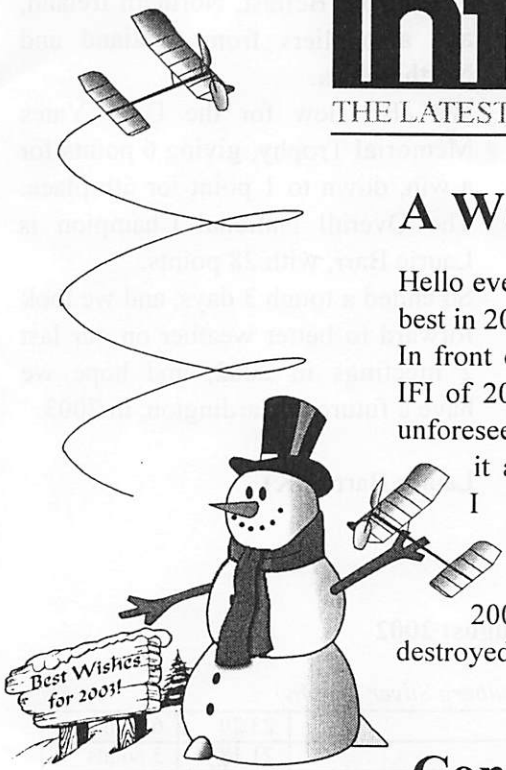
#56
Indoor Flight International
JAN 03
THE LATEST NEWS AND INFORMATION ON INDOOR MODEL AVIATION.



A Word from the editor

Hello everyone, and all the best in 2003 to all of you!
In front of you is the first IFI of 2003. Due to some unforeseen circumstances, it appears later than I had planned. Reason is that at the end of 2002, a large fire destroyed one of the university buildings. It was on one of the network servers inside this building that I kept my files regarding IFI. Unluckily enough, most of my files were lost in the fire and I had to a substantial part of this issue all over again.
Clearly, I've learned my lessons now and I'm keeping my files at home, making back-ups every week with a CD burner.
I thank you all for your patience and I hope I can compensate your wait a little with this bigger issue – and with these last words, I wish you happy reading!

Contest Calendar

What & When	Where	Info
Brainbuster Int. Indoor Postal Contest 01.01-31.03.03	Postal Contest	Ministick, A-6 and EZ-B As before all three events will be flown. Individuals may fly as many times as they like, in many sites as they can, in the three-month period. However only their highest score will count towards winning in their respective events.
2003 HANGAR RAT POSTAL CONTEST 02.01-31.03-03	Postal Contest	2003 Postal Contest (open to indoor flyers worldwide). Rules are further on in this issue. Results should be sent to Art Lane, 9 - 617 Wharncliffe Rd. S., London, Ontario, N6J 2N7 Canada or email: *artlane@juno.com* (no later than April 15th)
12th. Florence Indoor Open Int. 26.01.03	Florence, Italy	F1D, F1M-mod, TH, Ministick, F1N, Katapult, Funfly Contact Carlo Pesciolini at *jacopopesciolini@hotmail.com* or by phone at +39 05522 1625 – see the online contest calendar at *http://www.indoorflight.com* for more detail
2003 Midwestern States Indoor Championships 22-23.02.03	Champaign, IL, USA	HLG, Std & unltd cat glider, A6, FAC No-Cal, Sc. Ol., Pennyplane, Ltd Pennyplane, bostonian, ministick, delta dart mass launch, Double whammy mass launch, Intermediate Stick, F1D, Cabin ROG, AROB, EZB, F1L, Helicopter Contact: Bob Warmann, Phone: 708-834-9075
Uni-Dome Indoor Rally 01-02.03.03	Cedar Falls, Iowa, USA	FF Events: HLG, Bostonian 7gm, Unltd. Class Catapult Glider, Electric Duration, Peanut Scale, FAC No-Cal Scale, AMA Delta Dart- Jr. and Open classes. R/C Events: Electric Sport Scale, Indoor Electric Fun Scale and Electric R/C Duration. Contact: Bob Nelson, E-mail: *bobsrc@forbin.net* - Day Phone: 319-277-0211, Night Phone: 319-233-4771
Dutch National Championships F1M 09.03.03	Enschede, The Netherlands	F1M, F1M-Limited, (F)Looper, Bostonian, F1N, No-Cal Scale – from 11 pm to 17 pm. Contact Ebele Schouwstra, email: *sce@wanadoo.nl* or phone: +31 74 2420392 for more details.
British Scale Indoor Nationals 27.04.03	Nottingham, UK	Event takes place at Nottingham University Sports Hall. Peanut, Pistachio, rubber scale (F4D) and C02/electric (F4E). Pre-entry required for these classes. Second funfly hall available all day.
USIC 28.05-01.06.03	Johnson City, TN, USA	US Indoor Championships at the Mini Dome Address : 112 Tillerson Dr, Newport News, VA, 23602, USA
4th. Concours Int. de Bordeaux 07-08.06.03	Bordeaux, France	F1D, F1L, F1M. Entry fee €16+8. Contact: Jean-Pierre Darrouzes, 27 Av Kennedy, 33600 Pessac, France, tel +33 556 076566, fax +33 556 369544
21st. Concours Int. d'Orléans 21-22.06.03	Orléans, France	F1D, F1L, F1M. Entry fee €15+8. Contact: Jacques Delcroix, 41 Allee du Coudray, 45160 Olivet, France, tel/fax +33 238 634957
Kibbie Dome Annual 26-29.07.03	Moscow Idaho, USA	Light and heavy is flown at the same time under the 145' dome at opposite ends. 4-day fun fly style contest. All AMA and FAC events flown. F1D team selection regional.
West Baden, Indiana 15-17.08.03	West Baden, Indian, USA	14th. of August is a set-up day but no flying. It will most likely be a record trials. Keep watching INAV and http://www.indoorduration.com for updates.
5th. Copa Tabarca 6-7.09.03	Alicante, Spain	F1D, F1L, F1M + scale F4D, F4F. Entry fee €15 Contact: Fernando Haro Martinez, c/San Benito 23-d, 0313 Alicante, Spain, tel +43 965 208 587
European F1D Championships 02-05.10.03	CargoLifter, Brand, Germany	European Champs F1D, 14 pm – 20 pm every day ; see details in this issue! Contact Gerhard Wöbbeking at *woebbeking@t-online.de* Telephone: +49 (0) 40 38 98 310 / +49 173 93 53 869

INSIDE

A Word from the editor	1
Contest Calendar	1
The British Duration Nats	2
German Int. Championships	3
Cargolifter Loafer EZB/F1L	5
Tan II Rubber Update	5
Sport Rubber Tests	6
World Championships F1D 2002	6
Harmonisation	11
Electronic Scales	12
Maximus - Sainte Formule	14
Bord-o-line - F1M	14
F1D by Doug Schaeffer	19
Results Bad. Wurt. Nationals	21
The Aerofoil	22
F1M by Werner Nimpsch	24
Hangar Rat Postal	25
Three Midgets - F1M	26
Covering with Y2K2	27
Flémalle 2002 Int. Report	28
Flémalle 2002 Int. Results	29
Interscale 2002 Results	30
Interscale 2002 Report	31
Results Canadian Nationals	32

The 2002 British Indoor Duration Nationals at Cardington

Once again, the venerable old hangers at Cardington were available for our use, this year being held in the No 1 shed.

We spent a lot of time and money to repair the windows (60), some as high as 80 ft from the ground! Because wind is horizontal and not vertical, most of the time flying conditions have been excellent, but not when the wind is from the North. To repair the roof will cost over £1,000.00 million pounds, so we hope we get lucky with rain and wind. For our big weekend, we got Northerly winds!!!

The wind strength on Saturday was low, the direction, just off North, and conditions were fairly good. Sunday's air was poor, with a lot of drift toward the larger holes in the roof, and there was much heroic steering to tow the models away from the vortex at the north end of the shed, but also some "missed" chances, and the resulting breakage or loss.

Monday was a bit better, but no sun and a bit gloomy, but most of our best F1D fliers were busy just trimming for the upcoming trip to the CargoLifter hanger in Germany, followed 2 weeks later, at the World Indoor F1D champs in the Romanian salt mine.

I now have 58 people who are registered to attend Cardington, but the attendance was only moderate, but we were pleased to see the two lads who made the trip across the water from Belfast, Northern Ireland, and also fliers from Scotland and Northumbria.

We also flew for the Dave Yates Memorial Trophy, giving 6 points for a win, down to 1 point for 6th place. The Overall National Champion is Laurie Barr, with 28 points.

So ended a tough 3 days, and we look forward to better weather on our last 2 meetings in 2002, and hope we have a future at Cardington, in 2003.

Laurie Barr (UK)

Saturday 24th August 20002

Limited Pennyplane

1	Tom Chambers	13.08	6 points
2	Laurie Barr	12.37	5 points
3	Bert Spurr	10.39	4 points
4	Peter Watt	9.59	3 points
5	Urlan Wannop	9.13	2 points

No-Cal Profile Scale

1	Laurie Barr	5.54	6 points
2	Clive King	2.44	5 points

Catapult Glider (Cardington Cup)

1	Mick Page	74 seconds	6 points
2	Mark Benns	70	5 points
3	Kevin Tatlow	50	4 points
4	Laurie Barr	14	3 points

Hand Launched Glider (Sweepette Trophy)

1	Mark Benns.	47 seconds	6 points

Sunday 25th August 2002

E.Z.B F.1.L (Houlberg Silver Trophy)

1	Bob Bailey	23.20	6 points
2	Goeff Jones	21.18	5 points
3	Laurie Barr	20.04	4 points
4	John Tipper	18.26	3 points
5	Goeff Lefever	18.02	2 points
6	Urlan Wannop	14.31	1 point
7	Bert Spurr	12.16	
8	Rod O'Neil	11.08	

F.1.M (Beginners F1D)

1	Bernard Hunt	22.01	6 points
2	Mike Green	15.08	5 points
3	Laurie Barr	12.15	4 points
4	Bert Spurr	10.52	3 points
5	Tom Chambers	10.00	2 points

F.1.D (Houlberg Gold Trophy)

1	John Tipper	27.04	6 points

Living Room Stick

1	Laurie Barr	11.34	6 points
2	Bert Spurr	4.39	5 points
3	Urlan Wannop	4.18	4 points

Colophon

Indoor Flight International is published 4 to 6 times a year and covers all types of indoor models from peanut to microfilm. Texts can be sent in English, French or German and word processed documents can be sent on floppy disks in any text format. Computer drawings should be in Autocad .dwg (saved as Auto-cad v14 compatible) or .dxf formats and if you are no draftsman, I can do the drawings.

Payment of subscriptions should be in the form of an international money order in Euros or in cash (American $ or Euros). It is also possible to pay per creditcard online - see the website for details!

Editor:
Gert Brendel
A. Meyeringstraat 54
7521 TM Enschede
The Netherlands
Phone +31 53 4356921
Email: *indoorflight@yahoo.com*
Website: *http://www.indoorflight.com*

Subscription
(per 8 issues)
Holland EUR 14,-
Europe EUR 15,-
Rest EUR 22,-
(or US$ 20)

German International Indoor Championships 14-15 Sept. 2002

Cargo Lifter Werft – Brand

F1D

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Mangalea	Corneliu	ROM		40:38	39:06	79:44
2	Schramm	Lutz	GER		41:02	38:31	79:33
3	Krause	Marian	GER		39:15	35:23	74:38
4	Popa	Aurel	ROM		37:09	36:37	73:46
5	Kuttler	Peter	GER		37:23	34:58	72:21
6	Aikman	Nick	GBR		36:32	34:01	70:33
7	Green	Ron	GBR		36:02	33:39	69:41
8	Siebenmann	Dieter	SUI		35:42	32:12	67:54
9	Tipper	John	GBR		34:48	32:53	67:41
10	Lotz	Philipp	GER	J	34:28	30:56	65:24
11	Merkt	Thomas	GER		32:27	32:20	64:47
12	Bailey	Bob	GBR		32:11	32:03	64:14
13	Bundesen	Uwe	GER		32:04	31:24	63:28
14	Schönfelder	Karl	GER		31:29	31:23	62:52
15	Hunt	Bernhard	GBR		31:29	30:33	62:02
16	Botos	Istvan	HUN		31:30	30:27	61:57
17	Orsovai	Dezsö	HUN		30:52	30:48	61:40
18	Lotz	Rainer	GER		31:50	29:49	61:39
19	Dihm	Jan	POL		31:30	29:26	60:56
20	Sukosd	Zoltan	HUN		30:49	29:36	60:25
21	Ciapala	Edward	POL		30:07	28:27	58:34
22	Nimptsch	Werner	GER		28:12	27:23	55:35
23	Simon	Gyula	HUN		26:00	25:52	51:52
24	Ree	Andras	HUN		29:50	21:35	51:25
25	Filek	Jakub	POL	J	25:37	25:29	51:06
26	Markiewicz	Jerzy	POL		23:59	23:40	47:39
27	Vins	Karol	SVK		18:26	16:46	35:12
28	Kaplan Jun.	Mikita	CZE		24:56	00:00	24:56
29	Kaplanova	Klara	CZE	J	18:17	00:00	18:17
30	Barr	Laurie	GBR		18:11	00:00	18:11
31	Vogler	Kurt	GER		07:15	06:28	13:43

F1L

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Barr	Laurie	GBR		28:16	27:45	56:01
2	Kaplan Jun.	Mikita	CZE		27:58	27:01	54:59
3	Lefever	Geoffrey	GBR		26:41	26:40	53:21
4	Wilson	Roy	GBR		26:01	25:27	51:28
6	Lotz	Rainer	GER		25:27	25:08	50:35
5	Bundesen	Uwe	GER		25:45	25:25	51:10
7	Tipper	John	GBR		25:19	23:18	48:37
8	Feifer	Ladislav	CZE		23:08	21:25	44:33
9	Orsovai	Dezso	HUN		22:01	20:20	42:21
10	King	Clive	GBR		21:14	20:54	42:08
11	Nimptsch	Werner	GER		19:50	18:52	38:42
12	Najman	Milan	CZE		18:52	18:48	37:40
13	Vins	Karol	SVK		18:28	18:07	36:35
14	Kaplanova	Klara	CZE	J	17:15	16:05	33:20
15	Kaplanova	Gabriela	CZE	J	17:10	15:22	32:32
16	Strnad	Leo	CZE	J	16:39	13:29	30:08
17	Viezens	Ekkerhard	GER		12:57	11:57	24:54
18	Kaplan Sen.	Mikita	CZE		18:01	00:00	18:01

F1D-P1 (35 cm)

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Tipper	John	GBR		36:30	34:26	70:56
2	Lotz	Rainer	GER		24:43	24:19	49:02
3	Ciapala	Edward	POL		24:45	23:19	48:04
4	Nimptsch	Werner	GER		24:40	22:33	47:13
5	Strattner	Werner	GER		20:36	20:33	41:09

F1M

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Hunt	Bernhard	GBR		21:58	20:42	42:40
2	Nimptsch	Werner	GER		19:47	18:38	38:25
3	Barr	Laurie	GBR		18:11	17:43	35:54
4	Lotz	Rainer	GER		18:58	16:20	35:18
5	Wächter	Bruno	GER		17:20	16:58	34:18
6	Bundesen	Uwe	GER		18:05	15:38	33:43
7	Offterdinger	Harald	GER		16:55	15:10	32:05
8	Feger	Jens	GER	J	15:06	14:59	30:05
9	Hasselmann	Johannes	GER	J	14:52	14:04	28:56
10	Viezens	Ekkerhard	GER		09:21	08:02	17:23

F1M-L- Beginner Limitiert

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Lotz	Philipp	GER	J	14:44	14:36	29:20
2	Wächter	Bruno	GER		14:25	14:22	28:47
3	Offterdinger	Harald	GER		14:17	13:17	27:34
4	Hasselmann	Johannes	GER	J	13:29	12:09	25:38
5	Feger	Jens	GER	J	11:28	10:56	22:24
6	Viezens	Ekkerhard	GER		09:13	08:51	18:04
7	Leopold	Edgard	GER		08:52	05:26	14:18

Mini Stick

	Name	Vorname	Nation	Junior	1. Wert	2. Wert	Gesamt
1	Barr	Laurie	GBR		13:26	12:50	26:16
2	Wilson	Roy	GBR		12:31	12:19	24:50
3	Najman	Milan	CZE		10:29	09:52	20:21
4	Kaplanova	Gabriela	CZE	J	08:51	07:55	16:46
5	Kaplan Sen.	Mikita	CZE		08:24	07:54	16:18
6	Lotz	Rainer	GER		08:19	07:18	15:37
7	Strnad	Leo	CZE	J	06:44	06:03	12:47

No Cal

	Name	Vorname	Nation	Junior	1. Wert	Gesamt
1	Lotz	Philipp	GER	J	05:31	05:31
2	Barr	Laurie	GBR		05:28	05:28

German International Indoor Championships – contest report

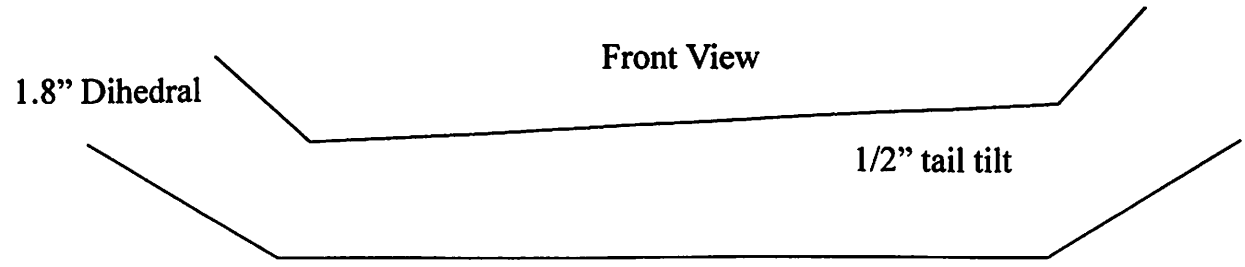
By Karol Vins (Slovakia)

Would you say that one would be able to fly over 40 min with a 55-cm F1D? And if, would you know where? During the German International Indoor Championships, Corneliu Mangalea answered these questions. Yes, it is possible: in the Cargolifter Hall!

At these German International Indoor Championships, strong teams from GBR, RUM, HUN, GER, CZE, POL were present.

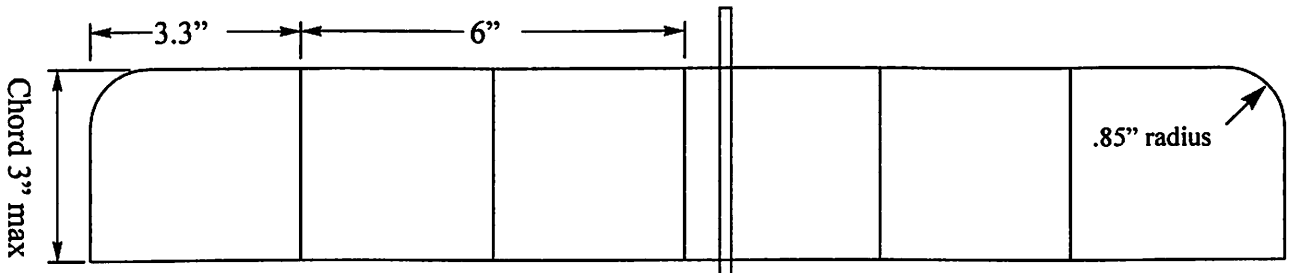
On the first day, Corneliu Mangalea and Aurel Popa from RUM flew over 39 min with 55-cm F1D (Slanic high altitude flyers know how to reach over 80 m!). Laurie Barr flew over 28 min in F1L, and made flights of over 36 min with 35 cm... Conditions in the hangar were relatively good (there was almost no drift), but it was short before a thunderstorm; after 17:30 hours it started to rain cats and dogs. Some raindrops fell inside the hangar but that was minimal. After a 30 minute period of rain, the temperature inside was warmer than outside and flight conditions were very good (19 degrees C) - the right time for records.

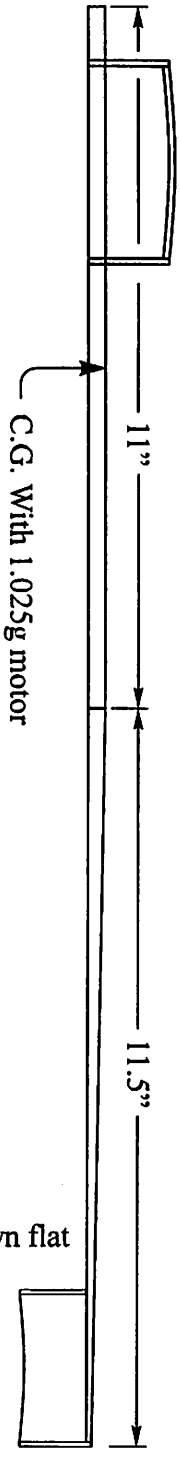
During the first day, we only used the west quarter sphere of the hangar - without any relevant crashes, and sometimes there were 20 models simultaneously in the air during the evening! And I can tell you: the second day was even better.



IFI
JAN 2003

Micro-x bearing





Glue wing post tubes, so that at rest, the wing has 3/32" washout on port wing, and 3/32" washin in on startboard panel.

When fully wound, the wing will then have the right amount of washin, on the inner port wing panel.

3/8" overlap

Winner of the German Indoor Nationals
Sept 14/15th 2002 - 27:45 & 28:16*
*European, British & World?record time.

1.5 degrees left thrust only.
Record Flight Motor -
4 strands of .025" Tan 3/02 17.5" long.
1.025 grams dry. Max turns 3246+.
Actual winds 2760 backed off to 2745
Launch torque 4.40 inch/Ozs Model landed with all turns used. At Cargolifter there was more height available, if all possible turns were used, over 30 mins is possible

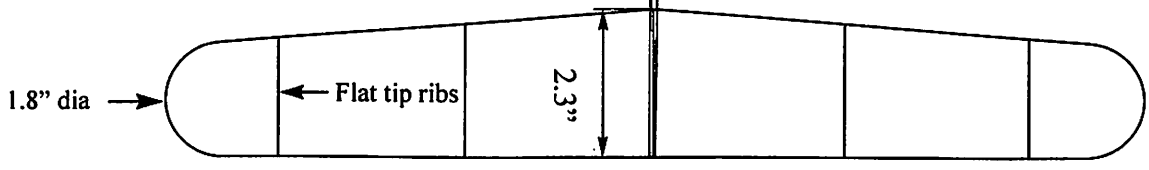
Weights	oz	gram
Wings	0.0076	.216
Fuselage)		
Tailboom)...	0.224	.636
Tailplane).....	0.0029	.084
Prop	0.0098	.278
	Total	1.214 grams

All wood except wing posts (which are approx 6lb) is 4.5 lbs, tested for flex/ weight ratio (S.C.) by method shown by John Taylor, n Norwind News To achieve these weights, and required stiffness, you must have wood that tests above 100!

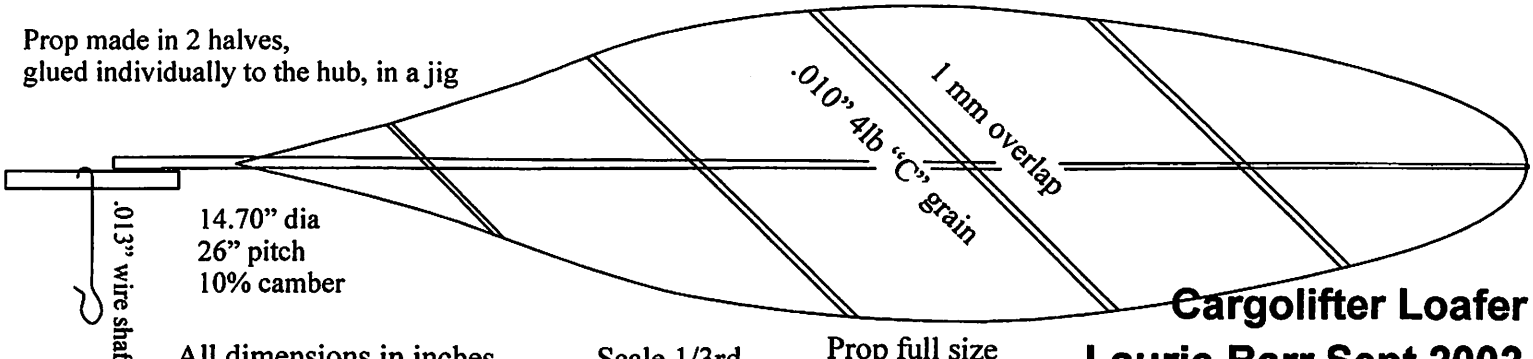
Wing Tips .036" x .060" taper to .042"
Wing Spars .036 thick x .085" taper to .055"
Wing Ribs .025 x .040 (C-grain_ 3% Arc.
Motorstick. .250" x .125", not taper!!
Tailboom .170" deep x .073" at root, at tip .100" deep x .055" wide. Must be stiff with no flexing.
Prop Spar .065" x .065" approx. 6lb wood.
Blades .010" C-grain, 4 lb to 4.5 lb
Wing and tail posts 6lb x .047" dia, glued to fuselage/boom. Tissue tubes glued to wing and tail.

Covered in YK2-2 plastic film.

Dimensions and plan for wing and tail shown flat



Prop made in 2 halves,
glued individually to the hub, in a jig



All dimensions in inches Scale 1/3rd Prop full size

Cargolifter Loafer
Laurie Barr Sept 2002

Cargolifter Loafer EZB/F1L by Laurie Barr (UK)

This EZB/F1L is number 4 in the series built over the last 5 years.
It's forerunners had by now become heavy with age and repairs, and knowing I was going to the Cargolifter hanger and the immense height available, I went to a lot of trouble to ensure great stiffness while keeping the airframe to 1.2 grams.
Most EZB's only fly in low ceilings, are much too floppy and cannot cope with the huge launch torque required to make the most of very high ceilings, like Cardington etc. As the great American Sal Taibi once remarked "Altitood is everything"!
This year in Hanger 1, we have enjoyed relaxed flying and more people have turned up to fly. Many of their models are built with ordinary Balsa with sagging wings and tailbooms, and the contortions they make when fully wound, wastes all the first burst of rubber power, and they never reach the roof!
Having now defined the detailed structure, I went to great lengths to test all the wood used, to find the highest S.C (Stiffness Coefficient *) rating I could.
I was fortunate, in that some of the wood used, was donated ("Extracted under duress"!) from Bernie Hunt, some of which had a S.C rating of 130!
I was determined not to exceed 1.2 grams, so I built and covered the whole model except the motorstick, and weighed the structure to find the amount of weight I could use in the motorstick. This motorstick would have to cope with almost every turn I could apply to it, without too much twist that would warp the wings too far on launch, or bow the motorstick to give too much downthrust.
In amongst my rag-bag of "treasures", I found a piece of 1/4" x 1/8" that was exactly what I was looking for and did not require any shaping to bring it down to weight. It had Red "spidery" writing on it, just like Bernie Hunts hand produces!!
The end result of all this is a model that seems to be able to take any amount of launch torque, and is launched vertically like a Javelin and climbs without hesitation to great heights.
I hope to return next year, and give it all the motor can take, and just see if I can reach the roof at Cargolifter, 320 ft above!

Laurie Barr Oct 2002

* I enclose a copy of the original article By Bernard Hunt and John Taylor. Maybe the Editor will publish this not to hard to follow measurement of strength and weight testing (*Editor's note: I will give an overview of stiffness testing methods in the next issue*).

For those not willing to do this: make several motor sticks, tailbooms, wing spars and do a simple deflection test with a small weight which will at least tell you which of each is the best you have!
It will not tell you that it is good enough, as compared to S.C testing, until you test fly the whole model but it is still better than guess work.

Tan II Rubber Update

Below are some messages that have been sent by John Clap from FAI Model Supply to various mailing lists, concerning the state of Tan II rubber and it's availability.

October 2002

The bad news

The rumours are true; no more TAN II rubber will be produced! A critical ingredient is no longer being produced due to the change in golf ball technology. A special version of this additive was crucial to produce TAN II.

Current status

We are all out of factory cut 1/8" Tan II when the current orders are filled. A few 1 pound boxes are available. We are re-cutting 1/4" into 1/8" with our power stripper for those who would like it. We obviously do have 1/4" available as well as a few 10 pound (or 1 pound) boxes of 3/16". We expect all of this remaining Tan II rubber will be gone in the next few days.

We will keep enough 1/4", 3/16", and 3/32" in small boxes to support Science Olympiad for this school year. Many of you may know that this event is a fertile breading ground for Junior F1D fliers and other young aspiring modellers. If some of you don't already know, the USA Junior Team blew away the competition in the Jr. World Champs! Please do not try to take advantage of this small S/O stock pile.

The future

There will be no shortage of TAN SPORT (*editor - for those interested: Carl Bakay's Tan Sport test results have been published in INAV 108*).

We have asked the factory to see what could be done to make what we would call TAN SUPER SPORT, and they have held meetings this week to see what possibilities exist. This new rubber, if feasible, would have greater energy storage than Sport, but somewhat less than the average value for TAN II.

We know that this situation, while not totally unexpected, presents a worldwide problem. Please be reassured that it is not being taken lightly!

November 2002

The factory has accepted the challenge to try to develop Tan Super Sport. Let's all keep our fingers crossed. They are currently into lab tests and research. Many have offered their help, suggestions, and support. To all we say THANKS and we will be in touch if need be.

Tan II further update

A. We have been in touch with Dan Tracy and Ian Kaynes regarding the Tan II situation.
B. We have discussed: rubber weight, and colour coding, concern for those who do not have a stock pile of Tan II, and the continued growth of the sport world wide.
C. My rubber company is not the culprit. Goodyear (key supplier of a critical ingredient to produce Tan II) had to cease production due to the total demise of the need for an additive required for quality rubber thread for golf balls.
D. Remember back to when we bought FAI MODEL SUPPLY, many were convinced that the "end of the world" was at hand! A UK rumour at that time was that the new owner was not interested in the continuation of Tan II.
E. We are very concerned about a "level playing field" and will try to make it such!
F. We suggest that everyone "take a deep breath" and let us see what we can do. Best regards and thanks for your support.

December 2002

The latest batch of 1/8" Tan Sport (Nov. 02) looks very interesting and will be sent out for test this week.

Our factory has advised us that they have identified two formulas that seem promising for Tan Super Sport.

These two batches of rubber are due to be received and tested by the end of January. If they look good and there is interest I will have some for sale at Max Men for international competitors.

By this notice - We are requesting any international fliers planning on attending Max Men, who would like Super Sport rubber to notify us of their interest.

Sport rubber tests

By Fred Tellier (CAN)

I obtained a sample of the new sport rubber and have ran some tests on it; the results are not exactly disappointing as the numbers I got are better than several batches I have tested in the last few years and is only about 300 off the results of 5-99. If John Clapp's promise of a super sport rubber with more power than the sport, then our worries may be unfounded. The only thing I didn't like about the sport is that it winds to a greater torque than the other good batches, but takes less winds and seems to reach the cruise torque sooner in the unwind. Once down to the cruise range the torque curve is somewhat flatter than most batches and the low end is about the same.
I think that I read somewhere that some F1B flyers found a sag in power in the climb that would correspond to what I saw testing.
I have enough of this rubber to do a little test flying and will keep everyone informed of the results.
This is not a great rubber but is much better than I expected, so I am encouraged that the future of rubber events is not as bad as we first thought.

World Championships (Sr. & Jr.) F1D 2002

Slanic, Prahova, Rumania - October 6-11 2002

For the third time in a row the World Championships for the class F1D (indoor models) were again being hold in the salt mines in Slanic Rumania. Due to lack of offers to hold the championships elsewhere, the indoor community had no other option than to go to the salt mines again. The world championships

were held in Slanic in 1970 for the first time, and then it returned to the mines in 1982, 1994, 1998, 2000 and now in 2002.

Flying in the salt mines (150m below ground) is always something special; the dark, damp and cold conditions put a lot of stress to the flyers and models. The average relative humidity is 70% and the temperature is a steady 11 centigrade. The darkness requires the illumination of flashlights in almost all the time; most flyers are using head-mounted lights. All in all not a very attractive place to fly indoor models, especially after the novelty of the location has worn off.

This is the very first world championship with the new reformulated class F1D, the specification has been changed to create a smaller and heavier model with a limited amount of rubber. The old specifications were maximum span 65-cm, a minimum weight of 1.00 g and unlimited amount of rubber; the new are maximum wingspan of 55 cm, a maximum stabiliser span of 45 cm, a minimum weight of 1.20 g and a maximum rubber of 0.60 g. The actual wing loading is lower than the older type of models. The change in specifications makes it possible to use a different covering material than microfilm; most flyers choose to use Y2K or Y2K2 (plastic) film, which is very strong compared to microfilm. Only some flyers from the eastern European countries used microfilm, possibly due to relatively higher cost of Y2K2 film. The new specifications also allowed constructing the models in a way that facilitate easier transportation. In the past it was only the British team who showed up with small boxes, but now almost everybody has their own version of a small box. Some were able to fit 5 models with more than 10 propellers in a box that is just about a quarter of the size of the old boxes. Jim Richmond's box was one of the most innovative, allowing removing parts of the model directly from several sides without having to remove other parts. The new boxes can also be transported as hand luggage in airlines, however there is one dimension that is always too large: the length of the box is usually 56 cm, allowing to hold a 55 cm wing; The maximum length that most airlines allows is 55 cm. As far as I know, nobody had any major problems carrying the smaller boxes as hand carried luggage. If needed we could possibly change the rules: maximum wing span 54 cm, allowing boxes of 55 cm size.....

Several teams arrived early in the hope that additional access to the mine will give them some extra time to trim their models. On the extra day we were allowed to fly in second cavern, this is lower floor that is being used as a health spa. The temperature is higher in this cavern due to the fact that it is closer to the centre of the earth. The trimming sessions were of limited value due to the small crowded space.

It was very hard to predict the favourites in this WC, but we expected that the ranking would be similar as with old rules. I remember the discussion that I had with Aurel Popa and others 2 years ago after the WC 2000: we thought that if the WC would be in the mine again the winning times were in the 26-28 minutes range. This WC will just prove how wrong that was.

Lets see how the different teams approached these World Championships:

- The Romanian team had the opportunity to test fly the most in the mines. Cornel Mangalea and Aurel Popa just returned 2 weeks earlier from a very successful trip to the Cargo Lifter. Cornel flew the new world record and later exceeded the 40 minutes. He had his best times in the mines of 37 minutes plus. Their models were scaled down 65-cm version type with only front and rear bracing. Most of their models were microfilm covered.
- The German team had wonderful opportunity to trim their models in the Cargo Lifter, they should have no problems with climb needed, but they could face a problem that their models could climb too high. Their models were the scaled down 65-cm type, no bracing on the wings.
- The British team had a mixture of models. Ron Green took the plunge to try a completely new very exciting approach. Inspired by Dieter Siebenmann (Switzerland) and guided by Bernard Hunt he made models with a very long tail booms that made a drop; some called this drop-tails or droop tails. Ron was just getting these models flying a few weeks earlier, but potential was unknown. The other members, Bob Bailey and Derek Richards, flew models similar to Hunt's Big Square. And naturally all without wing bracing.
- The Hungarian team had scaled down 65-cm models covered with microfilm and I had the impression that they did use wing bracing (I could be wrong). They did practice in the Cargo Lifter, but it seems that they were struggling to get good times.
- The Canadian Team had a mixture of models. Fred Tellier had scaled down 65-cm models, both in braced and non-braced versions. He only flew the non-braced models. Most of the trimmings were done in low ceiling with the occasional Lakehurst visit. Colin Raymond-Jones had models similar to Hunt's Big Square and Edmund Liem had a twin fin scaled down 65-cm type. Edmunds models had

not flown at all; only 5 weeks earlier he had the call to replace a teammate who could not make the trip.

- The US senior team had several big names. 3-Times world champion Steve Brown had to redesign his models completely after test flights in July. His new models were practically untested. They look like twin fin scaled down 65-cm models, but the tail booms were longer. 7-Time world champion Jim Richmond had also twin fin scaled down 65-cm models. He had successful test flights in Moscow and West Baden and was ready to go. Jim and Steve had both unbraced wings. The only thing he was not sure is which propeller would be the best. And third member Larry Cailliau brought only 2 models, both braced scaled down 65-cm types. And defending WC John Kagan had 4 models, unbraced scaled down 65-cm types.
- The US junior team had for the first time a full team. All members came from the very successful Science Olympiad. All 3 members had no international experience what so ever, they had been practising on a regular base in Lakehurst and Akron. All 3 flew with a kind of scaled down 65-cm models. They all have no more than 2 years of experience in this class. Doug Schaefer and Ben Saks had worked really hard to be ready; Matt Chalker only had 6 weeks to get ready after a team member could not make the trip. All had non-braced models covered with Y2K2.
- The Spanish team made their debut in these World Championships. All 3 members had very nicely made models and all look similar to the layout of Hunt's Big Square. They had never flown in a high ceiling.

Unfortunately I have no complete impression from the other teams, the only thing I heard was that the old Jr. World champion from Ukraine, Oleg Korniychiuk, tried and maybe flew his official flights with VP props, he could the only one.

On arrival day it was nice to hear that everybody had checked their models and were pleased to see that all were undamaged; I think that the new models are quite a lot sturdier than the old 65 cm microfilm flimsies.

On training day it was very busy with everybody trying to get used to the conditions. There were a few mid-air collisions, but all went without any major damage. On one occasion Fred Tellier's model drifted to the wall and got stuck to the salt, luckily about 6 m above a stair. He borrowed a steering pole and was able to dislodge the model. We inspected the model after retrieval and found very little damage. The lack of wing bracing wire and the use of Y2K2 film has definite helped the survival of the model.

The training day ended with the opening ceremony, which was one of the shortest one I had ever attended (5 min?). There were 12 countries present and 31 Sr. and 14 Jr. flyers. Spain was for the very first time present at an F1D world championship and they had a full team.

Day one.

The routine were as follows: waking up at 6.30 am, breakfast at 7.00, to the mine at 7.30, at the mine entrance at 8.00, test flights at 8.30 till 9.45 and then 2 competition rounds of 3 hrs. Getting back to the hotel at 6.00 pm and supper at 8.00. After that we got to do repairs or preparing rubber for the next day.

Round 1:

We expected a tight competition at the top but were surprised who made the fireworks. Two juniors of the USA team, Doug Schaeffer and Ben Saks, flew both 33"04'! They were by far the highest time in round 1. The high time of the seniors was 31"23' from Steve Brown (USA) followed by 31"11' from Peter Kuttler (Germany). Bob Bailey (GB) was 3rd and Fred Tellier (Canada) was 4th.

Cornel Mangalea (Romania) had a bad stall after a spectacular initial climb and came all the way down from 25-30 m height. Jim Richmond had a too wide turn and had to abort his attempt. Ron Green had the most spectacular climb I have ever seen, almost vertical, he hanged up on the catwalk at 11'12". Luckily they were able to retrieve the model later.

Round 2:

Aurel Popa made a good flight with 33'03" and Jim Richmond made the best flight of the day with 35'29". Aurel Popa was first in the seniors and Doug Schaefer made another good flight with 30'54" and was leading the junior competition. He had also a better score than the best senior.

Day 2, round 3:

High times in this round were from Aurel Popa (31'50"), Jim Richmond (31'33") and Oleg Korniychiuk (31'21"). The bad luck still followed Cornel Mangalea with a similar stall like on day 1. The day before he did a test flight after the competition and made a 35 minute plus flight.

Round 4:

Doug Schaefer made a good second flight of 32"40', the high time of this round, followed by Aurel Popa (32'09") and Bob Bailey (31'40")

Jim Richmond tops now the list followed by Aurel Popa and Bob Bailey (UK).

Day 3, round 5:

Desperate times need desperate measures; Edmund Liem decided the night before to clip the tip of his propeller in an attempt to make the blade area smaller. He was not the only one who did similar drastic measures to improve their flights. Jim Richmond made in this round the high time with 36'15", clearly in the lead. Second and third place is still for grab. Ben Saks (USA, Jr.) made an outstanding 33'10", enough to clinch first place with one round to go. Doug Schaefer had mid-air collision with a model from the Spanish team and still made 32'51", enough to improve his total, but short of the first place.

Round 6, last round:

Jim Richmond refrained from flying in the last round assuming nobody could beat him. Slowly John Kagan, the defending WC, made his move into third spot, leaving Aurel Popa at second place. The competition in the juniors is not over yet, Doug Schaefer made an incredible 36'12" and reclaimed first place. Ben Saks had tough luck with a mid-air collision with Andras Ree (Hungary) while he was close to the catwalks. Both models came down unharmed. Ben had to make a reflight in an attempt to clinch first place. His reflight was an excellent 32'09", but not good enough to beat Doug Schaefer.

That was the end of a very exciting World Championships with lots of material to talk about. Doug Schaeffer and Ben Saks delivered quite a performance, not only in the flight times, but also in intense competition. Both maintained their coolness during round 5 and 6, they acted very mature, almost un-junior like. It was an interesting observation that on day 3 more and more seniors paid a visit to these juniors and asked them questions. Usually it is the other way around.

The next WC will likely be held in Germany in the Cargo Lifter, a hangar of 100m high, the highest location ever for a major Championship. We all should be able to use this experience to perform better.

Jim Richmond told me that he waited 32 years to win in the salt mine, so there is still hope for us. Jim clinched an unprecedented 7th title, the first one in 1968 in Rome, Italy. The performance of the US juniors team, Doug Schaefer, Ben Saks and Matt Chalker, were outstanding, in fact they would clinch second place in the senior team standings. All 3 came from the very successful Science Olympiad program. Also remarkable was to find some renowned flyers struggling so much with the new models; The Hungarian team, who were very comfortable with the 65 cm models in the mine were having a hard time to make good times, also Hideyo Enomoto from Japan was not able to fly to his standard. And I am looking forward to the development of the drop-tail models, especially in high ceilings like the Cargo Lifter.

The most remarkable thing that I remembered from this WC was not the competition, but a very trivial thing: the surprising frequent sound of cellular/mobile phones down in the mine! I am still surprised that there is good reception 150 m down in the mine and that even the lift operator had a cell phone!

Edmund Liem (CAN)

Official Results Junior – Individual

	Name	Country	Flight 1	Flight 2	Flight 3	Flight 4	Flight 5	Flight 6	Total
1	Doug Schaeffer	USA	33'04"	30'54"	26'14"	32'40"	32'51"	36'12"	69'16"
2	Benjamin Saks	USA	33'04"	24'50"	13'00"	14'53"	33'10"	32'09"	66'14"
3	Somesan Horatiu	ROM	27'26"	26'56"	21'00"	27'53"	27'00"	20'00"	55'19"
4	Tamas Sukosd	HUN	27'10"	22'35"	18'35"	0"	0'45"	27'57"	55'07"
5	Olexander Kovalyov	UKR	23'07"	28'48"	23'02"	08'20"	17'30"	24'27"	53'15"
6	Mathew Chalker	USA	18'54"	16'49"	19'55"	24'34"	21'10"	25'58"	50'32"
7	Pukowiec Michail	POL	13'48"	15'20"	20'02"	24'00"	24'56"	16'46"	48'58"
8	Pop Ionut	ROM	22'11"	14'33"	23'06"	20'00"	22'50"	21'56"	45'56"
9	Mariusz Rogowski	POL	17'31"	16'20"	17'42"	21'33"	20'42"	0'16"	42'15"
10	Ignas Valiconis	LAT	20'19"	20'11"	14'27"	18'05"	21'10"	02'20"	41'29"
11	Lukas Ivanuskas	LAT	06'56"	0"	17'56"	16'56"	19'58"	20'50"	40'48"
12	Martynas Markulas	LAT	18'21"	18'52"	19'18"	18'05"	18'07"	19'20"	38'38"
13	Ivan Mihnea	ROM	04'55"	01'39"	17'39"	17'37"	18'37"	19'33"	38'10"
14	Jakub Filek	POL	14'31"	14'49"	16'16"	19'31"	0'48"	16'20"	35'51"

Official Results Junior - Teams

	Country	Member 1	Member 2	Member 3	Total Team
1	USA	Mathew Chalker	Benjamin Saks	Doug Schaeffer	186'02"
2	ROM	Ivan Mihnea	Pop Ionut	Somesan Horatiu	139'25"
3	POL	Jakub Filek	Mariusz Rogowski	Pukowiec Michail	127'02"
4	LAT	Martynas Markulas	Lukas Ivanuskas	Ignas Valiconis	120'55"
5	HUN	Tamas Sukosd	-	-	55'07"
6	UKR	Olexander Kovalyov	-	-	53'15"

Official Results Senior – Individual

	Name	Country	Flight 1	Flight 2	Flight 3	Flight 4	Flight 5	Flight 6	Total
1	James Richmond	USA	01'10"	35'29"	31'33"	28'51"	36'15"	0	71'44"
2	Popa Aurel	ROM	29'39"	33'03"	31'50"	32'09"	09'58"	28'31"	65'12"
3	John Kagan	USA	27'01"	27'09"	23'34"	31'10"	31'15"	32'55"	64'10"
4	Amoraritei Dan	ROM	28'33"	30'07"	30'09"	30'02"	29'48"	33'24"	63'33"
5	Robin Bailey	GBR	30'43"	29'53"	30'45"	31'40"	00'54"	29'15"	62'25"
6	Lawrence Cailliau	USA	17'00"	30'22"	22'51"	00'05"	30'06"	31'25"	61'57"
7	Lutz Schramm	GER	28'41"	0"	29'17"	30'09"	31'48"	01'36"	61'57"
8	Oleg Korniychiuk	UKR	30'34"	24'40"	31'21"	29'54"	01'03"	22'06"	61'55"
9	Peter Kuttler	GER	31'11"	0"	28'21"	29'24"	25'19"	29'49"	61'00"
10	Stephen Brown	USA	31'23"	25'54"	29'28"	24'59"	26'55"	23'13"	60'51"
11	Fred Tellier	CAN	29'08"	22'09"	30'05"	29'45"	29'52"	20'33"	59'57"
12	Derek Richards	GBR	23'44"	26'00"	0"	24'59"	29'17"	30'33"	59'50"
13	Ronald Green	GBR	11'12"	28'14"	29'06"	29'07"	0"	23'33"	58'13"
14	Andras Ree	HUN	19'19"	23'10"	22'49"	25'17"	27'32"	29'46"	57'18"
15	Zoltan Sukosd	HUN	27'17"	26'24"	02'05"	26'16"	28'31"	26'06"	55'48"
16	Jan Dihm	POL	25'56"	26'34"	27'39"	27'34"	28'05"	25'22"	55'44"
17	Daniel Medina Mangas	ESP	22'27"	27'06"	25'46"	28'12"	22'27"	19'10"	55'18"
18	Edmund Liem	CAN	16'00"	22'47"	23'23"	22'48"	26'33"	28'17"	54'40"
19	Deszo Orsovai	HUN	27'10"	25'33"	24'07"	24'37"	27'08"	22'35"	54'18"
20	Edward Ciapala	POL	23'47"	21'02"	24'50"	20'03"	05'01"	27'47"	52'37"
21	Mangalea Corneliu	ROM	01'36"	04'31"	01'15"	19'02"	09'45"	33'30"	52'32"
22	Karl Schoenfelder	GER	0	18'24"	18'27"	15'36"	27'26"	24'48"	52'14"
23	Manuel Diaz Garcia	ESP	22'43"	19'45"	24'43"	24'41"	21'17"	24'24"	49'24"
24	Dieter Siebenmann	SUI	22'41"	26'19"	16'02"	21'54"	00'47"	16'19"	49'00"
25	Sergy Mosolov	UKR	19'56"	22'36"	24'26"	24'22"	24'14"	24'22"	48'48"
26	Enomoto Hideyo	JPN	22'30"	22'16"	21'29"	22'36"	20'55"	22'13"	45'06"
27	Jerzy Markiewicz	POL	19'59"	22'24"	17'49"	15'01"	16'45"	06'38"	42'23"
28	Luis Font Bellot	ESP	17'18"	20'32"	19'33"	15'42"	14'30"	17'12"	40'05"
29	Raymond Jones Colin	CAN	15'43"	14'40	11'16"	18'45"	15'38"	19'28"	38'13"
30	Rimas Steponenas	LAT	11'08"	18'22"	19'20"	06'26"	00'23"	04'46"	37'42"
31	Vitalijus Salogubovas	LAT	18'02"	12'34"	0"	18'52"	18'34"	16'59"	37'26"

Official Results Senior – Teams

	Country	Member 1	Member 2	Member 3	Total Team
1	USA	Stephen Brown	Lawrence Cailliau	James Richmond	194'32"
2	ROM	Mangalea Corneliu	Amoraritei Dan	Popa Aurel	181'17"
3	GBR	Derek Richards	Ronald Green	Robin Bailey	180'28"
4	GER	Karl Schoenfelder	Peter Kuttler	Lutz Schramm	175'11"
5	HUN	Deszo Orsovai	Zoltan Sukosd	Andras Ree	167'24"
6	CAN	Raymond Jones Colin	Edmund Liem	Fred Tellier	152'50"
7	POL	Jerzy Markiewicz	Edward Ciapala	Jan Dihm	150'44"
8	ESP	Luis Font Bellot	Manuel Diaz Garcia	Daniel Medina Mangas	144'47"
9	UKR	Sergy Mosolov	Oleg Korniychiuk	-	110'43"
10	LAT	Vitalijus Salogubovas	Rimas Steponenas	-	75'08"
11	SUI	Dieter Siebenmann	-	-	49'00"
12	JPN	Enomoto Hideyo	-	-	45'06"

EUROPEAN F1D CHAMPIONSHIPS FOR SENIORS AND JUNIORS. OPEN INTERNATIONAL FOR F1D, F1L AND F1M. 'CARGOLIFTER' HANGER, BRIESEN-BRAND, GERMANY.

The schedule of events is:

Thursday	**October 2nd**	Arrival, Registration And Team Managers Meeting.
Friday	**October 3rd**	08.00-13.00 Registration & Practice.
		13.30 Opening.
		14.00-18.00 Round 1 Flights.
		16.00-20.00 Round 2 Flights.
Saturday	**October 4th**	08.00-14.00 Registration & Practice.
		14.00-18.00 Round 3 Flights.
		16.00-20.00 Round 4 Flights.
Sunday	**October 5th**	08.00-14.00 Registration And Practice.
		14.00-16.30 Round 5 Flights.
		15.30-18.00 Round 6 Flights.
		20.00-24.00 Banquet & Prize Giving.

Entry fees will be CHF (Swiss Francs) 300.- for senior competitors and CHF 255.- for juniors. CHF 45.- for senior supporters, CHF 30.- for junior supporters. The banquet fee is 20.- Euro's for adults and 10.- Euro's for children under 14.
The accommodation and food is to be arranged by competitors. Hotel information will be available.
There will also be an OPEN INTERNATIONAL competition for F1D, F1L and F1M. This will be flown at the same time as the Euro Champs in a different part of the hanger.
Given the financial state of the 'CargoLifter' company, the fate of the hall will now be decided by the local authorities and this may be the only time that the hanger can be used for such a championships.

Harmonisation

By Ebele Schouwstra (NL)

In CERVIA nr. 27, 2 possible contest rule changes regarding duration classes in France were mentioned. In CERVIA nr. 28, Alfred Klinck and Edmond Roch gave their view on these rule changes. At our club – Club *KOTTENPARK* – we have no experience with the Micro 35 class, and so we can't gave our opinion about it. However, in the second article Alfred Klinck expresses his favour for F1M-limited and it is on this subject that I would like to react. Or, better said, I would like to express my support on his point of view.

Alfred Klinck tells us that in Germany, there's a class that is derived from F1M; F1M-limited to be more precise. The basic rules are:

- Minimum weight 3 gram
- Max. wingspan 46 cm.
- Max. 1,5 gram rubbermotor.

For F1M-limited, the following restrictions are added to this set of basic rules:

- Max. 15 cm wing chord.
- Max. prop diameter 35 cm.
- The stab area should be no more than 50% of the wing area.
- The distance between hooks should be no more than 27 cm.
- The motorstick should be made of solid balsa.
- Bracing and the use of carbon, boron or other high-tech material is not allowed.

According to Alfred Klinck, models in F1M-limited are easy to build and are easier to fly than the smaller TH class models. Furthermore, F1M-limited can be flown in the F1M class.

Why I'm supporting Alfred Klinck's favour of F1M-limited? Well, in the Netherlands we've been flying for a long time with the Moustique – a model designed by Dieter Siebenmann. The Moustique meets the rules of F1M-limited. At our club *KOTTENPARK*, this is "the" model through which an 11-13 years old gets into contact with more serious duration flying – and that quite successfully over a period of 15 years. The model's success has to do with the fact that it is quite easy to build, that it is robust in handling, and that the model's flight behaviour is quite forgiving (but with a prop of 35 cm diameter on a Moustique we have no experience; my first impulse is to say that I find 35 cm rather big for a Moustique). A second reason why I favour a larger-scale use of F1M-limited is that in this way, chances for a harmonisation – at least in Europe – are more within reach. And that's an idea that Edmond Roch isn't totally insensitive to, as can be read from his conclusive phrase in the article in CERVIA nr. 28.

From the editor: send in your comments if you would like to share your opinion with us on this subject (email- and postal address in the colophon on page 2).

Electronic Weighing Scales

By Gert Brendel (NL)

Introduction

Accurate and precise scales are an essential device for the (competition minded) indoor (duration) flyer. Building a model to minimum weight can only be done with adequate equipment. Now I do know that it is easy to build a scale yourself (that might be good reading stuff for a future issue), but being the lazy kind of person I've bought an electronic balance myself some time ago.

Before deciding to buy a particular scale, I've been surfing on the internet for more information. This article is a summary of the electronic balances that I've found, and that I've considered buying myself. In price, they range from US$ 100.- to US$ 240.- as offered on several webpages (prices without shipping and handling costs; some companies ask quite an amount for that). And don't forget that, as a European citizen, you sometimes have to pay a large import duty when you buy in the USA...

The Scales

My Weigh MX 50

This is a reasonable cheap pocket scale (around US$ 100.-), which reads 50 grams by 0.01 grams. It comes with a 50 gram ASTM Class M1 calibration weight and recalibrating your scale can be doen with the provided EASY-CAL program. The MX-50C reads in grams, grains, carats, and ounces; the auto-off time can also be programmed.

A&D HL-100

This is a compact portable 0.01 gram resolution scale with 100 gram capacity; it has a hard cover hinged carrying case included. The HL-100 case is designed so you can weigh with the scale in the case.

The HL-100 is available with either 6 AA batteries as a power source (not included) or AC powered (not included). It has a power saving auto power-off function, which can be disabled.

Tanita 1210 – 100 (or – 50)

The Tanita 1210 50-carat version is a high accuracy mini scale of compact design. This scale has four selectable weighing functions: carats, grams, troy ounces, and grains. It's the only one in in this price class that offers a readability of 0.002 gram.

The 1210 50 carat version comes standard with 6 AAA batteries, a 10 g (50 carat) calibration mass (located on the scale itself), a weighing tray, a gem cup and a soft carrying case at no additional cost.

Acculab VI-200

This balance can be operated from an AC adapter or from a 9V Alkaline battery. All VI-Series balances are available with an optional DB-9, bi-directional RS-232 serial computer/printer interface.

At start up, the unit will default to the last weighing mode used. Membrane keypads are raised for tactile feel and include an audio tone to signal function. Large LCD with low battery, overload, underload, stability and mode indicators.

Ohaus Scout SC2020

Scout's durable construction and simple, two-button operation make it a favourite of classrooms and laboratories alike.

The balance can be operated by a 9 Volt battery or with the AC Adapter supplied.

This scale features a large, high contrast LCD display for great visibility; auto shutoff (user enabled/disabled); an error indicator for over/under loads; span and linear calibration; a tare feature and a low battery indicator.

More information

There's more to read on the Internet about the balances introduced here; at the following websites you can find information from the manufacturers:

- http://www.ohaus.com
- http://www.acculab.com
- http://www.tanita.com
- http://www.andweighing.com
- http://www.myweigh.com



MY WEIGH MX 50



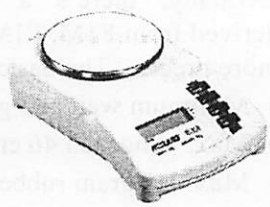
Ohaus Scout SC2020



Tanita 1210



A&D HL-100



Acculab VI-200

Digital Scale Overview

Model	MY WEIGH MX-50	My-weigh ibalance 201	A&D HL-100	Tanita 1210-100	Acculab VI-200	Ohaus Scout SC2020
Price (without shipping & handling costs)	Ca. US$ 100.-	Ca. US$ 140.-	Ca. US$ 200.-	Ca. US$ 215.-	Ca. US$ 220.-	Ca. US$ 240.-
Weighing modes	g, dwt & ozt	g, oz, oz t, dwt, grains & parts counting	g, ozt & ct	g, ct, ozt & grains	g, oz, dwt, ozt & parts counting	g, oz, oz t, dwt & parts counting
Capacity (grams) (pennyweight) (troy ounces)	 50 g 32.00 dwt 1.5910 ozt	 200 g 128.60 dwt 6.430 ozt	 100 g - 3.5280 oz	 20 g - -	 200g - -	 200 g - -
Readability (grams) (pennyweight) (troy ounces)	 0.01 g 0.01 dwt 0.0005 ozt	 0.01 g 0.01 dwt 0.001 ozt	 0.01 g - 0.0005 oz	 0.002 g - -	 0.01g - -	 0.01 g - -
Linearity		±0.01g	± 0.03 g		±0.01g	± 0.01 g
Repeatability/Std. Dev.		±0.01g	± 0.02 g			0.01 g
Stabilisation time	3 seconds	3 seconds	3 seconds (typically)		3 seconds	3 Seconds
Calibration	Auto calibration from keypad (50 gram mass included with the scale)		Full Digital Calibration with front key (calibration mass not included!)	Auto Calibration with 10 gram (50 carat) mass included	Auto calibration from keypad with included weight	Auto Calibration from keypad using 200 gram cal. mass (included with scale)
Maximum overload	150% of capacity	150% of capacity		3% of capacity	150% of capacity	103%
Auto shut-off	2 minutes no activity	Selectable: Off, 60, 120, 180 seconds no activity	Auto Power Off (5 minutes)	automatically 5 minutes after calibration	4 minutes no activity	Selectable: Off, 3 minutes no activity
Optimum temperature range	64 °- 77 ° f / 18 °- 25 ° c	32°- 104° F / 0°- 40° C	-10°C~40°C / 14°F~104°F		50-86 F (10-30 C)	50° to 104° F / 10°to 40° C
Operating humidity range			RH less than 85%		Less than 80% RH	10% to 85% RH
Display	5 segment LCD 1/2" high	6 segment LCD 1/2" high	8 mm, 7 segment LCD	5 digits LCD	5 digits LCD	LCD (0.7" high)
Power requirements	4 AAA batteries (included)	AC adapter (included) or 6 "AA" batteries (not included)	6 AA size batteries (not included) or optional 120V AC adapter	6 AAA batteries (included)	AC adapter (included) or 9V Alkaline battery (not included)	120v/60Hz AC Adapter supplied with balance or a 9 V battery (not included)
Low battery indicator	Yes	Yes	Yes	Yes	Yes	
Platform material	Plastic	Plastic			Stainless steel	Stainless steel
Platform dimensions, inches	2 7/8" x 2 5/8"	5¼" x 5¼"	70 mm / 2.75 inch diameter	1 3/4" diameter	4.5" diameter	4.0 in /10.2 cm diameter
Scale dimensions (L x W x H), inches	5 1/4" x 3 1/4" x 3/4"	7½" x 5¼ x 1¾"	5.9" x 5.5" x 2.1"	5 7/8" x 4 1/4" x 1 1/16"	10.25" x 5.75" x 3.5"	8.25" x 6.75" x 2.4"
Standard accessories	50 gram cal mass, batteries, & manual	200g Calibration Mass, AC Adapter, Manual	Manual, carrying case	6 AAA batteries, a 10g (50 carat) cal. mass, a weighing tray, a gem cup and a carrying case	AC adapter, Cal. weight	AC adapter, Cal. weight
Warranty	12 months from date of purchase	60 months from date of purchase	24 month manufacturer's warranty	180 days from date of purchase	2-year renewable warranty	5 year manufacturer's warranty
Net weight (approx.)	5.6 oz / 160 g	17.6 oz / 500 g	460 g / 1 lb (without batteries installed)	Approx. 260 grams (9.25 oz.)	4 / 1.8 (lb/kg)	1.5/0.7 (lb/kg)
Optional Accessories			External Calibration mass, 120 VAC adapter		Hard-Shell Carrying Case -$35	Security device, carrying case, cables, printer, calibration masses, scoops

It might be a good idea to compare prices before you buy such expensive equipment. A brief search on the Internet gave the following internetsites (off course, there are more!) were these scales could be bought:

- **AmberDepot.com**
  http://www.amberdepot.com/scales.htm
- **Precision Weighing Balances**
  http://www.balances.com, http://www.scaleman.com/ or http://balance.balances.com

VIOLET DREAM MICROFILM

I am using the same standard components every time.
The well poured microfilm has uniform colours, easy to pour, spreading well, easy to lift, it is not sticky, doesn't tighten and shrink, it is properly tough and durable.
I make pouring tests from every mixture, so I sell only solutions of excellent quality.

Prices		Mailing costs Europe	Other
100 ml bottle	6.- $ or €	3.- €	4.- $
330 ml bottle	20.- $ or €	3.50 €	5.- $
600 ml bottle	36.- $ or €	9.- €	10.- $

Address:
Orsovai Dezső
H-1224 Budapest IX. utca 12
Hungary
Fax: (36-1) 279-0686
Email:orsi48@interware.hu

Maximus – A Sainte Formule Model by Bernard Delhalle (B)

As promised in my correspondence with the editor, here is the plan of my Saint Formula. I designed (what a pretentious word for a square drawing!) it because I was trying to do something else. Understand that I had enough of building a Miniform, a Saint Plat, or all of the usual designs. Although I now know that it was based on a wrong idea: I wanted to try to fit rubber loops as long as possible and I thought of trying to put the maximum rubber length in a fuselage to improve flight performance. At that time, I was still working in rubber cross section. After some discussions with my friend Reg Boor, he persuaded me to work with the rubber mass instead of section. Of course he was right. This is really the only way to have similar flights even when using a new rubber.

So my first idea was wrong but the model was built and I continued to fly with it using the advice of Reg. The first propeller had simple rectangular blades. I tried another design that was rounded but based on nothing. For that period, flight times were around 2'30. Then I read a copy of an article on Larrabee designed props by Reg Boor that was published in Aeromodeller. There was a tiny basic program to calculate the blade co-ordinates. It was easy to program on my little Psion palmtop and I decided to try the new blades on my model. If I remember well, flight times were improved by at least 20 seconds.

I have been very lucky with that model; it flew directly without changing balance or anything else.

Bord-o-line - F1M by Geoffrey Lefever (UK)

Construction materials

All modelshop wood except for propeller blades, stick and boom.

Part	Sub part	Dimensions
Stick		0.28" dia, 26 thou 5 lb "C" grain
Boom		14 thou 4.5 – 5 lb "C" grain
Wing posts		60 x 80 > 60 6 lb 0.004 boron each side
Tailplane posts		60 x 60 6 lb 0.004 boron each side
Bracing		1.5 thou tungsten
Wing	Main spars	60 x 70 > 60 0.003 boron top & bottom
	Tips	60 x 60 > 50
	Ribs	30 x 60 5 lb 0.003 boron top & bottom
Tailplane	Main spars	60 x 60 5 lb
	Tips	60 x 60 > 40 5 lb
	Ribs	30 x 50
Covering		Y2K or polymicro
Propeller	Blades	13 thou 4 - 4.5 lb "C" grain
	Spar	75 > 30 thou dia
	Hub shaft	15 thou
Motor		March 2002 Tan 2 - 1.50 grams 14" 1900 turns 65 gcm RPM 105

Bord-o-line - Schedule of weights

Stick	0.90
Boom	0.25
Wing	0.80
Tailplane	0.35
Prop	0.58
Ballast	0.12
Total	3.00

Stick: 4 no. 0.004 boron at 45, 135, 225 and 315 degrees.
Boom: 3 no 0.003 boron at 0, 120 and 240 degrees.

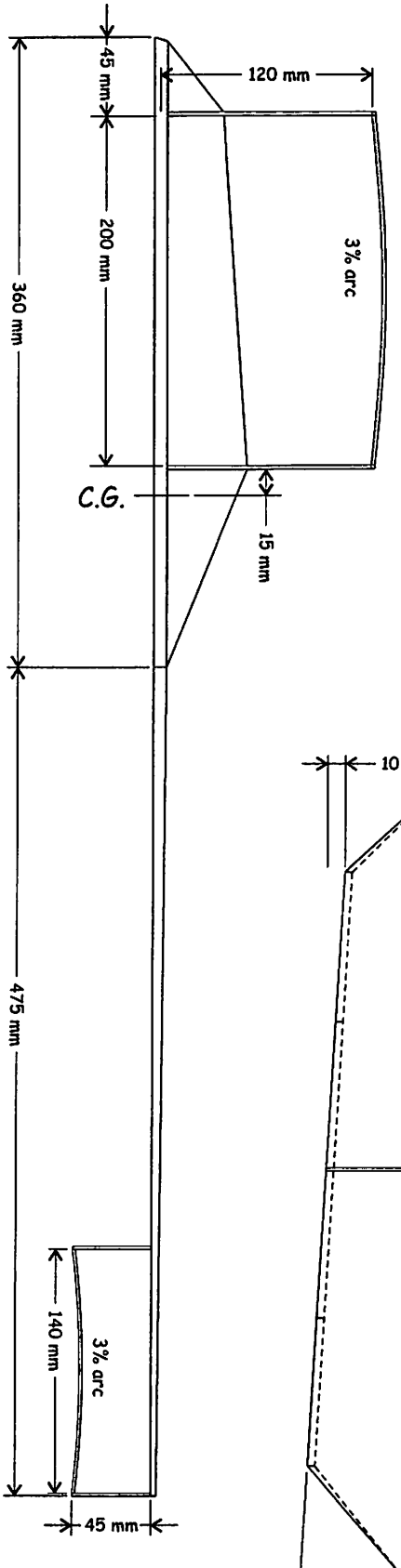
Trim

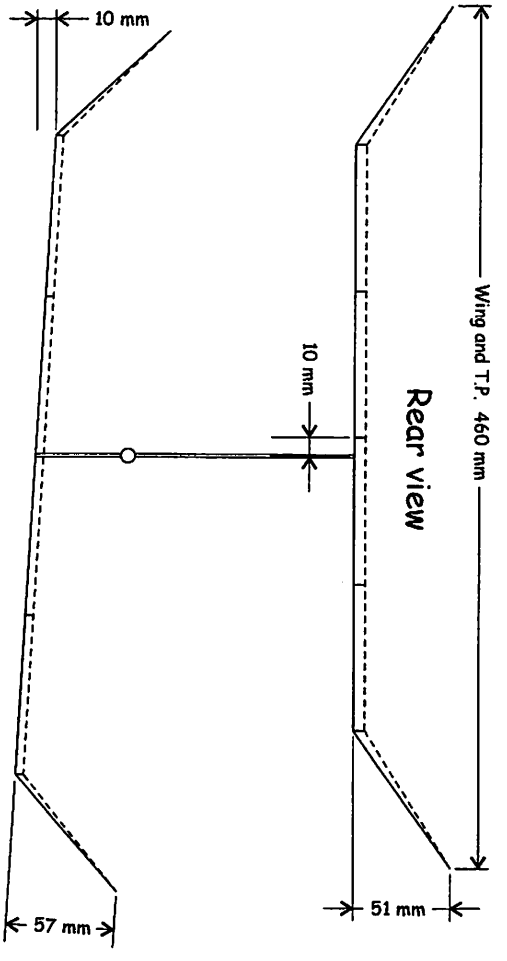
Some stick bow is necessary at high torque controlled by slackening wire bracing.
Wing is flat, i.e. no warps. Washin is induced by torsional deflection of stick.
Tailplane slight washin in left-hand panel (from rear). Rear tube offset 3 mm to provide left turn.
Thrust line 0 degrees down, 3 degrees left.

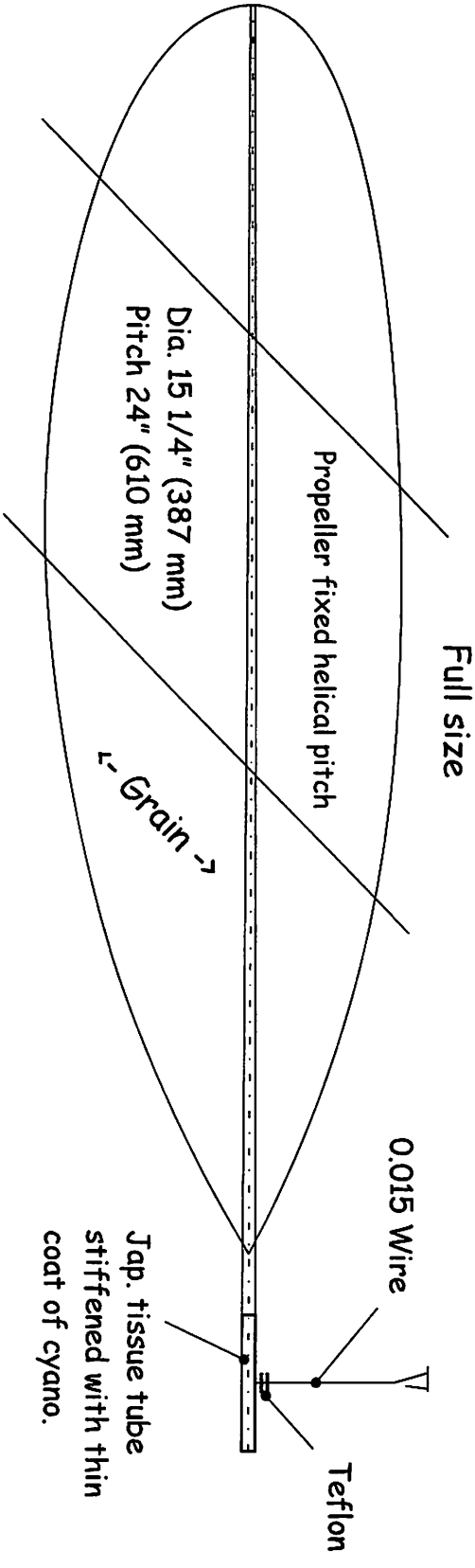
Units

Model dims in mm; Timber, rubber and wire & boron in inches; Weights in grams.

IFI
JAN 2003







BORD-O-LINE

An F1M model designed by Geoffrey Lefever (UK)

Scale 1:4, details 1:1

All measurements in mm

MAXIMUS

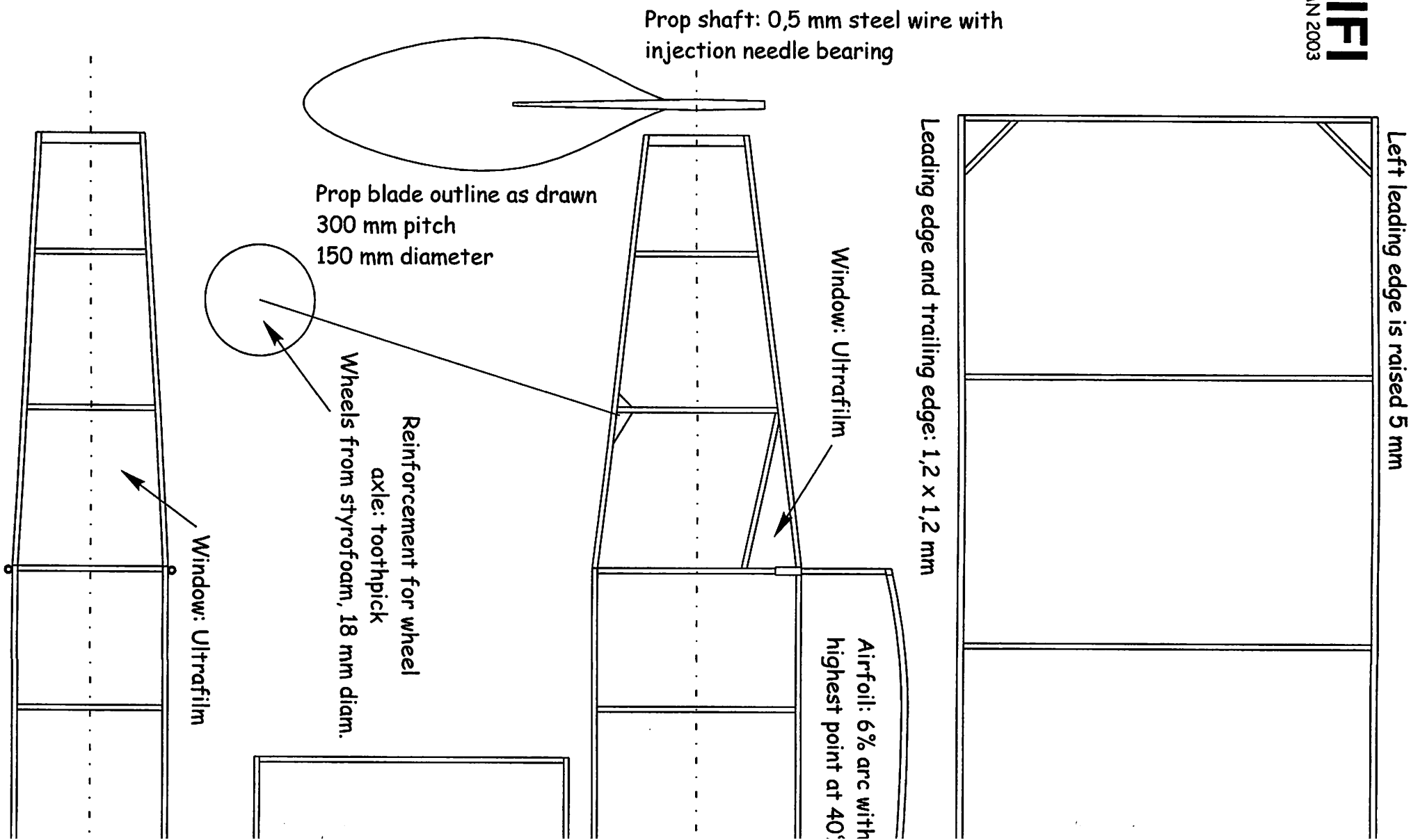
A "Sainte Formule" model (+ 3 gram)
designed by Bernard Delhalle
P.A.T. Flemalle

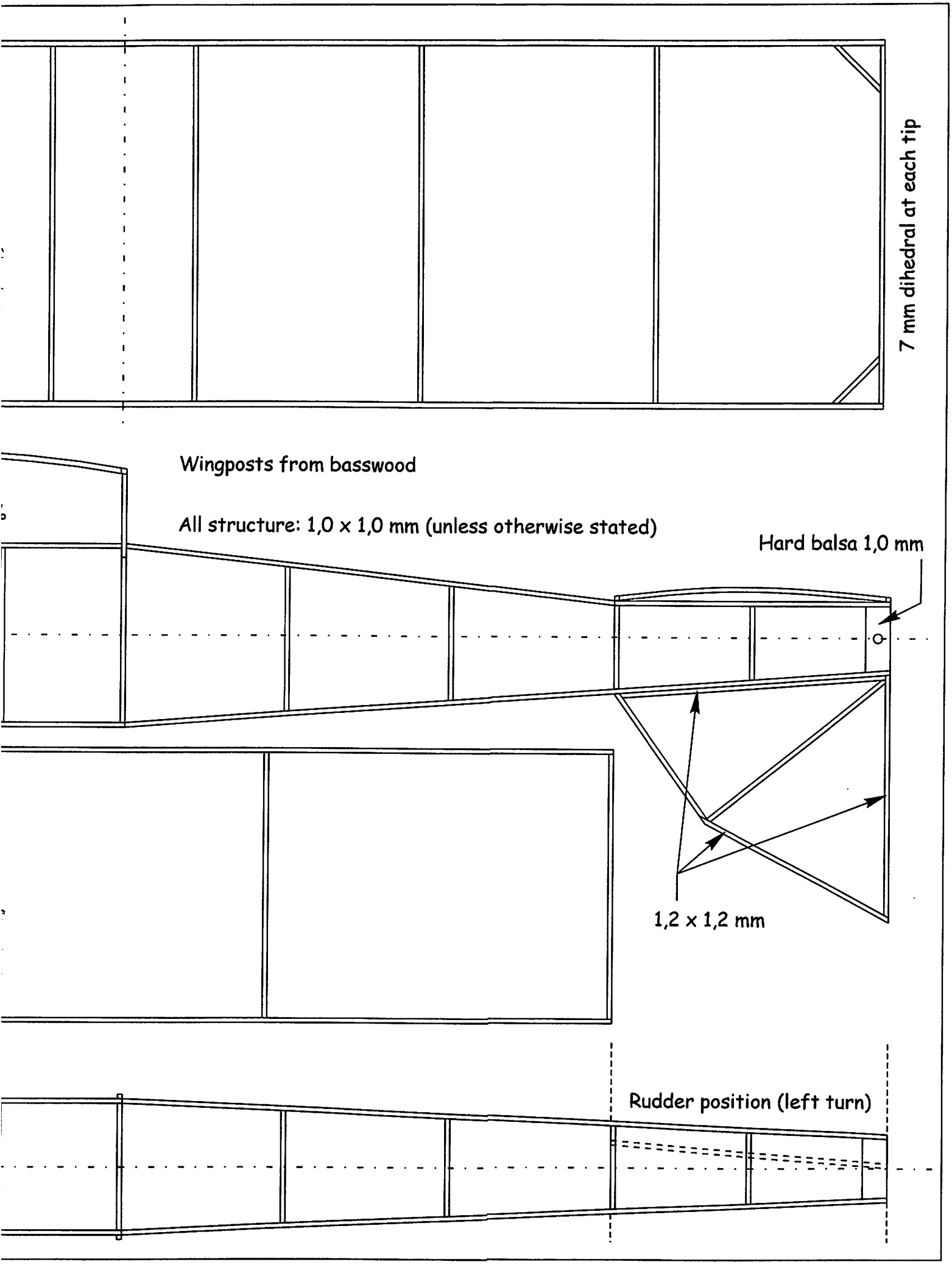
Best flights: 3'34" at A. Cools hall - Flemalle (Belgium)
4'05" at Tennis Club Condroz - Liege (Belgium)

Rubber: 650 mm loop of 1,15 gram/meter

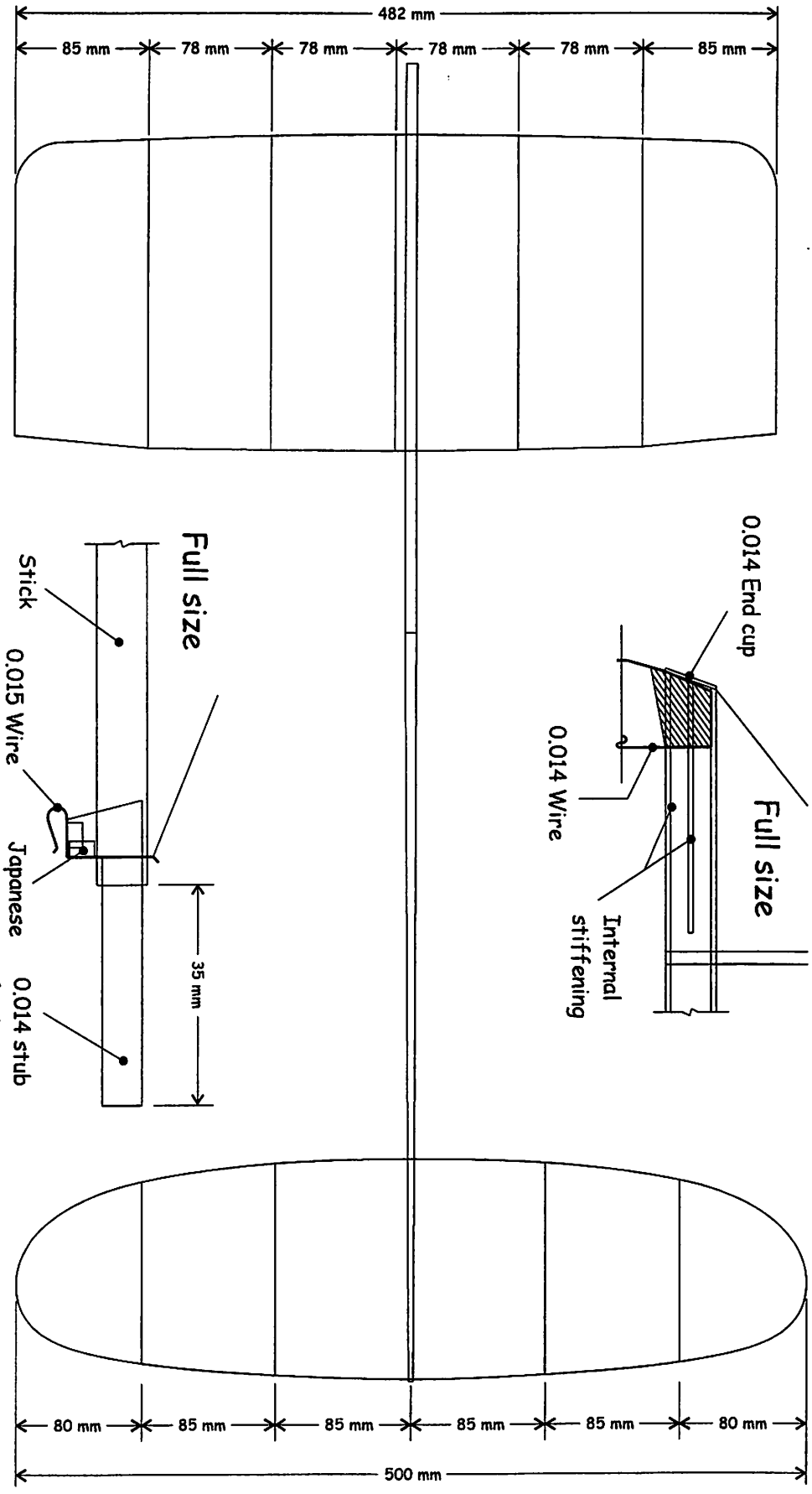
Covering: Fuselage: Condenser paper
Wing, stab and rudder: Ultrafilm

IFI
JAN 2003




7 mm dihedral at each tip
Wingposts from basswood
All structure: 1,0 x 1,0 mm (unless otherwise stated)
Hard balsa 1,0 mm
1,2 x 1,2 mm
Rudder position (left turn)

IFI
JAN 2003



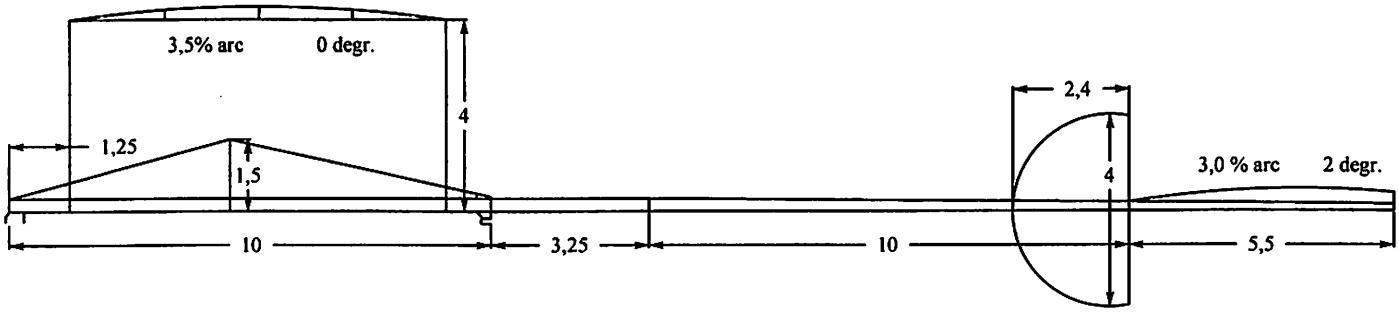
International Contest at Bordeaux Velodrome 2002
Height 30 m (98.4 ft)
1st place with flights of 17:38 and 17:37

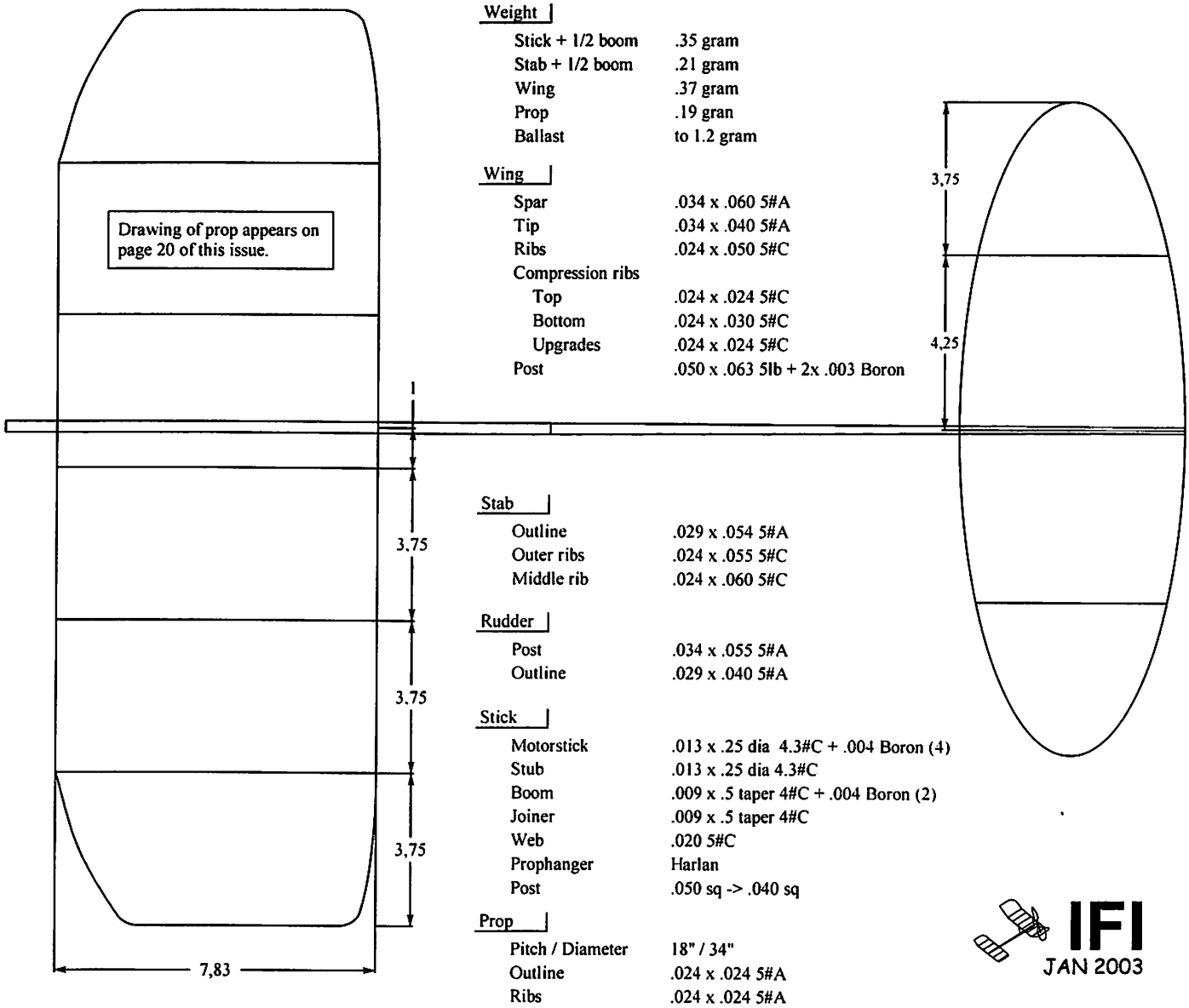
BORD-O-LINE

An F1M model designed by Geoffrey Lefever (UK)

Scale 1:4, details 1:1

All measurements in mm





Weight

Stick + 1/2 boom	.35 gram
Stab + 1/2 boom	.21 gram
Wing	.37 gram
Prop	.19 gran
Ballast	to 1.2 gram

Wing

Spar	.034 x .060 5#A
Tip	.034 x .040 5#A
Ribs	.024 x .050 5#C
Compression ribs	
Top	.024 x .024 5#C
Bottom	.024 x .030 5#C
Upgrades	.024 x .024 5#C
Post	.050 x .063 5lb + 2x .003 Boron

Stab

Outline	.029 x .054 5#A
Outer ribs	.024 x .055 5#C
Middle rib	.024 x .060 5#C

Rudder

Post	.034 x .055 5#A
Outline	.029 x .040 5#A

Stick

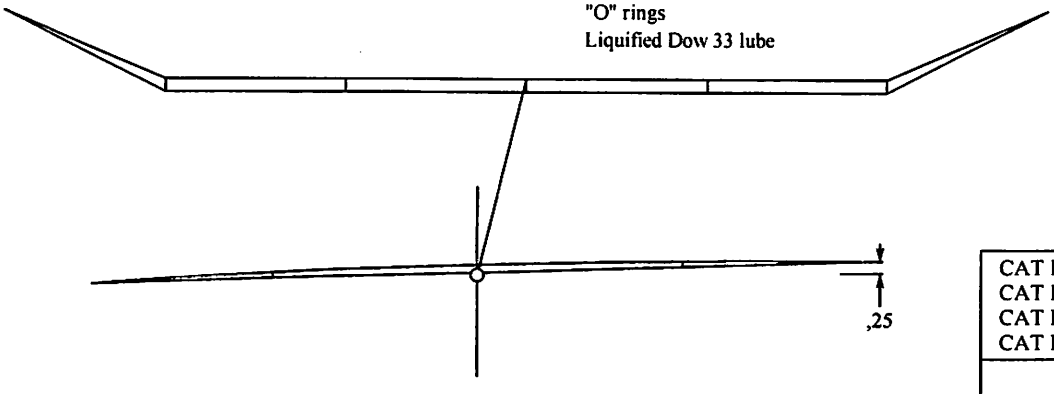
Motorstick	.013 x .25 dia 4.3#C + .004 Boron (4)
Stub	.013 x .25 dia 4.3#C
Boom	.009 x .5 taper 4#C + .004 Boron (2)
Joiner	.009 x .5 taper 4#C
Web	.020 5#C
Prophanger	Harlan
Post	.050 sq -> .040 sq

Prop

Pitch / Diameter	18" / 34"
Outline	.024 x .024 5#A
Ribs	.024 x .024 5#A

Motor

.05 x .6 gram 5/99
"O" rings
Liquified Dow 33 lube

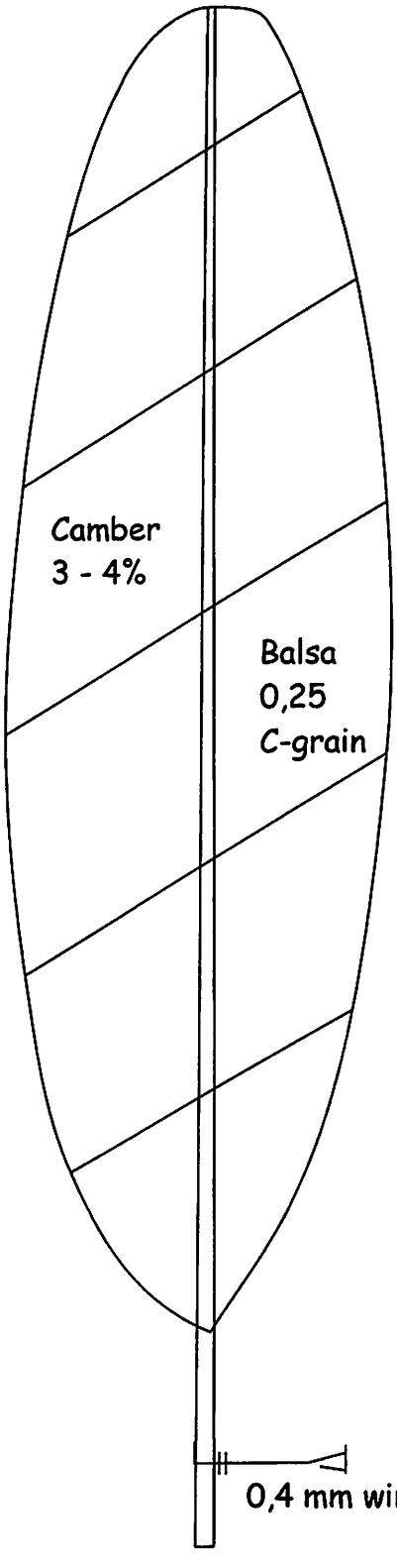


IFI
JAN 2003

CAT I: CAT II: CAT III: CAT IV: 36:12	F1D
	Built and flown By Doug Schaeffer

Prop Drawings

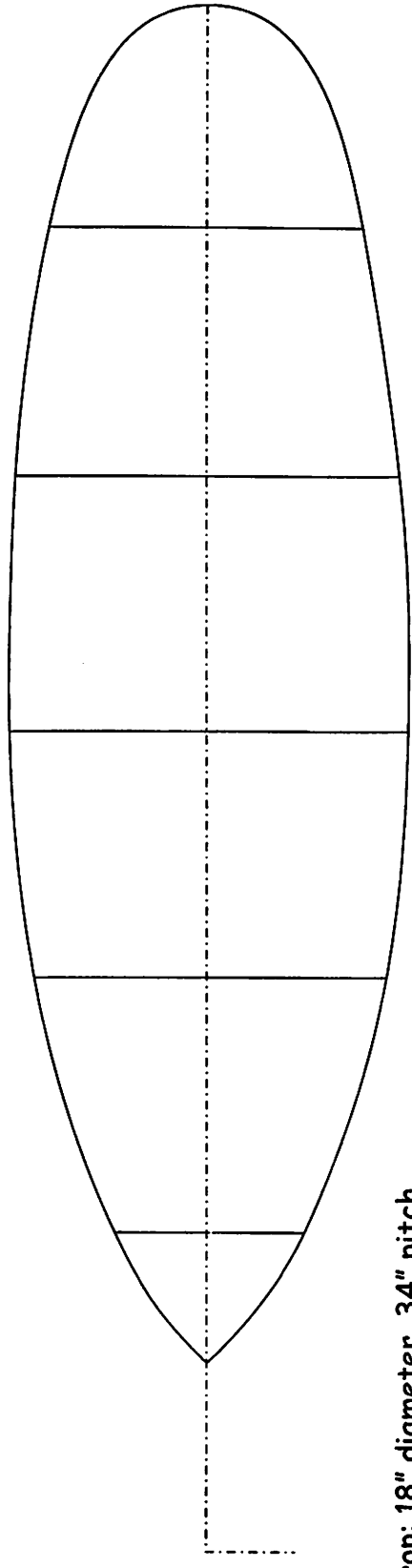
Prop drawing for Nimptsch' F1M model that appears on page 24 of this issue.



Prop: dia 390 mm, 500 mm pitch

Prop for F1M Model	
A F1M model designed by Werner Nimpsch (GER)	Scale 1:1
	All measurements in mm

Prop drawing for Schaeffer's F1D model that appears on page 19 of this issue.



Prop: 18" diameter, 34" pitch
1750 winds, 36:12 minutes
landed with 12 winds

Prop for F1M Model	
A F1M model designed by Werner Nimpsch (GER)	Scale 1:1
	All measurements in mm

Results of Baden-Württemberg Indoor Championships 2002 24th Indoor Contest in Schorndorf

10.11.2001, Brühlhalle in Schornbach

Rainer Lotz from Metzingen can't be beaten at the Schorndorf Indoor Contest. He achieved a new record of a bit more than 28 minutes with his win in F1M in the Schornbach indoorhall.

His sons won the junior contests: Philip won F1M-limited with a total of 18 minutes and Christian took first place in Ministick with 10 minutes.

There was a total of 25 participants at the 2002 Baden-Württemberg Indoor Duration Championships, organised for the 24th time by the Schorndorf aeromodel Club.

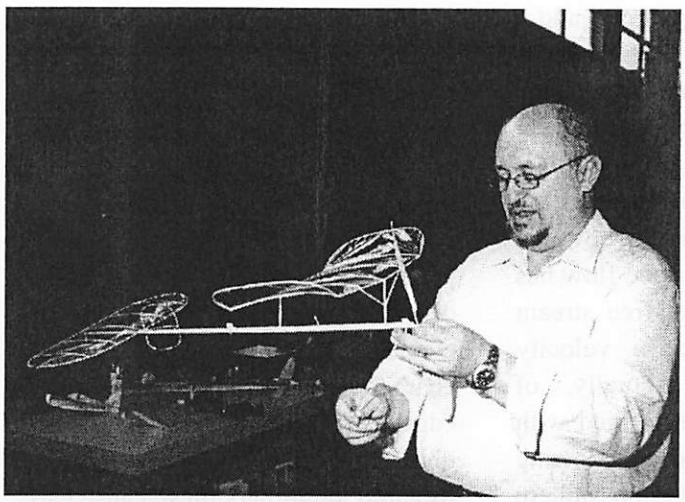
Ministick was the category that attracted most people: 15 entries, from which 5 were juniors. There was a great difference in performance, since many participants only flew for fun in this class.

Six flights were allowed in each category, of which the best 2 flights counted for the overall results.

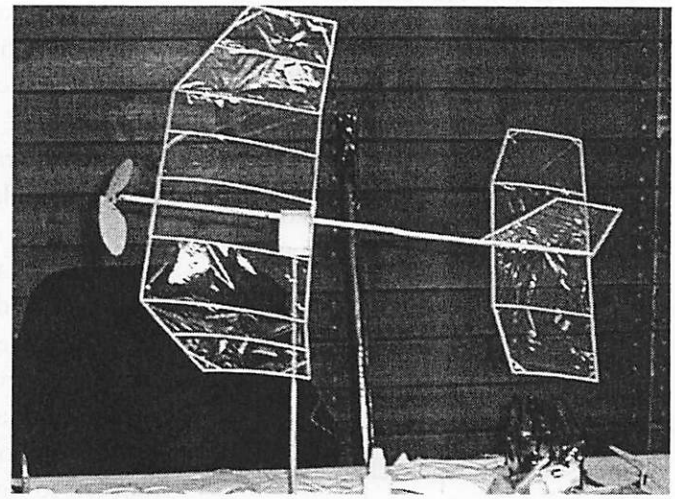
Harald Ofterdinger won the F1M-limited category with 18:41 minutes, followed by Bernhard Schwendemann (12:28 minutes). In F1M-limited, only simple models are allowed (see the article on page 11 of this issue for a description of the class).

Winner of the Ministick category was Rainer Lotz (13:17 minutes), followed by Benno Schlosser (10:11 minutes) and Thomas Merkt (9:33 minutes).

The junior Ministick category was won by Christian Lotz (10:00 minutes), with Alexandru Cosoveanu (7:47 minutes) in 2nd place and Oliver Meißnest (2:42 minutes) in 3rd place.



Marian Krause with his F1M model.



An F1M-Limited model flown during the contest.

F1M (=Beginner)*

	Name	Club	Flight 1	Flight 2	Total
1	Rainer Lotz	Metzingen	14:05	14:40	28:45
2	Harald Ofterdinger	Hildrizhausen	10:27	10:22	20:49
3	Marian Krause	Gerolsbach	3:52	5:10	9:02
4	Albert Riedlinger	Metzingen			-

F1M-L (= Beginner-limited)*

	Name	Club	Flight 1	Flight 2	Total
1	Harald Ofterdinger	Hildrizhausen	9:04	9:37	18:41
2	Bernhard Schwendemann	Schorndorf	5:47	6:41	12:28
3	Marian Krause	Gerolsbach	6:11	5:55	12:06
4	Benno Schlosser	Knittlingen	9:47		9:47

F1M-L (= Beginner-limited) Junior *

	Name	Club	Flight 1	Flight 2	Total
1	Philipp Lotz	Metzingen	9:00	9:15	18:15
2	Alexandru Cosoveanu	Gerolsbach	3:45	5:33	9:18

Winner of the Barbara-Künkelin-Cup:

- Seniors: Rainer Lotz
- Juniors: Christian Lotz

F1D-Mini-Stick

	Name	Club	Flight 1	Flight 2	Total
1	Rainer Lotz	Metzingen	6:36	6:41	13:17
2	Benno Schlosser	Knittlingen	5:02	5:09	10:11
3	Thomas Merkt	Spaichingen	4:47	4:46	9:33
4	Marian Krause	Gerolsbach	3:38	3:27	7:05
5	Roland Braun	Schorndorf	3:05	3:10	6:15
6	Bernhard Schwendemann	Schorndorf	2:28	2:19	4:47
7	Wolfram Hägele	Herrenberg	2:10	2:10	4:20
8	Hans Deuschle	Schorndorf	1:57	2:20	4:17
9	Heinz Hofmann	Schorndorf	1:01	1:03	2:04
10	Josef Schalkowski	Stuttgart	0:42	0:47	1:29

F1D-Mini-Stick Junior

	Name	Club	Flight 1	Flight 2	Total
1	Christian Lotz	Metzingen	5:20	5:00	10:00
2	Alexandru Cosoveanu	Gerolsbach	3:26	4:21	7:47
3	Oliver Meißnest	Backnang	0:57	1:45	2:42
4	Marina Meißnest	Backnang	1:04	1:24	2:28
5	Christian Fux	Stuttgart	1:03	1:15	2:18

The Aerofoil

By Reg Boor (UK)

PERPETUAL MOTION

A dream throughout the ages has been that of "perpetual motion". A machine that will do useful work for no input. Claims of the invention of these are fewer in the modern era but there have been some in my lifetime, one quite recently. But they all turn out to be either misinterpretations of what is going on in the machine or simply hoaxes.

And what has this got to do with aerodynamics? You might well ask.

The answer is simple. My candidate for the (almost) perpetual motion machine is that beautiful thing the aerofoil section. Anyone can design one using the sole of their shoe as a curve which will give 10 times as much lift as drag, the humble EZB can score about 8 (and what sort of an aerofoil is that?), a good F1A glider can achieve a lift/drag ratio of 20 and a modern fibreglass competition sailplane, "a glass ship", can approach 50. All these latter are also carrying around a fuselage and tailplane with them. In an exercise at the Douglas Aircraft Company in the 1970's, Robert Liebeck designed and tested a two-dimensional aerofoil section which gave a lift/drag ratio exceeding 200.

THE ORIGINS OF LIFT

How does it do it? Oh, the air flows faster over the top of the section, or wing, than it does underneath and Bernoulli's Theorem tells us therefore that the pressure is reduced on the upper side and increased on the underside thus causing a lift force. This is basically correct. But why does it flow faster over the top than it does underneath? And where does the efficiency spring from? The commonest explanation of the first of these questions is that the air going over the top has further to travel and so an air molecule has to flow faster in order to meet at the trailing edge its previously adjacent molecule flowing underneath. If this is true it only explains the origin of lift and not the extraordinary efficiency of the aerofoil.

But it is not true. The air flows faster over the upper surface than it does the under surface because of the "circulation" around the foil. In the mathematics of two-dimensional, inviscid, (frictionless) flow it is possible to impose a uniform stream of air onto an aerofoil section, but surprisingly, you don't get any lift. If you do the exercise again and add a circulatory flow about the section as well, you do get lift. The sign convention of this exercise is that for an aerofoil travelling from right to left the circulatory flow around the foil has to be clockwise for upwards lift. Thus, the upper surface flow has a velocity added to the free stream and the under surface a velocity subtracted from it. Actually, of course, the maths is performed with the foil stationary and air flowing from left to right and it is possible to show that this is an identical system. Measurements of lift on 2-dimensional sections in the wind tunnel agree with calculations from the mathematics, so this is a convincing explanation and also a model of the phenomenon of the aerofoil. The strength of circulation required at a given angle of attack is that which causes smooth flow off the trailing edge i.e. the flow does not have to achieve infinite velocity in order to curl around the sharp corner. This is known as the Kutta condition. Kutta was a mathematician who became interested in aerodynamics through the glider flights of Lilienthal in Berlin in 1890.

The efficiency of the aerofoil section arises from the fact that there are high velocities around the leading-edge - another consequence of the Kutta condition - and these velocities result in high suctions in that region. The suctions act perpendicularly to the local leading-edge surface and consequently have a forward component which gives a thrust in the flight direction. This is not saying that the overall pressure drag can be zero or negative, it cannot, but it does explain the aerofoil efficiency. At this point, it is worth saying that although it is the camber and its position on the chord (the mean line) that determine the aerofoil aerodynamic characteristics of zero-lift incidence, pitching moment, ideal operating lift coefficient and centre of pressure position, the envelope, or thickness distribution around the mean line contributes to the flow characteristics around the leading-edge. Well-rounded leading-edges give high suctions, but at model Reynold's numbers these cause early laminar separation with resulting low lift coefficients, so aeromodellers have stopped using RAF 32 and Eiffel 400 and now use very thin Benedek style aerofoil sections which, although they do not possess highly efficient leading-edges, encourage the transition to and maintenance of the turbulent flow essential for operation at model Reynold's numbers. The tendency to laminar separation is eliminated.

So, returning to the subject, how do I start the circulation and arrange that it is just of the right strength? Here is another beauty of the aerofoil section, you don't have to. It does it

for you, and despite the fact that we use inviscid mathematical theory to explain the origins of lift the, tiny, viscosity of air is essential to start the circulation.

INTO THREE DIMENSIONS

But let us take a step back and think now about our three-dimensional wing of some finite aspect ratio travelling through the air. We need a model of this system that will explain all the phenomena we know exist. That the lift can be explained by circulation theory, that the wing has induced drag, that there is a downwash at the tailplane reducing its efficiency and that the wing's lift-curve slope is no longer the ideal 2-dimensional value of 2PI. The "bound vortex" theory explains all this.

We conjecture a spanwise vortex attached along the line of centres of pressure, rotating clockwise viewed from the port wingtip, spanning the wing and travelling along with it. This is a very special type of vortex. In its small inner core, the tangential air velocity is proportional to radius and thus increases as we travel outwards from its centre, but outside the core the tangential velocity decreases as radius increases. This is a Rankine vortex, its inner core induces an outer circulation which possesses the properties necessary to satisfy the inviscid mathematics that we have discussed above and this gives us our connection with circulation theory. Rankine was a Scottish engineer interested in the design of ship's hulls.

But another 19th century giant of mathematics and physics, Helmholtz, showed that a vortex cannot end in space. It has either to end at a solid boundary or form a closed loop. Well, we know that our vortex curls off each wingtip to form the tip vortices, a proposal first put forward by the English aerodynamicist Lanchester in 1907 but developed later into the theory that we are discussing by Prandtl at Göttingen. In doing so these vortices absorb the energy which we call induced drag. Viewed from the tail of the aeroplane, the vortex from the starboard tip rotates anti-clockwise, that from the port clockwise, and these are often visible in full-size aircraft when the atmospheric conditions are right. The term "induced drag" was first suggested by a colleague of Prandtl, Max Munk, as Prandtl himself was basically interested in explaining the origin of lift.

Where, then, is the loop closed? As Helmholtz says it must be. It is closed at launch or take-off by the "starting vortex", although, because of viscosity in the surrounding air, this soon disperses. Nevertheless, the starting vortex is just what its name implies. When we start an aerofoil section from rest there is no initial circulation around the wing, but the viscous forces close to the foil surface cause an anti-clockwise vortex to be cast from the wing trailing-edge, which cannot exist in isolation either, so the clockwise vortex we need on the wing emerges, together with the tip vortices, to form our closed circuit. We have a very large, rectangular, invisible smoke ring. You can demonstrate the starting vortex for yourself. The next time you stir a cup of coffee, plunge the spoon half into the surface of the moving liquid. Your spoon is an arc mean line and you will see a starting vortex spring from its trailing edge.

DOWNWASH

The horseshoe-shaped vortex towed along by the wing induces a downward movement of air inside the horseshoe that we recognise as the downwash. Our tailplane is immersed in this and so, despite the fact that it is rigidly connected to the wing, it does not reflect changes in wing angle of attack during a disturbance but sees a reduced value. In other words, because of the effects of downwash, our tailplanes are less efficient and indoor duration modellers try to minimise this loss of efficiency by using both vertical and horizontal separation of the wing and tailplane which takes the tail out of the plane of the trailing vortices and reduces their effect.

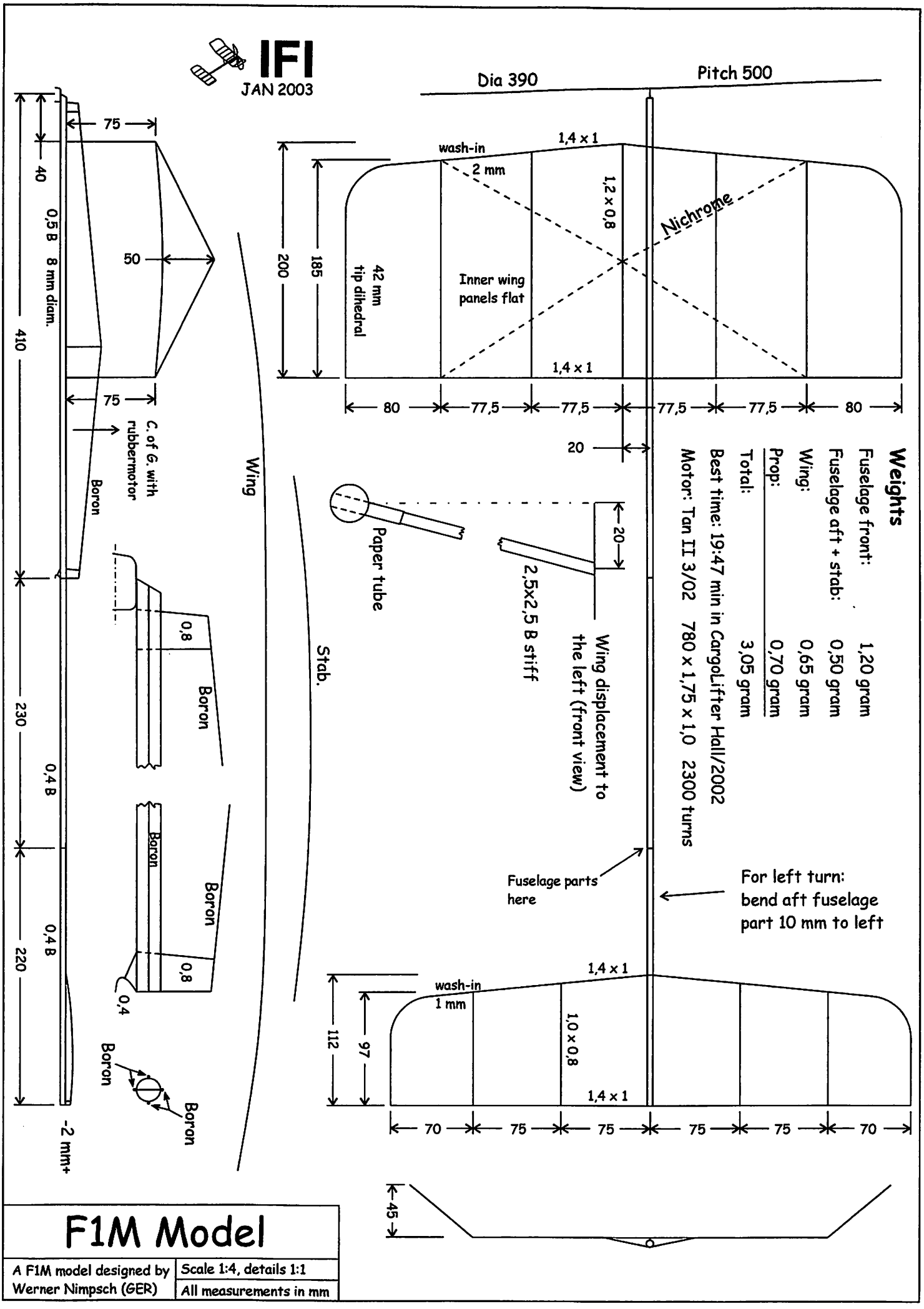
But not only the tailplane is in the downwash field. Although the wing bound vortex does not influence itself, the trailing vortices do induce a downward flow at the wing and the wing itself experiences an angle of attack which is less than the apparent geometric angle. The lift is reduced. We deal with this phenomenon theoretically by reducing the wing lift-curve slope from its ideal 2-dimensional value of 2PI, thus enabling us to use the geometric angle of attack in calculations. As I am sure you all know, the formula we use for lift-curve slope depends on aspect ratio only and, for aspect ratios above about 6, is 2PI times aspect ratio divided by aspect ratio plus 2.

CONFESSIONAL

This article was originally entitled "Downwash" and I intended to present some formulae to enable the estimation of downwash strength at the tailplane position, its variation with both vertical and horizontal separation and, in addition, to explain the phenomenon of "downwash drag" and how to calculate it.

But I became carried away with what was to be merely the introduction to such an article. Nevermind, a plunge into basics now and then does no harm and reminds us of the roots of our hobby.

I shall write the originally intended piece, and hopefully you will have it in the next IFI.



F1M Model

A F1M model designed by Werner Nimpsch (GER)	Scale 1:4, details 1:1
	All measurements in mm

F1M by Werner Nimpsch (GER)

When I fly this model in a lower hall (e.g. Flémalle), I use a wing and stab with more undercamber and with a larger wingchord. And if the vp prop also works well, then flight times of 17 to 18 minutes are possible. In the CargoLifter Hall, the model needs to get as high as possible, and that's why I've built the smaller wing that is shown on the drawing.

When testflying the model in my gym hall, I was able to get flight times of 7 minutes on one third motors. With hopes of flight times over 20 minutes I used this model in the CargoLifter Hall. Unfortunately, the expected flight times were not totally reached. But when I think of the fact that this was only the first time that I flew this model in a high hall, the times aren't that unsatisfactorily and maybe even open to improvement.

Just a short note on my rudder design. Last year, I flew this model in the CargoLifter hall with a normal rudder. The results were not well, since the model had start problems. Flight times were only up to 15 minutes or so. When looking for improvements, I changed the rudder design to what you now see on the drawing. The results were superbly; the model with new rudder design was able to climb like on rails!

Editor's note: since the drawing was too big to fit on one page, the prop drawing appears on page 20.

S.T.I.F.F. STICK AND TISSUE FLEDGLING FLYERS PRESENTS THE 2003 HANGAR RAT POSTAL CONTEST

JANUARY 2/03 TO MARCH 31/03 (ANY ONE DAY)
OPEN TO ALL INDOOR FLYERS WORLD WIDE

Rules

As per Harry Barr's 1979 original design in model builder mag.

1. Model as per plan. No other modifications allowed (see special amendment effective Jan. 2, 2003).
2. Rubber motor; 1/8" x 36" maximum (91.5 cm) before tying loop. Class B only.

Special amendment; change to rubber motor rule for class A, (wood Paddle).
Motor may be from 70 thou. to 90 thou, but must still be maximum 36" length.

Note: model must follow original outline as per plan. Woodsizes shown on plan, must be adhered to.

3. Tissue covering only. No condenser paper, mylars or microfilm. Colour your covering if you like!
4. Model must r.o.g. - hand launches are not permitted!

Scoring

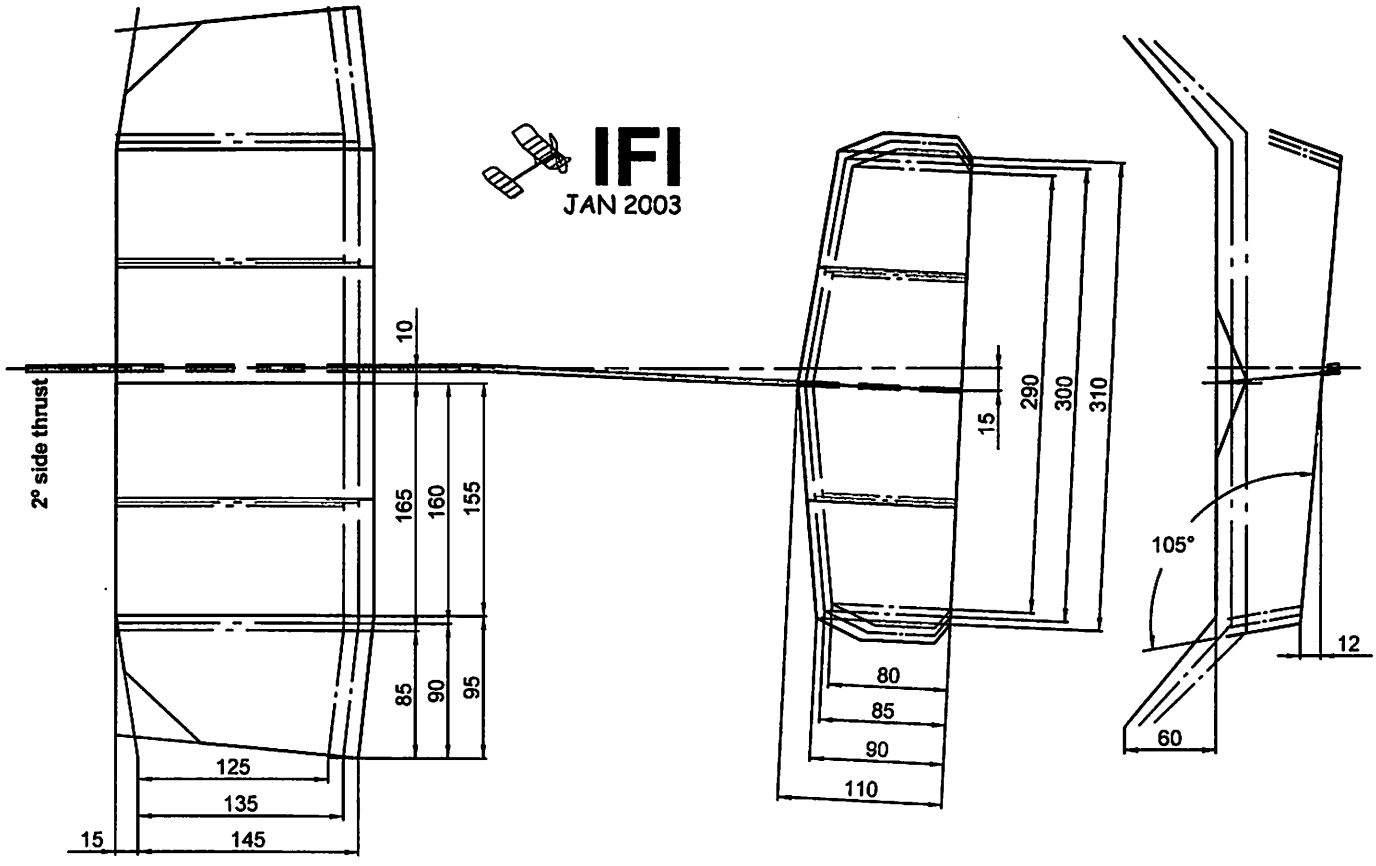
Best total of 2 flights out of 6 attempts. Times must be in seconds!
(the normal fudge factor for various ceiling heights will be used).

Results are to be sent to Art Lane no later than April 15, 2003. Mail to: Art Lane, 9 - 617 Wharncliffe Rd. S., London, Ontario, N6J 2N7 Canada or email to: artlane@juno.com

Entry Form

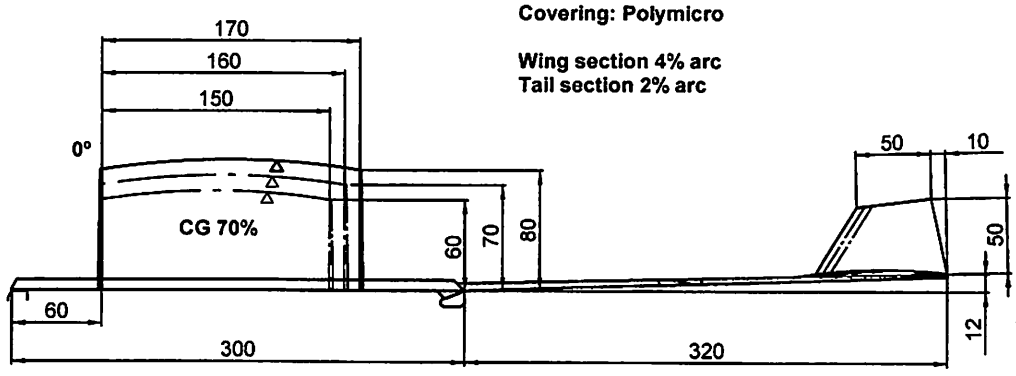
Pilot	Flt. 1	Flt. 2	Flt. 3	Flt. 4	Flt. 5	Flt. 6	Best 2 Total	

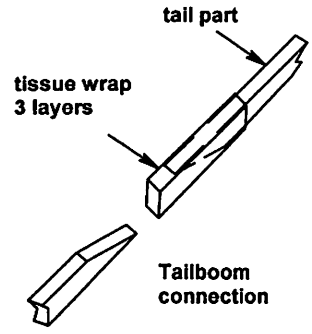
Class A _____ (Wood Paddle) Class B _____ (Plastic Propeller)
Verified _____ Team Manager
Address _____ Postal Code _____
City _____ Prov./State _____ Country _____
Ceiling Height _____ (Ft. or Meters; please specify). **Note: we must have this figure!**

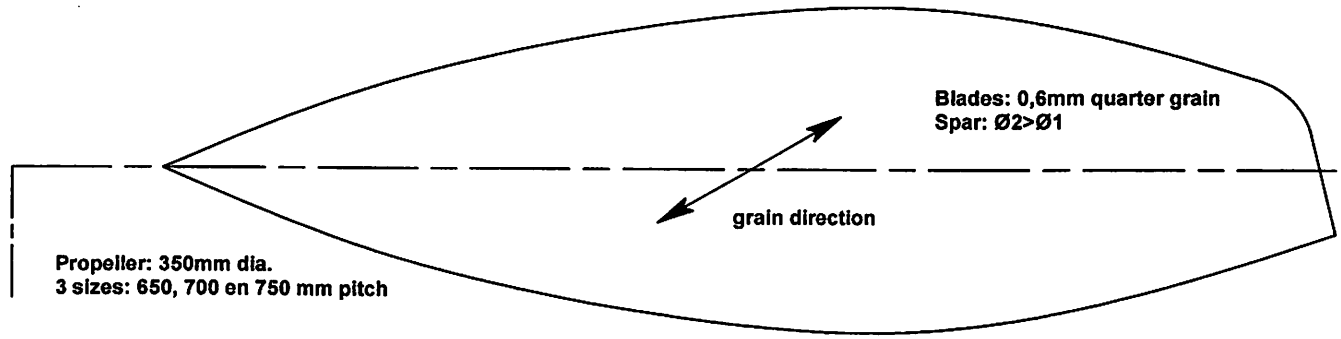


Covering: Polymicro

Wing section 4% arc
Tail section 2% arc







Dimensions

Wing:		Tailplane:	
spar	2x1	spar	1,5x0,8>1x0,8
tipspar	2x1>1x1	ribs	1x0,8
ribs	2x0,8	struts	0,8x0,8
posts	Ø 2		
struts	1x1	Fin:	0,8x0,8

Motorstick: 7,5x4
ends tapered to 5x4

Tailboom: 5x3,5>2,5x2

Midget (S, M and L)

F1M Beginner model

Design: Thedo Andre

Three Midgets in a little box

By Thedo André (NL)

Some time ago I was regularly asked to give indoor flying demonstrations, but I always had to borrow models from other people. All I had were microfilm models and these are not very suitable for the turbulent conditions that often prevail at such events. I therefore decided to build a few demonstration models myself. The design had to meet the following requirements:

3 models (i.e. spare in case of damage) quick to build, no jigs required, stable flight pattern, all models transportable in a small box.

I opted for an F1M-model according to the accompanied plan. The choice of straight outlines facilitated building directly over the plan without the need for jigs. The models proportions are based on Otto Rodenburg's Monty P design, which has a very nice flying pattern. The three models have different wing chords, allowing the wings to be stacked over each other for storage in the box. The tailplanes can also be stacked on top of each other and the tailboom is made detachable. The separation in the tailboom is made by cutting it under a shallow angle with a sharp razor blade. The end of the tailpart is wrapped with 3 layers of tissue forming a socket that fits the front part of the tailboom. The tissue is thoroughly impregnated with thinned down cellulose cement.

The wood sizes as chosen allow the model to be built just under the minimum 3 grams required. For wing, tail and fin the wood density should be 5-6 lbs and 4lbs for fuselage and propeller blades. The propeller spar is made from 7-8 lbs wood. Use glue very sparingly and keep the tail light!

I have identified the models by decorating them with silver Mylar stars glued on with spray glue. The tail parts are marked with different colour spots.

Because there was no need to make any jigs (I already had the required pitch jigs) I could build and finish all three models in a single weekend. The model has very smooth flying characteristics and easily does 8 minutes in a Cat I gym hall.

Covering with Y2K2

By Mark Bennett (USA)

If you are having trouble handling Y2K2, try the below method. But if your wings look like Larry Calliau's, then don't bother to read!

The handling trick is to always have a grabbable tape handle/border along the entire free end of the film roll; 3/4" wide masking tape seemed fine. To attach an initial "handle" on a new roll, roll out about a foot of film onto some clean, flat cardboard. Smooth out with a lady's powder brush. Attach two corners (or just opposite edges) with small tape pieces. Cut an 11" length of 3/4" tape across the 12" width, completely on top of film with no sticky parts hanging off. Remove the two small anchor tapes; this leaves a free hanging border/weight tape handle attached to the film roll.

The covering jig is just a big sheet of 3/4" Styrofoam with a rectangular hole cut out of the middle that exceeds the wing dimensions (for an F1D wing, a 13" x 30" hole worked fine). Use straight pins to pin the tape handle flat to the Styrofoam a few inches from one end of the jig hole. Unroll the film across length of the cutout hole (the slower the better, to catch any film splits). Use two tiny tape anchors on the edges of the film to momentarily attach it to the jig a few inches beyond the other side of hole. Now it is the best time to make the tape handle for the next job.

Similar procedure as before: brush that section smooth, and then lay an 11" length of 3/4" tape across/on top of the film. Lay another 11" length of 3/4" tape one inch away from this one. Cut or burn in between them. Now you can store the roll with the tape handle ready next time. The span of film that's on the jig now has a tape border across the widths at both ends, but it's not permanently stuck to anything. You can manipulate it with straight pins poked through both masking tape borders to adjust the sag and camber across the Styro hole. The sides just hang free. Drop the outline upside down on the film for final fussing with sag amount, wrinkles, etc. With ends pinned, the sides may need nothing, but they sometimes need one or more 1/16 wide strips of Scotch tape to hoist a side of the film into contact with the LE or TE. After you're happy with the position, wick around very, very thinned Super77/Xylol. A skinny sable scriptliner (#1) makes application a pleasure. Glue weight increase is almost unweighable (on my Harlan beam).

Probably not necessary, but to keep a light (F1D) wing outline from warping on top of the film, I tack glue 3/32 balsa sticks X-brace style to the bottom of the wing outline, connecting the LE to the TE. The extra weight lets the wing outline settle a little tighter onto the film – (not necessarily good, since it could end up too tight) but I liked the result on the three wings I did this way. Also, the temporary bottom brace makes later handling easier, such as while cauterising and sealing the film. I would rate this method easier than the adjustable (chordwise) rail jig I used for EZB parts, and it gives a better result. But beware; it's still difficult in a low humidity. I'm going to try with crinkled film next time. Not sure how that will play out, because it doesn't minimise film handling which is the whole point of the above method.

St. Séverin 2002 (Belgium) International Contest Report

By Gert Brendel (NL)

The Liege contest was held from 21st till the 25th of August 2002. As usual, the first couple of days were used to fly the duration classes and the weekend was mostly reserved for scale classes.

I arrived on Thursday and was welcomed by Bernard Delhalle at the train station, where he picked me up. When I entered the hall after lunch, the contestants who were already busy flying welcomed me. Sadly, there wasn't a great lot flying in duration. The British indoor flyers had their own Duration Nats at Cardington and were preparing for the CargoLifter Hall meeting in September – but it was good to see that some of them had made the long journey to Belgium.

In spite of the revival of the class with the rules change, only 2 flew in F1D. But then this hall isn't the best to fly this kind of duration models in. Nevertheless, the winners longest flight was a quite respectable 24 min 25 secs.

One person dominated in duration classes: Werner Nimptsch (he won 4 of the 5 classes he participated in). But the class he really would have liked to win, F1D, was won by Edward Ciapala from Poland with a best flight as posted above. One remarkable incident that happened during the F1D contest: Edward Ciapala's F1D model was hit by a raindrop during one of its flights and the model sustained only minor damage to a wingspar. A model built to the old rules would have sustained considerably more damage; the new rules models certainly are a lot more robust! In the other duration classes, Werner Nimptsch seemed unbeatable and he took home first prices in F1L (EZB), F1M, Micro35, and Saint Formule.

It was good to see the scale classes really well supported with participation from French, Spanish, Belgian, Dutch and English participants. Especially Peanut (F4F), where 14 participants entered a total of 29 models. Pistachio had 6 participants and 7 entries, and roughly the same amount of participants appeared in F4D Rubber Scale. There's not enough space to name and congratulate everyone separately, but my congratulations to all winners - the results are on the next page.

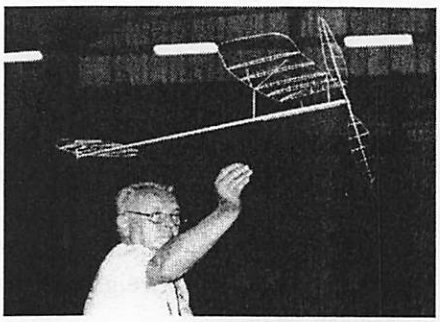
I've enjoyed another great contest in Belgium, and I really hope we will be able to attend this contest again. A big "Thank you!" to Bernard Delhalle and his crew for again making this contest to a great success!



Edmond Roch with EZB.



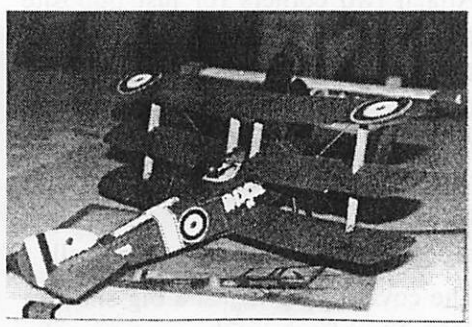
Reg Boor launching his EZB.



Edward Ciapala launching his winning F1D.



Andre Petit's Peanut Denight DDT.



Div's Masters' beautiful Sopwith Triplane.

Flémalle 2002 International Contest Results

F1D Microfilm Senior

	Name	Flight 1	Flight 2	Points
1	CIAPALA Edward (POL)	1465	1445	2910
2	NIMPTSCH Werner (GER)	1350	1292	2642

F1L (ezb) Senior

	Name	Flight 1	Flight 2	Points
1	NIMPTSCH Werner (GER)	773	766	1539
2	ROCH Edmond (FRA)	767	712	1479
3	LEMAITRE Daniel (BEL)	539	589	1128
4	BOOR Reginald (GBR)	540	502	1042
5	BOGAERTS Jean (BEL)	483	406	889
6	STICHBURY Bryan (GBR)	389	376	765

Micro 35 Senior

	Name	Flight 1	Flight 2	Points
1	NIMPTSCH Werner (GER)	998	1067	2065
2	CIAPALA Edward (POL)	960	878	1838
3	ROCH Edmond (FRA)	479	415	894

F1M (beginner) Senior

	Name	Flight 1	Flight 2	Points
1	NIMPTSCH Werner (GER)	906	928	1834
2	ROCH Edmond (FRA)	677	658	1335
3	PATAT Francis (FRA)	496	565	1061
4	BRENDEL Gert (NED)	330	405	735

Sainte Formule Senior (+3gr)

	Name	Flight 1	Flight 2	Points
1	NIMPTSCH Werner (GER)	228	230	458
2	BRENDEL Gert (NED)	198	184	382
3	LEMAITRE Daniel (BEL)	105	86	191

Bostonian Junior

	Name	Flight 1	Flight 2	Points
1	VAN HULST Matthijs (NED)	38	38	76
2	BRUINS Bernard (NED)	32	28	60

F4F Peanut Senior

	Name	Model	Flight 1	Flight 2	Points Flight	Place Flight	Points Stat.	Place Stat.	Place
1	MASTERS Divs (GBR)	R.A.F. SE.5a	53	49	102	6	204	2	8
2	BRENDEL Niels (NED)	Flightksplane VP-1	58	64	122	3	155	9	12
3	PETIT André (FRA)	Denight DDT	49	51	100	8	177	5	13
4	DAVID Christophe (FRA)	Sopwith Tabloid	54	53	107	5	153	10	15
5	BRENDEL Gert (NED)	Renard RSV-18-100	62	66	128	2	135	16	18
6	PATAT Francis (FRA)	Farman 450	42	43	85	12	168	7	19
7	PATAT Francis (FRA)	Poullin JP-30	51	51	102	6	132	17	23
8	PATAT Francis (FRA)	Caudron Luciole	27	29	56	20	186	4	24
9	BOYS Peter (GBR)	Waco VRS-7	25	22	47	24	211	1	25
10	BOURDEAUD'HUI Jean-Claude (FRA)	N.A. P-51D Mustang	45	49	94	9	132	17	26
11	DAVID Christophe (FRA)	Hyperbipe	39	27	66	17	153	10	27
12	BOOR Reginald (GBR)	Republic P-47D Thunderbolt	23	25	48	23	172.5	6	29
13	BOURDEAUD'HUI Jean-Claude (FRA)	HM Broussard	42	47	89	11	124	19	30
14	MASTERS Divs (GBR)	Sopwith Triplane	17	18	35	28	203	3	31
15	DAVID Christophe (FRA)	BD 4	54	59	113	4	106.5	28	32
16	PRIOR David (GBR)	de Havilland Hornet Moth	20	21	41	26	164	8	34
16	LEMAITRE Michel (BEL)	Zlin 526	27	32	59	19	136	15	34
18	BOURDEAUD'HUI Jean-Claude (FRA)	LS 60 (2)	77	74	151	1	103	34	35
19	HARO Fernando (ESP)	N.A. P-51D Mustang	39	40	79	13	111	25	38
20	STICHBURY Bryan (GBR)	Samolot HL.2	22	29	51	21	120	20	41
20	MASTERS Vibes (GBR)	Lacey M.10	46	46	92	10	103.5	31	41
22	LEMAITRE Michel (BEL)	LS 60 (2)	34	35	69	16	109	26	42
23	LEMAITRE Michel (BEL)	Piper PA-15	38	38	76	14	104	30	44
24	STICHBURY Bryan (GBR)	Renard R-17	21	20	41	26	116	21	47
25	LEMAITRE Michel (BEL)	LS 60 (1)	24	26	50	22	109	26	48
26	HARO Fernando (ESP)	Nakajima Ki.84 Hayate	33	32	65	18	103.5	31	49
27	BOURDEAUD'HUI Jean-Claude (FRA)	Pottier 100TS	31	39	70	15	94.5	35	50
28	LEMAITRE Michel (BEL)	Bellanca Skyrocket	20	13	33	29	115.5	22	51
29	STICHBURY Bryan (GBR)	Piper J3 Cub	20	22	42	25	103.5	31	56

Pistachio Senior

	Name	Model	Flight 1	Flight 2	Points Flight	Place Flight	Points Stat.	Place Stat.	Place
1	MASTERS Divs (GBR)	R.A.F. SE.5a (2)	33	33	66	3	112.5	1	4
2	DAVID Christophe (FRA)	Blériot Canard	39	32	71	2	87	4	6
3	BRENDEL Gert (NED)	Volksplane VP-1	61	49	110	1	81	5	6
4	DAVID Christophe (FRA)	Sopwith Tabloïd	30	31	61	4	91.5	3	7
5	MASTERS Divs (GBR)	R.A.F. SE.5a (1)	14	8	22	7	109	2	9
6	BOOR Reginald (GBR)	Bristol Brownie	22	21	43	5	79	6	11
7	STICHBURY Bryan (GBR)	Messerschmitt M.20	14	12	26	6	46.5	9	15

F4D Senior

	Name	Model	Flight	Stat.	Points
1	PRIOR David (GBR)	Sopwith Baby	434	1519	1953
2	MASTERS Divs (GBR)	Sopwith Triplane	482	1371	1853
3	TER HORST Marian (NED)	Bebe Jodel	523	1195	1718
4	BRENDEL Niels (NED)	Dart Kitten II	405	1263	1668
5	MASTERS Vibes (GBR)	Lacey M.10	460	1171	1631
6	TER HORST Marian (NED)	DH Tiger Moth	327	1213	1540
7	HARO Fernando (ESP)	Fiat CR.32	276	1126	1402

F4D Junior

	Name	Model	Flight	Stat.	Points
1	OOSTERHUIS Gijs (NED)	Farman Moustique	502	1290	1792
2	VAN HULST Matthijs (NED)	Farman Moustique	442	1266	1708
3	ZWIER Marijn (NED)	Fokker C.X	419	1095	1514
4	BRUINS Bernard (NED)	Fokker E.IV	319	1026	1345

F4E CO^2/Electrique Senior

	Name	Model	Flight	Stat.	Points
1	VANDEVENNE Lucien (BEL)	Tipsy Junior	459	1290	1749

Interscale 2002 Prostejov, Czech Republic

F4D

	Name	Model	Static Score	Flight Score				Best Flight	Total
				Flight 1	Flight 2	Flight 3	Flight 4		
1	Derek Knight	Avro 560	1403.0	1166.0	1635.0	1622.0	1704.0	1704.0	3107.0
2	Pavel Stranik	Martinsyde Buzzard	1392.5	1688.0	1705.5	1384.0	1689.0	1705.5	3098.0
3	Ivo Cervenka	P-51H Mustang	1338.5	1686.0	1448.0	1681.0	1594.0	1686.0	3024.5
4	Ray Johnson	Pilatus Porter	1246.5	1498.0	1561.0	1527.0	1575.0	1575.0	2821.5
5	André Petit	Messerschmitt Me-209	1268.0	1511.5	1403.0	1440.0	1498.0	1511.5	2779.50
6	Lubomir Koutny	Hodek HK-101	1153.5	1016.0	0	0	0	1117.6	2271.1
7	Lubomir Koutny	Messerschmitt Bf-109	1025.0	1187.0	1211.0	1200.0	0	1211.0	2236.0
8	Charlie Newman	S.E. 5a	1717.0	0	0	0	0	0.0	0.0
9	Michal Kralik	Zero A6M5	1459.0	0	0	0	0	0.0	0.0
10	Vladimir Kunert	Martin Baker M.B.5	1175.0	0	0	0	0	0.0	0.0
11	Nigel Druce	Fairey Tipsy Junior	842.5	0	0	0	0	0.0	0.0

F4E

	Name	Model	Static Score	Flight Score				Best Flight	Total
				Flight 1	Flight 2	Flight 3	Flight 4		
1	Derek Knight	Bristol M1B	1596.0	0	0	0	1728.0	1728.0	3324.0
2	Pavel Stranik	Martinsyde Elefant	1252.0	1206	1599.0	1754.0	0	1754.0	3006.0
3	Charlie Newman	S.E. 5a	1475.0	0	638.0	1259.0	1390.0	1390.0	2865.0
4	Charlie Newman	RWD-13	1585.0	971.0	0	0	0	971.0	2556.0
5	Jan Tyc	Cihak Rapid	1021.0	1302.0	1472.0	0	1266.0	1472.0	2493.0
6	Derek Knight	D.H.82 Tiger Moth	1500.5	672.0	0	832.0	917.0	917.0	2417.5
7	Nigel Druce	Andreasson BA.4B	858.5	0	0	1483.0	1359.0	1483.0	2341.5
8	Ivo Cervenka	Piper J-3	961.0	0	1112.0	997.0	1188.0	1188.0	2149.0
9	Fernando Ramos	Avia B-3	1085.0	0	0	564.0	836.0	836.0	1921.0
10	Dave Hanks	Bowers Fly Baby	1301.5	0	0	0	0	0	0

F4F

	Name	Model	S	B	N	Flight Score			F	Total
						Flight 1	Flight 2	Flight 3		
1	Michal Kralik	Hansa Brandenburg CC	84.0	71.0	5.0	57	56	15	115.0	199.0
2	Lubomir Koutny	Savoia S-13	73.0	72.0	5.0	59	60	64	122.4	195.38
3	Michal Kralik	Savoia S-21	78.0	72.0	5.0	47	49	14	107.1	185.08
4	Robert Cok	S.E. 5a	72.0	14.0	0.0	52	65	88	106.1	178.13
5	Robert Cok	Sopwith Camel	92.0	15.0	0.0	47	48	0	79.0	170.99
6	Lubomir Koutny	Heinkel He-64c	58.0	18.0	0.0	73	86	88	109.4	167.40
7	Ivo Cervenka	Jodel D9	69.0	14.0	1.0	71	86	81	96.4	165.37
8	Miroslav Kuba	Framan F450	71.0	3.0	0.0	69	76	59	89.8	160.76
9	André Petit	P-47D Thunderbolt	82.0	20.0	15.0	53	56	54	78.5	160.49
10	André Petit	Denight DDT	71.0	16.0	0.0	48	52	48	82.8	153.85
11	Jiri Kralik	Loening M2 Kitten	52.0	30.0	5.0	63	61	66	99.5	151.50
12	Juraj Jurovic	S.E. 5a	73.0	14.0	0.0	35	24	39	70.7	143.65
13	Jiri Kralik	Letov S-39	70.0	0.0	5.0	56	50	56	71.0	140.99
14	Miroslav Kuba	Sky Raider	49.0	0.0	15.0	89	94	104	85.3	134.32
15	Nigel Druce	D.H. 29 Doncaster	44.0	2.0	0.0	40	32	30	64.5	108.50
16	Han van Leeuwen	Upton Baby Ace	29.0	4.0	0.0	17	21	10	47.6	76.62
17	Vladimir Kunert	Heinkel He-114	56.0	45.0	0.0	0	0	0	0.0	56.0
18	Martin Jurovic	P-47D Thunderbolt	40.0	0.0	5.0	0	0	0	0.0	40.0

Pistachio

	Name	Model	S	B	N	Flight Score			F	Total
						Flight 1	Flight 2	Flight 3		
1	Michal Kralik	Savoia S-13	75.0	73.0	5.0	38	41	42	121.9	196.93
2	Michal Kralik	FBA – 1914	73.0	73.0	5.0	40	42	41	121.9	194.93
3	Ivo Cervenka	Fike E	59.0	0.0	0.0	89	90	90	116.2	175.19
4	Jiri Kralik	Fike E	55.0	0.0	0.0	54	55	58	93.3	148.27
5	Dave Hanks	S.E. 5a	61.0	15.0	15.0	14	18	19	53.4	114.39

Interscale 2002 Prostejov, Czech Republic – Contest Report

By Gé Brouwer (NL)

Interscale 2002 was the 2nd consecutive Interscale that was organised by Tonda Alfery in Prostejov. In Prostejov, there's an excellent sports hall with ample space and a convenient height of 12 meters. Compared with the first Interscale in Prostejov, the meeting was similar but with less participants than in 1999.

Derek Knight won F4D (Open Rubber) as well as F4E (CO_2/Electric), respectively with his Avro 560 and a Bristol M1B. His Avro 560 scored quite constant in flight, as opposed to his Bristol, which was low in flight score except for the last flight. Pavel Stranic, on the other hand, became second in both these classes with high and constant flight scores but with lower static scores. In F4D, only 9 points separated number 2 from number 1, and there were 83 points between 2nd and 3rd place.

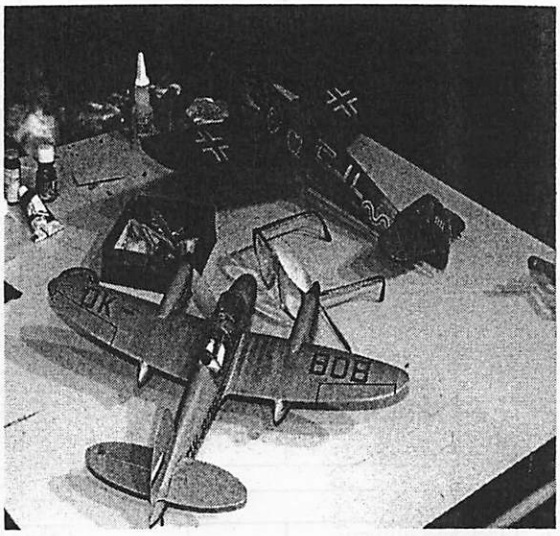
Remarkably, Charlie Newman's 5 year old S.E.5a is still in service. This model has been built so that Charlie is able to fly it in both F4D and F4E; he only has to change the nose of the model. There was a big difference in static score for this model in the two classes, and the model didn't want to fly with a rubbermotor.

In both F4D and F4E, the competition level was quite high because of beautifully built and well-flying models.

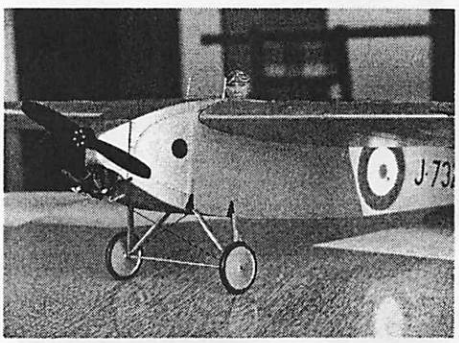
Peanuts and Pistachios were differently judged than what we are used to. At Czech contests, the model is statically judged and the best of three flight times is multiplied with a factor (positive for a complex model and negative for any flight enhancing features – e.g. enlarged stabiliser). These two scores combined gives the end score.

Whether you like this kind of judging or not, Michal Kralik deservedly won. His models were extremely well built and very complex.

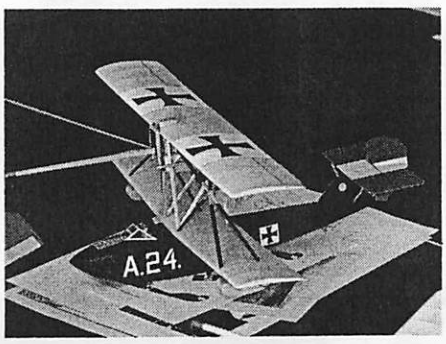
By judging this way, complex models that are built to a lesser standard can end higher in the ranking only because the type of model is more difficult to build. Models that are less complex, but are well built and are flying nice as well can't compete for the top rankings. The rankings in both Peanut and Pistachio would have looked totally different if the normal rules for judging had been used.



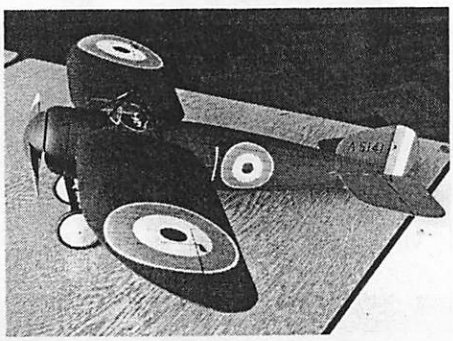
F4D: Hodek HK-101 and Me109 by Lubomir Koutny



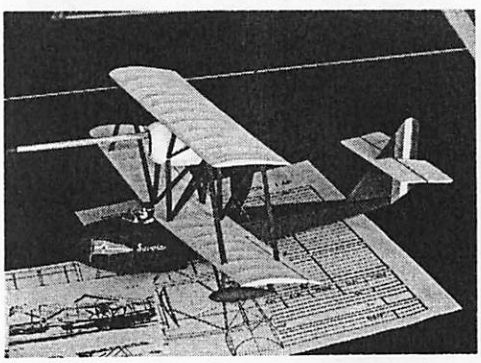
F4D: Avro 560 by Derek Knight



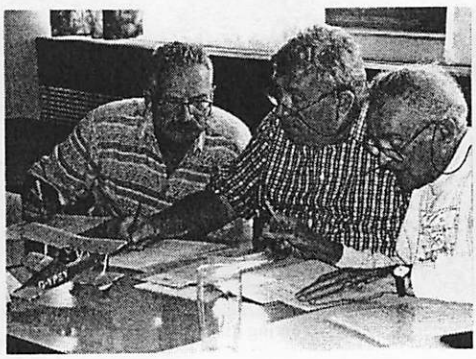
F4F peanut: Hansa-Brandenburg by Michal Kralik



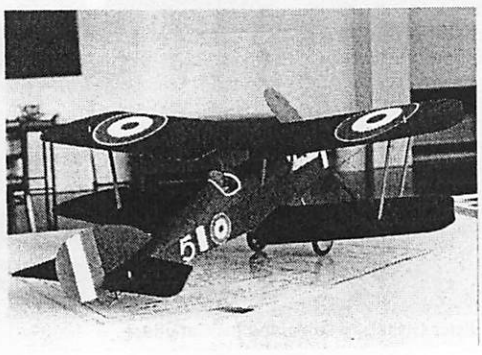
F4E: Bristol M1B by Derek Knight



F4F Peanut: Savoia S-21 by Michal Kralik



Judgement in F4F Peanut.



F4E: Martinsyde Elephant by Pavel Stranik

Results Canadian Nationals 2002

Unlimited Cat. Glider		
1	John Marett	72.3 sec

Standard Cat. Glider		
1	John Marett	68.2 sec
2	Richard Miller	65.7 sec
3	Peter Olshefsky	40.0 sec

NoCal		
1	Vladimir Linardic	
2	Mitch Fookwe Jr.	
3	Bill Penny	

FAC Peanut		
1	Mike Thomas	
2	Garry Hunter	
3	Richard Miller	

FAC Scale		
1	Jack McGillivray	
2	Mike Thomas	
3	Jim Lee	

Golden Age Scale		
1	Mike Thomas	
2	Jack McGillivray	
3	Jim Lee	

Dime Scale		
1	Mike Thomas	
2	Richard Miller	
3	Garry Hunter	

Manhattan Cabin		
1	Mike Thomas	4:14
2	Vladimir Linardic	3:00

Limited Penny Plane		
1	Vladimir Linardic	8:34
2	Richard Miller	8:19
3	Mike Thomas	7:18

Penny Plane		
1	Peter Olshefsky	12:11
2	Fred Tellier	11:10
3	Mike Thomas	10:19

Mini Stick		
1	Peter Olshefsky	6:37
2	Ken Mark	6:37
3	Mike Thomas	6:29

F1M		
1	Vladimir Linardic	29:57
2	Fred Tellier	9:25

F1L		
1	Vladimir Linardic	11:17
2	Len Singer	12:47
3	Ken Mark	12:34

F1D		
1	Fred Tellier	42:54
2	Vladimir Linardic	35:27
3	Bill Leppard	30:26

Intermediate Stick		
1	Fred Tellier	19:20
2	Bill Leppard	10:50
3	Vladimir Linardic	2:35

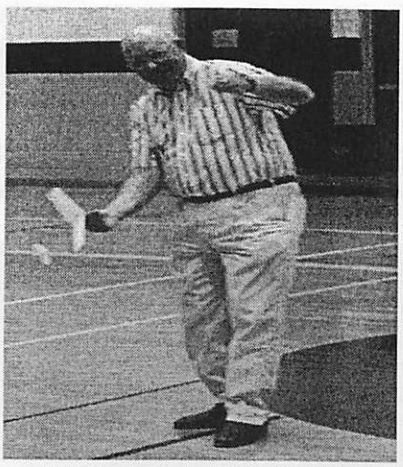
EZ-B		
1	Jack McGillivray	16:13
2	Fred Tellier	15:17
3	Bill Leppard	11:18

ROG Stick		
1	Vladimir Linardic	10:06

Bostonian		
1	Richard Miller	
2	Ted Toth	
3	Garry Hunter	



Vladimir Linardic launching his cabin ROG



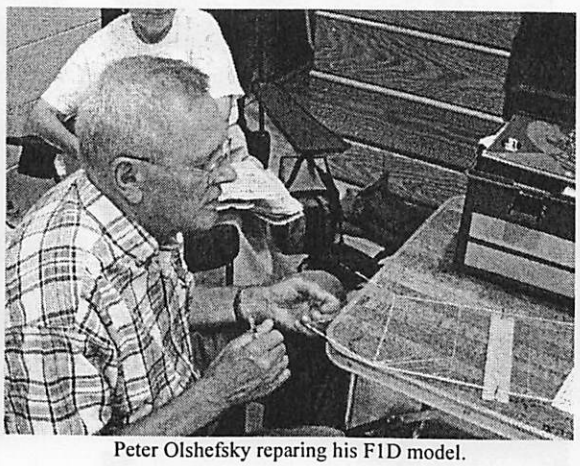
Bill Henderson launching his glider



Jack McGillivray preparing for a flight



Peter Olshefsky launching his Cat glider



Peter Olshefsky reparing his F1D model.



Jack Humphries scale judging