued by drift, especially in F1M. It was a busy day for me flying in all three classes and managed a single flight in F1L, 3 flights in F1M and 4 in Ornithopter. I had no luck in F1M... all of my flights ended up 'out of sight', my model having drifted into the 2 meter opening between the roof and the wall about 15 meters up.

F1L (15 flew)

Pl.	Name	Time
1.	Akihiro Danjo	19:17
2.	Toru Onishi	14:31
3.	Youichi Kato	12:56
3.	Michio Osada	12:56
5.	Takao Moriyama	12:51
6.	Shinsuke Miura	12:21

F1M (7 flew)

Pl.	Name	Time
1.	Shigeyoshi Nonaka	11:04
2.	Akihiro Danjo	10:17
3.	Masatoshi Misawa	9:20
4.	Shoji Kaneko	9:17
5.	Zuikichi Fujiwara	8:44

Ornithopter (5 flew)

Pl.	Name	Time
1.	Akihiro Danjo	7:30
2.	Toru Onishi	5:16
3.	Kazumasa Kihara	5:02
4.	Yasutaka Tanaka	3:59
5.	Noboru Omata	3:08

All results are best flight out of five.

Dutch National Championships

Report by Gert Brendel (NL)

On the 28th of December 1999, the Dutch National Championships and the Midwinter Competition were held in two halls of the sports complex at the University of Twente (both halls measure 42x24x10m with smooth ceilings). Seniors flew F1M and Sainte Formula one hall, while the Midwinter Competition for juniors took place in the other hall. The juniors competed in the classes "Wortel" (Dutch for Carrot – a plan of this model appeared under the name (F)looper in an earlier issue of Indoor News), Bostonian (10 gram minimum weight), Moustique (a beginners model in the F1M class) and No-cal scale. Although the separate contest was organised for them, juniors could participate in the National Championships and some of them did.

Although the venue was really great, the number of participating seniors in the National Championships was quite low. This was perhaps due to the eastern location and consequently longer driving distances (at least by Dutch standards) for people who normally appear at regular contests. That being said: how about the results? Hubert Meulman, after initial struggling with a propeller selection, took a well-deserved 1st. place in F1M with a two-flight total of 1549 seconds. Second and third were Matthijs van Hulst and Nick Vissers. In Saint Formula, Mark Vermeulen was the only competitor with a flight total of 158 seconds.

On the other hand, numerous juniors had great fun in the other hall. Gijs Oosterhuis took 1st. place in both (F)looper and Bostonian, with two-flight totals that were somewhat lower than last year. Full junior results below.

Mass launches and air-races are gaining popularity in Holland, and at the end of the day a couple of them were held for everyone to have some fun. The air-races were very nice to watch, with models flying and competitors running all over the place. A great way to release some tension!

A heartfelt thanks goes to the organisation and to the various helpers.
hope to see you again next year!

Dutch National Championships – F1M

Pl.	Name	1	2	3	4	5	6	Total
1.	Hubert Meulman	585	10	510	16	**779**	**770**	1549
2.	Matthijs van Hulst	343	181	343	396	**399**	**410**	809
3.	Nick Vissers	280	323	363	**394**	212	**384**	778
4.	Leon Oude Aarninkhof	295	308	**355**	**372**	351	-	727
5.	Gijs Oosterhuis	**355**	347	**363**	267	265	331	718
6.	Erik Crins	**220**	**382**	51	-	-	-	602

Dutch National Championships – Saint Formula

Pl.	Name	1	2	3	4	5	6	Total
1.	Mark Vermeulen	**66**	**92**	40	-	-	-	158

Midwinter Contest – Moustique (juniors)

Pl.	Name	1	2	3	4	5	6	Total
1.	Remy van Wijk	**173**	**41**	-	-	-	-	214
2.	Martijn Gielen	**151**	-	-	-	-	-	15

Midwinter Contest – Bostonian (juniors)

Pl.	Name	1	2	3	4	5	6	Total
1.	Gijs Oosterhuis	**69**	**60**	44	-	-	-	129
2.	Leon Oude Aarninkhof	**39**	**44**	-	-	-	-	83
3.	Nick Vissers	**27**	-	-	-	-	-	27

Midwinter Contest – Wortel (juniors)

Pl.	Name	1	2	3	4	5	6	Total
1.	Gijs Oosterhuis	53	21	**79**	63	**74**	69	153
1.	Noud van Gemert	39	57	56	66	**70**	**83**	153
3.	Edward Ogg	62	**73**	63	58	41	**72**	145
4.	Martijn Gielen	67	**75**	63	54	**69**	15	144
5.	Melanie Laarman	**66**	65	64	62	32	**68**	134
6.	Remy van Wijk	31	**48**	**47**	20	27	-	95
7.	Nick Vissers	**37**	**42**	-	-	-	-	79
8.	Ruud Kurvers	**44**	**35**	-	-	-	-	79

Midwinter competition – No-cal (juniors)

Pl.	Name	1	2	3	4	5	6	Total
1.	Martijn Gielen	50	45	40	49	46	**53**	53
2.	Eddy Bijnen	**5**	-	-	-	-	-	5

Pylonrace – 1st group

Pl.	Name	# rounds
1.	Nick Vissers and Leon O. Aarninkhof	38
2.	Willy van Dalen and Henk Maatman	29
3.	Edward Ogg and Ruud Kurvers	17
4.	Ruud and Hans Kroes	12
5.	Jeroen Meij and Roel Lucassen	3

Pylonrace – 2nd group

Pl.	Name	# rounds
1.	Marian ter Horst and Niels Brendel	14
2.	Henk Oosterholt and Henk Brendel	11
3.	Willy v. Dalen and Henk Maatman	9
4.	Eddy Bijnen and Laurens	6
5.	Remy van Wijk and Martijn Gielen	3

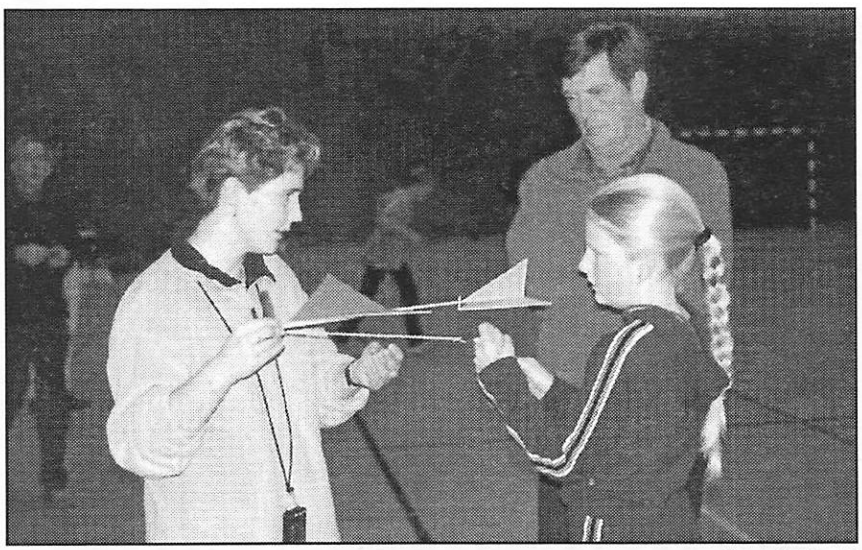


Photo by Gert Brendel

9th Int. Open Indoor Contest

Florence, Italy

23th Jan., 2000

F1N (10 flew) - 2 Flight Total

Pl.	Name	Time
1.	Urs Schaller	109 sec
2.	Marco Zamperini	87 sec
3.	Bento Bertolani	82 sec
4.	Giacomo Scatena	69 sec

TH (10 flew) - 2 Flight Total

Pl.	Name	Time
1.	Giacomo DeAngelini	12:34
2.	Nello Sighelle	10:47
3.	Claudio Bartoli	10:41
4.	Silvia Vaccaro	9:35
5.	Mauro Ghisalberti	9:24

Ministick (9 flew) - 2 Flight Total

Pl.	Name	Time
1.	Peter Keller (SUI)	13:44
2.	Giacome DeAngelini	8:18
3.	Franco Piangiani	7:29

F1M (9 flew) - 2 Flight Total

Pl.	Name	Time
1.	Peter Keller (SUI)	22:15
2.	Renzo Tabellini	14:36
3.	Vittorio Negri	14:29
4.	Giacomo DeAngelini	12:42

Catapult(9 flew) - 3 Flight Total

Pl.	Name	Time
1.	Franco Marvenaro	83 sec
2.	Christian Toccafondo	75 sec
3.	Luciani Maurizio	67 sec

Left: A young flier winds her (F)looper at the Mid-winter Contest

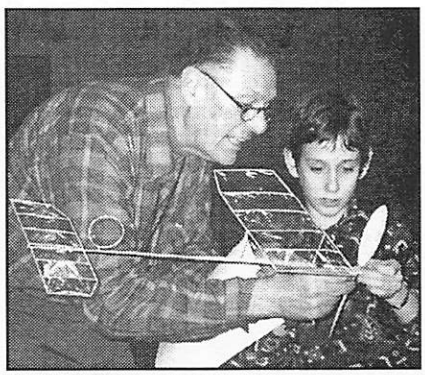


Photo from Thermiksense 1/2000

Right: Well known Wakefied flier Vittorio Negri helps a young-ster prepare his TH Model.

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			1997	SANTA ANA
ASLETT, BERNARD	UK	52:22	X		1983	CARDINGTON
COSLICK, LARRY	US	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	US	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		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
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, IDA140
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 I - 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:
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