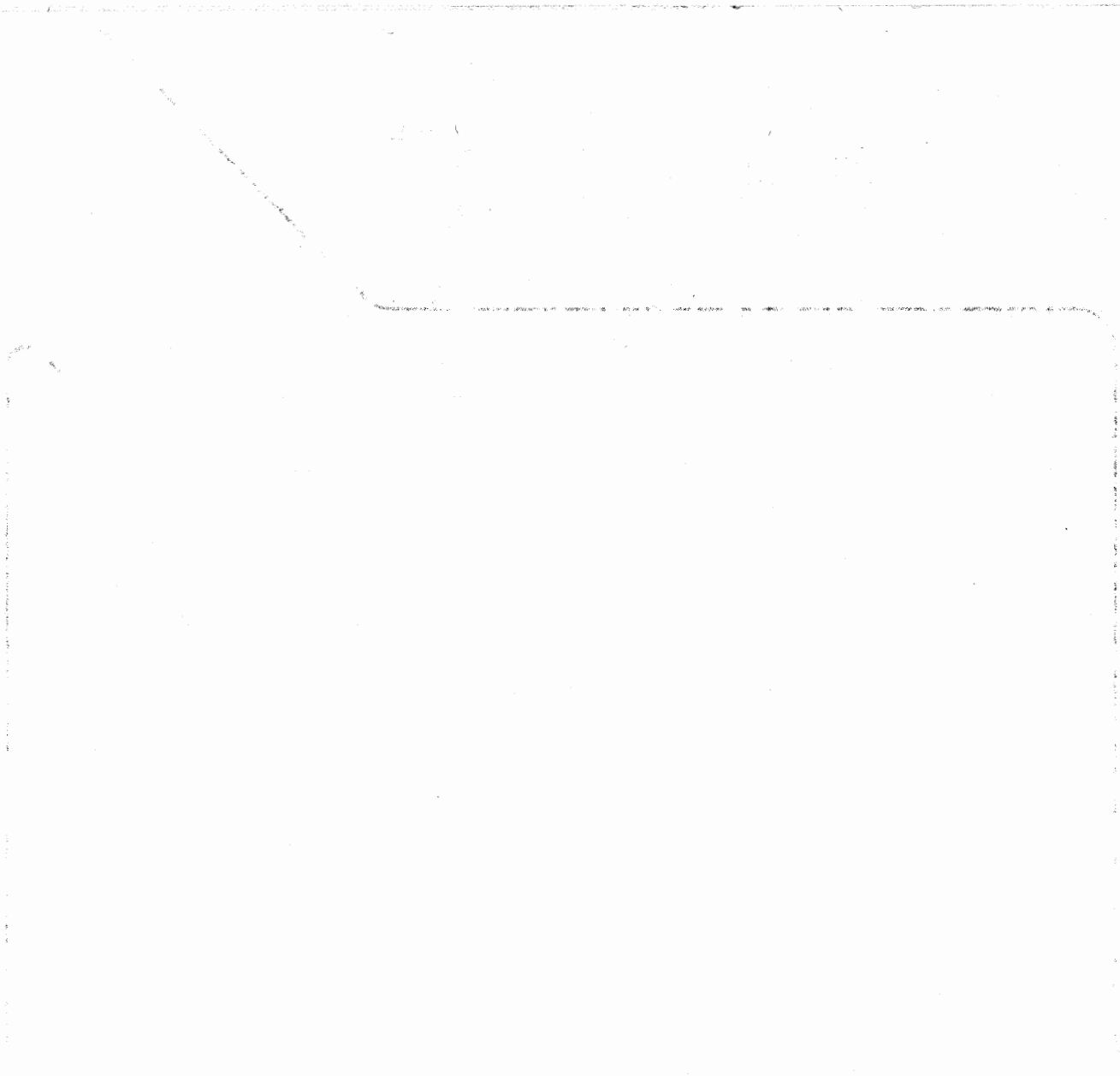
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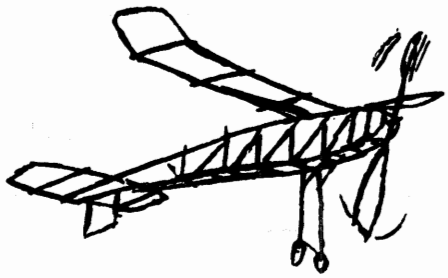
...TIONAL FREE FLIGHT SOCIETY

WINNING INDOOR DESIGNS

...ited States Indoor Championships



WINNING INDOOR DESIGNS



UNITED STATES INDOOR CHAMPIONSHIPS 1987-1989



The NATIONAL FREE FLIGHT SOCIETY, NFFS, a non-profit corporation, acts in co-operation with the Academy of Model Aeronautics to preserve, enhance and promote the sport and hobby of free flight modeling. The current President is Mr. Anthony J. Italiano, Brookfield, WI. Book orders, correspondence and requests for information about NFFS publications should be sent to Mr. Fred Terzian, 4858 Moorpark Avenue, San Jose, CA 95129, USA.

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WINNING INDOOR DESIGNS, 1987-1989

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About Ralph E. Knight (Ed):

In 1940, back in Auburn, NY, I learned Ed Knight was a new neigbor when his souped-up wireless phonograph, converted to voice, came blasting in over our radio. My brother investigated and brought back a life-long friend. Over the next few years, Ed and I built models, went to contests, learned to ski and to fly, chased girls, got jobs, and decided to become fighter pilots. We mooched a gas ration stamp from my Mom and drove over to Syracuse to sign up.

Late in 1942 the Army Air Corps took us in, and off we went to Atlantic City for Basic Training. He was trained in Florida; I went to Texas. We both got to be Mustang pilots; me to the Western Pacific, Ed to India and China. Now Ed lives in Virginia; I'm in Ohio. We are still great friends.

There would be no book without Ed. Where else could I find a retired, willing free-flighter who was also an English graduate and teacher, who owns a computer, and who could also type like fury? He actually seemed to relish it all!

Jerry Nolin

About G.R. Nolin (Jerry):

If you're lucky, you may have a friend like Jerry. When we meet, we pick up the last sentence where we left it off. He's been a mentor and inspiration to me for a long, long time.

Jerry had a hand in many of the superb scale models on display in the Air Force Museum at Wright Field, and also in the restoration of Air Corps and Air Force airplanes, especially the Wright Flyer replica. Did you know he once was in engineering at Dyna-Jet? That's as far as you can get from the quiet, slow-paced indoor scene. Modeling has something for everyone.

When I was managing the full-scale glider operation at Harris Hill in Elmira, NY, during the summers, what did Jerry have in his basement? A Schweizer 1-26 kit under construction! Both of us have flown sailplanes for many years, so when my FF slowed down, I turned to RC soaring, and sneakily lured Jerry into it as well. After all, a sailplane is a sort of Honorary Free Flight!

Ed Knight

CONTENTS

As nearly as possible, this manual consists of drawings and related data from the first-place winners at the 1987, 1988 and 1989 United States Indoor Championships (USIC). The manual is divided into twenty-two USIC events.

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THE HISTORY OF
THE UNITED STATES INDOOR CHAMPIONSHIPS

In 1981, there was a discussion between Tony Italiano, the President of the National Free Flight Society, and Hardy Broderson, the Society's Executive Director. The topic was the future of indoor activity in the U.S.A. The Nationals Indoor event was deteriorating due to the lack of truly suitable sites for a National competition adjacent to the full Nats. Also, it appeared that there were a great many more indoor flyers East of the Mississippi. What if the NFFS were to present a second large competition, held at a proper championship site in the East?

Tony set out to canvass the USA for sites. Many phone calls were made, and many letters were exchanged. A number of sites were located, but in most cases, they cost too much to be acceptable. While all of this investigation was in progress, Tony initiated the first United States Indoor Championships in 1982.



Northwood Institute West Baden, Indiana

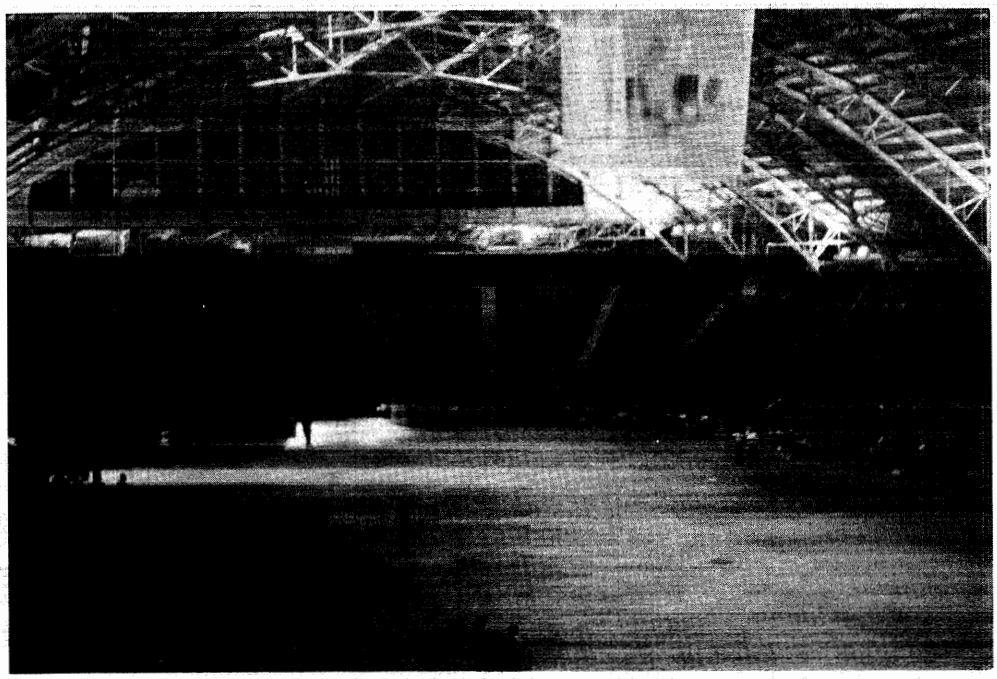
Many titles for this competition were considered. After some deliberation, we settled on USIC. We had a total of 63 entrants at West Baden, Indiana, for this first USIC, a fair number but not great. However, the enthusiasm and caliber of competition was good, so it was decided to continue with USIC. If the Nats committee continued to select marginal sites, at least there would be a proper site for competition, if only once a year, somewhere in the U.S. If the Nats did come through with a really good site, we had the option of dropping the USIC that year. However, the USIC has continued and prospered. The prime goal for the future remained the need to operate in a really good indoor site.

The USIC was again held at West Baden in 1983. Subsequently, the old building was sold, and our presence would not fit into the grand plans for the refurbished spa. Through the good offices of Richard Doig, we were able to obtain the Michigan State Fair Coliseum in Detroit for 1984. The ceiling at the Coliseum was 66 feet, fair but far short of the 100 feet at West Baden.

The attendance was 63 in 1982, 89 in 1983, and back down to 57 in 1984. During the search for usable sites, it was discovered that the Convention Center in Niagara Falls was large in floor space, had an acceptable 72 foot ceiling, and could be rented at a fair price. In fact, the USIC was held in Niagara Falls in 1985 and 1986, with attendance at 74 and 64 respectively.

However, the ultimate goal was to try to find a proper site with a ceiling of no less than 100 feet, with enough floor space, a good geographical location, and a reasonable cost. The word went out that the NFFS was on the prowl for a better site. Yes, we were aware of the Kibbie Dome in Moscow, Idaho, but we placed it on hold because of the location, at least for the present.

Luckily, John Schlagetter of the Chicago Aeronuts was on an airline flight in 1986 and picked up the airline's magazine. There was a picture of a football game at an INDOOR field! John gave the article



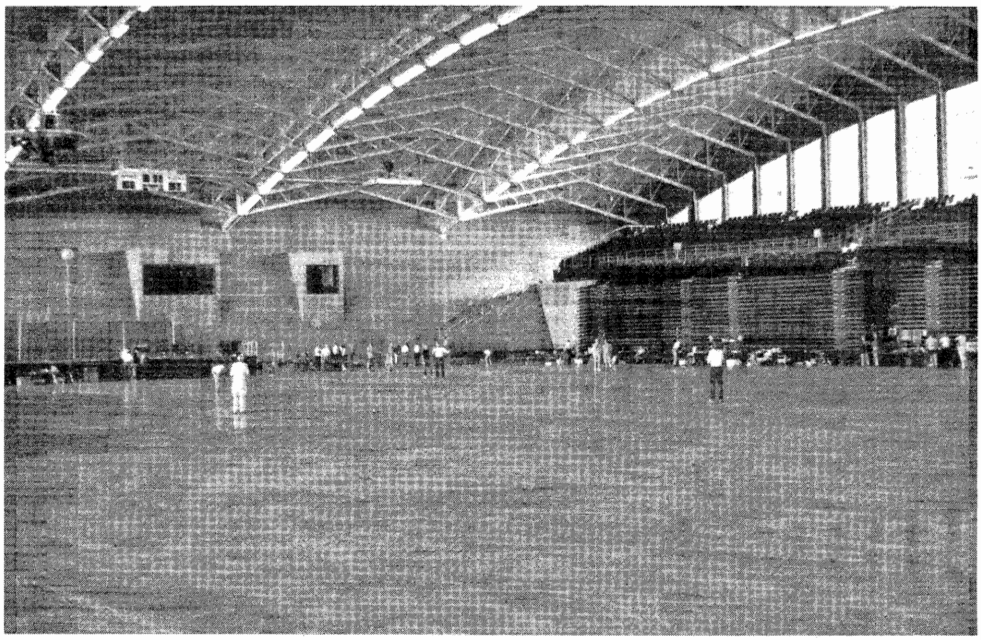
Michigan State Fair Coliseum, Detroit

to Don Lindley, who passed it on to Tony. Further investigation revealed that the building manager's name and phone number were in a publication that Stan Chilton had given to Tony.

Tony made contact with John Knox, the manager, and explained what we needed. As the discussion progressed, it developed that Tony and John had each spent some of their youthful years in the same area of Wisconsin, and that they had had many similar military experiences. A friendly rapport grew up between them. A good arrangement was worked out between the NFFS and East Tennessee State University, allowing the 1987 USIC to be held in the unique Mini-Dome at ETSU. This kind of event was completely unknown at ETSU, and they were intrigued. The ceiling was 116 feet up, and the building was deliciously tight, with few drafts and little drift. The people of ETSU were thrilled to see this kind of event in their lovely dome, and happily extended an invitation for a repeat performance. The people of Johnson City, Tennessee, were friendly, welcoming and interested. The enthusiasm of the participants spread across the country.

The attendance jumped to 98 in 1987. Everyone who came thought that it was a first-class operation. The floor covering of Astro-Turf was the 'creme de la creme'. As a result of the availability of such a fine site, and the enthusiastic cooperation of the people of ETSU, we decided that we should host the 1988 F1D World Championships there. The Championship was held, with great success, and was followed by the USIC, which had an attendance of 135 indoor modelers. Momentum was rolling, and new people were getting into the act. We continued at ETSU in 1989, with 102 total entrants.

In November, 1989, concern arose over the 1990 F1D World Championships as political turmoil began in Eastern Europe, a possible location for the 1990 World Championships. A urgent inquiry was made, and Hardy and Tony presented a plan that would be acceptable to the AMA and the FAI. John Worth of AMA carried the proposal to the FAI, and the proposal was accepted. There was a suggestion from Bob Stalick to conconsider holding the WC at the Kibbie Dome. However, in the final analysis, costs dictated that we should again host the WC at ETSU.



Niagara Falls Convention Center

So here we are, in 1990, hosting the F1D World Championships, followed by the AMA Nationals, combined with the USIC. We now have what may be termed the largest indoor competition in the world, located in a very fine site.

Now, unfortunately, we are back to ONE major indoor competition per year. Our lingering hope is that we may find other suitable high-ceiling sites at reasonable cost, perhaps enabling us to split the USIC from the NATS and have TWO major events per year once more.

We hope that the USIC will continue on out into infinity!

Anthony J. Italiano, President
National Free Flight Society

Walter Erbach photo

FOREWORD

WHY THIS COLLECTION?

Some Words From The President

1990 is the ninth year that the National Free Flight Society has hosted the United States Indoor Championships. Each year the competition level has been improving, while we have maintained a very nice level of camaraderie. Reviewing the statistics, one soon notices that we continue to see the same names at the top of each event. Yes, there are new ones, too, but overall, we see repetition. This isn't bad, except that we should take a look at why this is happening.

If we set aside skill levels, we then address the junior problem. But is it "the junior" problem? In reality, we could move into the area of "newcomer" at any age level!

This then leads to the problem of — where does anybody pick up the knowhow? Thus, we find that the indoor fraternity does not have a publication that contains today's state-of-the-art designs for competition flying.

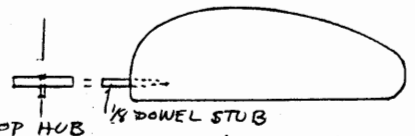
That is why this manual was created. Herein we have gathered a compendium of existing, good-performing model designs to use as a base for all modelers, new and experienced. The designs and descriptions presented are meant to record the designs as they exist in 1990 and leave the future development up to you, the modelers. Here are the relative dimensions, concepts, techniques and characteristics which you can alter at will to suit your fancy thoughts of what a "perfect" model should be.

It is hoped that at a future time, YOU will be in a position to offer your improved design for the next manual. It is not intended that this manual will be published annually, but rather approximately every five years, unless we see an enthusiastic demand and sufficient new designs to warrant a new publication.

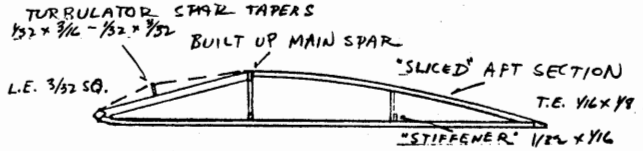
Enjoy this INDOOR modeling sport; it is the greatest!

Anthony J. Italiano
President, NFFS

SCALE: 3/4" = 1'. SPAN: 30" LENGTH: 18½"
LONGERONS AND WING SPAR 10 LB. STOCK.
ALL OTHER WOOD 6-8 LB. STOCK
ALL SURFACE OUTLINES LAMINATED BALSA.
DIHEDRAL ¼". INCIDENCE: WING 0° STAB -4°.
NOTE: SMALL STAB REQUIRES NEGATIVE INCIDENCE AND FORWARD C.G. FOR STABILITY.
PROP: 8" DIAMETER, CHEESE CARTON BLADES PITCH IS ADJUSTABLE.
POWER: 4 STRANDS .070 FAI GRAY, 30" LONG. 1800± TURNS.
COVERING: "KYOSHO" TISSUE, ALCOHOL SHRUNK 2 COATS 40% CLEAR NITRATE.
WEIGHTS: FUSELAGE 10 GR. COVER 3 GR.
WING 4 GR. PROP ASSY. 4 GR.
STAB & FIN 1.5 GR. TOTAL 22.5 GR.
RUBBER 5.5-6 GR.
PLANE IS TRIMMED FOR FAIRLY WIDE LEFT CIRCLE.



5/32 O.D. ALUM TUBE NOT TO SCALE
DRILL FOR 1/16 TUBE SHAFT BUSH.

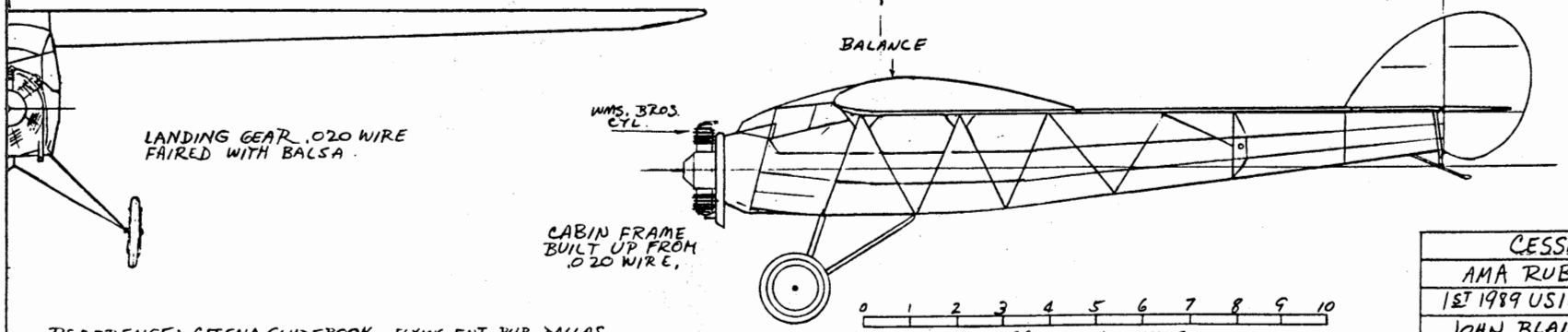


TYPICAL RIB ALL FROM 1/32 STOCK.
NOT TO SCALE.

MAIN SPAR 1/32 x 1/16

LONGERONS 1/16 SQ. ALL CROSS BRACES AFT OF LANDING GEAR 1/32 x 1/16
TOP STRINGERS 1/32 x 1/8.
SIDE STRINGERS 1/32 x 1/16.

BALANCE



LANDING GEAR .020 WIRE FAIRED WITH BALSA.

CABIN FRAME BUILT UP FROM .020 WIRE.

SCALE IN INCHES

REFERENCE: CESSNA GUIDEBOOK FLYING ENT. PUB., DALLAS

CESSNA "AW"
AMA RUBBER SCALE
1ST 1989 USIC - 90 SEC. AV.
JOHN BLAIR, WARNE, NC.

AMA SCALE 1st PLACE 1989 USIC 190.0 pts. JOHN BLAIR, Warne, NC

First, let me state the obvious - it's hard to be competitive without a competitive airplane. So, when deciding which plane I would build for the 1989 USIC, certain criteria were kept in mind: plenty of wing area, good moments, a simple, clean structure, and beauty!

The Cessna AW, with its broad cantilever wing, box fuselage, simple landing gear and clean good looks, fitted the criteria closely. Since I had built the model before (for outdoor flying), the main design task was to adapt my plan to "indoor" structure.

The AW has a bit over 120 sq. in. of wing area and 22.5 grams of airframe weight. With six grams of rubber, it takes off at just under one ounce, which for a scale model is a respectably low wing loading. Since the airfoil is also quite deep, the plane is a real floater, and in the generous airspace at Johnson City, it was able to make the 90 second max with no sweat.

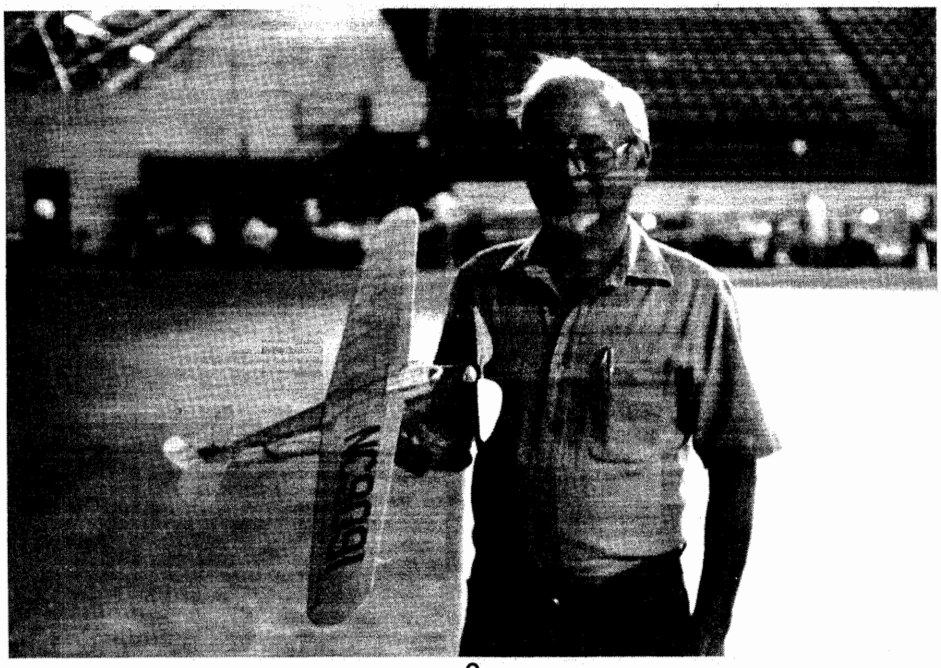
Two design features which contribute directly to this model's good flying characteristics are the wing and the prop. The wing has an extremely deep airfoil and with the help of two sharp turbulator spars is quite happy at a very low flying speed. Wing design is a mixture of "sliced rib" and "cracked rib" techniques, along with a built-up main spar, which makes a very light, strong unit. The prop is built up of an aluminum tube hub and removable "cheese carton" blades. This type of prop is heavier than an all-balsa prop, but scale models usually need nose ballast anyway, and working ballast is much better than added dead weight. Also, blades of differing diameter and shape may be tried; and since pitch is adjustable, an optimum combination may be arrived at by the time-honored cut and try method.

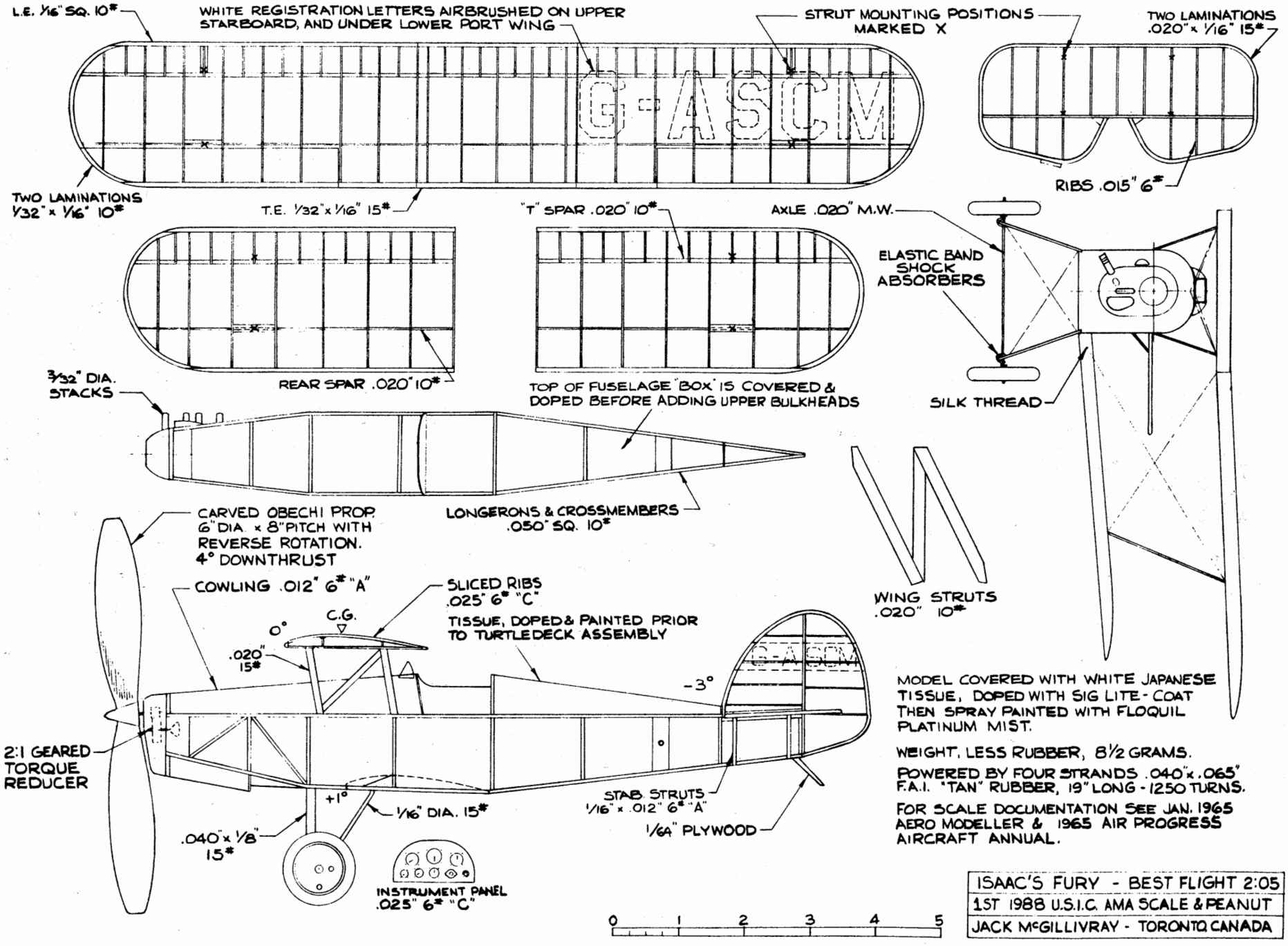
My own best prop is eight inches in diameter, uses blades with maximum chord near the hub, and is set at a very low apparent pitch. However, the dowel plug-in stubs are very near the trailing edge of the blades. Under full torque, the blades flare considerably. This gives high pitch to utilize "first burst" torque and a lower pitch for cruise. I am convinced that this setup allows me to get max flight performance from a minimum of rubber.

If the above rambling has a point, it can be stated as "light flies better than heavy". More weight requires more rubber, which adds more weight, which hurts the climb... When we can cut out a gram or two of weight, we can reduce rubber diameter a bit, which removes a bit more weight, which improves the climb...

If prospective indoor scale builders would like a rule of thumb to follow, I would recommend trying to build to a weight of no more than 20 grams per 100 sq. in. of wing area. This will produce a plane strong enough to be handled and light enough to be competitive.

I have no graphs or tables of data to prove this. It is just some wisdom I have absorbed by building and flying my share of doggy airplanes. I can only defend my philosophy by saying, IT WORKS!.





MODEL COVERED WITH WHITE JAPANESE TISSUE, DOPED WITH SIG LITE-COAT THEN SPRAY PAINTED WITH FLOQUIL PLATINUM MIST.

WEIGHT, LESS RUBBER, 8½ GRAMS.

POWERED BY FOUR STRANDS .040" x .065" F.A.I. "TAN" RUBBER, 19" LONG - 1250 TURNS.

FOR SCALE DOCUMENTATION SEE JAN. 1965 AERO MODELLER & 1965 AIR PROGRESS AIRCRAFT ANNUAL.

ISAAC'S FURY - BEST FLIGHT 2:05
1ST 1988 U.S.I.C. AMA SCALE & PEANUT
JACK McGILLIVRAY - TORONTO CANADA

AMA SCALE, PEANUT SCALE 1st PLACE 1988 USIC 181 and 286 pts.
JACK McGILLIVRAY, Toronto, Ontario, Canada

ISAACS FURY MK 1

My indoor scale models are generally quite sensitive to rubber motor power and weight changes. Quite some time is usually spent at a contest, tuning for site changes, etc., for maximum performance.

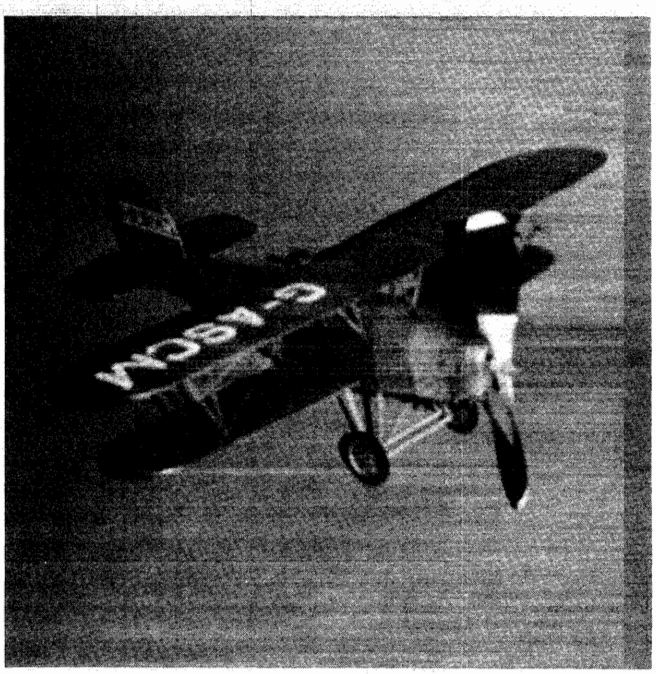
Although two models are often permitted in the Peanut class, I generally only have time for one model. Once my Peanut flights are completed, I fly the same model in the AMA Scale event too, since the model was designed to be competetive in both classes. If the model has been ironed out to my satisfaction in Peanut, it doesn't become much of a problem to get 90 second maxes in AMA Scale. Scale rib spacing for the wings, stabilizer and rudder are utilized for more AMA Scale points, although they are not justified in the Peanut event. Using a biplane permits hand launching in AMA Scale and gives a benefit in scale points over a monoplane in Peanut. I am a sucker for biplanes anyway.

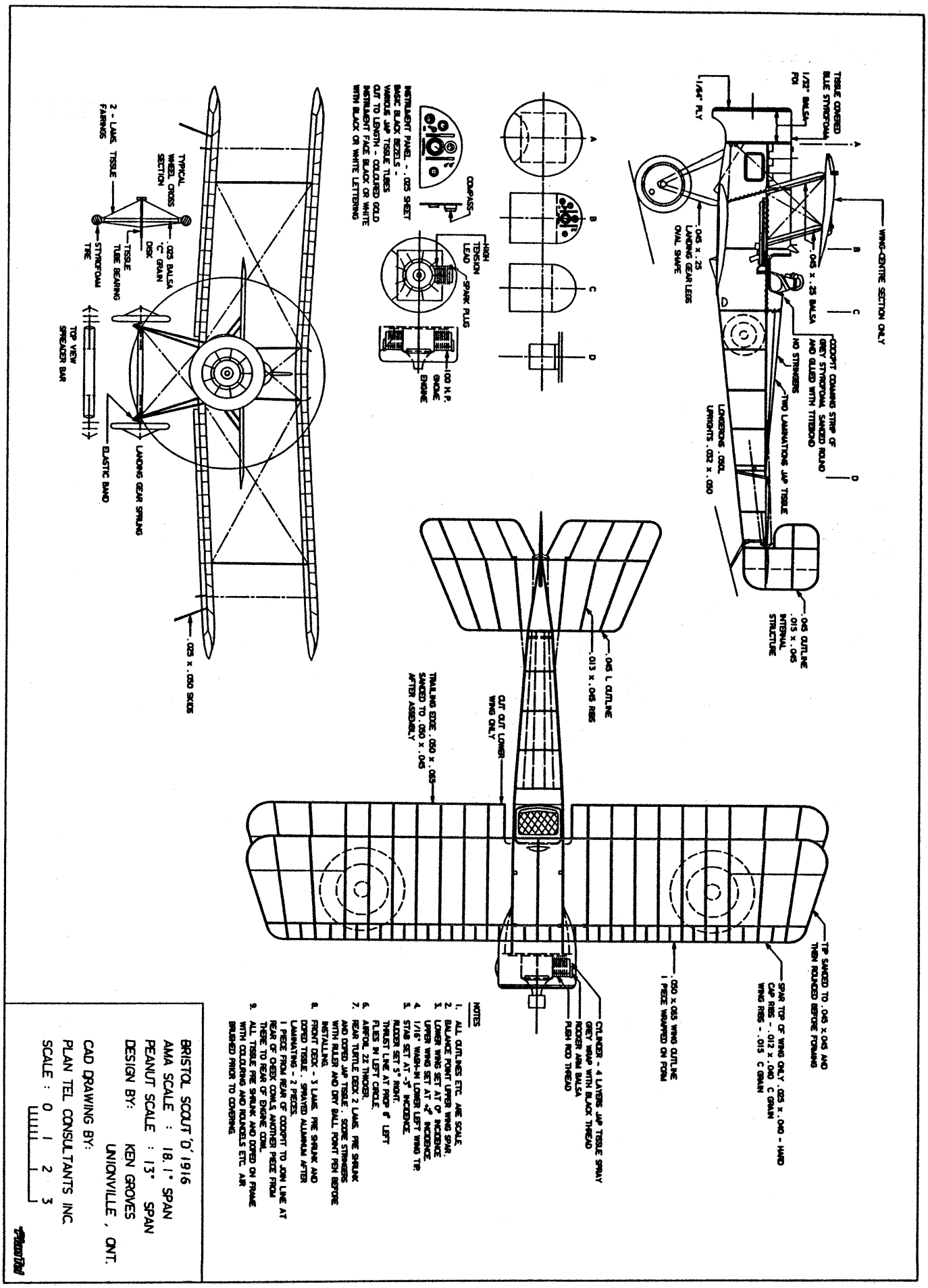
The Isaacs Fury Mk 1 is an ideal indoor rubber scale model, since no deviations from scale are required on the rudder, stab area, or dihedral. Fortunately, the scale judgement is not applied to the propeller size, although the undercarriage length is sufficient for prop clearance on ROG's. The nose length permits a relatively long motor without much nose ballast.

This model is my third Mk 1, but it is the first one equipped with a 2:1 geared torque reducer. The use of gears permits me to theoretically use 1.6 times as much rubber as a standard drive arrangement. Worthwhile benefit should be obtained, if gear friction is minimized. I would estimate that this model has at least a 15-second edge over the best of its predecessors, and therefore I believe that the gears give me some advantage. Since I wished to maintain my regular winding direction, I carved the prop for reverse rotation. This rotation now conforms with the rotation direction of the full-size aircraft. The model flies to the left, opposite the torque reaction. My gears were obtained from Stock Drive Products, 55 South Denton Ave., New Hyde Park, New York 11040. Phone (516) 328-0200. The brass pinion bar stock is their catalog no. 1B9-N48008. The nylon gear has catalog no. 1M1-N48016.

Since the latest AMA Scale rules state that the wing span of the model must exceed 13", I guess that I had better get busy and build a larger one for myself.






TISSUE COVERED BLUE STYROFOAM
1/32" BALSA FOI
1/64" PLY
.045 x .25 BALSA
.045 x .25 LANDING GEAR LEGS OVAL SHAPE
WING-CENTRE SECTION ONLY
COCKPIT COAMING STRIP OF GREY STYROFOAM, SANDED ROUND AND GLUED WITH TITEBOND
NO STRINGERS
TWO LAMINATIONS JAP TISSUE
LONGERONS .050L UPRIGHTS .032 x .050
.045 OUTLINE .013 x .045 INTERNAL STRUCTURE
A
B
C
D
INSTRUMENT PANEL - .025 SHEET BASIC BLACK BEZELS - VARIOUS JAP TISSUE TUBES CUT TO LENGTH - COLOURED GOLD INSTRUMENT FACE BLACK OR WHITE WITH BLACK OR WHITE LETTERING
COMPASS
HIGH TENSION LEAD
SPARK PLUG
100 H.P. GNOME ENGINE
TYPICAL WHEEL CROSS SECTION
2 - LAMS. TISSUE FAIRINGS
.025 BALSA 'C' GRAIN DISK
TISSUE TUBE BEARING
STYROFOAM TIRE
TOP VIEW SPREADER BAR
ELASTIC BAND
LANDING GEAR SPRING
.025 x .050 SKIDS
.045 L OUTLINE
.013 x .045 RIBS
TRAILING EDGE .050 x .065 SANDED TO .050 x .045 AFTER ASSEMBLY
CUT OUT LOWER WING ONLY
TIP SANDED TO .045 x .045 AND THEN ROUNDED BEFORE FORMING
SPAR TOP OF WING ONLY .025 x .040 - HARD CAP RIBS - .012 x .040 C GRAIN WING RIBS - .015 C GRAIN
.050 x .065 WING OUTLINE 1 PIECE WRAPPED ON FORM
CYLINDER - 4 LAYERS JAP TISSUE SPRAY GREY WRAP WITH BLACK THREAD
ROCKER ARM BALSA PUSH ROD THREAD
NOTES
1. ALL OUTLINES ETC. ARE SCALE.
2. BALANCE POINT UPPER WING SPAR.
3. LOWER WING SET AT 0° INCIDENCE. UPPER WING SET AT 4° INCIDENCE.
4. 1/16" WASH-IN LOWER LEFT WING TIP.
5. STAB SET AT -3° INCIDENCE. RUDDER SET 5° RIGHT. THRUST LINE AT PROP 8° LEFT
6. FLIES IN LEFT CIRCLE.
7. AIRFOIL 22 THICKER.
8. REAR TURTLE DECK 2 LAMS. PRE SHRUNK AND DOPED JAP TISSUE. SCORE STRINGERS WITH RULER AND DRY BALL POINT PEN BEFORE INSTALLING.
FRONT DECK - 3 LAMS. PRE SHRUNK AND DOPED TISSUE. SPRAYED ALUMINUM AFTER LAMINATING - 2 PIECES.
I PIECE FROM REAR OF COCKPIT TO JOIN LINE AT REAR OF CHEEK COWLS ANOTHER PIECE FROM THERE TO REAR OF ENGINE COWL.
9. ALL TISSUE PRE SHRUNK AND DOPED ON FRAME WITH COLOURING AND ROUNDELS ETC. AIR BRUSHED PRIOR TO COVERING.
BRISTOL SCOUT 'D' 1916
AMA SCALE : 18.1" SPAN
PEANUT SCALE : 13" SPAN
DESIGN BY: KEN GROVES
UNIONVILLE, ONT.
CAD DRAWING BY:
PLAN TEL CONSULTANTS INC.
SCALE : 0 1 2 3

AMA SCALE 1st PLACE 1987 USIC 186.5 pts. KEN GROVES, Unionville, Ontario, Canada

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This "Bristol Scout D" is, I feel, as accurate as I can produce without the aid of the full-scale aircraft. The original 3-views are Repla-Tech drawing 13k15; colours are from Profile Publications' Bristol Scout. The Lewis gun and Gnome 100 hp. engine are from Scale Aircraft Drawings, World War I. Rib spacing, stringers, etc., are from the 3-views. For a more accurate engine reproduction, use drawings of the 100 hp. Gnome Monosoupape from a source other than shown on the plan, as I feel that the one shown is greater in cylinder circumference than scale.

Construction: Small sizes of wood are used in the structure, so the tissue must be shrunk and prefinished before covering. Use a 1" x 3" frame the size of the tissue sheet and glue or mask the tissue to it. Spray it with water and air-brush a thin (90% thinner) coat of dope. Next lay out the roundels, etc., on the tissue and mask off. Then spray base colour, two thin coats. I use Floquil pigment only, mixed with thinner. Remove roundel mask and spray one light overall coat of clear to set the colour. Mask off and spray parts of roundel, one at a time. Then remove mask and spray one more light coat of thin clear dope. Tissue is now ready for use.

Make, from 1/8" sheet, patterns of one wing, stab & rudder. Candle-wax the edges, then soak the wood outline strips in water and form them around the patterns, using masking tape to hold them till dry. Coat the inside of sharp corners with thin Titebond to strengthen the wood. Put the form into the oven at 180^{0} for 45 minutes.

When framework is ready for covering, apply a coat of thin 50% dope to all attachment surfaces. Cut prefinished tissue oversize and stick it to a flat surface with masking tape, over the framework. Lightly brush thinner through covering to ribs and outlines. The pre-doped tissue will adhere to the framework. Make sure that covering is adhered to ribs; otherwise the frame will warp out of shape in time. Use thin tissue strips for control surface outlines. Cut control horns, etc., from .020 balsa and install.

Some parts are made of laminated preshrunk tissue. Cut 2 or 3 pieces larger than you need and stack them on wax paper Brush very thin dope on to saturate. Rub out air bubbles with fingers, remove from wax paper while still wet, and place on soft flat surface. Pass warm clothes iron over without touching until partially set, then iron until dry. The deflector on the underside at rear of cooling duct is formed on a light bulb, first stretching plastic wrap around it, then laminating doped tissue and carefully peeling off when dry.

Basic fuselage box is made, doped and covered on all sides before cheek cowls and formers are added. Add front former with cutout for cooling duct, with a 3/4" circle cut out on center line to clear rubber motor. Remove lower front cross brace and add laminated cooling duct. Do not trim sides until cheek cowls have been installed. Make & install cheek cowls of grey styrofoam, to blend in with cooling duct at bottom and match front former. Cover them with prefinished aluminum laminated tissue, two layers. Apply with thin Titebond. Hollow the cheek cowls out as much as you can before installing. Next add three upper formers, Front former at rear of cheek cowl is identical with instrument panel; former behind cockpit is lower. Top covering is now applied, using three laminations of aluminum-coloured tissue. One piece goes from front to rear of cheek cowl, with another from there to rear of cockpit, cutting out opening first. Rear turtledeck is 2 lams. of linen colour. Prefit carefully, then turn over and score stringer lines on back with a dry ball point pen & straight edge and attach. There are no formers or stringers under this turtledeck.

Engine: Make a crossgrained 1/16 sheet square backplate to fit fuselage box front. Cut out to match duct and rubber hole. Crankcase is 1/32 sheet, grain front to rear, formed on dowel or pipe so that outside dia. is 1". Glue small reinforcing rings inside front and rear, with 1/64 ply ring glued to front face. Build up front portion of crankcase (which is the noseblock). Cylinders are silver-grey tissue formed on a tube, with black thread cooling fins. Glue to crankcase, add rocker arms, spark plugs, high tension leads & push rods. Glue in place. For cowling, stack 1/32 rear ring, styrofoam, 1/32 ring and 1/64 front ring. Shape and cover with 2 laminations of doped tissue, attached with white glue. Hollow out to slide over engine. Bump on side is added after initial shaping and is made of balsa.

The prop is basswood, carved from 3/4" x 2" x 7-1/2" block using X configuration. Landing gear legs are from hard 1/16 sheet. Wing struts are med. 1/16" balsa, spreader bar is 3/32" med. balsa. Machine gun is made of tissue tube and scraps of balsa. Add other details as desired. Wheels are as per drawing.

Four strands of .080 rubber are used for flying.

NOVICE PENNYPLANE

REV Jan '90

WING:
- LE 1/16 sq-round nose
- TE 1/16 sq
- TIPS 1/16 sq to .04
- RIBS 1/32 x 1/16 with 12" arc
- POSTS 1/16 Round

STAB:
- LE .05 x .04 -round nose
- TE .05 x .04
- TIPS .05 x .04 taper to .03
- RIBS 1/32 x .05, 18" arc

STICK:
- 3/16 x 1/4; taper both ends to 1/8 x 3/16

BOOM:
- 3/16 x 1/8 taper to 1/16 sq

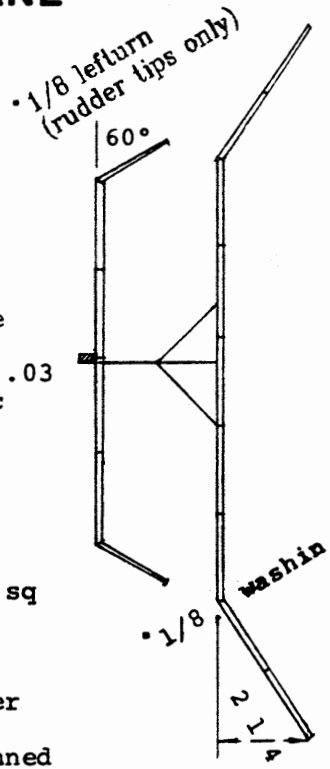
PROP:
- 12" Dia, 22" Pitch,
- HUB: 4", 1/8 round, taper to 1/16
- BLADES: 1/32 sheet, thinned out at tips
- WIRE .020" or .025"

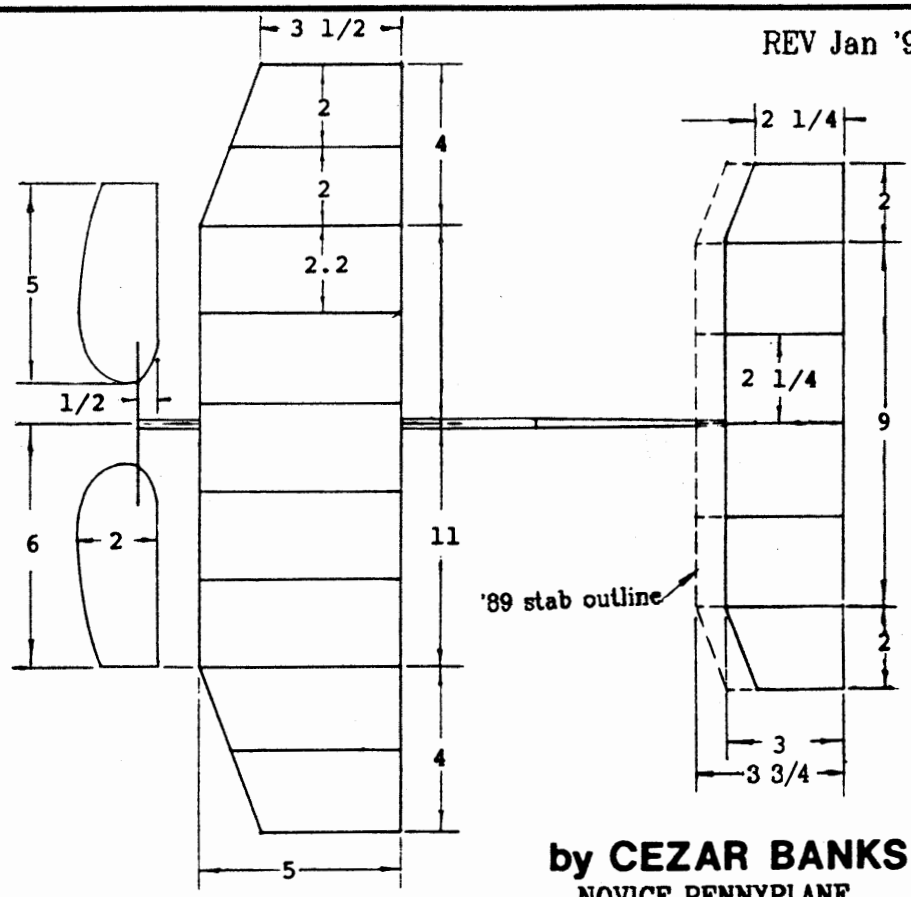
COVER:
- Microlite or any thin plastic film - thinned rubber cement

WEIGHTS:

Wing	.031
Prop	.023
Rest	.058
Total	.112 oz

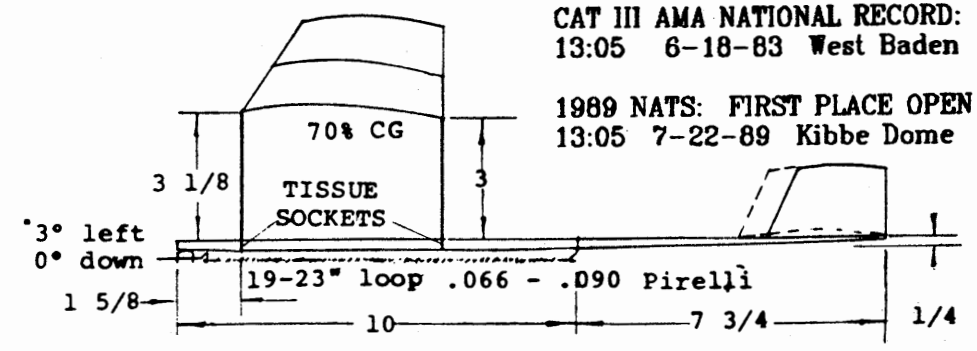
RIBS & PROP BLADES ARE SOFT BALSA; ALL ELSE IS MEDIUM.





•IMPORTANT ADJUSTMENTS

NOTE: soak/form/bake blades on one gallon glass jug at angle of 17°. Glue to hub so that at 3.5" radius, 45° angle is formed.



Drawn by Keith Varnau

by CEZAR BANKS
NOVICE PENNYPLANE

CAT III AMA NATIONAL RECORD:
13:05 6-18-83 West Baden

1989 NATS: FIRST PLACE OPEN
13:05 7-22-89 Kibbe Dome

NOVICE PENNYPLANE 2nd PLACE 1987 USIC - 12:30 JOE MACAY, Southfield, MI

Joe used a stock Banks NPP at the '87 USIC, which is not unusual; everybody flies them. For service to indoor flying, this great Cezar Banks design should probably be classified as the Indoor Model of the Decade. Here are Joe's comments:

JOE MACAY:

The Pennyplane was strictly stock. I don't know enough about indoor stuff to make changes. The model was "to weight". I used the rubber indicated on the 3-view that I had. I had flown it two or three times in a small gym, 18 foot ceiling. It flew right off the bat and showed promise of being a good airplane. All I had to do was "tweak" the wing on the inboard panel - beautiful!

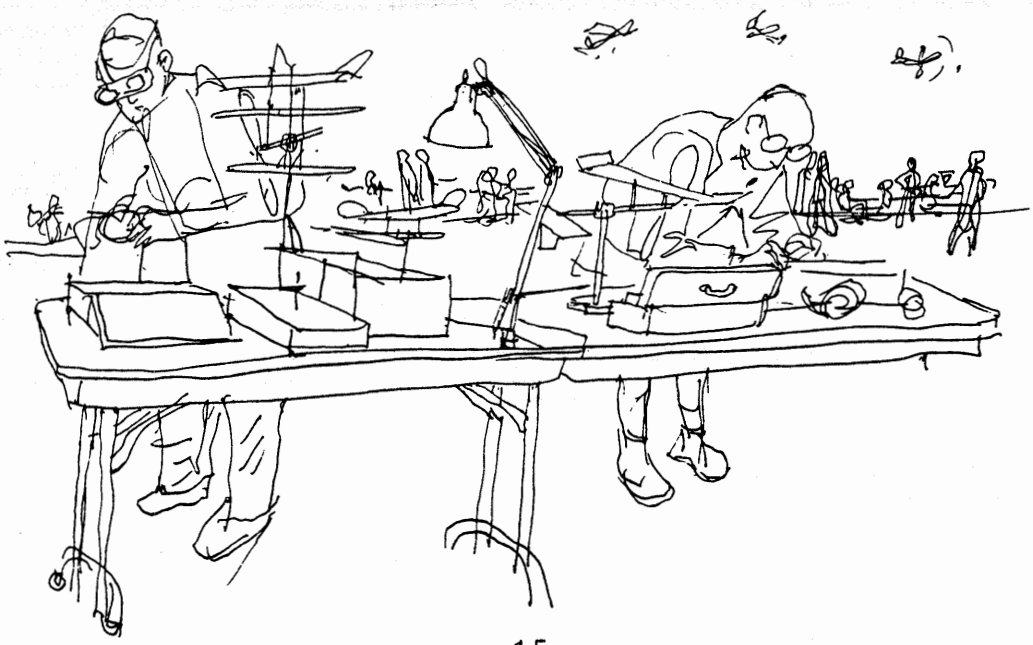
Now from the designer himself, Cezar Banks, who has brought his NPP drawing up to 1989-Nationals-winning standards for this Manual:

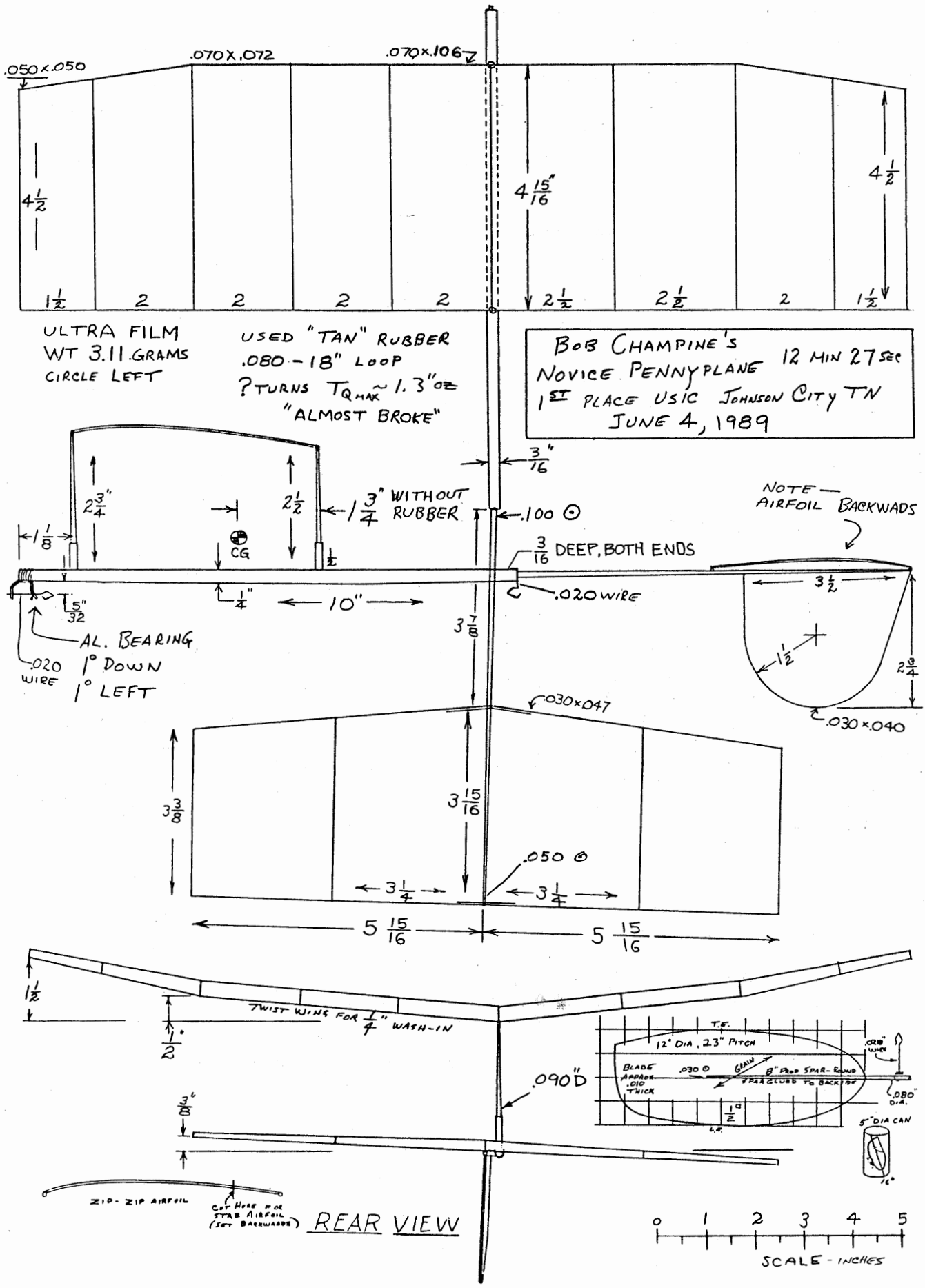
CEZAR BANKS:

This is my first (and so far only) NPP design. It originally appeared in the July/August 1977 NFFS Digest. Since then it has been built many times by scores of indoor modelers and seems to fly well even with as wide latitude of construction and trimming skills. I don't know why. I wasn't trying for anything special. It just turned out to be a very forgiving design, and perhaps that explains its popularity.

I made one change in '89, increasing stab chord to 3.75 inches (from 3.0 inches on the original). I was prompted by the Canadian flyers (John Marret et al) who were having good success with a wider chord stab. Its basic benefit is to make it groove better on a high-torque launch, near as I can tell, based on '89 Nats experience. I also keep a 25 inch pitch prop (22 shown on plan) in the box and may trade off between the two, depending on motors available and site conditions. Both work fine.

As with most models, try to keep the extremities "light" (i.e., tail, boom, wing tips, prop tips) and the whole model down to the weight rule. Good Success!

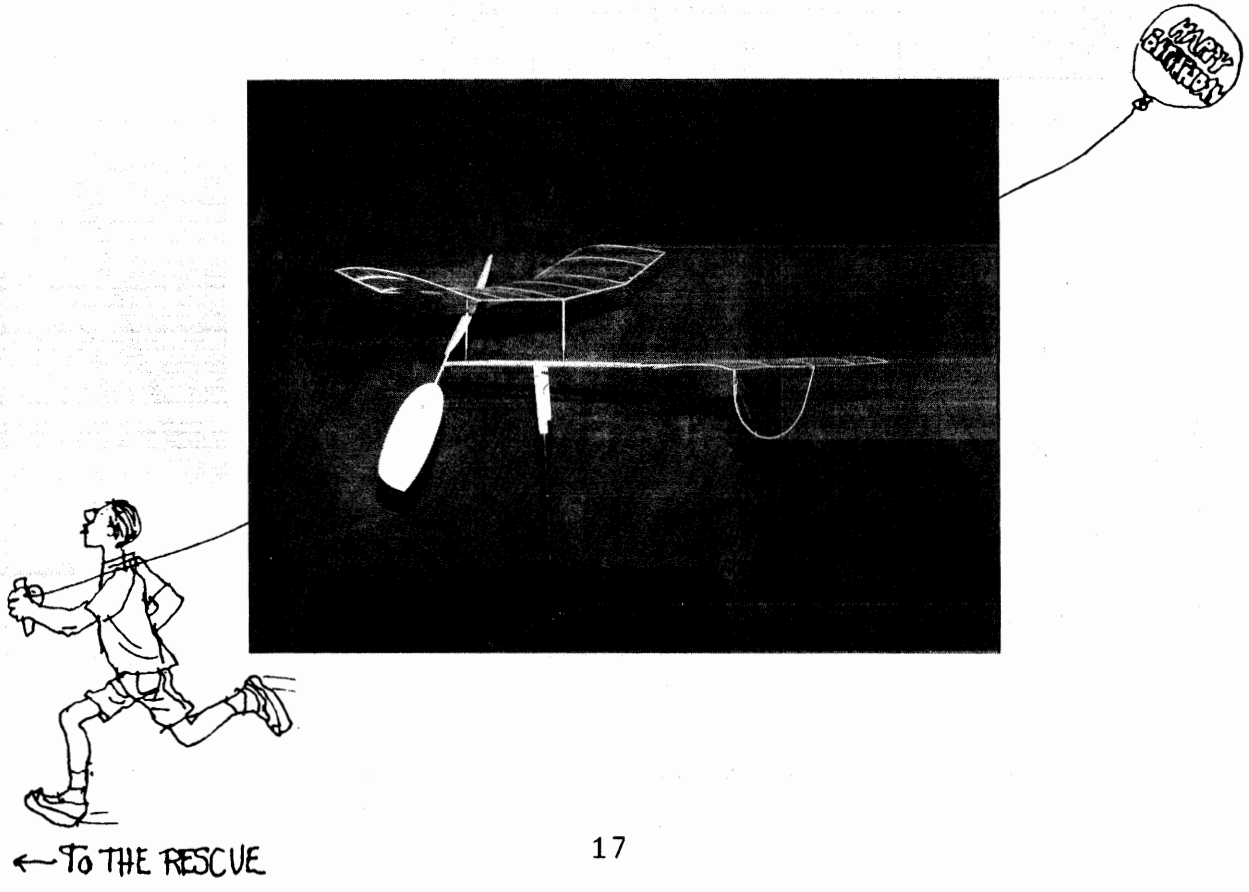


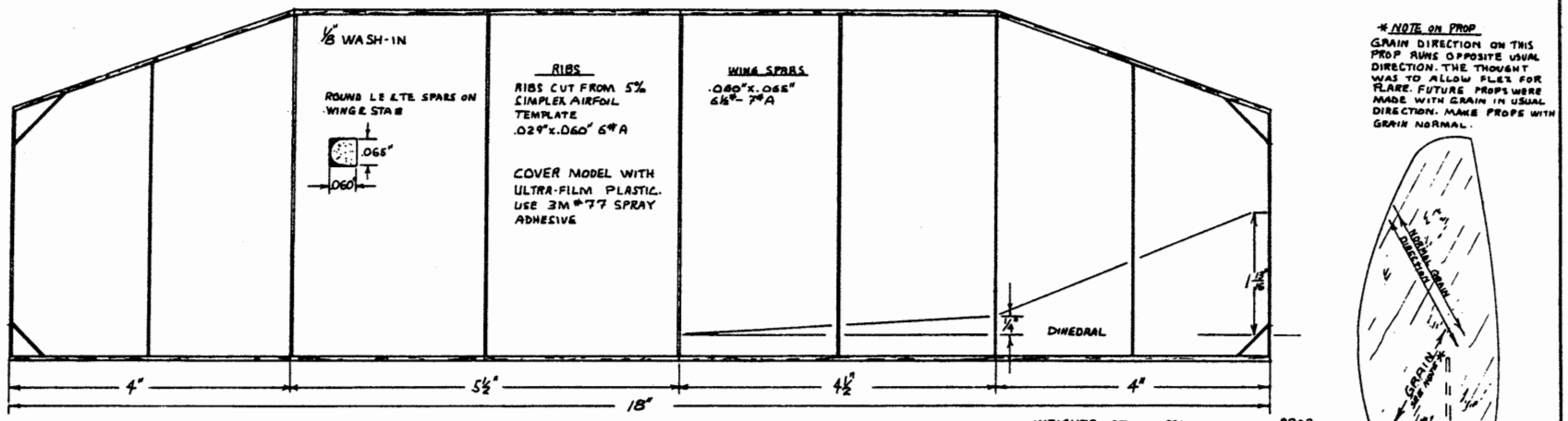

.050 x .050
.070 X .072
.070 x .106
4 1/2
4 15/16"
1 1/2
2
2
2
2
2 1/2
2 1/2
2
1 1/2
ULTRA FILM
WT 3.11 GRAMS
CIRCLE LEFT
USED "TAN" RUBBER
.080 - 18" LOOP
? TURNS TQ MAX ~ 1.3" oz
"ALMOST BROKE"
BOB CHAMPINE'S
NOVICE PENNYPLANE 12 MIN 27 sec
1ST PLACE USIC JOHNSON CITY TN
JUNE 4, 1989
3/16"
2 3/4"
2 1/2
1 3/4" WITHOUT RUBBER
.100
1 1/8
CG
1/2
3/16 DEEP, BOTH ENDS
NOTE — AIRFOIL BACKWADS
5/32"
1/4"
10"
.020 WIRE
3 7/8
3 1/2
1 1/2
2 3/4
AL. BEARING
.020 WIRE
1° DOWN
1° LEFT
.030 x .047
.030 x .040
3 3/8
3 15/16
.050
3 1/4
3 1/4
5 15/16
5 15/16
1 1/2
TWIST WING FOR 1/4" WASH-IN
1/2°
T.E.
12" DIA, 2.3" PITCH
.030
GRAIN
8" PROP SPAR - ROUND
SPAR GLUED TO BACK OF BLADE
.020" WIRE
.080" DIA.
BLADE APPROX .010 THICK
1/2
L.E.
5" DIA CAN
1/2°
.090" D
3/8"
ZIP - ZIP AIRFOIL
CUT HOLE FOR STAB AIRFOIL (SET BACKWARDS)
REAR VIEW
0 1 2 3 4 5
SCALE - INCHES

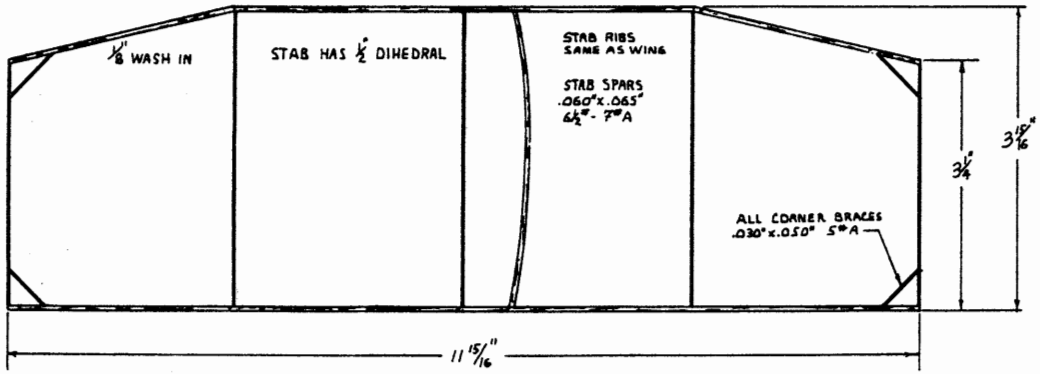
NOVICE PENNYPLANE 1st PLACE 1989 USIC 12:27
BOB CHAMPINE, Newport News, VA

The basic plan was to design a model that would comply with the rules and be constructed at the minimum allowable weight. The airfoil was laid out to be fairly thin so as to allow the model to climb to the high ceiling and cruise well. The propeller is diameter-limited; therefore, generous blade area was planned to keep the RPM as low as possible. All of the above items did indeed work out very well. The model was built slightly underweight. I used the new TAN rubber because I found it stored more turns. However, the cruising torque seemed to be a little less than FAI rubber, so I increased the size of the motor a few thousandths. After getting a good cruise and descent, I wound up a motor to determine the breaking torque and then started flying at higher and higher torque values. My method was to wind to a point just below the breaking torque and then "back off" turns somewhat to see the climb rate and height gained for that backed-off torque. This allowed the model to climb closer to the ceiling as the higher torque was wound into the motor. In my eagerness, I have to admit that the model hung up a couple of times, so I had to increase the length of the motor about 1 1/2 inches. This was A-okay, as the extra length allowed for even more turns, and the extra weight slowed down the rate of climb up near the ceiling. On the winning flight, it did some rafter-banging, but it didn't climb very fast while doing it. Therefore, it did not hang up (lucky, maybe). During the early part of the climb, the model did collide with another that was coming down, but after about 10 seconds of climbing united, they broke loose, and mine continued for the 12:27 flight. Now that really was luck.

The wood I used was "contest grade". I pick out a good area of a sheet by holding it up to a 100-watt light bulb and find an area that is smooth-looking. The spars and ribs are cut from that part of the sheet.







WEIGHTS	OZ	GRAMS
WING	.025	.71
TAIL ASSY.	.021	.59
PROP	.022	.63
BODY	.041	1.16
BALLAST	.005	.14
TOTAL	.114 oz.	3.23 gs

PROP

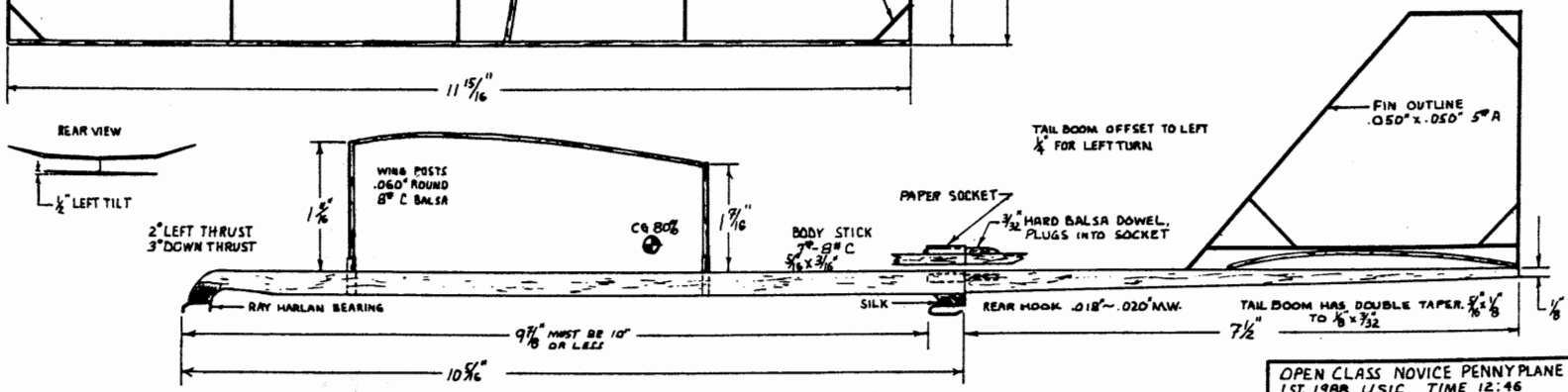
- 12" DIA. X 22.75 PITCH
- BLADES - .025" 6" C FORMED ON 5" DIA CAN.
- SPAR - .090" ROUND TAPER TO .050" ROUND 8"-9" C
- PROP SHAFT .018"-.020" MUSIC WIRE WITH TEFLON WASHER
- BLADE ANGLE ON FORM, 12°

*** NOTE ON PROP**

GRAIN DIRECTION ON THIS PROP RUNS OPPOSITE USUAL DIRECTION. THE THOUGHT WAS TO ALLOW FLEX FOR FLARE. FUTURE PROPS WERE MADE WITH GRAIN IN USUAL DIRECTION. MAKE PROPS WITH GRAIN NORMAL.

WINNING FLIGHT

RUBBER: JACK McGILLIVRAY'S PIRELLI .085"x.042"x 25 1/2" LONG 2350 TURNS. WENT TO CEILING AND BUMPED ABOUT 10 TIMES. LANDED DEAD STICK FROM ABOUT 30'



OPEN CLASS NOVICE PENNYPLANE
1ST 1988 USIC TIME 12:46
CHUCK SLUSARCZYK BRECKSVILLE OHIO

SCALE: FULL	APPROVED BY	DRAWN BY C. SLUSARCZYK
DATE: 2-10-90		
		DRAWING NUMBER NO 003

NOVICE PENNYPLANE 1st PLACE 1988 USIC 12:46
CHUCK SLUSARCZYK, Brecksville, OH

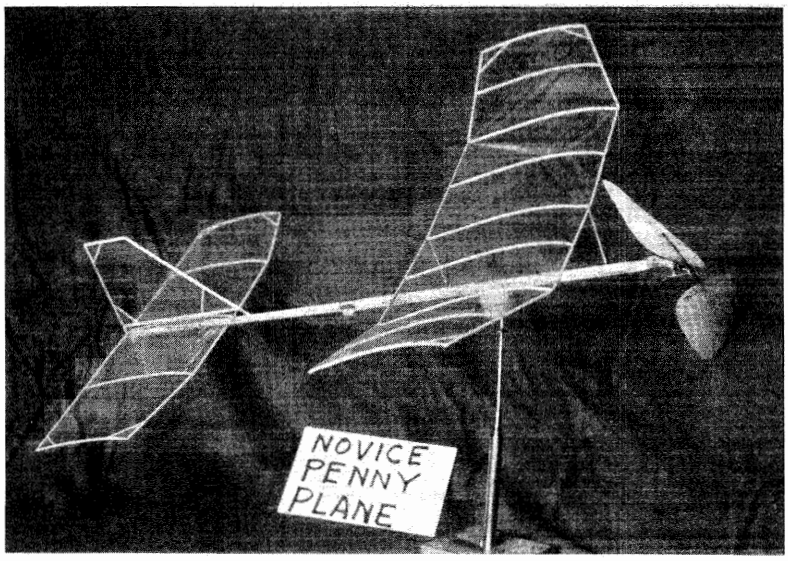
During the 1988 contest season, I focused more on the Novice Pennyplane event than any of the others I flew. My game plan was to concentrate on one or two events per year, even though I flew about ten events. I wanted to reach the point in each event where all I had to do was to take the model out of the box, wind it up, launch it and get a good flight. I haven't reached this point yet with all my models and I honestly don't know if I ever will.

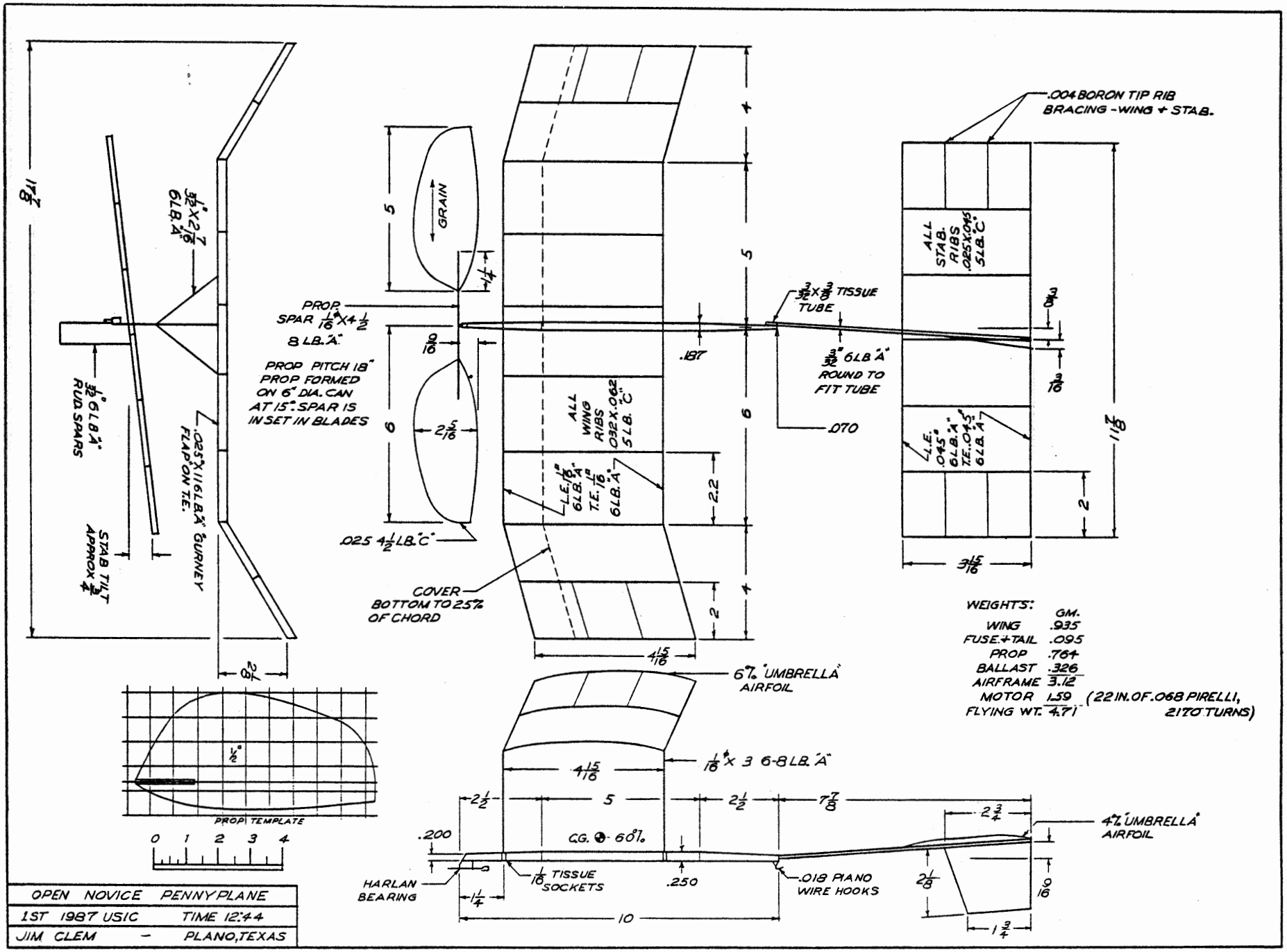
This Novice Pennyplane is a relatively generic design that my son Don, Larry Loucka, and I have been flying for a couple of years. This model gives graphic proof of the difference that prop and rubber can make. Typical flights were in the 10 - 11 minute range with FAI black rubber; not bad, but not spectacular. I built a new prop for the 1988 USIC with the grain running opposite the usual direction with the idea that during the power burst, it would flare more at the tips, resulting in a constant pitch angle across the entire blade. I haven't done enough testing to know if it works that way or not. I really have Jack McGillivray to thank for my win in 1988, because he gave me a piece of his Pirelli rubber to try. On the next flight, the time went from 11:01 to 11:47 using the Pirelli. Since I was landing with a lot of turns left, I started to match the prop to the rubber. Normally I would have snipped about an inch off the motor, but since I had only one motor, I modified the prop, first by lowering the pitch and later by trimming some area off the trailing edge. The prop rpm went up slightly, and so did the times. I had two official flights left with about 30 minutes remaining in the contest. I launched with 2150 turns and had a great flight going until the rubber bunched up at about 50' and locked the prop for 12:03. The last flight was wound to 2350 turns. A perfect flight resulted with the prop spinning all the way to the floor for a time of 12:46 and first place. The plane landed dead stick from about 30', so I knew it still wasn't a perfect match. I broke my Pirelli motor in the Akron Airdock a few weeks later, and could not get any better than 12 minutes using FAI black rubber. I am now using FAI tan, which has excellent cruise torque but a shorter power burst. Therefore, I am building new props to match this rubber,

Construction is straightforward and conventional. I try to build a little light and add clay ballast where needed. Choose wood carefully and use sizes and weights as shown on the plan. Use thinned-down Testors, Ambroid or Duco cement for building. Keep away from Cyanoacrylate type glue except for nose bearing. Good luck and good flying.



"Dad! When are we going outside to fly my Starduster 100?"





WEIGHTS:

	GM.
WING	.935
FUSE. + TAIL	.095
PROP	.764
BALLAST	.326
AIRFRAME	3.12
MOTOR	1.59 (22 IN. OF .068 PIRELLI, 2170 TURNS)
FLYING WT.	4.71

OPEN NOVICE	PENNYPLANE
1ST 1987 USIC	TIME 12:44
JIM CLEM —	PLANO, TEXAS

NOVICE PENNYPLANE 1st PLACE 1987 USIC - 12:44 JIM CLEM, Plano, TX

Most NFFS members will probably be familiar with Jim Clem of Okie Bird and ABC Scrambler fame. I thought it'd probably be wise to note that this author is the "old speed" Jim Clem. How the world has ever survived two Jim Clems, I don't know, but it has.

Like most successful models, this model is kind of a combination of original ideas from years of looking and then adding your own twist. "D.O.D. Novice P" (Dear Old Dad's Novice Pennyplane) has been very consistent through the years. It won NPP at the 1987 USIC with 12:44. In 1988 it finished third with 12:31. First place was 12:46, so the model was in there all the time. In 1989 I completely bombed out; I was switching to Tan rubber and didn't have the prop-rubber combination right. Tan has to go up in size compared to Pirelli. As Walt Van Gorder and others have said, if there is just one secret, it's that you must match the prop and rubber. This model is still working great. It was 3d at Moscow, ID, in 1989 with 12:25.

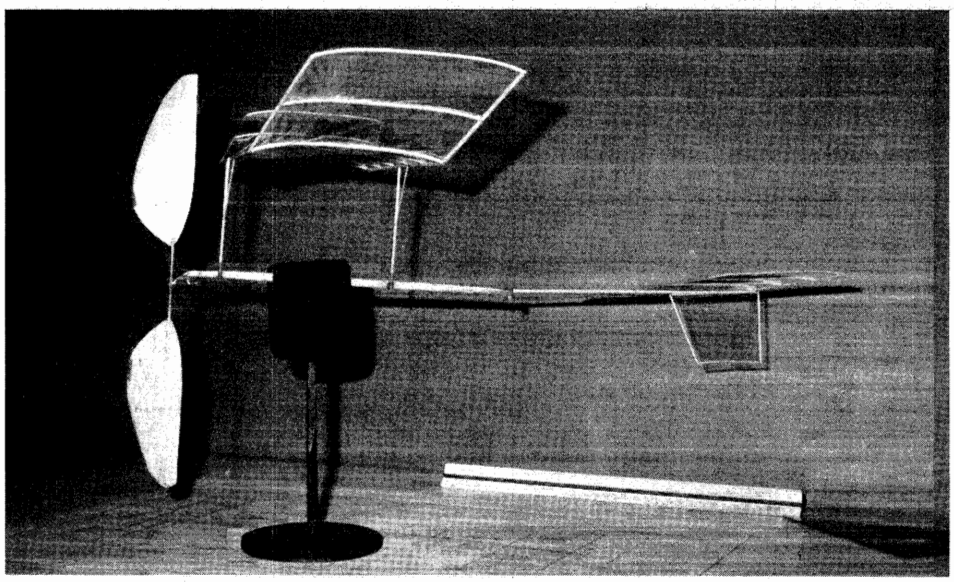
In explaining details, I'll outline differences from the way other models may be set up. The fuselage has a tapered stick and a Harlan bearing. It differs from most models in having a 3/32 square boom plugged into a 3/32 x 3/8 paper tube. This makes it easy to set stab tilt. There is no down thrust, but it does use left thrust. If you extend the thrust line back, it is offset 7/16" at the rear hook.

The wing is very simple. The tips are swept back so that we can ceiling-scrub without snagging the wing's corners in the roof. The LE is covered on the bottom back to 25% of the chord, which seems to smooth out oscillations in turbulence. Also a little bit different is the .025 square Gurney flap on the center sec-tion ,which seems to give considerable lift for a small drag penalty. Rather than Ultrafilm, the covering is Charlie Sotich's 1/10 mil mylar, which balloons less between the ribs. The tip ribs are braced to the second rib with .004 boron, with the covering glued to it so that it stays put if it breaks.

Since there is quite a bit of incidence in the stabilizer, the wing flies with zero incidence, or maybe a little negative. I feel this helps on the sink rate.

I've done a lot of research on props. The prop is wider than most, and the pitch much lower than everyone uses. The prop is very light for an NPP - each blade weighs .3 gram. The spar is inset into the blades 1-1/4". With this large flaring prop, low pitch and lots of blade area, the prop will flare and slow the rpm down at the beginning of the flight. The rpm always stays between 149-155. Thus you can use motors that are smaller than those of most Pennyplanes, and get the overall weight down.

The rubber used at the USIC was Pirelli, .068 x 22", with 2170 turns. With FAI Tan, in Moscow, the motor was .085 x 23" and 2200 turns. That probably covers all the so-called secrets. Try it - you'll like it!

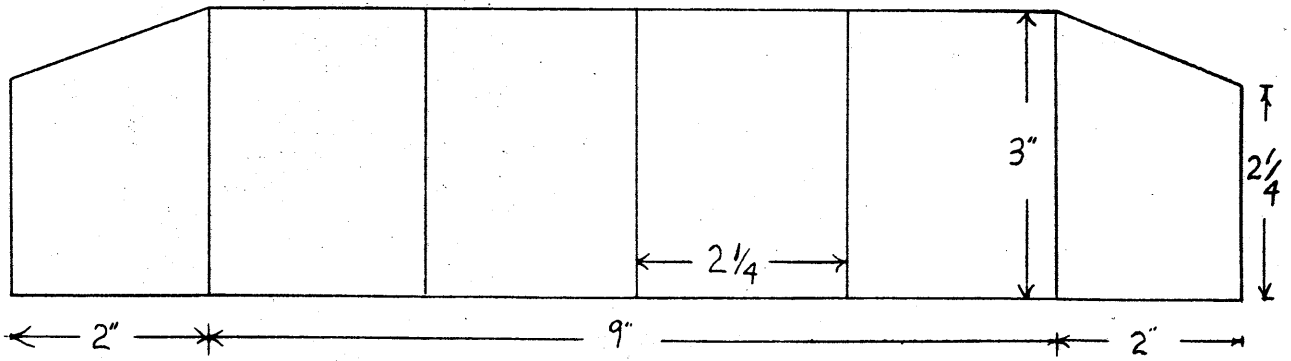




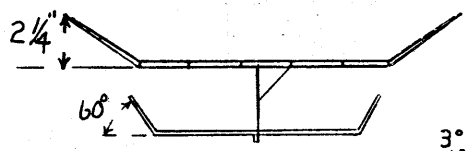
WING - LE 3/32 SQ ROUND NOSE TE 3/32 SQ
BOTH TAPERED TO 1/16" TIPS 1/16 SQ
FORMED ON CARD BOARD FORM
RIBS 1/32 BY 1/16 WITH 12" ARC
POST 1/16 ROUND
STAB LE .05 X .04 ROUND NOSE
TE .05 X .04
TIPS .05 X .04 TAPER TO .03
RIBS 1/32 X .05 18" ARC
STICK 3/16 X 1/4 TAPER BOTH ENDS TO 1/8 X 3/16
BOOM 3/16 X 1/8 TAPER TO 1/16 SQ
PROP 12" DIA 26 TO 28" PITCH
HUB 4" 1/8 ROUND TAPER 1/16
BLADES 1/32 C GRAIN THINNED AT TIPS
FORMED ON GALLON JUG 15° ANGLE
WIRE .020
COVER ULTRA-FILM 3M SUPER 77 CEMENT
RUBBER 26" LOOP .100 TO .105 CHAMPION
MARCH 1986 2080 TURNS

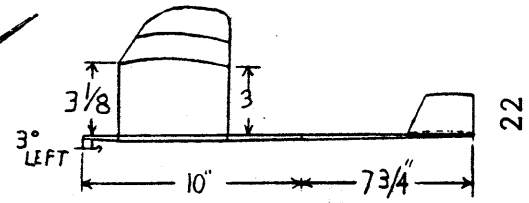
WEIGHTS
WING .65
PROP .90
REST 1.55
TOTAL 3.10 GR

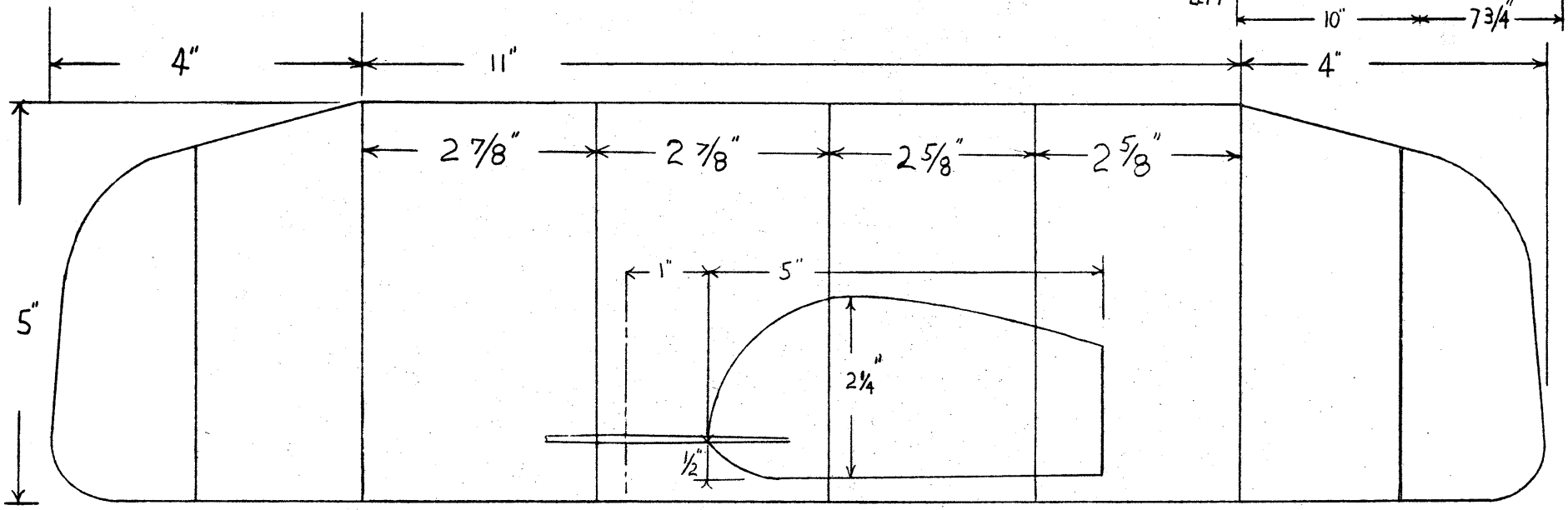
NOSE BEARING .020 WIRE



By RICHARD MILLER
NOVICE PENNYPLANE
"MUNCH — BANK"
2ND PLACE '89 USIC 12:31







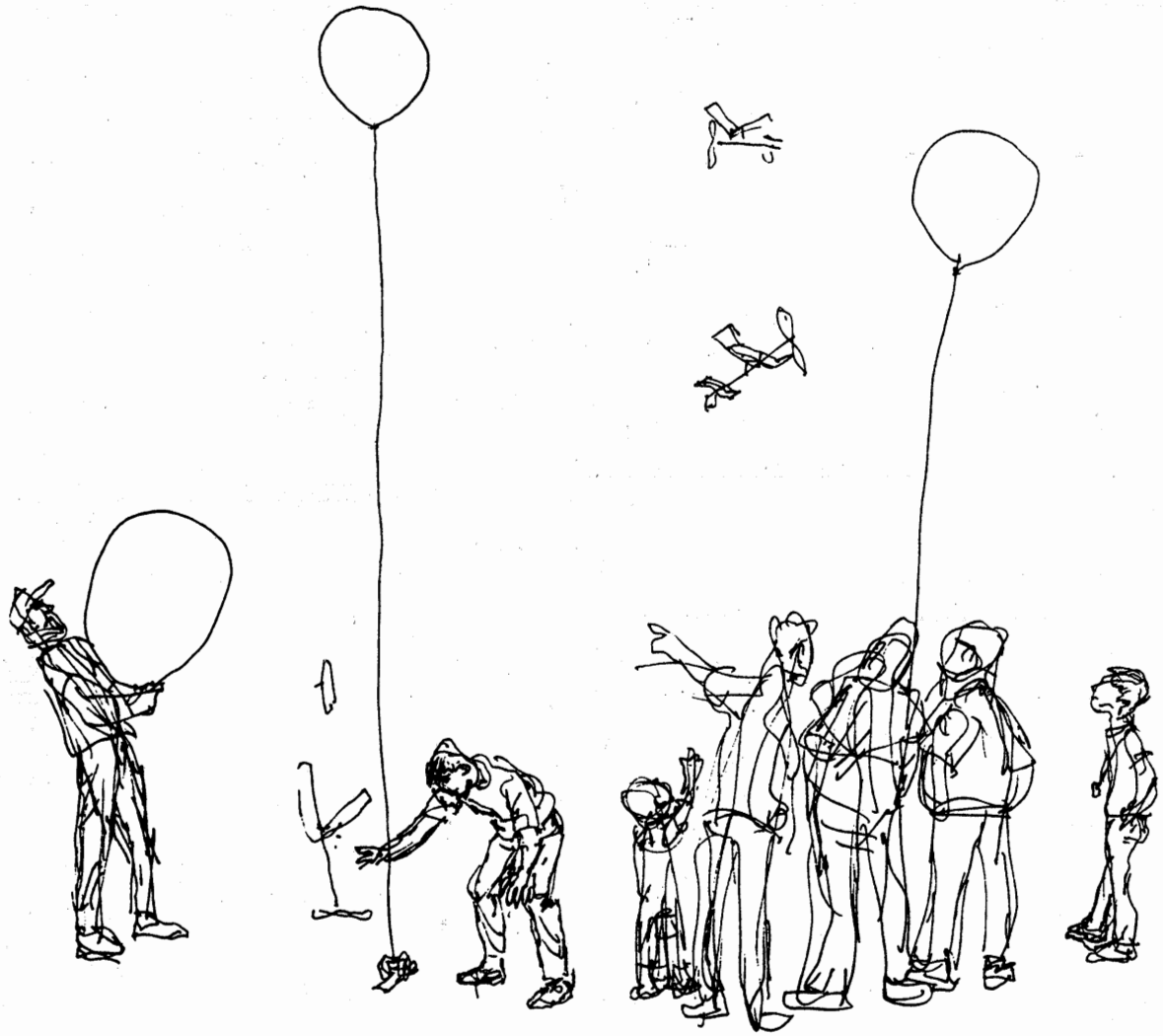
NOVICE PENNYPLANE 2nd PLACE 1988 USIC - 12:32 RICHARD MILLER, Angola, NY

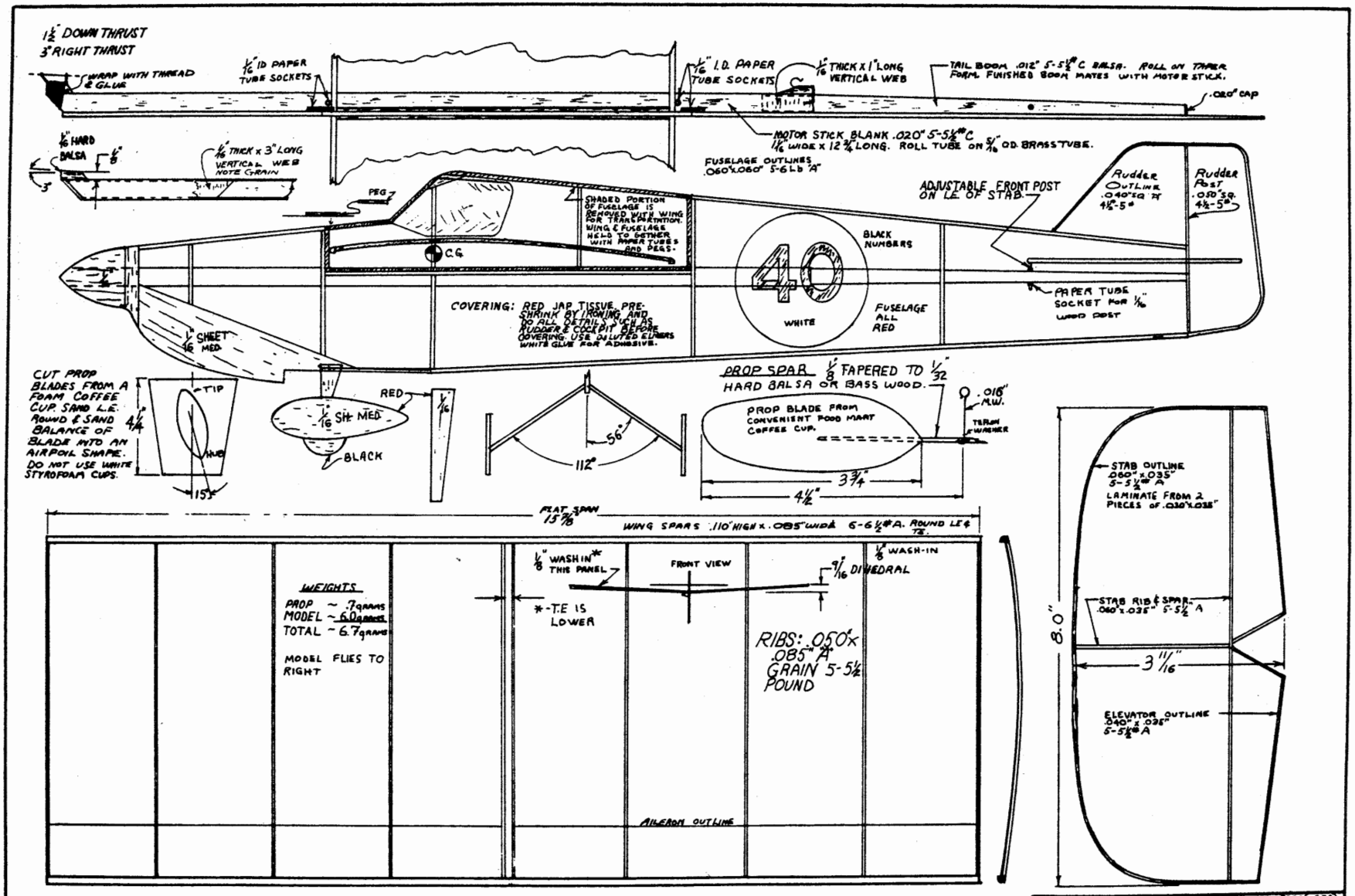
I got started with indoor flying in 1985, when we had the Niagara Falls Convention Center to practice in. I knew nothing at all about indoor, but with the help of the Canadians, I put a Jim Jones Pennyplane, "Munchkin", together. That was the start of my indoor flying.

Next, I built a Cezar Banks Novice Pennyplane and started making changes. I put the "Munchkin" wing on the Cezar Banks body and tail and called it the "Munch-Bank". The nose bearing was made from .020 wire with about 1/2" from the motor stick to the hole in the bearing.

The prop blade twist was formed on a gallon jug at a 15 degree angle. Props of 26" and 28" pitch were made. I used March 1986 Champion rubber, as it had good energy and would not grapevine, or form twists.

All this gave me a model which won second place in Novice Pennyplane in both 1988 and 1989.





WINNING FLIGHT 1988
~ MOTOR .100"x.042"x 27" JACK McGILLIVRAYS PIRELLI, 2100 TURNS 4.5 TORQUE ON JONES BIG METER.
~ TIME 3:46 AVG. PROP RPM 537 PROP 8½ DIA x 11 P P/D 1.34
~ WEIGHT 7.4 GRAMS
~ PLANE 5.85 GRAMS ~ PROP 0.85 GRAMS ~ NOSE WEIGHT 0.7 GRAMS

WINNING FLIGHT 1989
~ MOTOR .120"x.042"x24" LONG TAN F.A.I 2000 TURNS 4 TORQUE ON JONES B16 METER
~ TIME 5:03 AVG. PROP RPM 400.
~ WEIGHT 6.3 GRAMS (5.75 GRAMS + 0.55 GRAMS NOSE WEIGHT + 0.83 GRAM PROP)
~ PROP 9" DIA. X 13.9" PITCH P/D 1.75

OPEN NO-CAL 1ST 1989 1ST 1988 USIC 5:03 (1982)
CASSUTT NO-CAL
CHUCK SLUSARCZYK – BRECKSVILLE, OHIO
SCALE: FULL
DATE: 2-1-90
DRAWN BY: Chuck Slusarczyk
CASSUTT NO-CAL
FOR 6.2 Gr. – 7.0 Gr. EVENTS
MD 001

NO-CAL SCALE 1st PLACE 1989 USIC 5:03
CHUCK SLUSARCZYK, Brecksville, OH

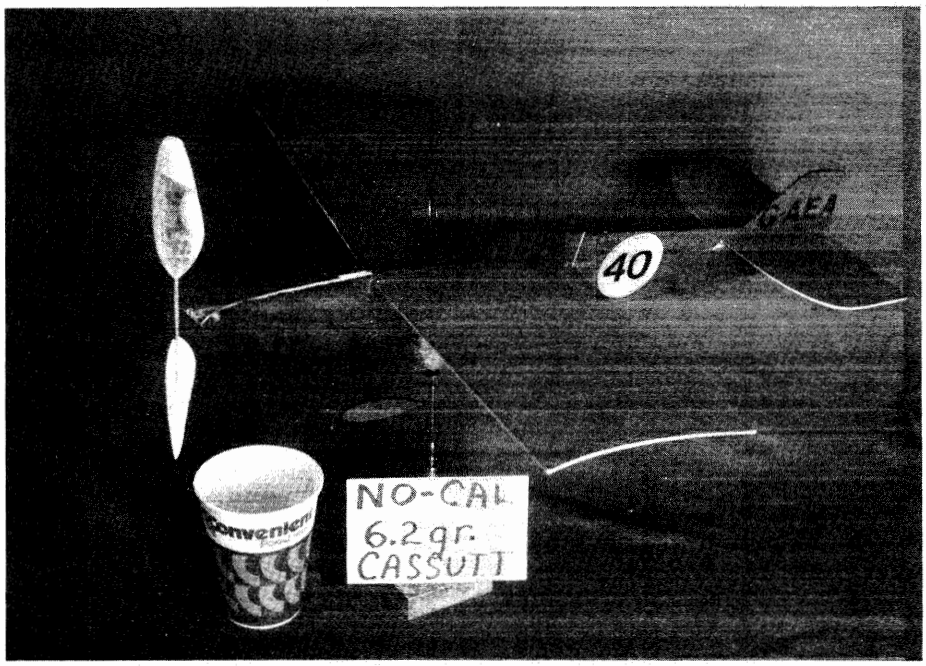
I started flying No-Cal models when I got back into Indoor flying after a 25-year hiatus. The event appealed to me because the models resembled full-size planes. It is based solely on flying time, not on decisions by a scale judge. Since I wanted a low wing loading, I looked for an airplane design with low aspect ratio wings. A long nose was necessary to aid balance without adding lots of clay. Full-size airplanes that have short noses but have spinners are good because the model prop is in front of the scale spinner.

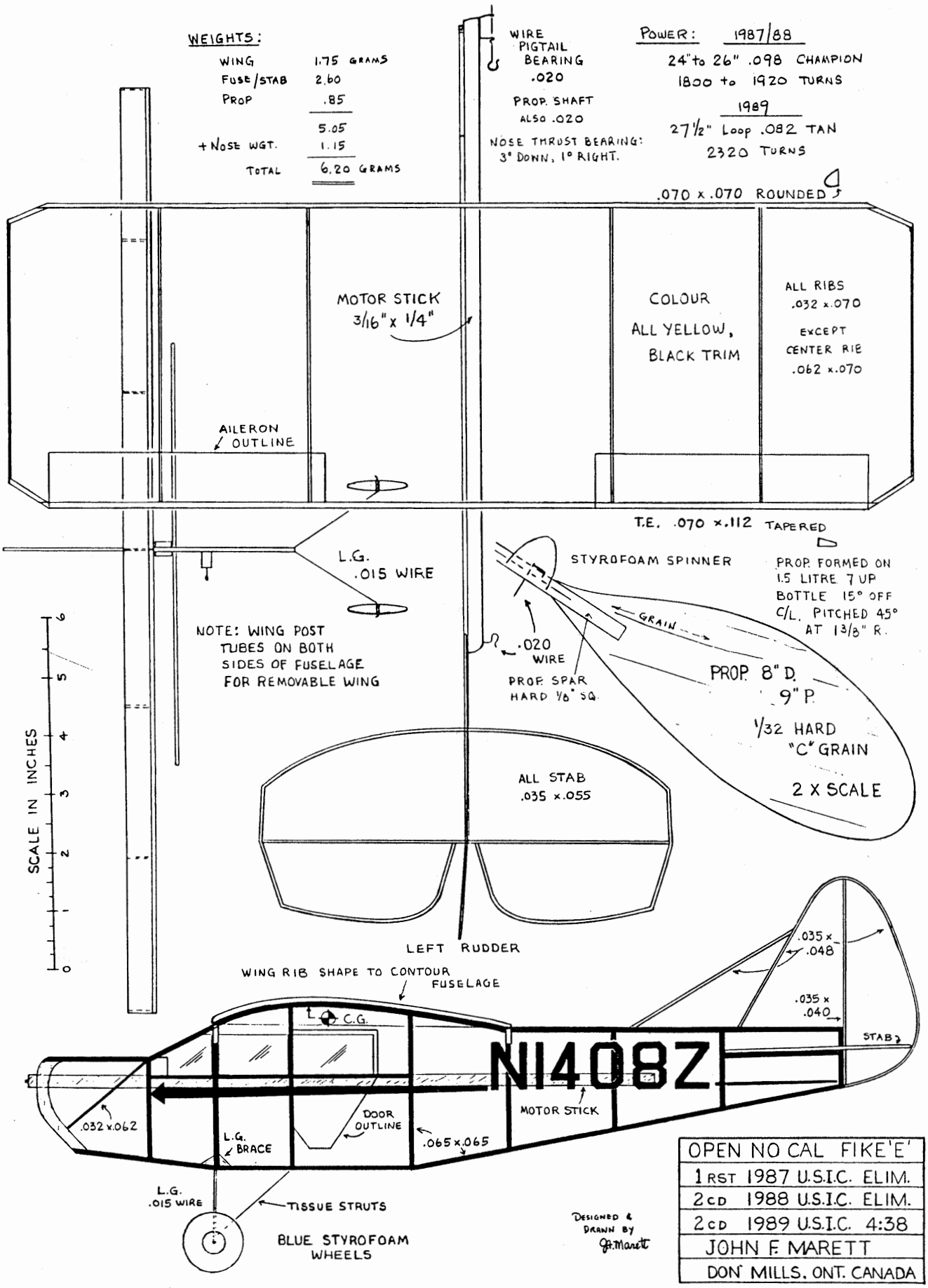
Use thinned Duco cement on all wood joints. While flight testing, temporarily cement the nose bearing on with Duco and silk. After the side and down thrust is determined, a medium grade of CyA cement will lock the bearing on. The airframe is conventional. Make a template of the rudder and stabilizer out of hard balsa and form the wet outlines around the template. Bake them in the oven at 200^0 for 15-20 minutes. The wings are designed to be removed for transportation.

When covering, preshrink and iron the tissue. Draw the control outlines, cockpit, markings, etc., with felt and ball pens prior to attaching with diluted Elmers glue (60% water) for attaching. Lay the part on the tissue and place small weights on the part to hold it flat. Then apply the adhesive with a small pointed paint brush. Let dry, then trim tissue. After wing is covered, it is cut in half and mounted to the fuselage with proper dihedral and washin angle.

Coffee cups make excellent prop blades. Props and rubber are probably the most important aspect of flying indoor models, for no matter how well the model is built, if the prop and rubber combination are wrong, your model will not fly to its potential. Rubber can vary, but we've had good luck with FAI tan.

Check CG and adjust with clay if needed. Start off with a short loop of .100 x 18" rubber. Test fly with about 500 turns. Model should fly slightly nose high and to the right. Stabilizer angle can be adjusted up or down and weight added to the nose if required. When properly adjusted, the model will climb quickly to 40-50' and then slowly circle, flying slightly nose high for the duration of the flight.




WEIGHTS:
WING 1.75 GRAMS
FUSE/STAB 2.60
PROP .85
5.05
+NOSE WGT. 1.15
TOTAL 6.20 GRAMS
WIRE PIGTAIL BEARING .020
PROP. SHAFT ALSO .020
NOSE THRUST BEARING: 3° DOWN, 1° RIGHT.
POWER: 1987/88
24" to 26" .098 CHAMPION
1800 to 1920 TURNS
1989
27½" Loop .082 TAN
2320 TURNS
.070 x .070 ROUNDED
MOTOR STICK 3/16" x 1/4"
COLOUR ALL YELLOW, BLACK TRIM
ALL RIBS .032 x .070
EXCEPT CENTER RIB .062 x .070
AILERON OUTLINE
T.E. .070 x .112 TAPERED
L.G. .015 WIRE
STYROFOAM SPINNER
PROP FORMED ON 1.5 LITRE 7 UP BOTTLE 15° OFF C/L. PITCHED 45° AT 13/8" R.
GRAIN
.020 WIRE
PROP SPAR HARD 1/8" SQ.
PROP 8" D. 9" P.
1/32 HARD "C" GRAIN
2 X SCALE
NOTE: WING POST TUBES ON BOTH SIDES OF FUSELAGE FOR REMOVABLE WING
SCALE IN INCHES
ALL STAB .035 x .055
LEFT RUDDER
WING RIB SHAPE TO CONTOUR FUSELAGE
C.G.
.035 x .048
.035 x .040
STAB
N1408Z
.032 x .062
L.G. BRACE
DOOR OUTLINE
.065 x .065
MOTOR STICK
L.G. .015 WIRE
TISSUE STRUTS
BLUE STYROFOAM WHEELS
DESIGNED & DRAWN BY J.F. Marett
OPEN NO CAL FIKE'E'
1RST 1987 U.S.I.C. ELIM.
2CD 1988 U.S.I.C. ELIM.
2CD 1989 U.S.I.C. 4:38
JOHN F. MARETT
DON MILLS, ONT. CANADA

NO-CAL SCALE 1st PLACE 1987 USIC JOHN MARETT, Bramton, Ontario, Canada

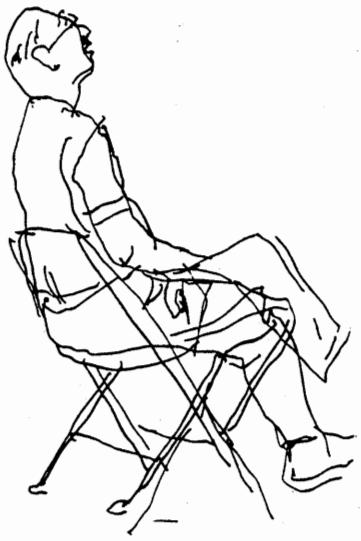
The "Fike E" model was designed for the 1987 USIC as a direct result of the Chicago Aeronuts competition in April of that year, where my 55 sq. in. Citabria could barely make 3 minutes when ballasted to their 6 gram minimum. As much as I dislike the Fikes and Laceys, these arbitrarily imposed weights left little choice. I needed a larger wing, and thanks to Micro X and their Peanut kit, the Fike looked better to me than a Lacey. Since No-Cals do not have to be exact scale, I took small liberties where I felt it necessary, including a slightly longer fuselage and a reduced wing chord to improve tail moment, yet retaining all shapes true to the original.

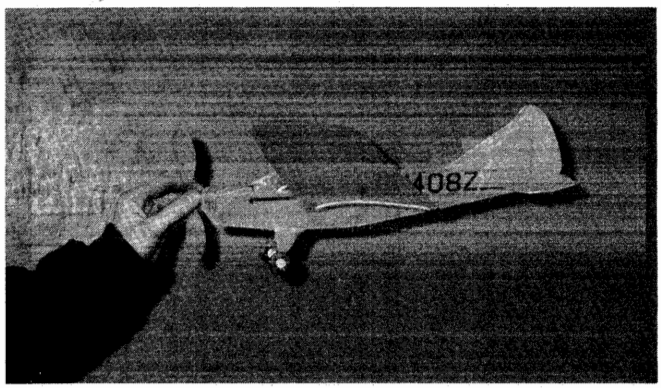
There is nothing unusual about the construction, except that in 1987, with No-Cals, I didn't worry too much about wood weights, a bad mistake. The model could be built a lot lighter, and I have no data in this regard to share with you. The nose bearing was formed from .020 music wire as described in Building and Flying Indoor Model Airplanes, by Ron Williams. I like these bearings because thrust adjustments can easily be done on the model with needlenose pliers.

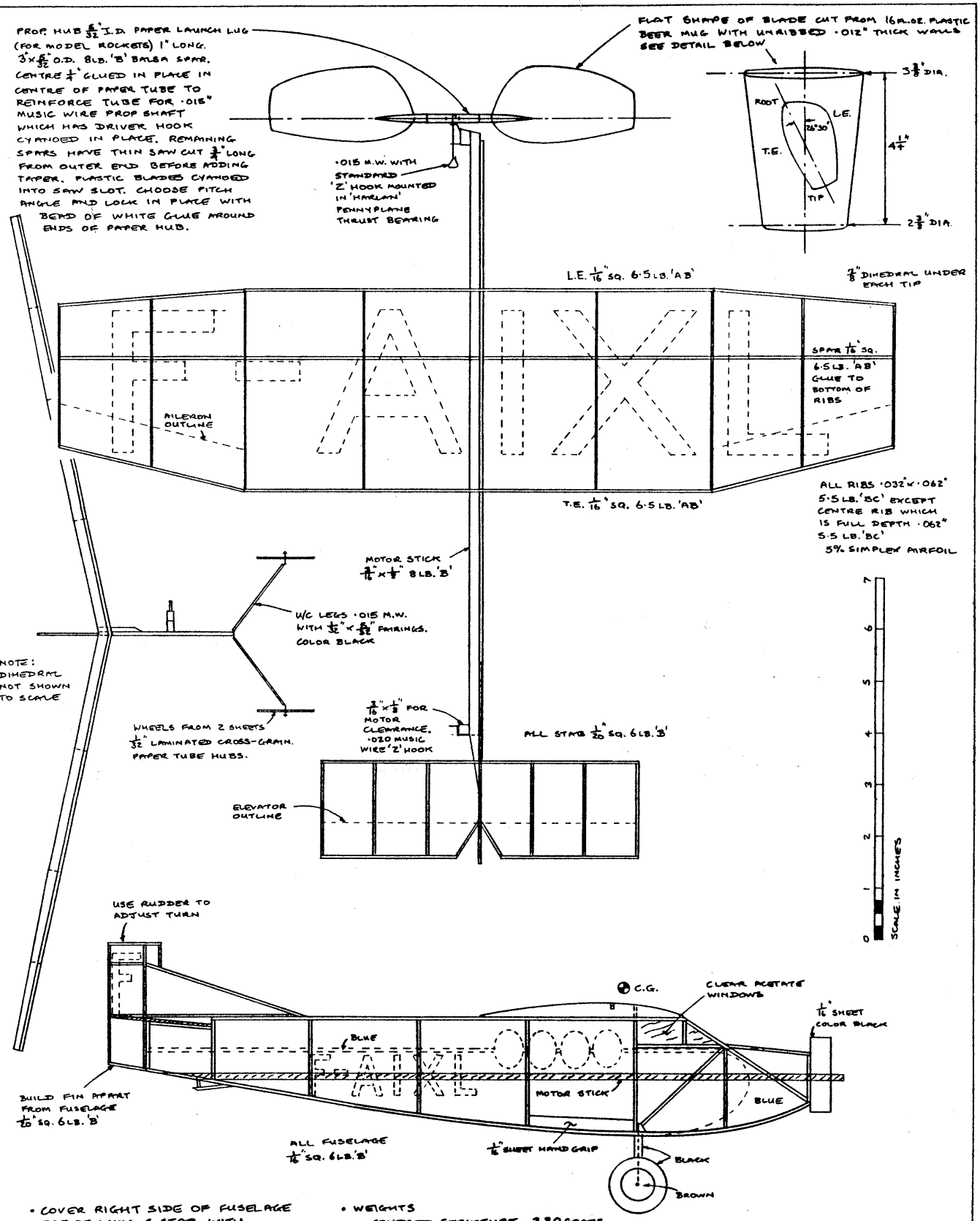
The covering was lightweight yellow tissue, preshrunk on a frame. It also had one coat of SIG Lite-Coat dope thinned 80% with SIG thinner, after which the markings and letters were done while still on the frame, by tracing through from the plan. Covering was done in the driest conditions I could get, even running the frame over the heat from a hot electric stove element prior to cutting the pieces free for covering. Better to have a few wrinkles later in high humidity than warps at a hot, dry contest site. The prop was formed on a bottle with a diameter of 4 1/4", and the wet blades were baked dry in an electric oven for 20 minutes at 240 degrees F. The styrofoam spinner, a personal touch, absorbs some bad hits on low gym beams.

When complete, the original version came in at almost 7 grams with nose weight, so drastic measures were taken to lighten the tail end. It was also found that 4 wing posts and sockets were required to hold the removable wing adequately.

My "Fike E" was somewhat finicky to adjust, but as long as I could afford to add nose weight, the finer adjustments in downthrust and elevator became less critical. Under high torque at the USIC she tended to stall slightly on the initial burst, with the downthrust pulling her through. Although not designed for a specific direction of turn, I did cover her anticipating a right circle. However, she likes to turn left, and I'm not inclined to argue this point with ladies or model airplanes.







- COVER RIGHT SIDE OF FUSELAGE TOP OF WING & STAB WITH PRESHRUNK & PREDOPED WHITE JAP TISSUE
- COLORS - OVERALL WHITE
  BLUE TRIM
  BLACK REGISTRATION LETTERS
  BLACK PORTHOLES
  BLACK CONTROL SURFACE OUTLINES
- 7" DIA. ADJUSTABLE PITCH PROPELLER MODEL HAS BEEN FLYING WITH 10" PITCH

- WEIGHTS

COVERED STRUCTURE	3.90 GRAMS
PROP ASSEMBLY	1.55
	5.45
NOSEWEIGHT	0.95
TOTAL	6.40

- MOTOR
  27" OF 0.070 PIRELLI
  2640 - 80 TURNS
- ORIGINAL MODEL FLEW RIGHT

DESIGNED BY: DAN DELOACH, DALLAS, TEXAS
DRAWN BY: W. HENDERSON

OPEN NO-CAL
FARMAN F190
3RD 1989 U.S.I.C. 3:40
W. HENDERSON - TORONTO, CANADA

NO-CAL SCALE 3d PLACE 1989 USIC 3:40
WILLIAM HENDERSON, Toronto, Ontario, Canada

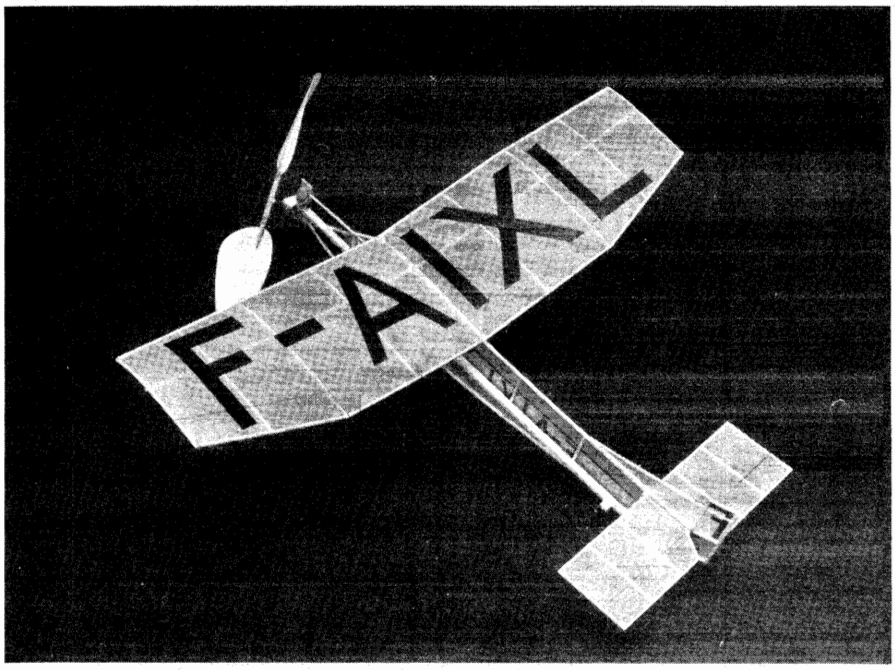
This model was chosen after a lot of searching for a full-size original other than the "Fike" or "Lacey". These two aircraft offer large area wings, a distinct advantage when the model must weigh over 6.2 grams, but I am not a great fan of these particular aircraft.

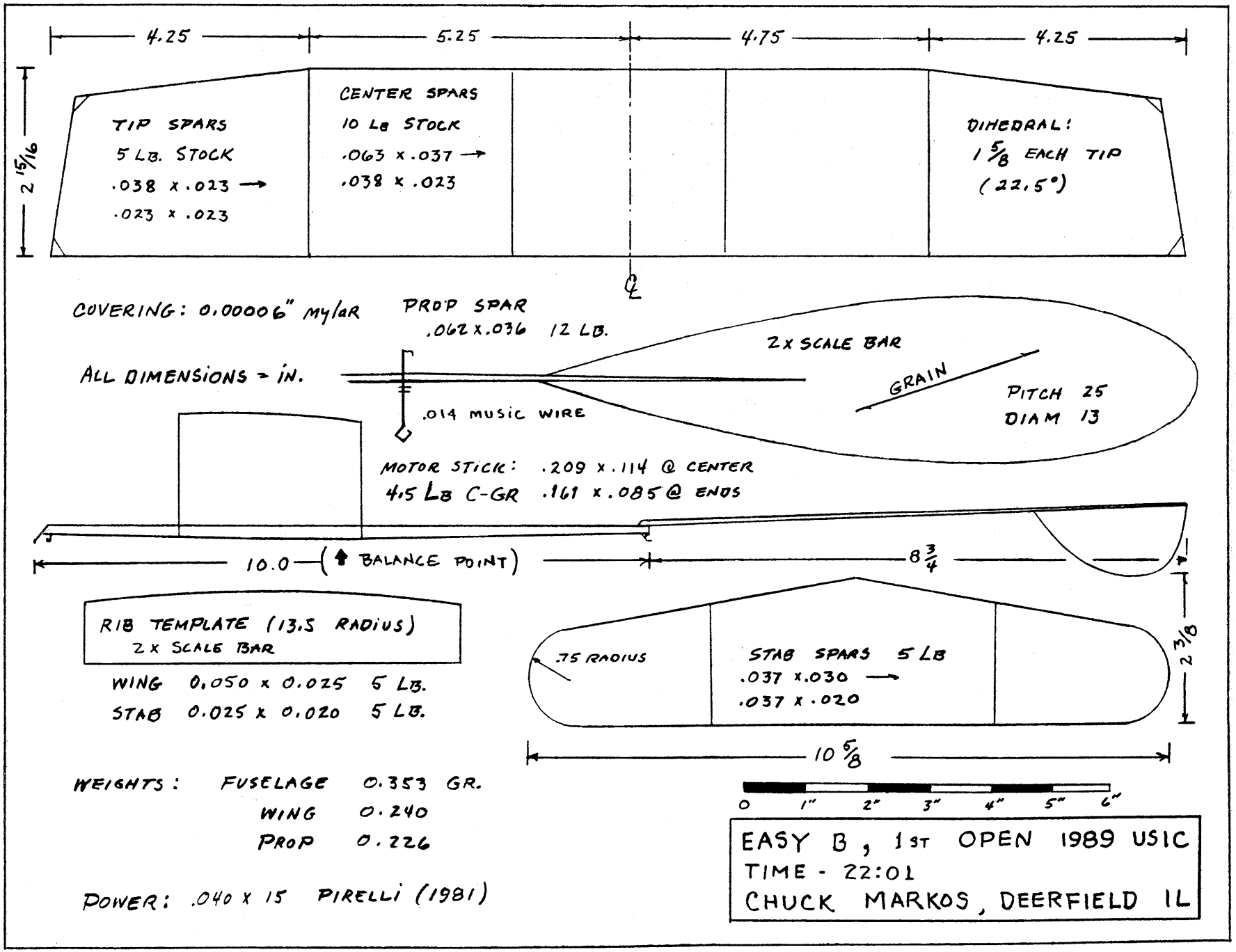
My first attempt at profile scale was a "Tipsy Junior" built from A. A. Lidberg's plans, but its best time was 2:25 under an 80' ceiling, and it was underweight. In an attempt to gain wing area, I built a "Farman Carte Postale" for the 1988 USIC, but it turned out to be difficult to trim and had divergent stability problems; i.e., the same trim gave a stall on one flight and a nose-dive on the next.

As always, time was running short, and by the beginning of May 89 I had to make a decision. At this point, I came across Don DeLoach's plans for the "Farman F190" in Flying Aces News. Two things appealed to me; a longer moment arm and a slightly larger wing. It looked simple to build, and in fact, only took one week of evenings to complete. With necessary nose weight for stable flight, it weighed 6.4 grams.

First flights in a 46' ceiling gave better times than the "Tipsy Junior" had under 80' ceilings. It had a natural turn to the right, but forcing it into a left circle produced a very erratic flight pattern. At Johnson City it was flown to the right and turned in several three-minute flights before producing a 3:40, which was good enough for 3d place.

The only differences between my version and Don's original are a reinforced fuselage at the hand launch grip area, a longer fin strake, the prop hanger and rear hook on the left side of the model, and the addition of the registration letters for the second aircraft in the Farman F190 series. I have used an adjustable pitch prop assembly that I developed for use on heavier indoor duration models such as 6.2 gram No-Cal and 7 gram Bostonians. It has proved to be able to withstand constant rafter banging without blade damage or unwanted change of pitch, yet pitch can be easily changed by softening the white glue seal with water. After resetting the pitch, the seal must be renewed with a fresh bead of white glue.




4.25
5.25
4.75
4.25
2 15/16
TIP SPARS
5 LB. STOCK
.038 x .023 →
.023 x .023
CENTER SPARS
10 LB STOCK
.063 x .037 →
.038 x .023
DIHEDRAL:
1 5/8 EACH TIP
(22.5°)
COVERING: 0.00006" mylar
PROP SPAR
.062 x .036 12 LB.
ALL DIMENSIONS = IN.
2x SCALE BAR
GRAIN
PITCH 25
DIAM 13
.014 MUSIC WIRE
MOTOR STICK: .209 x .114 @ CENTER
4.5 LB C-GR .161 x .085 @ ENDS
10.0
BALANCE POINT
8 3/4
RIB TEMPLATE (13.5 RADIUS)
2x SCALE BAR
WING 0.050 x 0.025 5 LB.
STAB 0.025 x 0.020 5 LB.
.75 RADIUS
STAB SPARS 5 LB
.037 x .030 →
.037 x .020
2 3/8
10 5/8
0 1" 2" 3" 4" 5" 6"
WEIGHTS: FUSELAGE 0.353 GR.
WING 0.240
PROP 0.226
POWER: .040 x 15 PIRELLI (1981)
EASY B, 1ST OPEN 1989 USIC
TIME - 22:01
CHUCK MARKOS, DEERFIELD IL

The challenge of Easy B is to make a model lightweight enough to be competitive, yet rugged enough to withstand the stress of flying. My approach to solving the problems of this challenge is to construct a relatively rigid model, with attention paid to pretesting the structural members so that an acceptable margin of strength can be obtained without overbuilding. Of course, to set these margins, you must find them by flying and then make decisions on what works and what doesn't work. An added bonus of a rigid model is that it can be brought up to competition trim with only a short period of testing.

This model was first built in 1988 and flown to a respectable 20:02 at that USIC before the motor stick broke. A stronger motor stick was the only change for 1989. The only flying of this Easy B was at these two USIC's, since we currently have no indoor site in Chicago. The design has been refined during about eight years of contest flying, starting with paper-covered models, one of which was used to set a Category II record of 16:30 at the Lincoln, NE Nats in 1987.

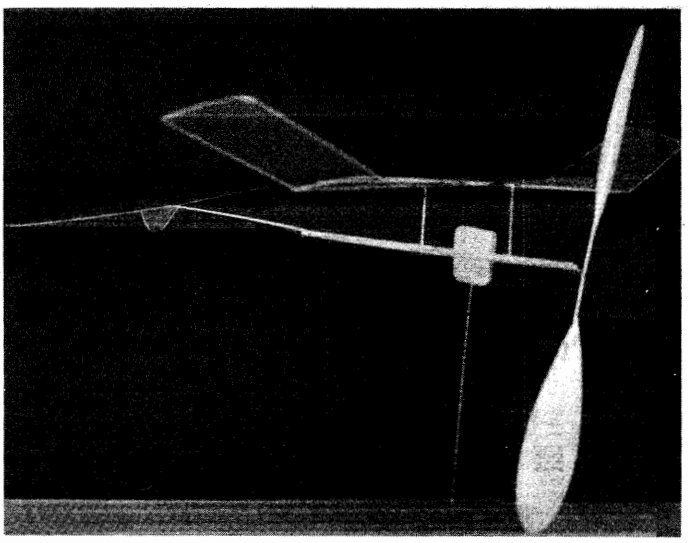
PROPELLER: A symmetrical blade shape is used to avoid the propeller stall which can occur with a flaring unsymmetrical shape. Since this model was intended to be flown in relatively high ceilings, controlling altitude by use of a flaring propeller was not an important consideration. But controlling the model under a high torque condition at the launch is very important. The blade grain is at a slight bias to the spar axis so that the blade does not separate from the spar when "abnormal" situations, such as hang-ups, occur. A pitch block is used to form the blades. The process I use is to soak the blades and lay up a "sandwich" in the following sequence: 3/32 balsa - tissue - blade - tissue - blade - tissue - 3/32 balsa. Bind sandwich to the pitch form and bake at 200 ^{0}. (The 3/32 balsa cut to blade shape, but slightly larger, may be preformed on the pitch block.) This technique allows (a) the blades to be formed to the desired twist; (b) easy release from the pitch form; (c) mark-free blades when bound with rubber; (d) addition of color to the blades by the use of colored tissue; and (e) a way to hold the blades for final sanding without distortion. The propeller blades were cut from 0.020" 5-lb. BC-grain - the only piece of "indoor" wood used in construction. The blanks were sanded to about 0.010" at the tips.

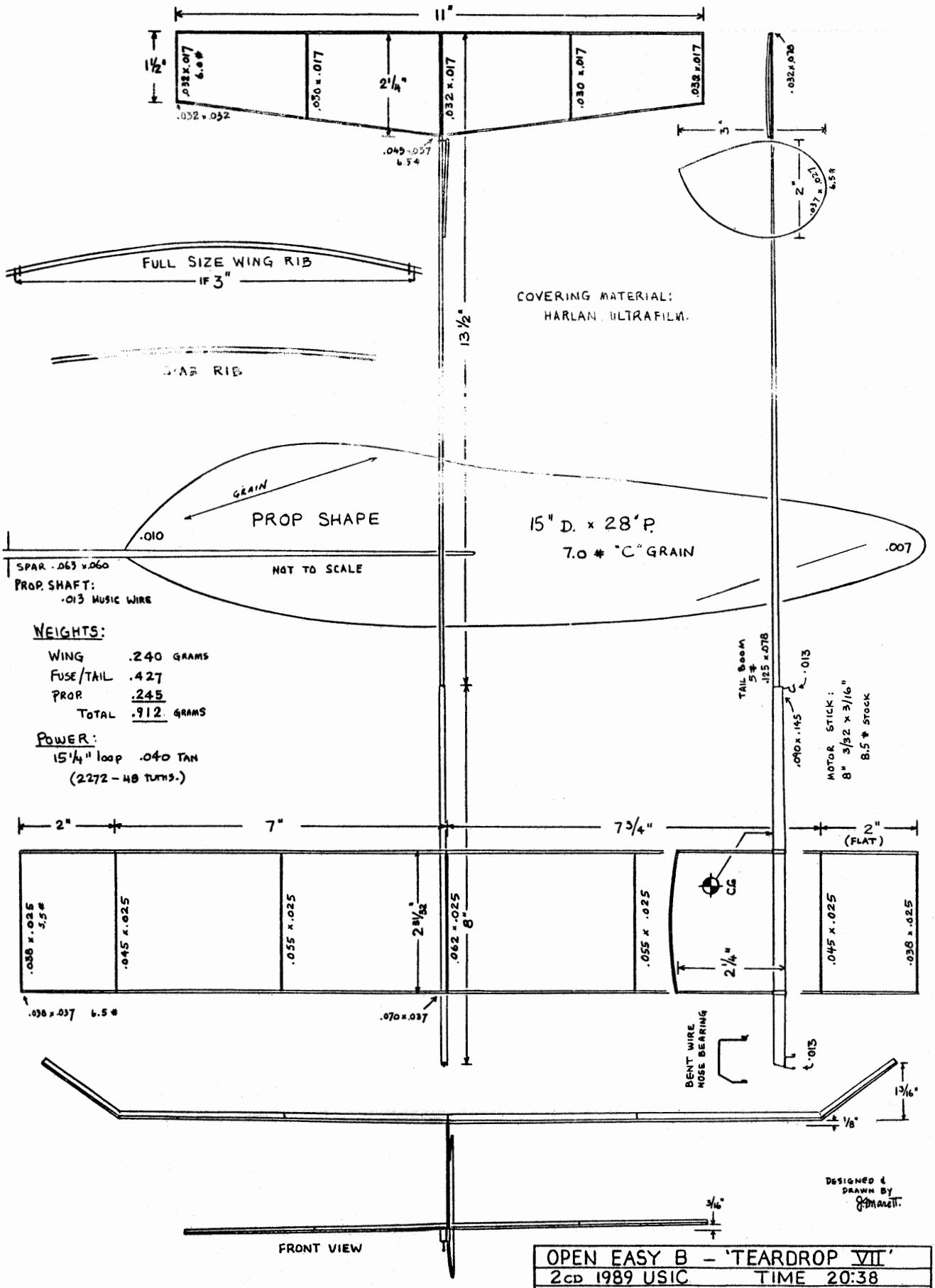
MOTOR STICK: Use C-grain 1/8 sheet balsa. Hold the sheet up to a 100-watt light bulb to find the clearest, whitest section. Cut the blank 1/8 x 1/4 x 10" and weigh it. A weight of 0.040 grams per inch of length indicates a density of about 5 lb./cu. ft. Check the sideways deflection of the blank by supporting each end at a distance of 9" and placing a 50 gram weight in the center. If the deflection is greater than 1/4", find a new piece of wood. When tapered to final shape, the deflection should be no more than 1/2" when tested as above.

WING: Super light wing spars caused most of my problems with earlier Easy B's, as these models were unable to bump ceiling obstacles and recover flying attitude. Too often, the model would do a death-dive with the wing tucked under. A secondary problem was controlling the launch under high torque conditions; the tips tended to tuck under and a wasteful low-altitude burnoff of stored energy resulted. Quite hard main spars were necessary: 10 lb. for the 800 mg model, 12 lb for the 1 gram paper model. Other adjustments in the wing are tip wash-in (contrary to outdoor trim) to make the launch more manageable and wash-out in the inner main panel to counteract motor stick twist transmitted through the wing posts.

COVERING: I use 0.06 mil mylar attached with thinned contact cement. I thin with toluene, but Hobby-Poxy paint thinner works and is available at hobby shops. Give the structure a very light coat of thinned cement with a brush. Lay the structure with dried adhesive on the mylar and allow thinner to bleed between the film and structure to activate the adhesive. Experiment on scraps to see how much to thin the cement.

FLYING: Use the minimum rubber necessary to get the turns required to obtain the target duration. After each flight, count the turns left in the motor and calculate rpm's. For making test flights, I use half motors with a equally-weighted connector for the other half of the length. Next, adjust stab tilt so that the inboard half of the stab is higher than the outboard half under high torque conditions. Also, wash-in the inboard side to keep it from tucking under during the launch.





OPEN EASY B – 'TEARDROP VII'	
2cd 1989 USIC	TIME 20:38
JOHN F. MARETT	DON MILLS ONT. CANADA

EASY B 2nd PLACE 1989 USIC 20:38
JOHN MARETT, Bramton, Ontario, Canada

"Teardrop III" is the 7th of a string of Easy B's begun originally in 1986 for my first USIC at Niagara Falls. There I met Jerry Nolin and was able to observe, time and discuss his record-setting Easy B design, "Serendipity!" The most important thing I remember, however, was confirmation in my own mind that weight, although a major factor, was not as important as having all the components of the aircraft working in balance.

In 1988, with "Teardrop III", now covered with Harlan Ultrafilm and weighing 1.25 grams, my top time at Tennessee improved to 15:55. But again, more important was the fact that I met Ray Harlan and bought his gram beam balance scale.

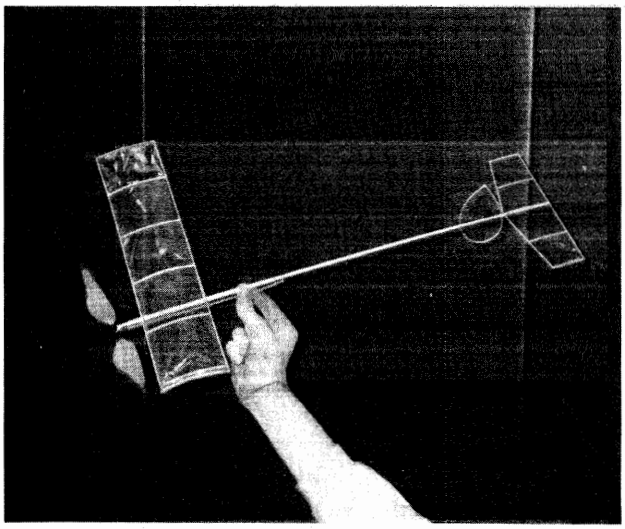
So in March of 1989, recalling an earlier stated goal to build an EZB under a gram, I finally put my Harlan scale together. Using a drawing of Jack McGillivray's .76 gram EZB published in our M.A.A.C magazine (Canadian equivalent of AMA) to check comparative component weights, I proceeded with "Teardrop IV". I knew I had no really light indoor wood, and so I set myself the goal of not more than 25% heavier than any of Jack's components. I decided to use the heavier wood but try to go thinner with selective pieces. The first major weight saving came with the 8" motor stick. I also needed a longer tail boom, but then reduced the stab size, and this combination ended up only 12.5% heavier than Jack's.

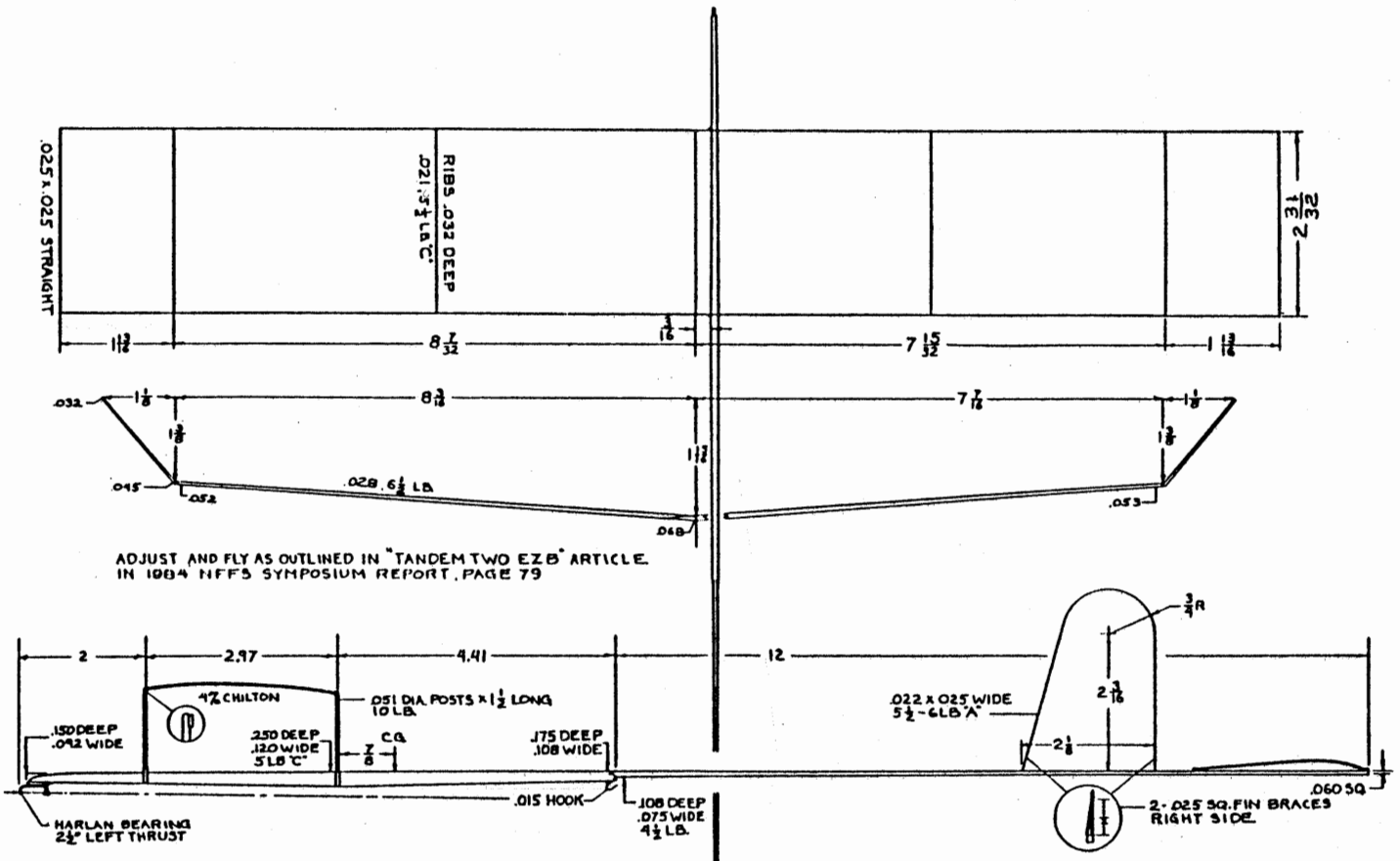
The propellers were made from SIG "C" grain 1/32 sheet about 7# stock, carefully sanded down, cleaning out the sandpaper frequently and checking my thicknesses as I went. Two props were built, one slightly lighter, with less flare area than the one flown. The unusual shape is something I've been working on with Intermediate Stick for some time and wanted to try in EZB. Not being strong on theory, I have no proof of any advantage, but I like to think it works for me.

A la Nolin, "Teardrop IV" has no wing bracing, and during its first test flights, because of the forward wing position and little or no incidence, tended to tuck badly if it was allowed to speed up. So after 6 test flights, she went into the box for high ceiling.

Six weeks later in Tennessee, the plan was simple. Keep the model's nose up and don't hit the girders! Two test flights showed no trim adjustments were required, so the ship was launched nose very high to keep it away from the high speed mode. It climbed away without hesitation, as if on a rail. Unfortunately, the first official somehow hung on the rope holding the sandbag. It came loose after about 5 seconds, but came straight down, going through two tuck sessions, recovering at about 80' and finishing at 18:41.

I used a slightly longer motor for subsequent flights, none of which touched the beams, but the 2nd official had the inevitable knot bunch up at the prop, causing a vertical descent from about 70'. The third go was clean, but I had taken off too many torque turns and she didn't get over 100' for 18:36. The 4th official turned the 20:38. It was smooth to within about 1 foot of the 106' beams, with a very large circle throughout. It landed with a minimum of useful turns left.



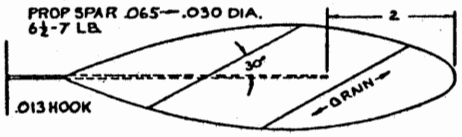


SERENDIPITY!

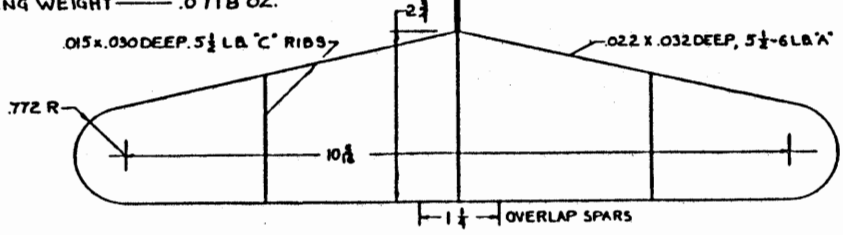
RECORD BREAKING EZB
23 MIN. 25 SEC. 30 AUG 86
G.R. NOLIN FAIRBORN, OH

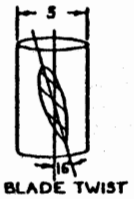
WEIGHTS:

WING W/POSTS	.0134
FUSE + TAIL	.0182
PROP	.0082
AIRFRAME	.0398
MOTOR (2225-25)	.0320 17" OF .040 PIRELLI
FLYING WEIGHT	.0718 OZ.



14 D-28 P PROP
3¾ TO 5½ LB. .009 "C" BLADES
45° STATION AT 4.46" RADIUS





BLADE TWIST

EASY B 1st PLACE 1987 USIC 18:40 G. R. (JERRY) NOLIN. Fairborn, OH

In the spring of 1982, I caught Easy B fever. It took a series of ten models, built and flown over a four-year period, for me to get up to a competitive level. The progress was logarithmic. After three years of grudging progress, I came up with a model that seemed without limits. It outflew my expectations. When trying for 15:00, I'd get 16:50; for 18:00, I'd get 20:00. I called it "Serendipity!", which is somewhat synonymous with "blind luck", but my "Serendipity!" wasn't really all that lucky. Here's how it happened:

A. I test glided my first EZB, ballasted, without the prop or motor. It looked awful! The left rudder was fighting the right offset and the built-in right wing wash, causing a sick-looking side-slip. The EZB glided much better with everything straight.

B. I glided my straightened "Paper Swiss" (Dick Hardcastle, NFFS SYMPO 1984 p 55), which had the CG 1/2" behind the wing. It glided even better, if you could launch it into the exact "slot" it seemed to prefer. A reverse airfoil in the stab made it much easier to launch correctly.

C. I checked out Stan Chilton's plans for his "Sweet 16" (SYMPO 1983) and his "Honey B" (El Torbellino.) Stan used wing tip washin (more dihedral in the front spar) and set the wing on the posts with a slight positive incidence on the right side. Both measures keep the right wing from "digging in" under full power. My new ship crab/stalled at 50% turns, nevertheless.

Crabbing-stalling is caused by insufficient left wing lift to offset the torque of a well-wound rubber motor. The left wing sags down, the circle opens and the model stalls, recovers, and stalls again until the torque drops down to a sustainable level.

D. I then read Bernard Hunt's article (SYMPO 1984) on controlling torque by weakening an overstrength motor stick, torsionally, between the wing posts. This procedure increases the wing twist and skew to match and offset the motor torque.

E. I noticed that more left wing lift could be obtained by gradually weakening the left front spar to cause increased left wing "flare" at high power. C, D and E, combined, WORKED! All of these tips resulted in a model which twisted properly for torque control in proportion to need, and then gradually returned to "aerodynamically straight" as the torque ran down. Easy high-torque, low-drag flying was the result.

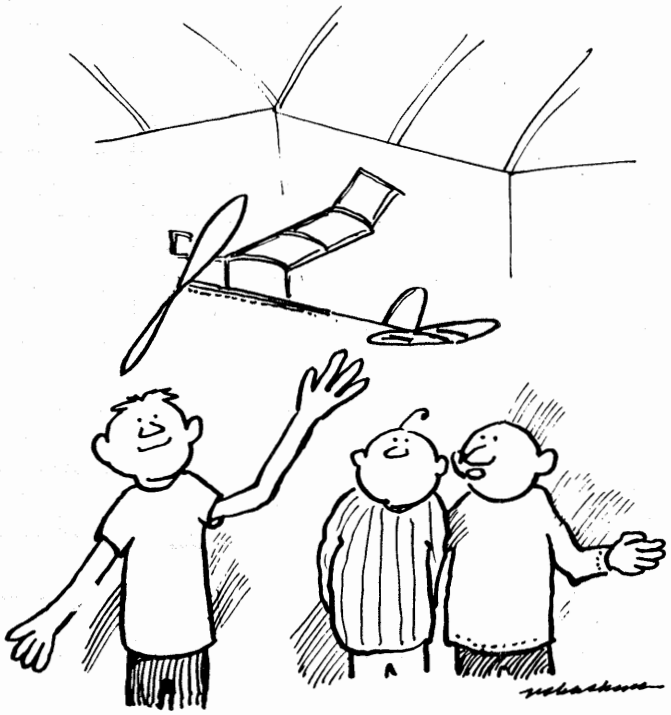
F. Next I tried Bernard Hunt's stiff, twelve-inch tail boom, which put the CG 7/8" behind the wing. This seemed to cause an increase in performance, which permitted me to use a longer, thinner motor and a larger, higher-pitched prop.

All of these features resulted in a model that really FLEW! It broke the Cat IV record three times in 1986, ending with a 23:25 flight, won the USIC twice, and was designated Indoor Model of the Year 1987.

The "fever" finally cooled. Development stalled at the 1986 level, but "Serendipity!" is still an excellent mid-skill ship which can be very competitive when covered with Ray Harlan's Ultrafilm (use less camber in the new stab). The motor, stick and prop should be lightened accordingly, but don't overdo it! Try a 13 or 13 1/2" dia. x 27" pitch prop using FAI Tan rubber.

A full construction/flying article was published in the Jan 1988 issue of Model Aviation. MA offers a full-size plan which includes flying instructions. Try it! You'll like it!

Model Aviation c/o AMA, 1810 Samuel Morse Dr., Reston, VA 22090. Plan no. 578. They charge $3.25 for the plan.



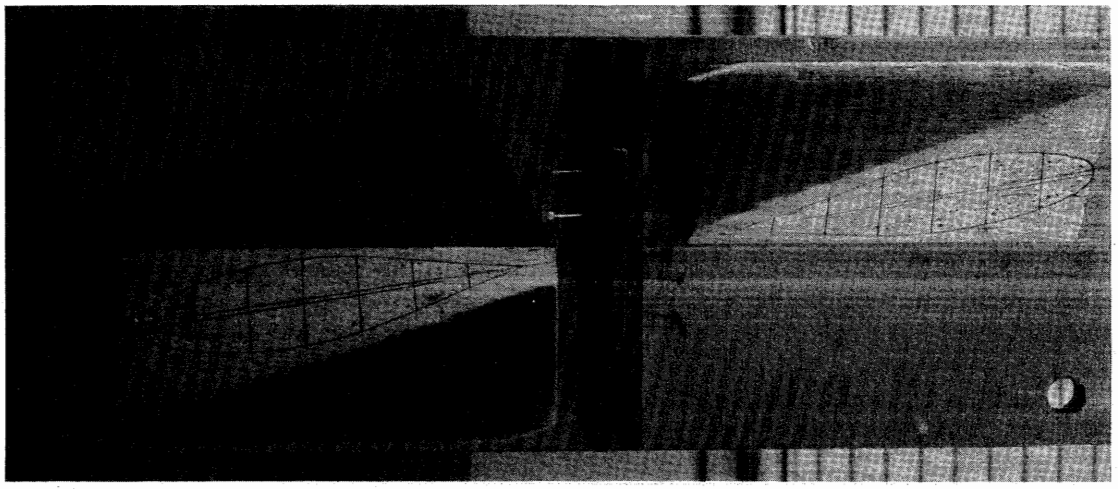
"It looks deceptively simple...."

A METHOD OF MAKING LIGHT EASY B PROPS

by Earl Hoffman

As shown in the accompanying photograph, the prop is built on a double-block helical jig. If you want to save time, a single-block jig will serve the purpose just as well. Various methods of making a helical block are shown on pages 75 & 76 of Ron Williams's great book, Building and Flying Indoor Model Airplanes. I like solid balsa blocks because I can nail cardboard patterns to them.

You are now ready to proceed. The prop blade outline and rib positions can be plotted on a piece of card-board. Cut out the pattern and nail it to the block with 1/2" nails. Draw the outline on the block and also locate the ends of the rib positions. Do not remove the cardboard pattern yet. I make the outline from .020" x .020" 4.5 to 5.0 lb. balsa. Soak the strips in hot water for 10 or 15 minutes and then bend one around the cardboard pattern. Try keeping the strip taut as you carefully pull it around the pattern. As you go around, pin soft balsa blocks 1/8" x 3/8" x 3/8" every inch or so to hold the outline in place. It may require some practice to avoid breaking the thin wood, but keep trying, and you'll get the hang of it. Heat the jig in an oven set at about 225 ^{0}for 20 to 25 minutes. After you get two good outlines, you can remove the cardboard pattern.

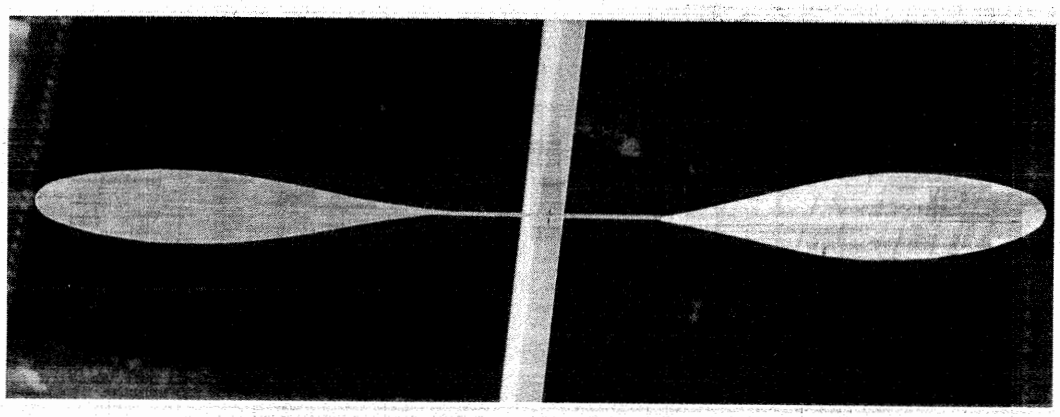


Jig with outline and rib positions drawn and cardboard templates removed.
Jig is ready to assemble prop. Note 'sliders' to hold shaft vertical.

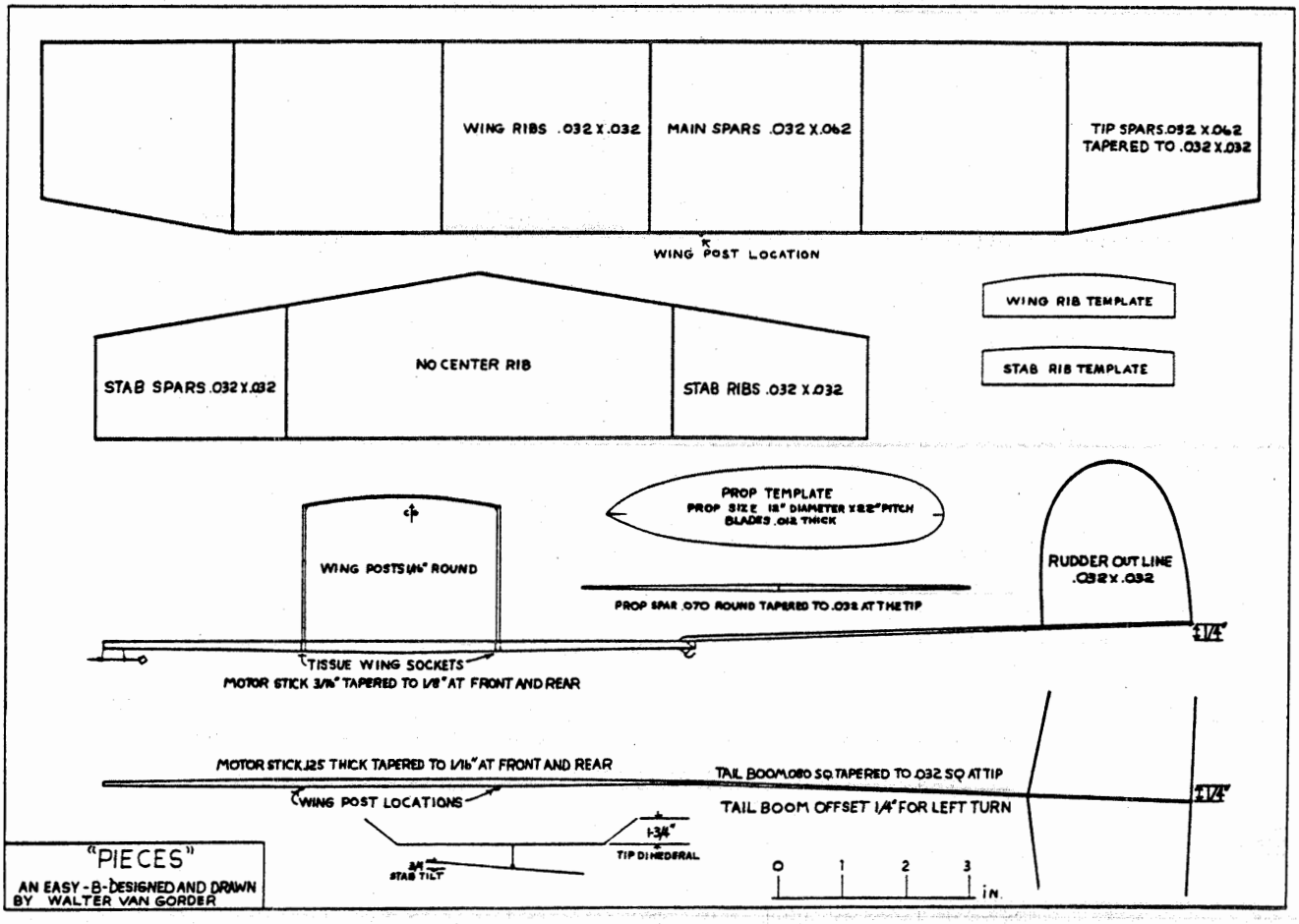
The prop spar, which extends for the full diameter of the prop, is made in two identical halves which are later spliced together. It is fabricated from 5.0 lb. balsa, tapering from .058" high x .054" wide at the hub to .028" wide x .026" wide at the tips. Before splicing the two halves together and gluing in the .012 music wire shaft, check the two pieces to make sure that they deflect the same amount. Weight down the two halves side by side so that the spars extend out from the edge of the table. Hang identical weights out near the tips and note the amount that each half - bends - small pieces of paper clip, for example. They should deflect equally, or the prop will wobble even though it may be statically balanced. The two halves of the spar can now be glued together and the music wire shaft glued in. I use CA glue for this.

When fastening the spar and wire shaft in the jig, hold the shaft absolutely vertical with small 1/4" x 3/4" pieces of masking tape. The ribs can now be cut and glued to the spar. Make them .022" high x .020" wide from 4.0 to 4.5 lb. wood. The formed outline can now be glued in place, with small bits of waxed paper, about 5/16" square, under each rib to prevent the ribs and outline from adhering to the jig. Leave the entire framework on the jig for at least 24 hours to allow the glue to set. Be very careful when removing the masking tape, or you will break the spar.

The prop should now be ready for covering. Look for the lightest piece of fine "A" grain balsa you can find. It can be almost any thickness over 1/32. First cut a piece about 7/8" wide and about 12" long, wide enough to overlap each rib. Glue the wood to a flat surface, such as plate glass, with rubber cement. Then glue a piece of No. 500 or 600 sandpaper to a flat wood, steel or aluminum block with rounded edges. Holding the block very steady, so as not to round off the surface, sand the surface of the balsa flat and smooth. With a razor plane and a new sharp blade, carefully shave off a slice. Hold the plane at about a 30^{0} angle to the direction of motion - it will slice the wood better. Try to shave off slices about .003" to .004" thick.* Sand the sheet flat and smooth before each razor plane cut. The shavings will curl up, but they can be ironed flat. The prop is covered with the grain running chordwise. As indicated above, the wood should be wide enough to overlap each rib. I have found that thinned Titebond glue works well for gluing the thin balsa to the prop framework.

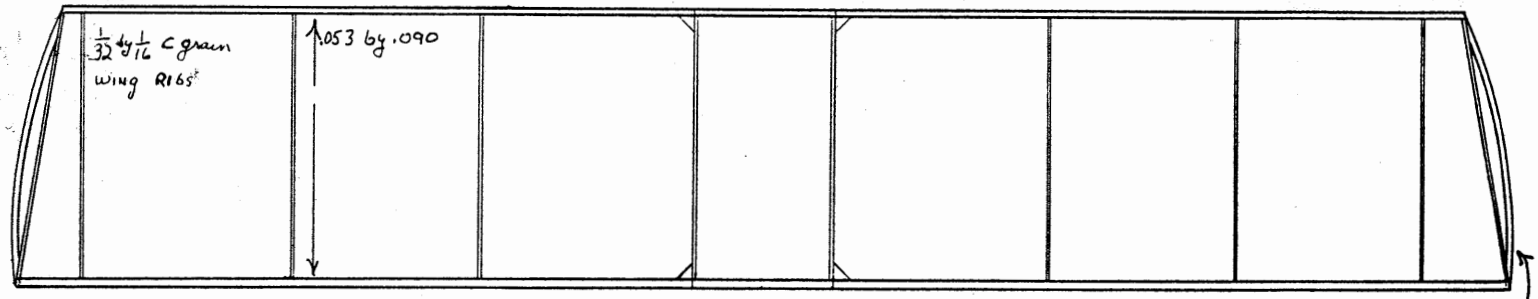


Finished propeller - 13-1/2" diameter x 28" pitch. Weight = .0059 oz.

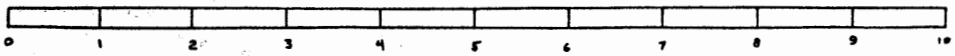


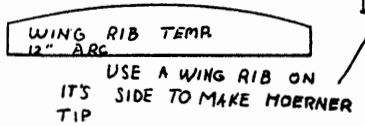
EASY B 3d PLACE 1989 USIC 20:38 WALTER VAN GORDER, Cincinnati, OH

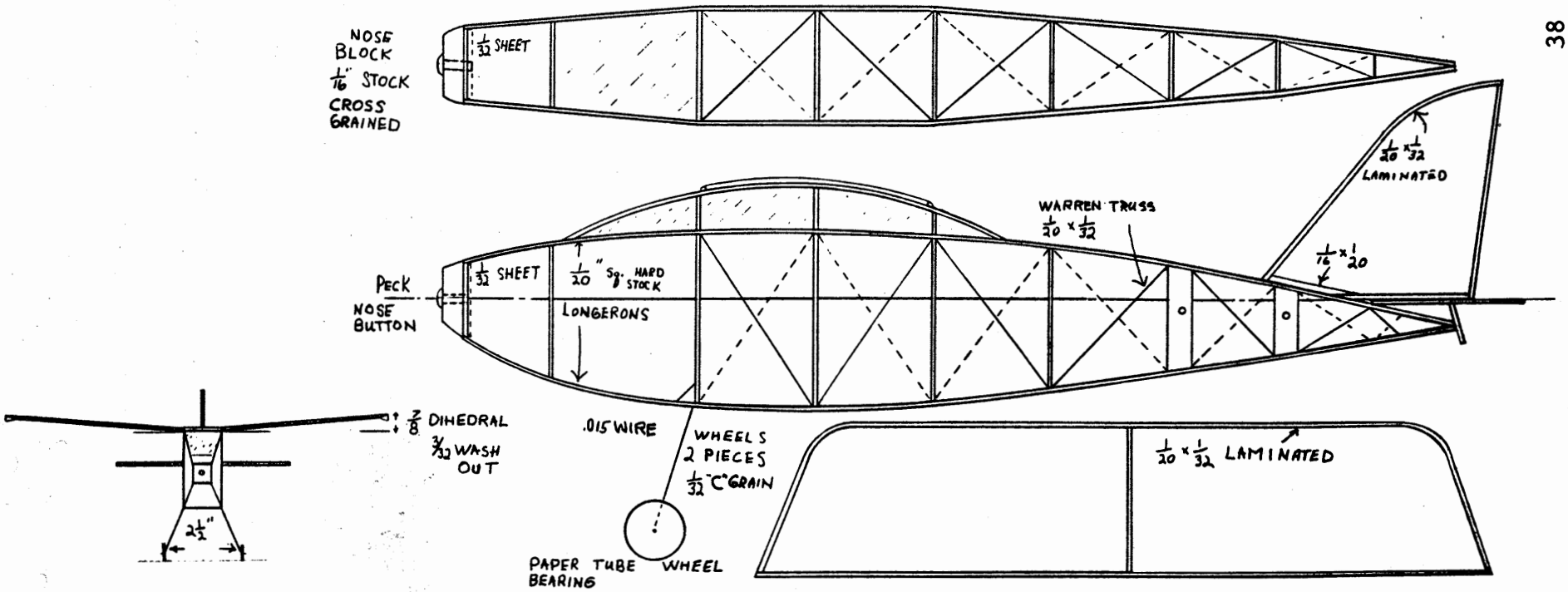
Walt's Easy B "Pieces" has been a contest winner for quite a while. It won the 1988 Nationals, and it holds the AMA Easy B CAT III endurance record at 22:06. A full construction/flying article was published in the Jan. 1982 issue of Model Aviation. A full-size plan, No. 358, "PIECES" can be had for $1.00 from Model Aviation c/o AMA, 1810 Samuel Morse Drive, Reston, VA 22090. It is one of the easier Easy B's to build and fly, but is a great performer too.



7 GRAM "MILLER LIGHT"		
1ST 1988-1989 USIC	BEST TIME	3:38
RICHARD MILLER	ANGOLA, N.Y.	







BOSTONIAN 1st PLACE 1988,1989 USIC 427.28 & 501.5 pts.
RICHARD MILLER, Angola, NY

I have made about six Bostonians. The first three were other modelers' designs, but the last three have been of my own design, with verbal help from my Canadian friends. My idea was to have a model that looked good and had smooth, flowing lines.

I use sliced ribs with a 12" arc for the wing ribs, and the same rib shape on its side for part of the Hoerner tips. The longerons are 1/20 hard stock. Four to six pound stock is used for the rest of the model. I decided on a Warren truss for a more rigid fuselage. The diagonals are 1/20" x 1/32". To keep the tail light, the curved parts are laminated around a cardboard form. The only rib used on the tail is one rib in the center of the stab.

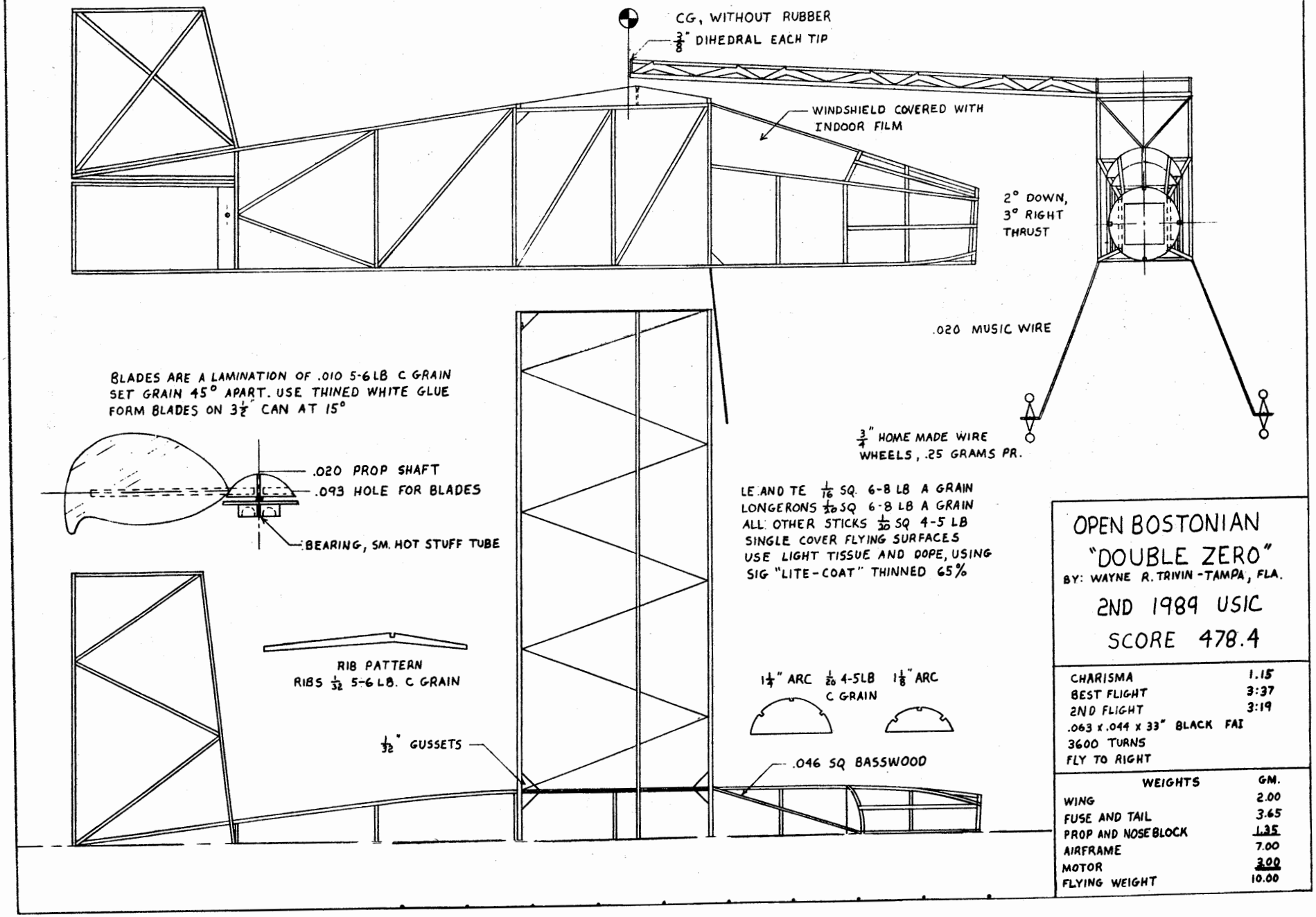
The lightest Japanese tissue is used for the covering, doping only the fuselage. The paper on the wing, stab and rudder is pre-shrunk on a wooden frame. I use masking tape to hold the paper on the frame while sprinkling it 3 or 4 times with water.

The landing gear is only .015 wire, but adding Japanese tissue gives it stiffness and improves the looks of the model.

The 6" diameter, 8" pitch prop is carved from a block of basswood. This wood can be carved very thin and still be strong.

The "Miller Light" used a 36 1/2" loop of March 1986 Champion rubber, .091 wide, with 3200 turns on the 3:38 flight.





OPEN BOSTONIAN "DOUBLE ZERO"

BY: WAYNE R. TRIVIN - TAMPA, FLA.

2ND 1989 USIC

SCORE 478.4

CHARISMA	1.15
BEST FLIGHT	3:37
2ND FLIGHT	3:19
.063 x .044 x 33" BLACK FAI	
3600 TURNS	
FLY TO RIGHT	

WEIGHTS	GM.
WING	2.00
FUSE AND TAIL	3.65
PROP AND NOSE BLOCK	1.35
AIRFRAME	7.00
MOTOR	3.00
FLYING WEIGHT	10.00

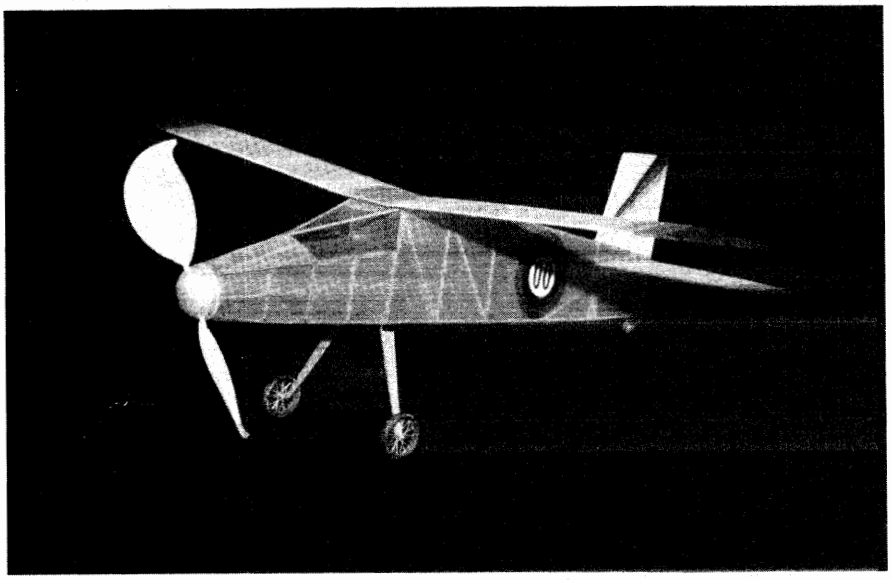
BOSTONIAN 2nd PLACE 1989 USIC 478.4 pts.
WAYNE TRIVIN, Tampa, FL

"Double Zero" was designed to compete in the 7 gram Bostonian class. To be competitive, it must be built as close to 7 grams as possible. My experience has been that 1 gram of extra weight equals about 15 seconds of flying time. Therefore, pick your wood carefully and use the suggested weights as indicated on the plans.

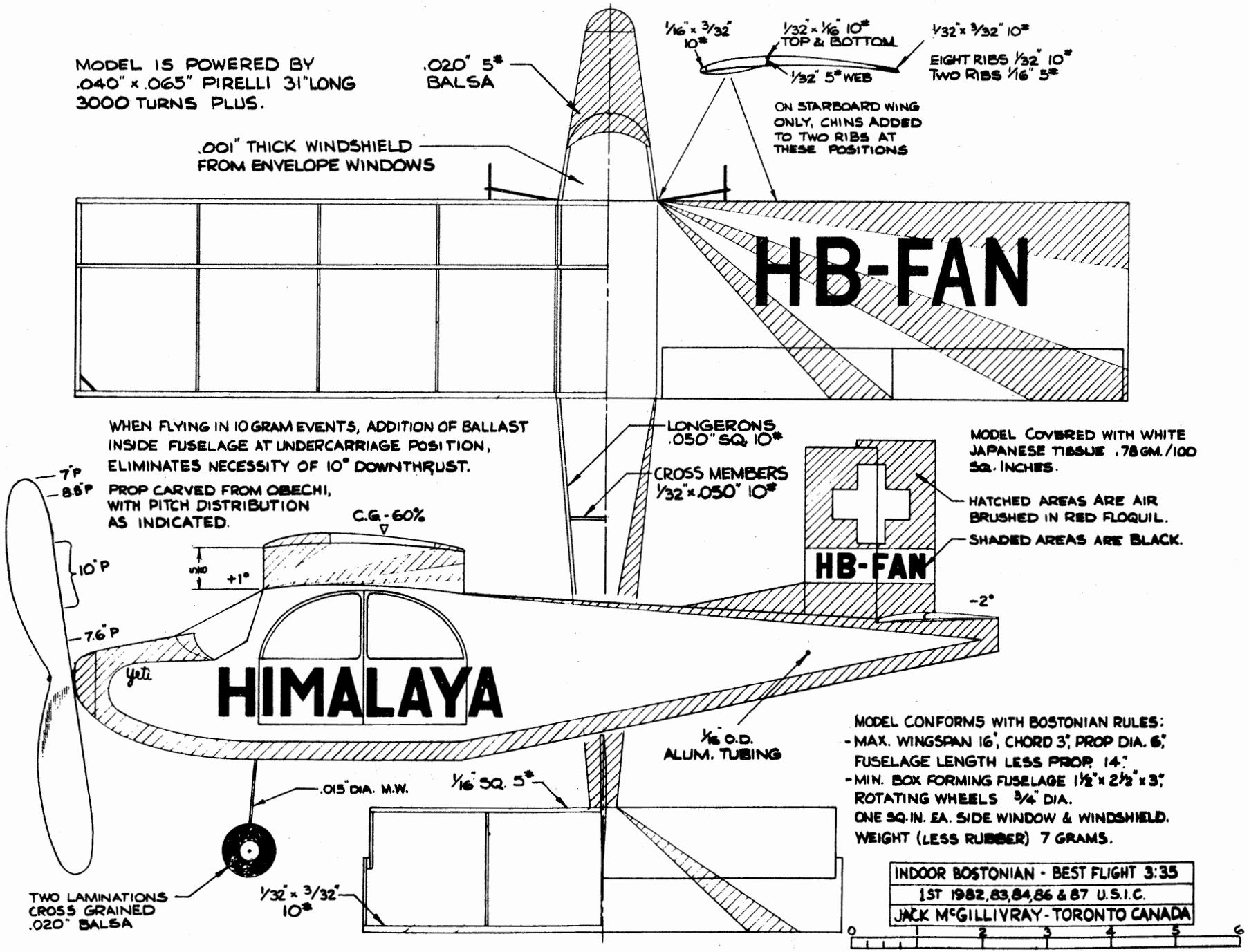
The most important area, and also the hardest to keep light, is the propeller and nose block. I've tried using plastic cup blades and sanding them down to almost nothing, but I still find that nothing tops balsa for lightness. To keep balsa from splitting, I cross-laminate two layers of .010 balsa with the grain at 45 degrees. This method provides sturdier blades that keep their shape. The blades are glued to thinned basswood dowels and inserted in the spinner. However, I do not glue them to the spinner until after the first test flights so that I can achieve the best power (rubber) and pitch combination possible. Then I only glue them lightly with white glue so that changes can be made easily.

The fuselage construction is straightforward; however, the wing is unique. I have been using the diamond-shaped airfoil on my Bostonians and Embryos for some time now, and with great success. I'm not one to explain the theories behind why something works or doesn't work. The only thing I want to do is to provide the airplane with enough lift and drag to make it perform the way I want it to perform.

To trim the model, wind with low turns and aim for a 12 to 15 foot circle, just barely flying to a stall. On full torque, the model should take off briskly to almost a stall and then continue to fly at a high angle of attack. Should it stall, increase right thrust until it flies out of the stall and continues upward. If your CG is in the right location, as indicated on the plans, the model should also fly well on the way down.






MODEL IS POWERED BY
.040" x .065" PIRELLI 31"LONG
3000 TURNS PLUS.
.020" 5* BALSA
.001" THICK WINDSHIELD FROM ENVELOPE WINDOWS
1/16" x 3/32" 10*
1/32" x 1/16" 10* TOP & BOTTOM
1/32" 5* WEB
1/32" x 3/32" 10*
EIGHT RIBS 1/32" 10*
TWO RIBS 1/16" 5*
ON STARBOARD WING ONLY, CHINS ADDED TO TWO RIBS AT THESE POSITIONS
HB-FAN
WHEN FLYING IN 10 GRAM EVENTS, ADDITION OF BALLAST INSIDE FUSELAGE AT UNDERCARRIAGE POSITION, ELIMINATES NECESSITY OF 10° DOWNTHRUST.
LONGERONS .050" SQ. 10*
CROSS MEMBERS 1/32" x .050" 10*
MODEL COVERED WITH WHITE JAPANESE TISSUE .78 GM./100 SQ. INCHES.
HATCHED AREAS ARE AIR BRUSHED IN RED FLOQUIL.
SHADED AREAS ARE BLACK.
7"P
8.6"P
PROP CARVED FROM OBECHI, WITH PITCH DISTRIBUTION AS INDICATED.
C.G. - 60%
10"P
7.6"P
+1°
-2°
HB-FAN
Yeti
HIMALAYA
1/16" O.D. ALUM. TUBING
.015" DIA. M.W.
1/16" SQ. 5*
TWO LAMINATIONS CROSS GRAINED .020" BALSA
1/32" x 3/32" 10*
MODEL CONFORMS WITH BOSTONIAN RULES:
- MAX. WINGSPAN 16", CHORD 3", PROP DIA. 6", FUSELAGE LENGTH LESS PROP. 14".
- MIN. BOX FORMING FUSELAGE 1½" x 2½" x 3", ROTATING WHEELS ¾" DIA.
ONE SQ. IN. EA. SIDE WINDOW & WINDSHIELD.
WEIGHT (LESS RUBBER) 7 GRAMS.
INDOOR BOSTONIAN - BEST FLIGHT 3:35
1ST 1982, 83, 84, 86 & 87 U.S.I.C.
JACK McGILLIVRAY - TORONTO CANADA
0 1 2 3 4 5 6

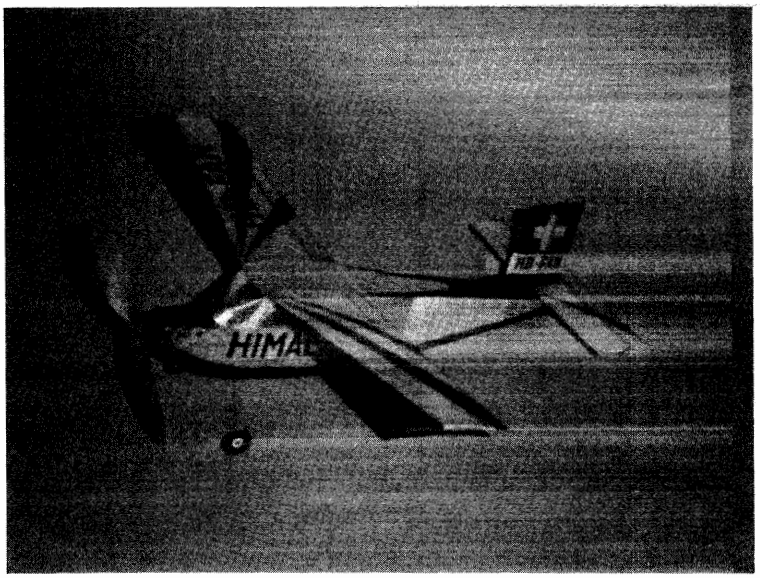
BOSTONIAN 1st PLACE 1987 USIC 441 pts.
JACK McGILLIVRAY, Toronto, Ontario, Canada

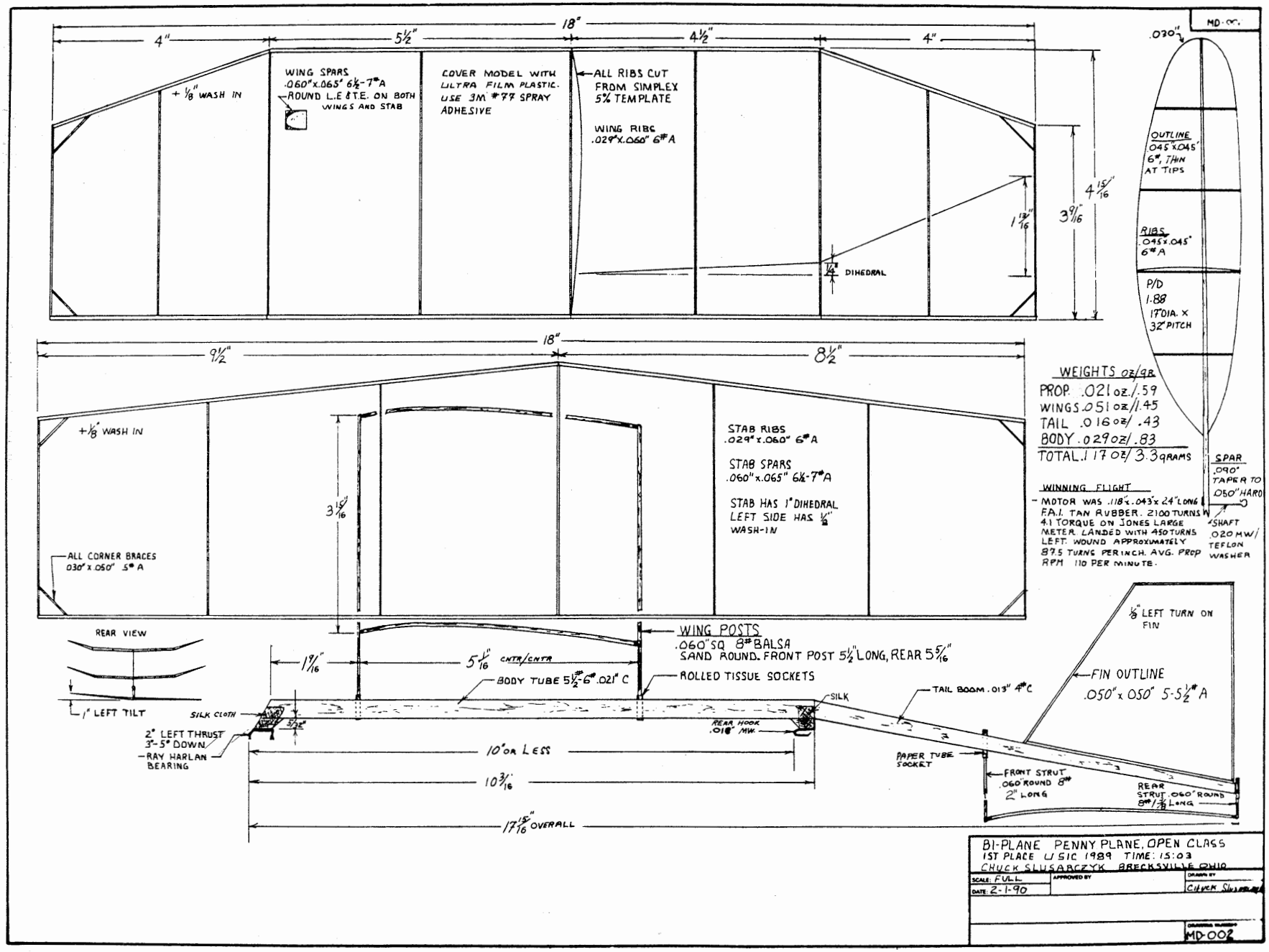
A unique feature of the Bostonian class is the use of a Charisma Factor. Each model is given a Factor from 1 to 1.2, depending on its appeal to the contest director. This figure is multiplied by the flight score. While endurance is the primary goal, model uniqueness, neat construction and scale-like detail cannot be ignored, if high placing is the modeler's objective.

For endurance, I chose to construct a high-wing monoplane, with rectangular wing planform, to maximize wing area. These features would not seem to be the hallmark for a high Charisma Factor, so I patterned the model on a full-scale Pilatus Porter which had been used in a 1960 Swiss expedition into the Himalayas. Its fancy color scheme tended to distract attention from the wing's angular outlines. To preserve the model's low wing loading, it was necessary to maintain the minimum specified weight of seven grams. An airbrush was used for the light application of color. In addition, a little shading effect was added along the edges of the ailerons, elevator and rudder surfaces.

The airfoil section chosen is undercambered, with a relatively pointed leading edge. On a previous Peanut Scale model, I was quite surprised by the significant spiral effects of propwash. The possibility that airflow might separate from the bottom of the starboard wing leading edge prompted me to add a little chin to two ribs. The objective was to give the section a shape which would promote smooth flow around this corner and lower the drag. As shown, the prop, which I carved, has a non-helical pitch distribution, being washed out considerably at the tip and near the hub. This model does have an excellent cruise when trimmed out close to the stalling point. Perhaps this propeller is the reason.





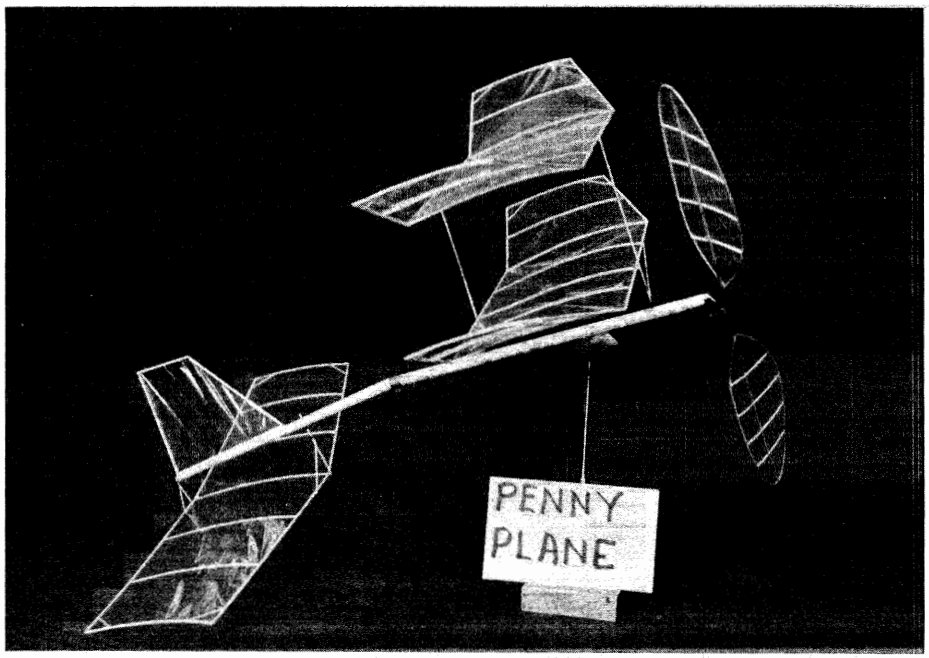

18"
4"
5½"
4½"
4"
+ ⅛" WASH IN
WING SPARS .060"x.065" 6½-7#A ROUND L.E & T.E. ON BOTH WINGS AND STAB
COVER MODEL WITH ULTRA FILM PLASTIC. USE 3M #77 SPRAY ADHESIVE
ALL RIBS CUT FROM SIMPLEX 5% TEMPLATE
WING RIBS .029"x.060" 6#A
1 13/16"
4 15/16"
3 9/16"
¼" DIHEDRAL
18"
9½"
8½"
+⅛" WASH IN
3 15/16"
ALL CORNER BRACES .030"x.050" 5#A
STAB RIBS .029"x.060" 6#A
STAB SPARS .060"x.065" 6½-7#A
STAB HAS 1° DIHEDRAL LEFT SIDE HAS ¼" WASH-IN
REAR VIEW
1" LEFT TILT
SILK CLOTH
2° LEFT THRUST 3°-5° DOWN
RAY HARLAN BEARING
1 9/16"
5 1/16" CNTR/CNTR
BODY TUBE 5½#-6#.021" C
WING POSTS .060" SQ 8# BALSA SAND ROUND. FRONT POST 5½" LONG, REAR 5 5/16"
ROLLED TISSUE SOCKETS
REAR HOOK .018" MW
SILK
TAIL BOOM .013" 4#C
PAPER TUBE SOCKET
10" OR LESS
10 3/16"
17 15/16" OVERALL
FRONT STRUT .060" ROUND 8# 2" LONG
REAR STRUT .060" ROUND 8# 7/8 LONG
⅛" LEFT TURN ON FIN
FIN OUTLINE .050" x 050" 5-5½#A
MD-00
.030"
OUTLINE .045"x.045" 6#, THIN AT TIPS
RIBS .045"x.045" 6#A
P/D 1.88 17"DIA. X 32" PITCH
SPAR .090" TAPER TO .050" HARD
SHAFT .020 MW/ TEFLON WASHER
WEIGHTS oz/gr
PROP .021 oz./.59
WINGS .051 oz/1.45
TAIL .016 oz/.43
BODY .029 oz/.83
TOTAL 1.17 oz/3.3 grams
WINNING FLIGHT
- MOTOR WAS .118"x.043"x 24" LONG F.A.I. TAN RUBBER. 2100 TURNS W 4:1 TORQUE ON JONES LARGE METER. LANDED WITH 450 TURNS LEFT. WOUND APPROXIMATELY 87.5 TURNS PER INCH. AVG. PROP RPM 110 PER MINUTE.
BI-PLANE PENNY PLANE, OPEN CLASS
1ST PLACE USIC 1989 TIME: 15:03
CHUCK SLUSARCZYK BRECKSVILLE OHIO
SCALE: FULL
DATE 2-1-90
APPROVED BY
DRAWN BY CHUCK SLUSARCZYK
MD-002

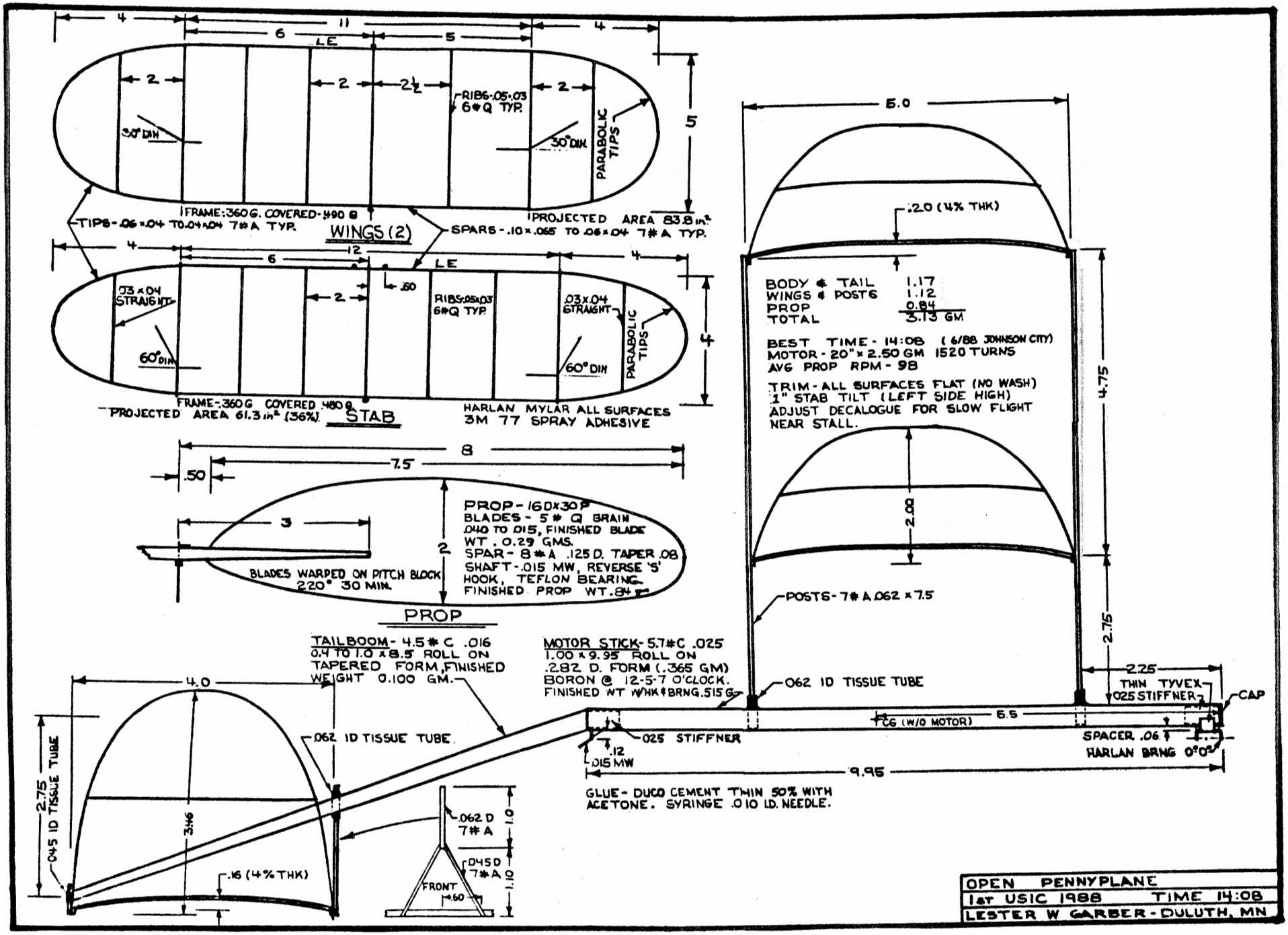
PENNYPLANE 1st PLACE 1989 USIC 15:05
CHUCK SLUSARCZYK, Brecksville, OH

I decided to build a biplane Pennyplane for the 1989 USIC at the urging of my son Don. He was flying a biplane design that was doing quite well. So using his templates, I built a model of his design. Since I had won NPP the year before, I had hoped to fly my NPP once or twice, get a good flight time, and spend the rest of the time trimming out the biplane. Needless to say, it didn't happen that way! The NPP was not performing, so I took a break from testing and tried the bipe. It flew right off the board. The first test flight was 11:36, using .118 x 21" Tan FAI and 1675 turns. Since the model was landing dead stick from about 50', I lengthened the motor 3", increased the number of turns, and slightly increased the torque. The next flight was the winning flight of 15:05. Average RPM was 110.

I'm finding that with the Tan FAI rubber, a prop with slightly larger diameter and slightly lower pitch works well for me. Rubber bunching on Pennyplanes can be a problem and has terminated a couple of good flights for me. It appears that a slightly larger amount of rubber lube keeps the FAI Tan from climbing on itself.

Construction is straightforward and uses two NPP wings with a rolled-tube fuselage and boom. Wood selection on a biplane is crucial because it uses more wood. Buy good wood when it's available, not when you need it. Balsa has bad years and good years, so buy plenty when it's good. I build with thinned-down Duco cement, but you can use Testors, Ambroid, or any of the indoor cements. Do not build with CyA glues, as they do not evaporate and can add substantial weight to a finished model. The only place I use CyA is on the prop bearing. Be sure to reinforce the prop bearing and hook with silk. A fully-wound Pennyplane motor can straighten out a weak hook or tear out a poorly-glued bearing. Most models need a little clay on the nose to achieve a proper CG, so build the model light and add some clay ballast where it's needed. Keep records, noting such things as wood weight and grain, weights of subassemblies, weights after covering, amount of dihedral, washout or washin, CG location, down and side thrust. Remember, more data is better than less. Don't be discouraged if the first one is not as light as you had hoped. Build two or three more, and you'll discover that just a little less glue and a little better wood can transform an average-flying model into a contest winner.




4
6
11
LE
5
4
2
2
2½
RIBS-.05x.03
6#Q TYP.
2
30° DIH
30° DIH
PARABOLIC TIPS
5
FRAME-.360 G. COVERED-.490 G
TIPS-.06x.04 TO.04x.04 7#A TYP.
WINGS (2)
PROJECTED AREA 83.8 in²
SPARS-.10x.065 TO .06x.04 7#A TYP.
4
12
6
LE
4
.60
.03x.04 STRAIGHT
2
RIBS-.05x.03 6#Q TYP
.03x.04 STRAIGHT
PARABOLIC TIPS
60° DIH
60° DIH
4
FRAME-.360 G COVERED .480 G
PROJECTED AREA 61.3 in² (36%)
STAB
HARLAN MYLAR ALL SURFACES
3M 77 SPRAY ADHESIVE
8
7.5
.50
3
2
PROP-16Dx30P
BLADES-5# Q GRAIN
.040 TO .015, FINISHED BLADE
WT. 0.29 GMS.
SPAR-8#A .125 D. TAPER .08
SHAFT-.015 MW, REVERSE 'S' HOOK, TEFLON BEARING
FINISHED PROP WT. .84 gm
BLADES WARPED ON PITCH BLOCK 220° 30 MIN.
PROP
5.0
.20 (4% THK)
BODY & TAIL 1.17
WINGS & POSTS 1.12
PROP 0.84
TOTAL 3.13 GM
BEST TIME - 14:08 (6/88 JOHNSON CITY)
MOTOR - 20" x 2.50 GM 1520 TURNS
AVG PROP RPM - 98
TRIM - ALL SURFACES FLAT (NO WASH)
1" STAB TILT (LEFT SIDE HIGH)
ADJUST DECALOGUE FOR SLOW FLIGHT NEAR STALL.
4.75
2.00
2.75
POSTS-7#A .062 x 7.5
TAILBOOM-4.5#C .016
0.4 TO 1.0 x 8.5 ROLL ON
TAPERED FORM, FINISHED
WEIGHT 0.100 GM.
MOTOR STICK-5.7#C .025
1.00 x 9.95 ROLL ON
.282 D. FORM (.365 GM)
BORON @ 12-5-7 O'CLOCK.
FINISHED WT W/HK & BRNG .515 G
.062 ID TISSUE TUBE
2.25
THIN TYVEX
.025 STIFFNER
CAP
4.0
.062 ID TISSUE TUBE
CG (W/O MOTOR)
5.5
.025 STIFFNER
SPACER .06
HARLAN BRNG 0°05'
.12
.015 MW
9.95
2.75
.045 ID TISSUE TUBE
3.46
.16 (4% THK)
.062 D 7#A
.045 D 7#A
1.0
1.10
FRONT
.60
GLUE-DUCO CEMENT THIN 50% WITH ACETONE. SYRINGE .010 I.D. NEEDLE.
OPEN PENNYPLANE
1st USIC 1988 TIME 14:08
LESTER W GARBER-DULUTH, MN

PENNYPLANE 1st PLACE 1988 USIC 14:08
LES GARBER, Duluth, MN

The design for this Pennyplane was strongly influenced by Kukon and Jaecks' designs in Ron Williams's book, Building and Flying Indoor Model Airplanes, and Doug McLean's article in the 1976 Sympo. McLean notes that a biplane Pennyplane should have a 30% performance advantage over the best monoplane designs. His predictions have proven to be true, as all Pennyplane records are now held by biplanes.

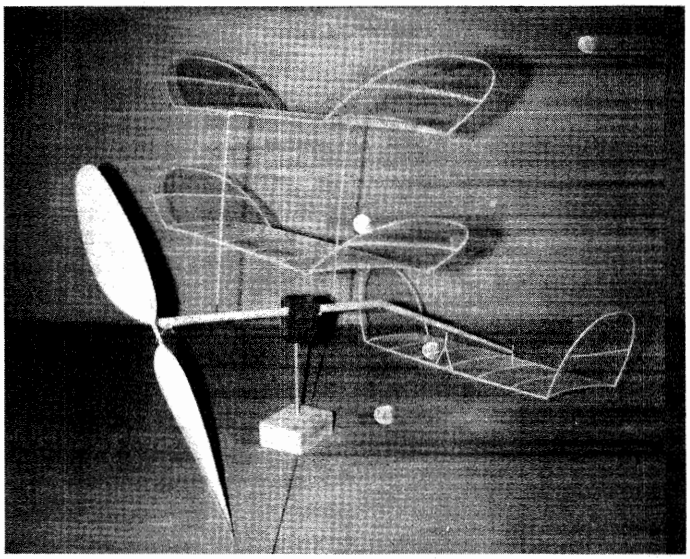
McLean notes that the distance between the wings should be at least 1/4 the wingspan. This spacing causes the wings to be located at a considerable distance above the motor stick, so that the wing drag causes a large rearward force moment, tending to pull the nose up. The moment resulting from the drag of the drooped tailboom and stab counterbalances the wing drag moment. This model readily handles high initial torque and climbs out as though on a rail, showing no tendency to stall or fall off on one wing.

My experience indicates that airfoil thickness has a strong effect on the velocity at which a Pennyplane or Novice Pennyplane flies. Typical thicknesses are from 4% to 6% of the chord. Kukon and Jaecks used 6.6% and 5.4%. To reduce the wing drag moment, I selected a rather thin 4% airfoil thickness. I will probably use 5% if I build another version of this design.

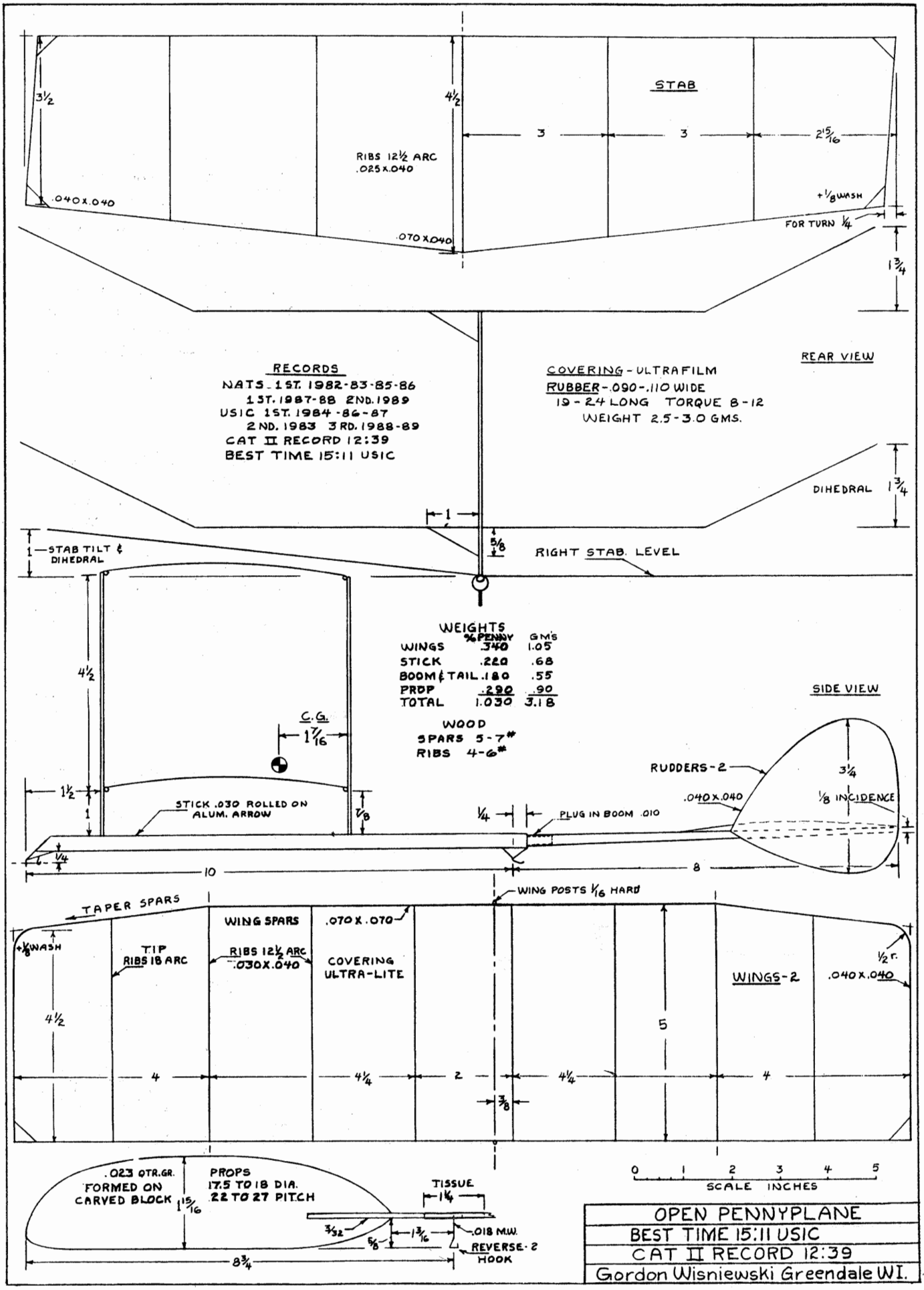
The stab tips have 60^{0} of dihedral and function as rudders, giving considerably more rudder area than is commonly used on indoor models. I felt that this extra area was needed because of the vertical projected area from four wingtips instead of the normal two.

The model is built using conventional indoor practice. The motor stick is reinforced and stiffened with 3 boron fibers. Extremely careful jigging is required when assembling the wings and posts.

There are no thrust or rudder offsets and the wing and stab have no washouts. One inch of stab tilt, left side high, was used for turn. During test flights, it was found necessary to move the wing back 0.5" to the present location.







OPEN PENNYPLANE
BEST TIME 15:11 USIC
CAT II RECORD 12:39
Gordon Wisniewski Greendale WI.

PENNYPLANE 1st PLACE 1987 USIC 15:11
GORDON WISNIEWSKI,Greendale, WI

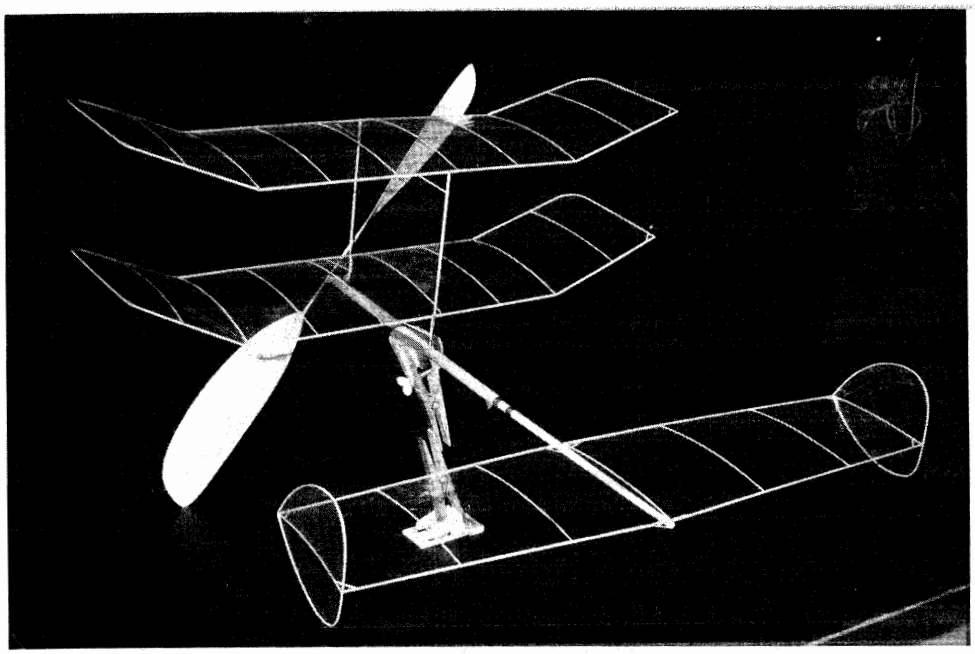
The Pennyplane shown in the plan is the result of a progression of designs and refinements from the beginning of the Pennyplane event. The event was started around 1970, by Erv Rodemsky, then with the Chicago Aeronuts. My first model was adapted from an EZB that I had designed and was flying. My next Pennyplane was a model that some of the Bong Eagles are still flying. The third model had a wider chord, larger tail, hollow stick, mylar covering and a larger prop. It was a very competitive monoplane, until the biplanes came along.

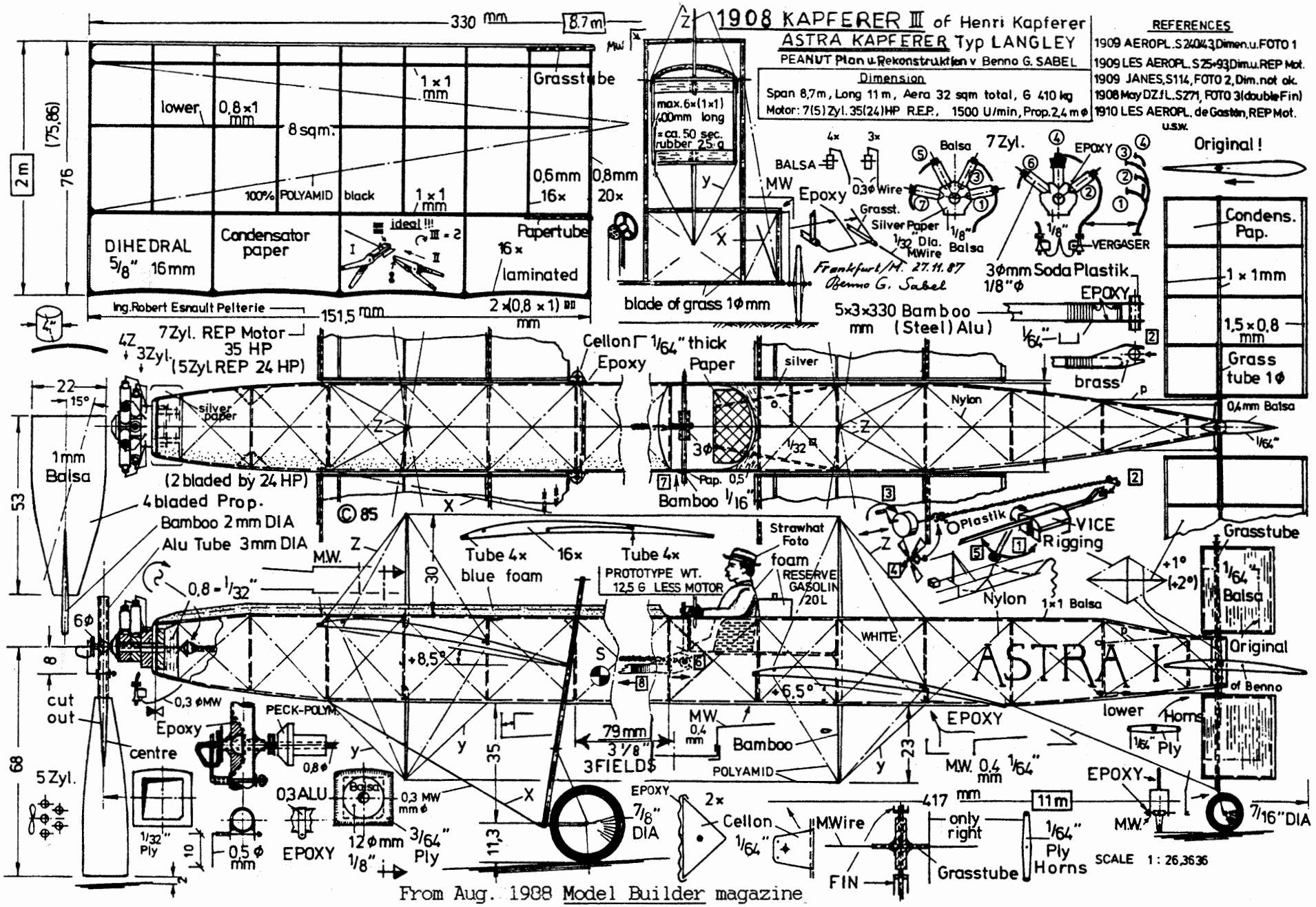
I set out to design a biplane which incorporated all of the best features from my monoplane and any new improvements available at the time. The wings were of similar plan shape and dihedral, with a 5" chord and a little less camber. Ribs are of 12.5" radius arc except the tip ribs, which are 18" radius arc. The first stabilizer was 17-7/8" span, tapered, with an 18" radius arc, 1" dihedral and a single rudder. The airplane performed well from the first and won most of the contests in which it was entered.

The model liked to fly slowly, with the nose up. The more the nose-up attitude, the longer the flight, so I made a new high-camber stabilizer to take advantage of this flight characteristic. I went too far with the camber, so the next modification was a twin rudder with medium camber. The rudders acted as tip plates, helping the airplane fly at a higher angle of attack without falling off and increasing the flight time. New wings were built with closer attention to wood weight and size, covered with the lighter Ultrafilm. Flight time increased again.

With tissue sockets for the wings and a plug-in tail boom, it is easy to test various configurations of wing, prop and tail for maximum time at a given location. When flying, if I land with more than a half-row of knots in the rubber, I shorten the loop slightly until the maximum time is achieved.

Build the model and enjoy Pennyplane.





From Aug. 1988 Model Builder magazine

PEANUT SCALE 1st PLACE 1989 USIC 192.2 pts. JOHN MARTIN, Miami, FL

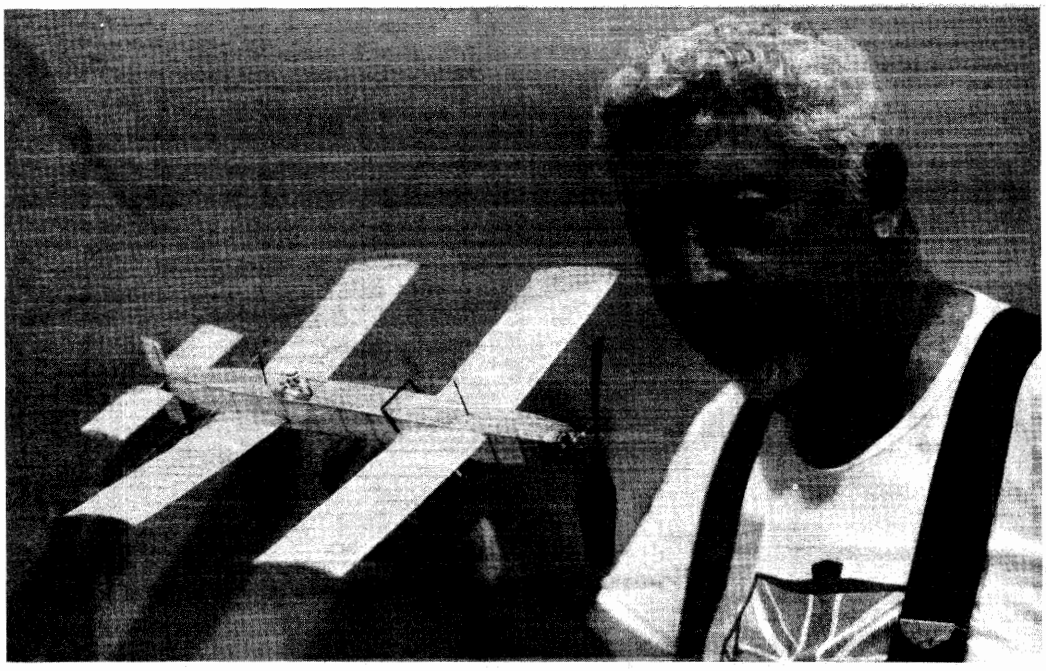
For the 1989 USIC I chose an old pioneer aircraft, since many of these old-timers get plenty of bonus scale points. In Peanut competition these bonus points may provide the slight margin of victory. Tandems, biplanes, triplanes, sea planes all get extra points, and a lot of the pioneers have several of these features. Airframes are usually simple and light, and some designs are surprisingly stable. The negatives: good documents are hard to find, color is often plain linen, weight builds up with all that rigging and all those ribs, and all those struts add to the considerable drag. They usually take a lot more power than you thought. Good subjects include the 14-bis, Voisin Hydroplane, Drweswiecki canard, the Bleriot VII, and of course, my subject, this "1908 Astra Kapferer III".

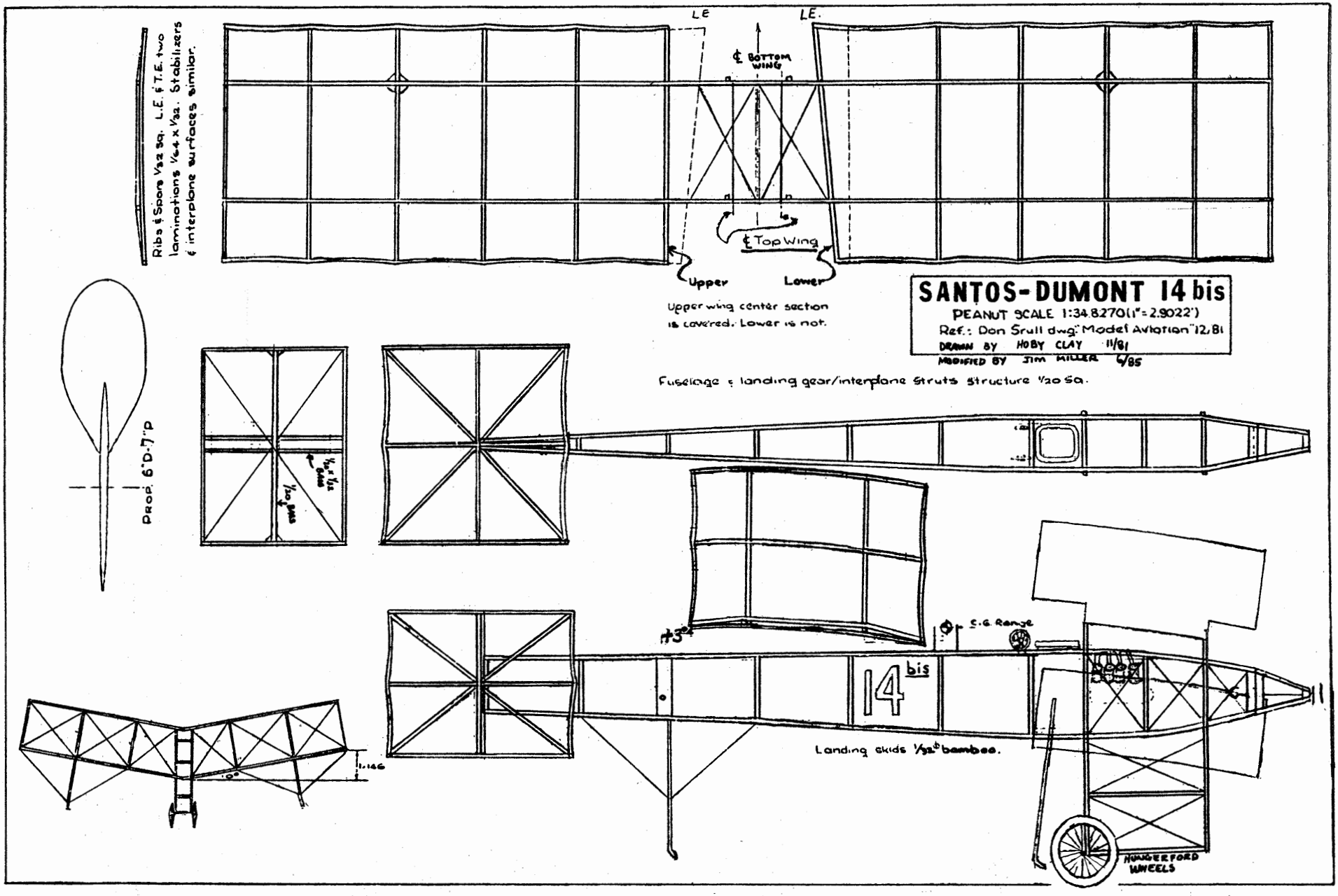
I used Benno Sable's plan, published in Aug. 1988 Model Builder. Benno was kind enough to send old photos and data from Germany, through Butch Hadland. I found it difficult to get a copy of the 1909 Les Aeroplanes here in Miami. A word about documents; don't kill the poor judges with material. The best photo is a color photo of the plane you have modelled, and it's a big plus if you can get one. 3-views, and additional closeups of the LG, empennage, and nose are real pluses. Try to find and authenticate the color scheme.

Benno has a great plane here. I put the rear rubber post back to the bay behind the trailing edge. You can build the 7 cyl. motor heavy because you will need nose weight. I used tissue on the slight turtle deck. My cockpit stops at the upper longeron - no basket seat. I used pre-shrunk Micro-X "Old Timer" tissue instead of condenser, so gave back some weight there. A real goodie; rigging is LYCRA thread. It is elastic, and never sags - even provides support. This is a Hadland find. I unabashedly used Peck Polymers' plastic prop (PA-15, 6", wide blade). It is a very heavy 3.1 gm. when you get it, but scrape it down to less than half that. Use a curved knife blade to scrape,not sandpaper or a file. My Astra weighed 10 gm. Don't fail to enlarge the fuselage plan by adding 3-1/8" from rear of LG to front of cockpit. See arrows on the plan. I used a 28" loop of tan FAI rubber stripped to .103". Yes, very long loop.

Tandems may dive at high speed and stall at low. You will have to crank more negative into the rear wing at the expense of needing more nose weight. Try increasing the stab negative first, but if that doesn't work, reposition the back wing. Use right thrust; the rudder isn't effective. Leave all the struts, motor details, etc. OFF until you get it flying, and then add all the fruit salad. The performance suffers, but the judges expect all that stuff.

My margin of victory over Jim Miller's 14-bis came because he hand-launched (canards are tough to ROG), while the Astra took off the floor for a 10-point bonus. The best flight I had was 1:27.0 ROG (for 97 flight points) with 2250 turns on the motor.




Ribs & Spars 1/32 sq. L.E. & T.E. two laminations 1/64 x 1/32. Stabilizers & interplane surfaces similar.
LE
LE.
℄ BOTTOM WING
℄ Top Wing
Upper
Lower
Upper wing center section is covered. Lower is not.
SANTOS-DUMONT 14 bis
PEANUT SCALE 1:34.8270 (1" = 2.9022')
Ref.: Don Srull dwg. Model Aviation 12/81
DRAWN BY HOBY CLAY 11/81
MODIFIED BY JIM MILLER 6/85
PROP. 6'D-7"P
1/16 x 1/32 BASS
1/16 BASS
Fuselage & landing gear/interplane struts structure 1/20 sq.
+3°
C.G. Range
14 bis
1.146
Landing skids 1/32" bamboo.
HUNGERFORD WHEELS

PEANUT SCALE 2nd PLACE 1989 USIC 189.9 pts.
JIM MILLER, Cincinnati, OH

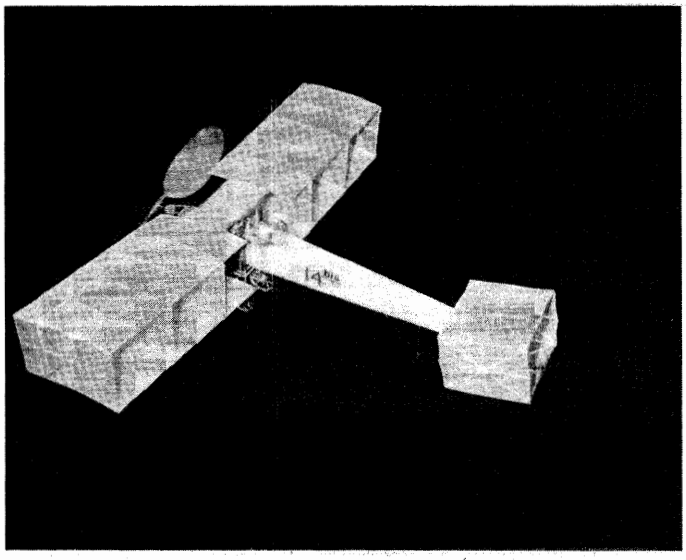
Santos Dumont 14 bis
Scale pts. 105.37 + ave of 2 best flts 84.5 sec. = 189.87
Wt. of model (w/o motor) 7.1 grams - prop 6" dia 7" pitch
Motor 23" .078 FAI rubber 1880 turns torque 7.6
Flight path: flew to the left (against torque). Flies almost straight up on launch until it stalls or does a wingover high enough to recover before hitting the floor.
Plans: drawn by Hoby Clay and modified by Jim Miller

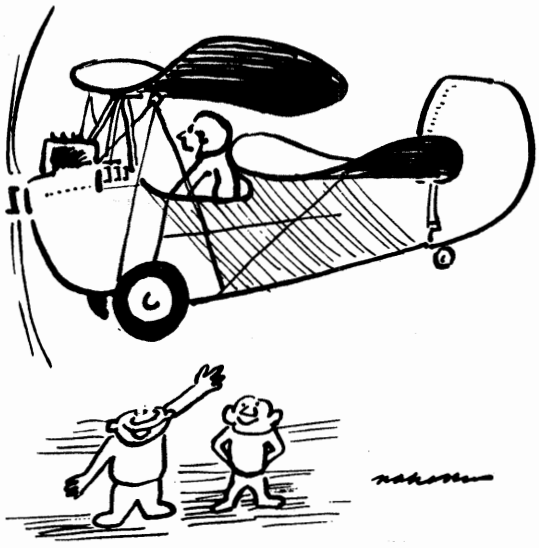
The Santos Dumont 14 bis was chosen because it receives bonus scale points over the conventional high wing monoplane. The scale score can be increased by as much as 15 points because a bonus of 2 points is awarded to biplanes and a 1-point bonus awarded to canards.

It is difficult to make a model of this type fly to the maximum number of scale points it receives. This is the main reason for the bonus system in Peanut scale judging, to encourage models of unusual configuration.

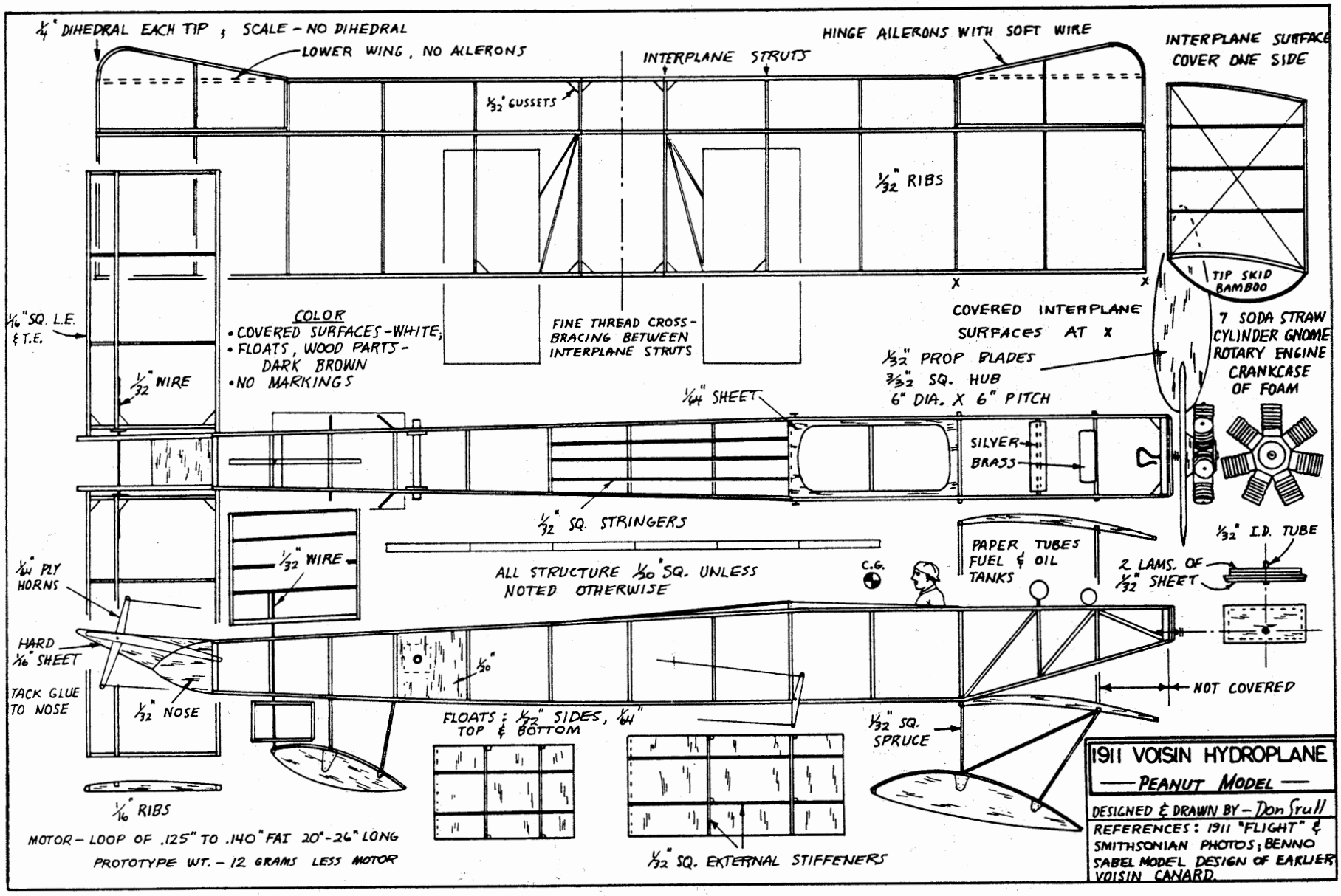
Documentation is a major concern for all scale flyers. Pictures of the 14 bis in flight and at rest are readily available in many aviation-oriented publications. Accurate 3-views are another problem. The best 3-view is Don Srull's, which can be purchased through Model Aviation's plan service. It comes with the full-sized plans for Don's RC 14 bis.

I have found the 14 bis to be a stable flyer when trimmed properly. Surprisingly, I have even experienced several long thermal flights in outdoor competition with the same model that was flown indoors.





"Let's hear it for Pistachios and Peanuts!"



From Dec. 1985 Model Aviation

PEANUT SCALE 1st PLACE 1987 USIC 218.5 pts.
JIM MILLER, Cincinnati, OH

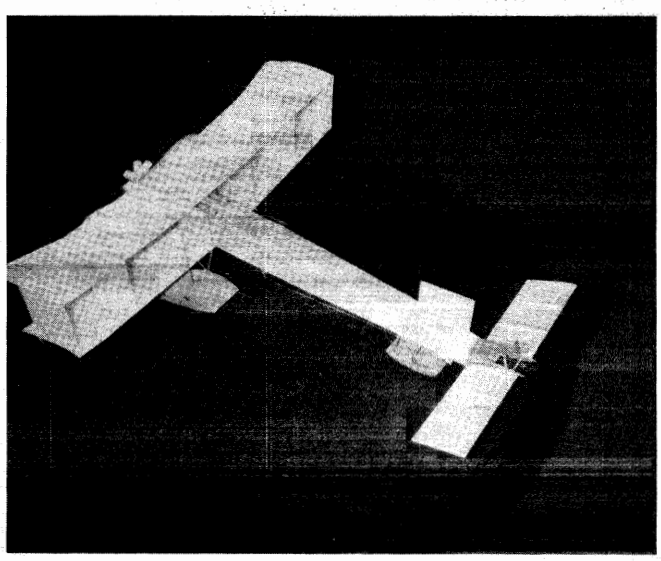
1911 Voisin Hydroplane; Scale pts. 130 + Ave. 2 best flights 88.5 sec = 218.5 total pts. ; Wt. of model (w/o motor) 8.5 grams - prop 6" dia. .9" pitch;
Motor 27" x .080 FAI rubber, 2380 turns, torque 9.1
Flight path: Model flew to the right (with torque). Model had to be tilted to the left to counter initial torque. Model ran out of turns at 25-30 ft. altitude. More time possible if better prop & motor combination can be found.

Don Srull must receive most of the credit for the success of this model. His good article in the December 1985 issue of Model Aviation inspired me to attempt to build a successful copy of his model. The drawing comes from the centerfold of that issue. I chose the Voisin because the AMA Peanut rules allow 3 pts. bonus for an aircraft on floats, 2 pts. bonus for a biplane, and 1 pt. bonus for a canard type airplane. 6 pts. times the workmanship score could mean a maximum of 30 extra points over a conventional high wing monoplane. To get this model to fly those extra 30 points in scale is something I haven't been able to accomplish. Nevertheless, those 30 extra points were enough to allow me to win at the 1987 USIC.

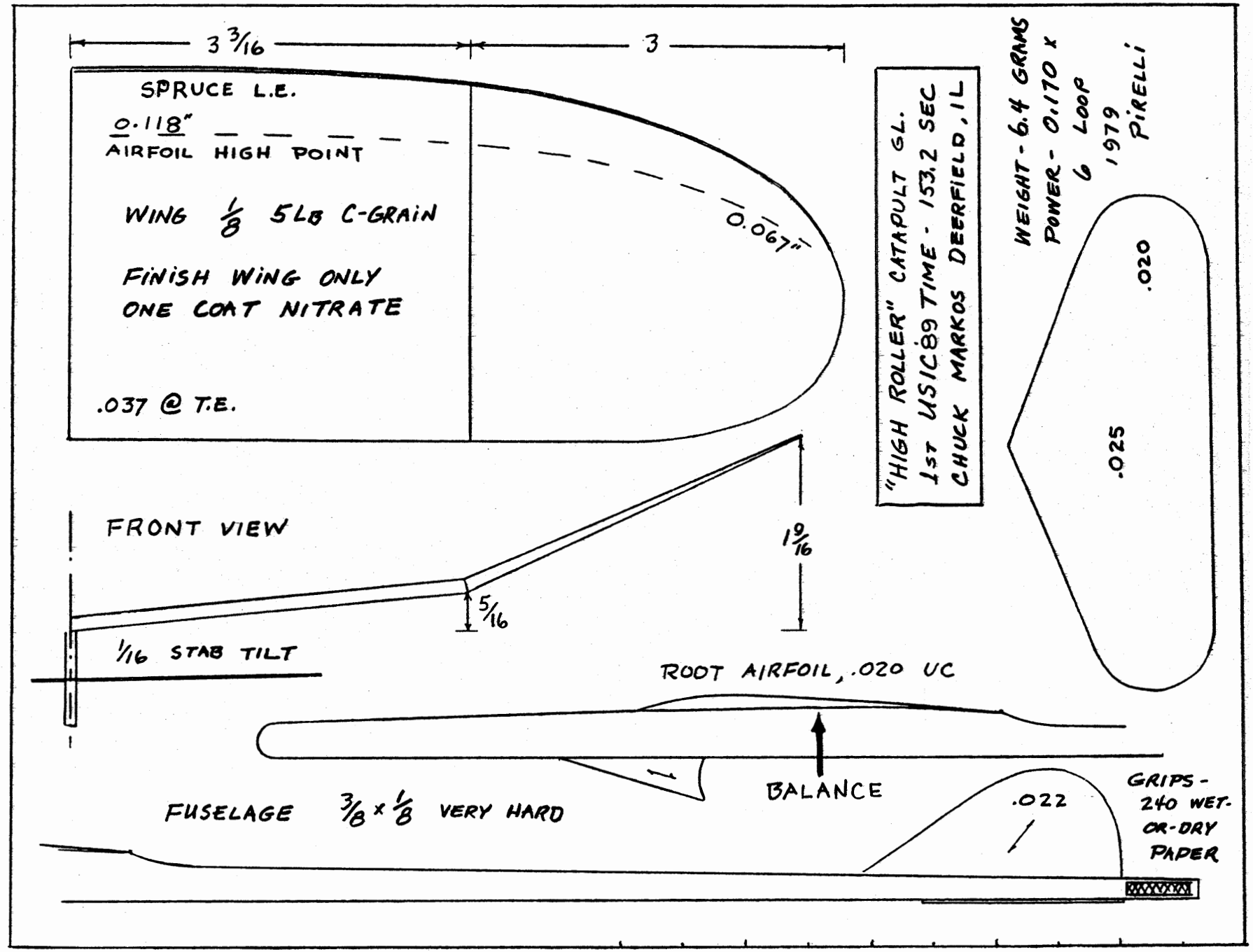
At 8.5 grams, the model is rugged enough to fly outdoors in fairly high winds. A skilled builder could probably build this model considerably lighter for indoor flying and get higher flight times than I have been able to get.

I experienced few trimming problems and was thrilled when it flew successfully the second time I wound the motor. Although I flew it with torque (to the right) in the 1987 USIC, I have since trimmed it to fly against torque (left). It might be interesting to note that I carve all of my canard props to turn to the left as viewed from the rear of the model. In this way I can wind the same direction as I do for tractor type models. It is embarrassing and sometimes disastrous to the model to wind it up backwards!

Up to this writing, 1:33 is the best time I have been able to achieve. When you consider all the drag caused by two wings and three large floats hanging underneath, how much more can you expect?






3 3/16
3
SPRUCE L.E.
0.118"
AIRFOIL HIGH POINT
WING 1/8 5LB C-GRAIN
FINISH WING ONLY
ONE COAT NITRATE
.037 @ T.E.
0.067"
"HIGH ROLLER" CATAPULT GL.
1ST USIC89 TIME - 153.2 SEC
CHUCK MARKOS DEERFIELD, IL
WEIGHT - 6.4 GRMS
POWER - 0.170 x
6 LOOP
1979
PIRELLI
.020
.025
FRONT VIEW
1 9/16
5/16
1/16 STAB TILT
ROOT AIRFOIL, .020 UC
BALANCE
FUSELAGE 3/8 x 1/8 VERY HARD
.022
GRIPS -
240 WET-
OR-DRY
PAPER

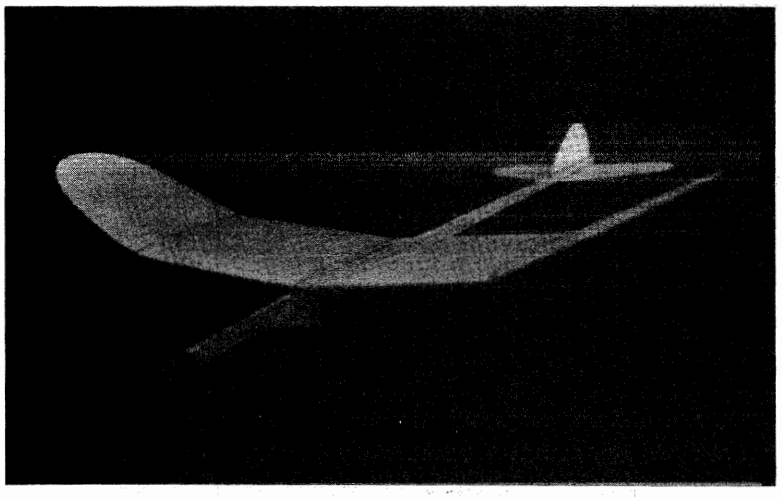
CATAPULT GLIDER 1st PLACE 1989 USIC 153.2 sec.
CHUCK MARKOS, Deerfield, IL

Indoor catapult glider is rapidly catching on as one of the most popular events at the USIC, with 33 entries in the Open age class. Only the Pennyplanes, Easy B, and two unofficial events (Bostonian and No-Cal Scale) had more participation in 1989. The class appeals to me since by the time in my life that I had figured out how to make a good IHLG, my arm wasn't nearly as good as it once was. However, even at my best, I could not come close to the altitude possible with the catapult launch. It almost seems like cheating to be able to achieve such spectacular results with no pain.

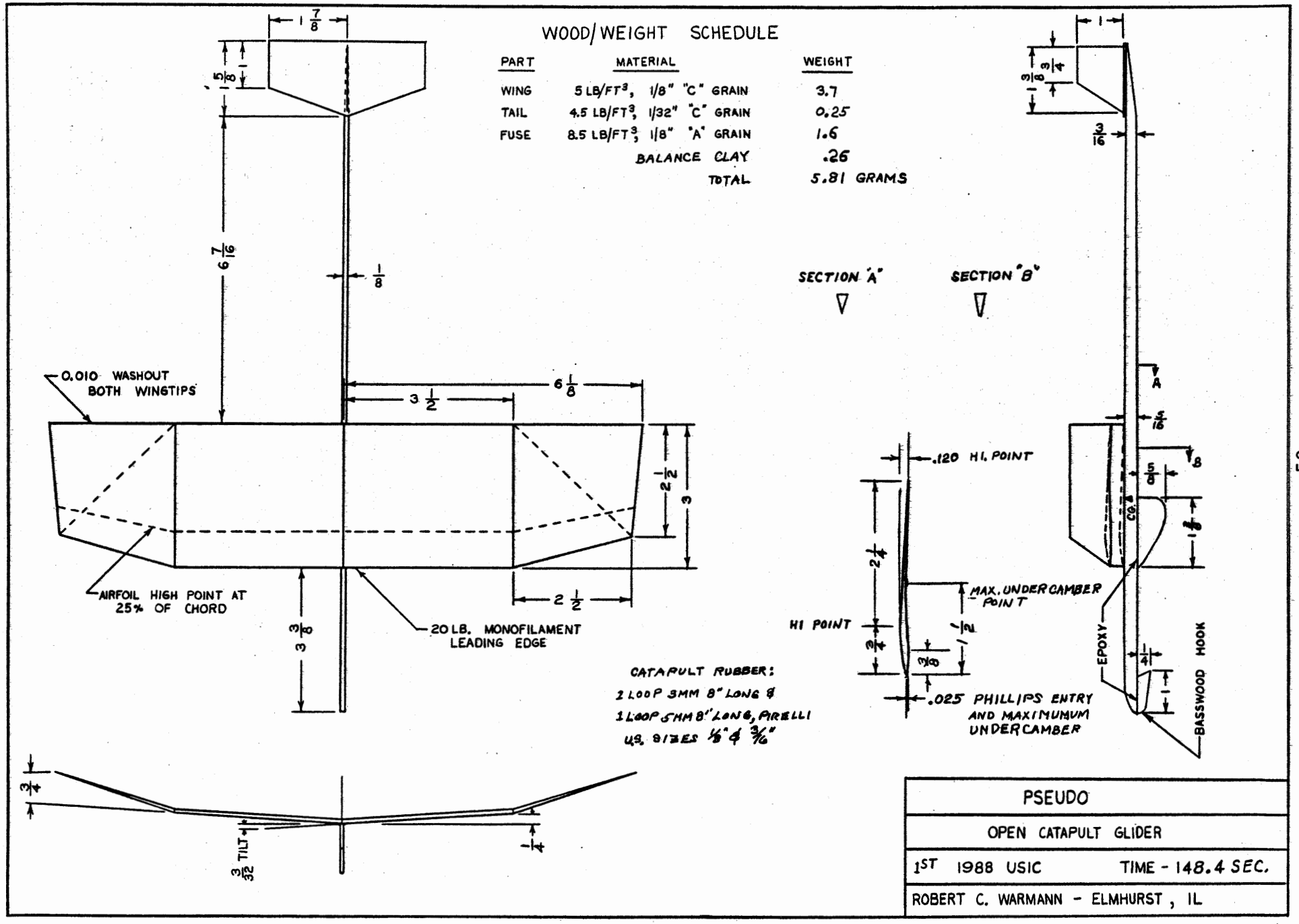
My earlier experiences with the "Sub-Sweep" design (NFFS Digest, May, 1988) convinced me that a slightly heavier model with more wing area should show considerable improvement in duration as a result of the anticipated increased altitude. The weight addition was put into the fuselage, the wing LE spruce, a coat of nitrate dope, and the added epoxy glue for the polyhedral joints. The result was a more rigid model than the "Sub-Sweep" and the desired performance enhancement. I caution not to save weight on the fuselage, as too much flex in the tailboom gave very erratic performance until carbon-fiber stiffeners were added. To save weight, use the very lightest balsa you have for the wing. If I were to change anything in the "High Roller", it would be to use a flat-bottomed airfoil from 3/32 stock. There is no substitute for altitude, and I still have not bounced a catapult glider from the girders of the 116' ETSU mini-dome.

The characteristics of this design (two were built) are a joy to behold. Its climb trajectory starts with a straight-away launch at an initial angle of 75 degrees with no left or right bank. After making an upward arc, a half-roll at maximum altitude puts the model at glide altitude and speed in a perfect transition from climb. Wow!

Construction technique follows the description in the NFFS Digest, March, 1985. If you don't have access to the article, send me a SASE and I'll send you a copy. 655 Carlisle Ave, Deerfield, IL 60015



Indoor Catapult Glider rules:
Maximums: wing span, 12"; chord, 3"; catapult handle 6"; 1 loop 1/4 rubber. Catapult glider must he hand-held. Best 2 of 5 flights scored.


WOOD/WEIGHT SCHEDULE
PART
MATERIAL
WEIGHT
WING
5 LB/FT³, 1/8" "C" GRAIN
3.7
TAIL
4.5 LB/FT³, 1/32" "C" GRAIN
0.25
FUSE
8.5 LB/FT³, 1/8" "A" GRAIN
1.6
BALANCE CLAY
.26
TOTAL
5.81 GRAMS
SECTION "A"
SECTION "B"
0.010 WASHOUT BOTH WINGTIPS
AIRFOIL HIGH POINT AT 25% OF CHORD
20 LB. MONOFILAMENT LEADING EDGE
.120 HI. POINT
MAX. UNDERCAMBER POINT
HI POINT
.025 PHILLIPS ENTRY AND MAXIMUMUM UNDERCAMBER
EPOXY
BASSWOOD HOOK
CATAPULT RUBBER:
2 LOOP 3MM 8" LONG &
1 LOOP 5MM 8" LONG, PIRELLI
U.S. SIZES 1/8" & 3/16"
3/32 TILT
PSEUDO
OPEN CATAPULT GLIDER
1ST 1988 USIC
TIME - 148.4 SEC.
ROBERT C. WARMANN - ELMHURST, IL

I was first exposed to indoor catapult gliders in 1979 by Otto Curth of the Chicago Aeronuts. Otto was using a 1/4 dia. dowel and about 1/8 rubber and was reaching the 70-foot ceiling in the Madison St. Armory. I was impressed, and saw this as a way of once more enjoying the pleasures of hand launched glider flying, while attaining times well over one minute. "Pseudo" evolved as a result.

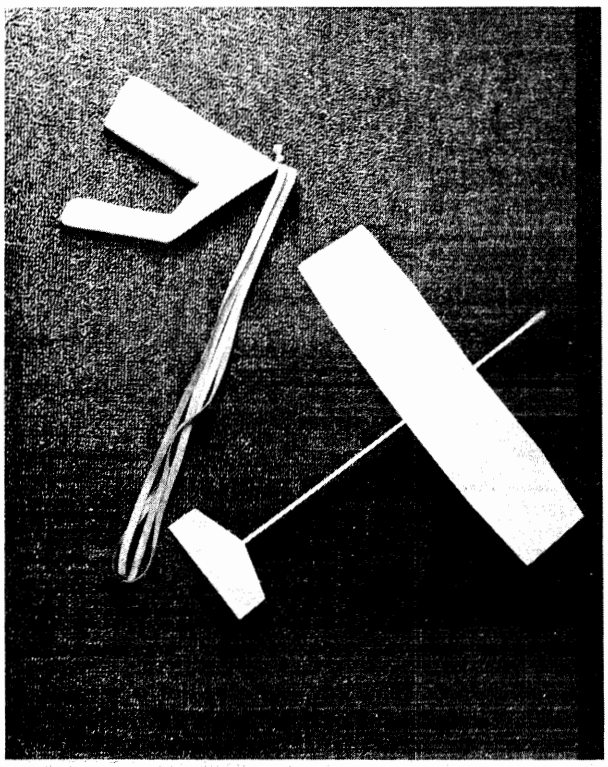
Construction of a catapult glider is exactly the same as that of a hand-launched glider except for the launching hook and the holding tab. The tab is balsa, sanded to a teardrop section. Do not locate the tab any closer to the hook than shown on the drawing, or the tab may hang up on the launching rubber. The washout in the wing is very critical. I sand the wing on a flat glass surface, using sanding fixtures. Do not skimp on fuselage dimensions. Rigidity from wing back to stab is important. Keep tail assembly as light as possible without inducing flutter at launch velocity. The six-inch launching handle is as important as the glider. A handle similar to the one pictured will provide a more rigid launching point with much less strain.

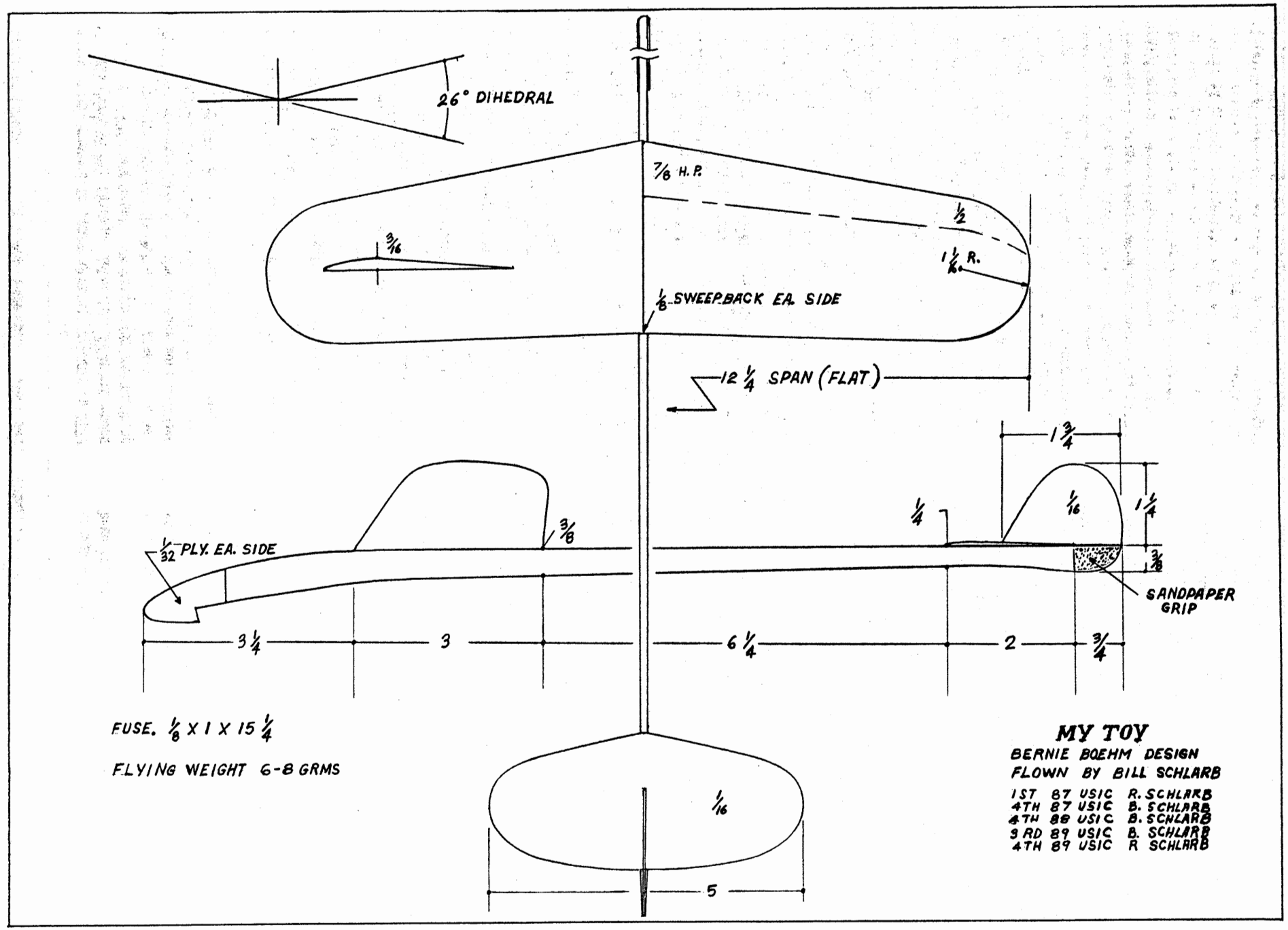
Flying Adjustments. All turn adjustments are made with stab tilt and wing and horizontal stabilizer wash-in and out. Never use the rudder to adjust the circle. Preliminary adjustments are made with HAND launched test glides. These adjustments assume that the wing tip washout is correct and that the glider has nearly zero-zero wing/stab incidence, as shown in the drawing. Balance the glider so that the center of gravity is 1 3/8" back from the leading edge of the wing. Launch the glider gently from shoulder height, aiming at a point 60 to 75 feet ahead. The glide should be smooth. The turn can be right or left, depending on the stab tilt. Add or remove nose weight until a satisfactory glide, just verging on a stall, is obtained. Now launch the glider at 2 or 3 times the velocity of the first glides, launch angle zero or slightly up. "Pseudo" should fly on the line it was launched, flying over the hump and continuing in a normal gliding turn. Do not change adjustment if the glider stalls; this simply means that launch angle and velocity were not matched. However, any launch at higher velocity which results in the glider flying over the hump and then making a diving turn, or exhibiting a looping tendency before stalling, must be corrected. Either condition means that the wing/stab relationship is not exactly zero-zero. The looping condition is corrected by warping the outboard panel of the stabilizer trailing edge DOWN. Diving is corrected by warping the inboard panel UP. Hand glide and re-balance as necessary after these adjustments. Final hand launches are made at a 30 to 45 degree angle. Launch the glider straight ahead with just enough velocity and inboard tilt to get it over the hump and transition into the glide.

This procedure should be repeated several times to verify the circle and glide adjustments. Use only the horizontal stabilizer. Increase turn by warping trailing edge of inboard panel up and outboard down; opposite for less turn. Changing stab tilt also works. Wash-in of the inboard wing panel is used only if the inboard tip is too low in the glide. This is a problem only where the glide circle diameter is less than 100 ft. due to building size. The glider is now ready for its first catapult launch.

"Pseudo" is catapulted by clasping the tab between the thumb and forefinger and placing the middle finger in front of the tab. Engage rubber on hook. Stretch (do not look back) to almost full arm reach; aim and release. Do not move hand or you may lose the tail assembly. Use a 9 to 12 inch loop of 1/8 to 3/16 rubber. The first catapult launch should be made at the same angle of elevation as the last hand launches, with the rubber stretched enough to get the glider to transition, 3 to 4 times rubber length. Gradually increase angle and stretch until you reach maximum. Now is the time to increase rubber size and shorten the loop.

Are you a frustrated hand launch glider flyer who, because of injury or longevity, can no longer get your glider up? Then try "Pseudo" and see your glider get up and really perform.





FUSE. 1/8 X 1 X 15 1/4

FLYING WEIGHT 6-8 GRMS

MY TOY

BERNIE BOEHM DESIGN

FLOWN BY BILL SCHLARB

1ST	87	USIC	R. SCHLARB
4TH	87	USIC	B. SCHLARB
4TH	88	USIC	B. SCHLARB
3 RD	89	USIC	B. SCHLARB
4TH	89	USIC	R SCHLARB

CATAPULT GLIDER 3d PLACE 1989 USIC 140.2 sec.
BILL SCHLARB, South Bend, IN

Our records failed to show Catapult Glider times for 1987, so we neglected to ask Ralph Schlarb for information. His son set us straight. Sorry, Ralph !

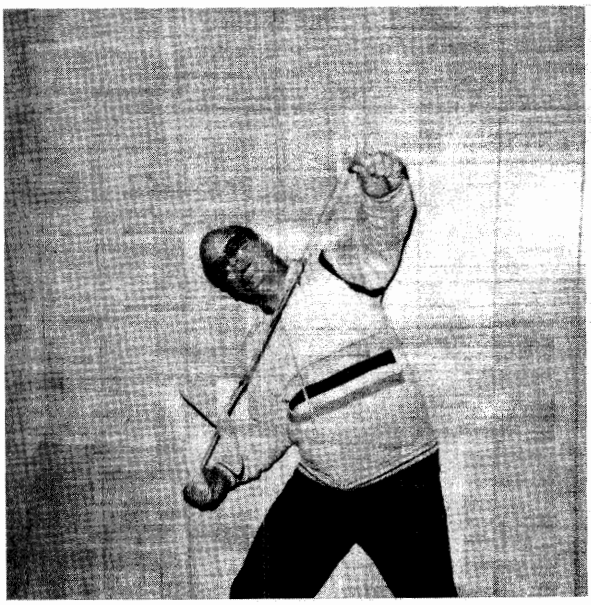
"My Toy" was designed by my good friend, Bernie Boehm. This glider was designed especially for the 1987 USIC at Johnson City, Tennessee. In its first contest, my father, Ralph Schlarb, won first place, and I placed 4th. In 1988, the following year, I placed 4th again in the Mini-Dome. In 1989, "My Toy" placed 3d and 4th.

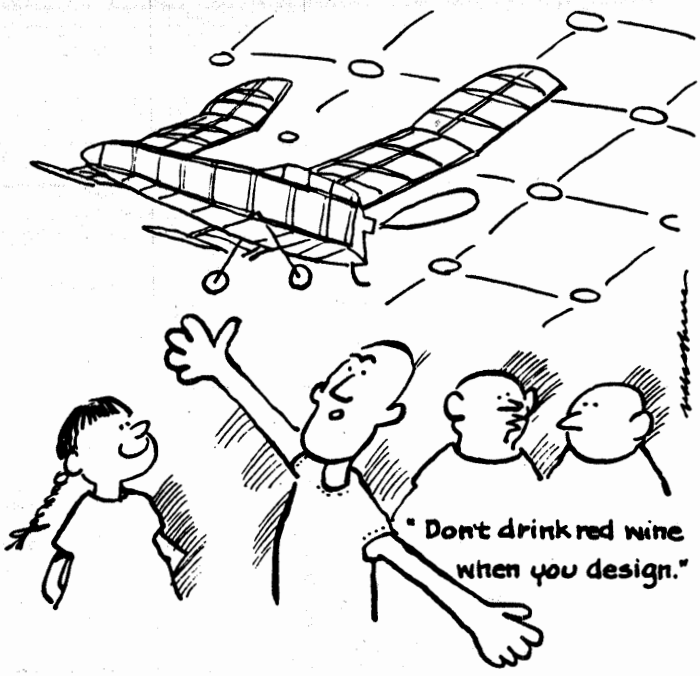
I really feel that this small glider reached the greatest altitude and had the best transition of any of the catapult gliders in the contest. The reason it didn't do better was that old devil, "model too heavy".

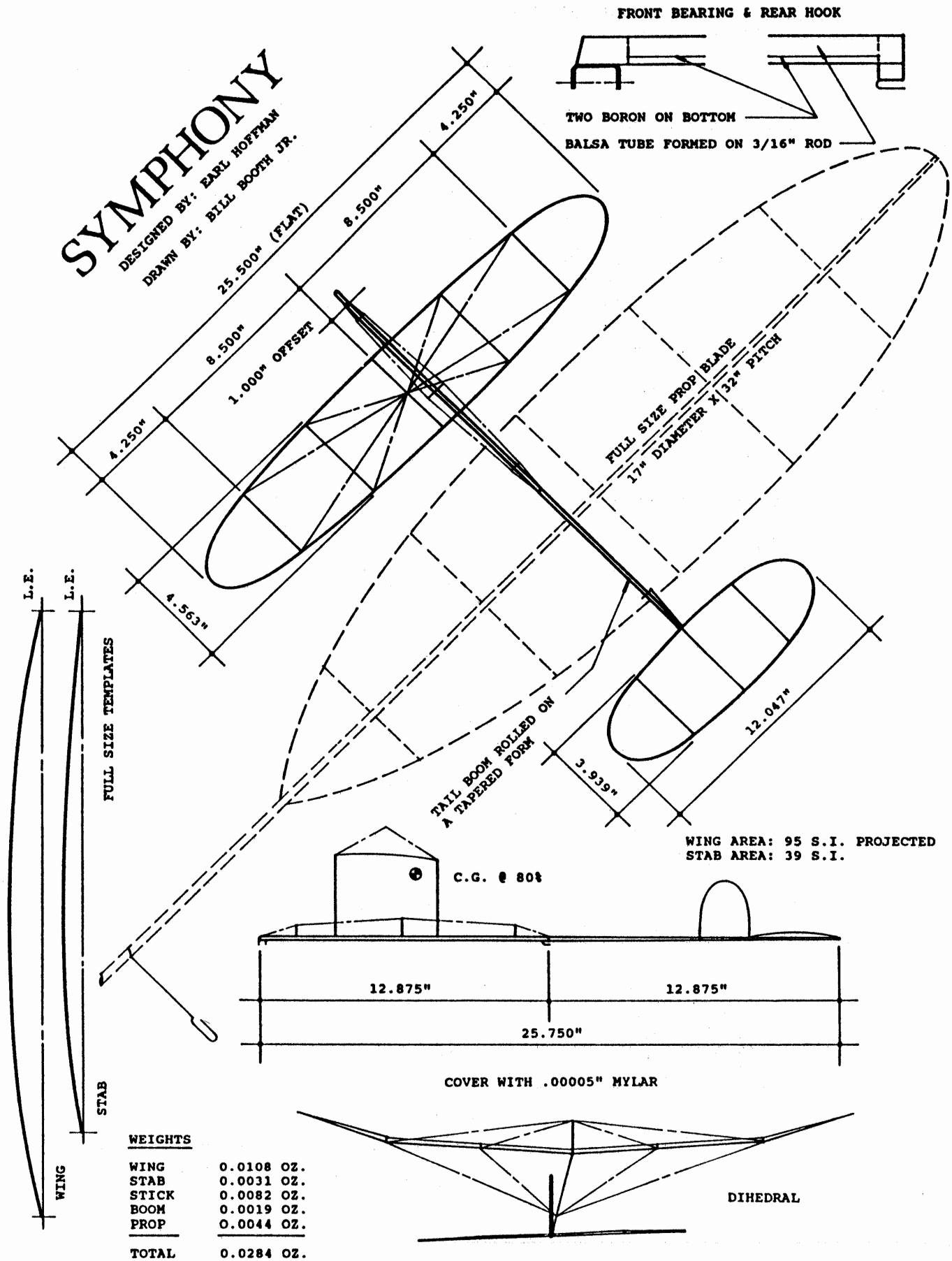
The latest versions have been constructed to be lighter, and therefore the glide looks better than that of the heavier models.

I believe that winning next year will take a longer time than Chuck Markos's winning time of 1989, and I also feel that 1:20 will be about the maximum that can be expected from the size of glider being used.

This event is a lot of fun. Everyone should enter this class, and there should be more classes like this one, a challenge to the experienced modeler but within the reach of the beginner.







WEIGHTS

WING	0.0108 OZ.
STAB	0.0031 OZ.
STICK	0.0082 OZ.
BOOM	0.0019 OZ.
PROP	0.0044 OZ.
TOTAL	0.0284 OZ.

INTERMEDIATE STICK 1st PLACE 1988 USIC 29:03
EARL HOFFMAN, Carpenteria, CA.

Earl, when 75, drove by himself all the way from California to Johnson City. With crafty, unflinching flying, he trounced us Easterners by taking first place in both Easy B and Intermediate Stick, not so easy anywhere. The ladies loved him, and the men treated him with the deference usually reserved for a Bob Hope or a George Burns. More than one person walked away smiling, saying "Ain't he sumthin'!" And he is, too! A grand person! A good flyer! A charming and enthusiastic gentleman!

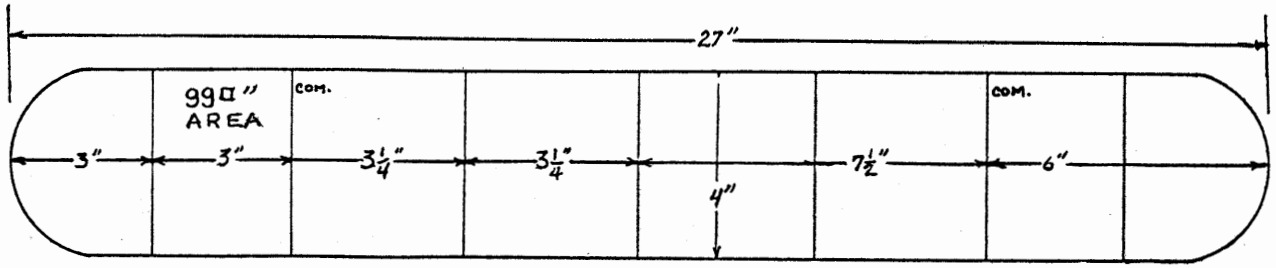
We couldn't get new drawings for Earl's winning Intermediate Stick and Easy B because he was in the process of moving. We are including the drawing and text from the 1989 NFFS Symposium, wherein his Intermediate Stick model was recognized as Indoor Model of the Year 1989.

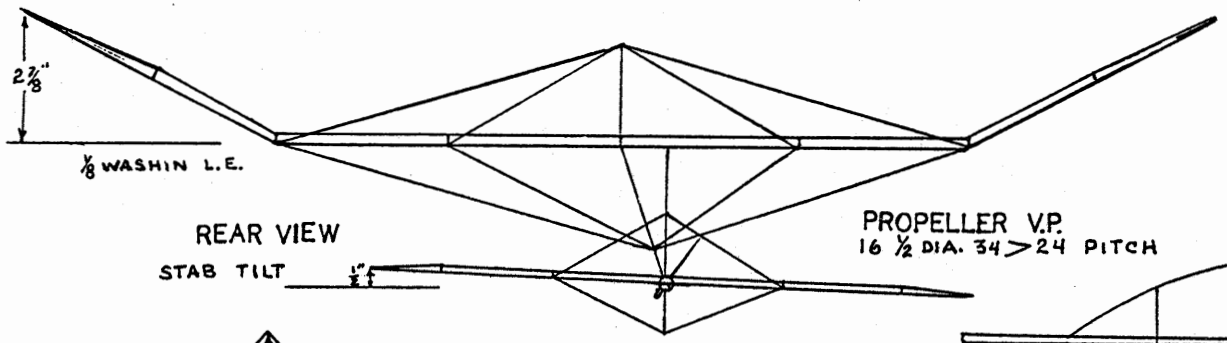
"This Intermediate Stick design was developed over a period of five years, and this particular model is number 5 in the series. The model's most distinctive feature is the parabolic wing and stabilizer planform. Not apparent, but suspected when you see the model fly, is the light weight of the braced structure and the 89% C.G. location that contributes to a buoyant, nose-up flight attitude, so desirable for long indoor flights. The use of a built-up 17" diameter, 34" helical pitch prop with slightly washed-out tips takes advantage of this near-stall trim to maximize flight times.

September 5, 1988, was a hot and humid day at Santa Ana, the most uncomfortable weather that I had ever experienced at the Blimp Hangar in the 10 years of my flying models there. I stripped a motor from a piece of 3mm Pirelli that was purchased in 1982, "the last of the good stuff." It was a 17 1/2" loop weighing .041 oz. and was wound to 2180 winds and launched with 2080 winds. The climb was slow but steady. The model never got near the top of the hangar but managed to drift 2/3ds the length of the hangar without ever being in danger of touching the sides of the structure.

With the number of winds that the hot weather had allowed me to pack into the motor, coupled with a good cruise and a slow descent, the model nearly landed dead-stick. Time... 31:19. The record was mine!"



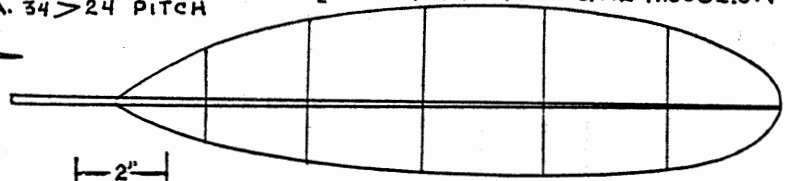




MATERIALS

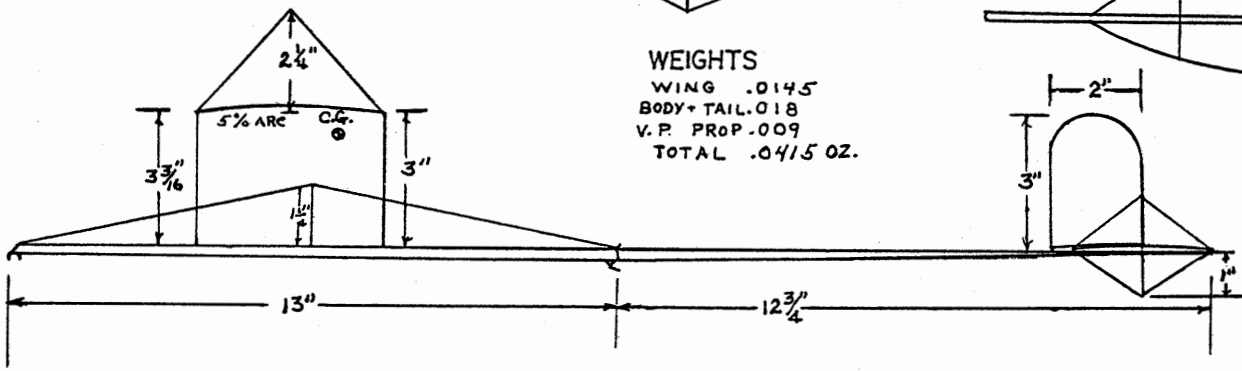
WING CENTER PANEL L.E.&T.E.
5# B .040 X .030
TIPS .040X.030 > .030 □ < .040X030
RIBS 4 1/2# C .030 - COM. .040X.030
POST 5# .062 ROUND > .062X.030
CABINE 5# .050 X .032 > .032 □
STAB & RUDDER
SPARS - OUTLINE 5# B .030X.026
RIBS 4# C .030 X .026
FUSELAGE
MOTOR STICK 4# C .013 - .250 I.D.
BOOM 4# .009 TAPER FORM
PROP SPAR (2) 6# .090 □ > .060 8 1/4"L
OUTLINE .026 X .024 RIBS .026 □
BRACING WING .0008 CHROMEL R
MOTOR STICK .001 TUNGSTEN (2)
STAB KEVLAR
COVERING ULTRAFILM
POWER 18" LOOP .058 PIRELLI
WIRE SIZE
- PROP SHAFT REAR HOOK .014
- V.P. PROP F.008 G.012 H.008 I.014

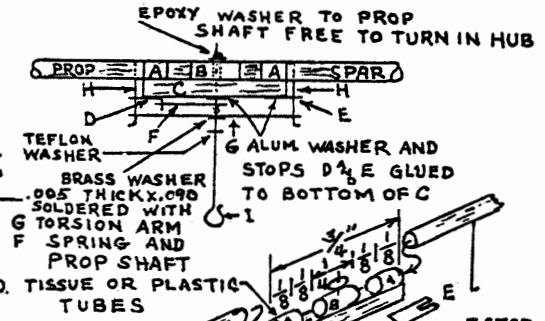
PROPELLER V.P.
16 1/2 DIA. 34 > 24 PITCH

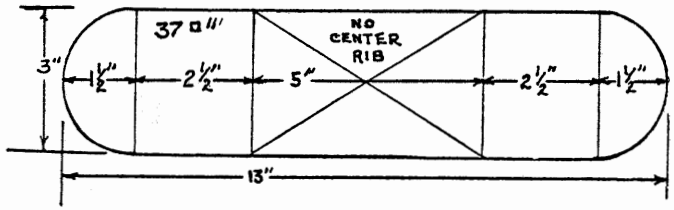


WEIGHTS

WING .0145
BODY + TAIL .018
V.P. PROP .009
TOTAL .0415 OZ.







DWG R.L. 90

MY-LAR DOLL

OPEN INTERMEDIATE STICK
1ST 1987 USIC TIME 25 :11
RONALD GANSER
PITTSBURGH PA.

INTERMEDIATE STICK 1st PLACE 1987 USIC 25:11
RONALD GANSER, Pittsburgh, PA

"My-lar Doll"

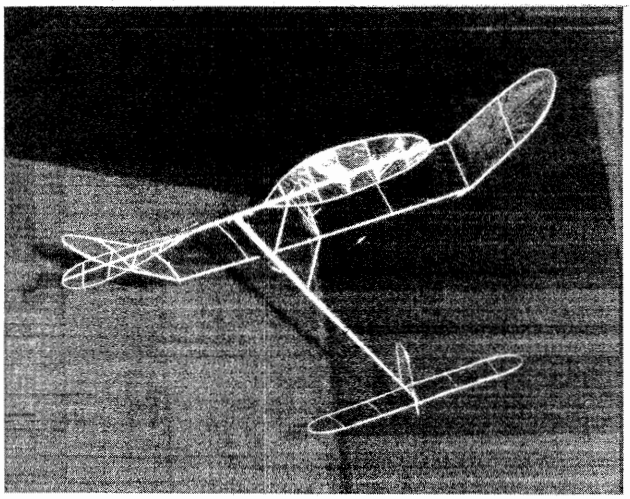
The Intermediate Stick model presented here is all straight-forward, simple, easy construction, other than that of the variable pitch propeller. Before I go on, I want to point out that the model can be and has been flown with the fixed-pitch 16.5" diameter, 32" pitch propeller with the same great flying success. It is possible that the model would actually produce longer flights with the standard prop under ceilings in excess of 100 feet. It is a trade-off, since the standard fixed pitch prop can be built much lighter and still give some pitch change by flare and twist.

All balsa wood weights and sizes are given on the plan, but some balsa in the same class can be stiffer than other balsa, so you must be selective. The only dimension not given is that of the prop hub C. It is 6 pound balsa, 3/32 square x 3/4 long.

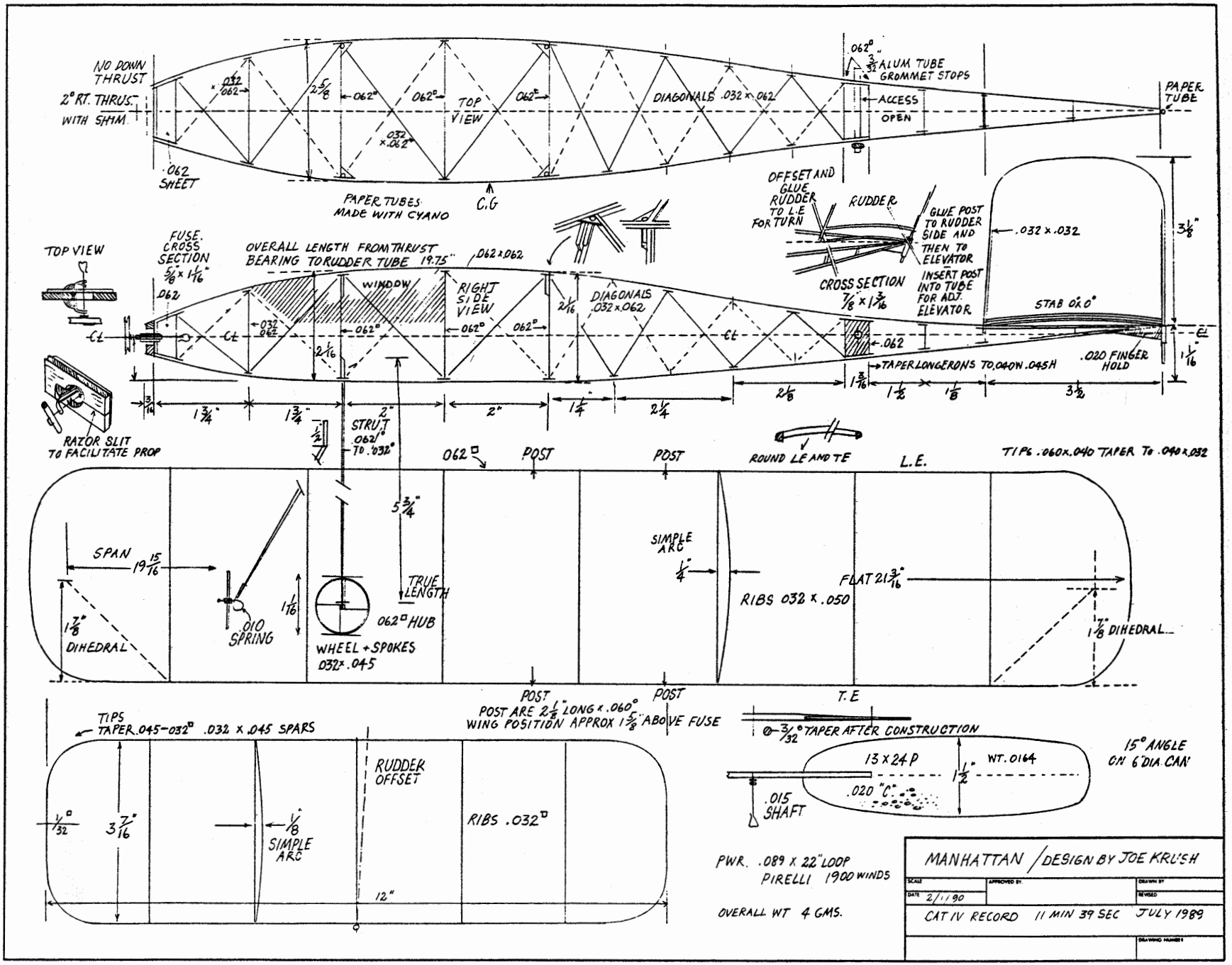
The model is flown at an 80% C.G. with 1 degree down and 1 degree left thrust. Winning flights were attained with a 17" loop of Pirelli .058 wide that increased in length to 18" after being prewound. The motor is wound to 1600 turns with O rings and no back-off of turns. The VP prop will flare to high pitch, controlling top power torque and high RPM.

The model has also placed 2nd at the USIC in 1988 and 1989. So the design speaks for itself.

If you decide to build your own My-lar Doll, I wish you success and long flights.






NO DOWN THRUST
2° RT. THRUST WITH SHIM
.062 SHEET
.032 x .062
2 5/8
.062"
.062"
.062"
.032 x .062"
TOP VIEW
DIAGONALS .032 x .062
.062" 3/32 ALUM TUBE GROMMET STOPS
ACCESS OPEN
PAPER TUBE
PAPER TUBES MADE WITH CYANO
C.G
OFFSET AND GLUE RUDDER TO L.E FOR TURN
RUDDER
GLUE POST TO RUDDER SIDE AND THEN TO ELEVATOR
INSERT POST INTO TUBE FOR ADJ. ELEVATOR
CROSS SECTION 7/8 x 1 3/16
.032 x .032
3 1/8"
STAB 0° x 0°
TOP VIEW
FUSE. CROSS SECTION 5/8 x 1 1/16"
OVERALL LENGTH FROM THRUST BEARING TO RUDDER TUBE 19.75"
.062 x .062
WINDOW
RIGHT SIDE VIEW
DIAGONALS .032 x .062
.062
TAPER LONGERONS TO .040W .045H
.020 FINGER HOLD
1 1/16"
3/16
1 3/4"
1 3/4"
2"
2"
1 1/4
2 1/4
2 1/8
1 3/16
1 1/2
1 1/8
3 1/2
RAZOR SLIT TO FACILITATE PROP
2" STRUT .062° TO .032°
1/2
062 □ POST
POST
ROUND LE AND TE
L.E.
TIPS .060 x .040 TAPER TO .040 x .032
SPAN 19 15/16
1 7/8" DIHEDRAL
.010 SPRING
1 1/16
5 3/4"
TRUE LENGTH
062 □ HUB
WHEEL + SPOKES .032 x .045
SIMPLE ARC 1/4"
RIBS .032 x .050
FLAT 21 3/16"
1 7/8" DIHEDRAL
POST
POST
T.E
POST ARE 2 1/8" LONG x .060"
WING POSITION APPROX 1 5/8" ABOVE FUSE
TIPS TAPER .045-.032 □ .032 x .045 SPARS
1/32"
3 7/16"
1/8" SIMPLE ARC
RUDDER OFFSET
RIBS .032 □
12"
Ø 3/32" TAPER AFTER CONSTRUCTION
13 x 24 P
WT. 0164
1 1/2"
.020 "C"
.015 SHAFT
15° ANGLE ON 6" DIA. CAN
PWR. .089 x 22" LOOP
PIRELLI 1900 WINDS
OVERALL WT 4 GMS.
MANHATTAN / DESIGN BY JOE KRUSH
SCALE
APPROVED BY:
DRAWN BY
DATE 2/1/90
REVISED
CAT IV RECORD 11 MIN 39 SEC JULY 1989
DRAWING NUMBER

MANHATTAN 1st PLACE 1989 USIC 11:16
JOE KRUSH, Wayne, PA

Here are the plans for my "Manhattan". I hope all necessary info is shown. The only other points I should make are these:

1. A lot of hobby shop grade wood was used, especially spars and longerons.
2. The adhesive used for the mylar on the fuselage was slightly thinned acrylic matte medium (the stuff used in artists' acrylic paint). It dries slowly - completely dry in 24 hours. Waterproof, they say. Mylar was applied from a frame. Flying surface covering applied with 3M 77. Window outline was drawn with a Sharpie pen.
3. The nose bearing, a la Harlan, was home-grown. The prop shape was borrowed from a Pete Andrews prop.

The plane is a good flyer and has never disappointed me.

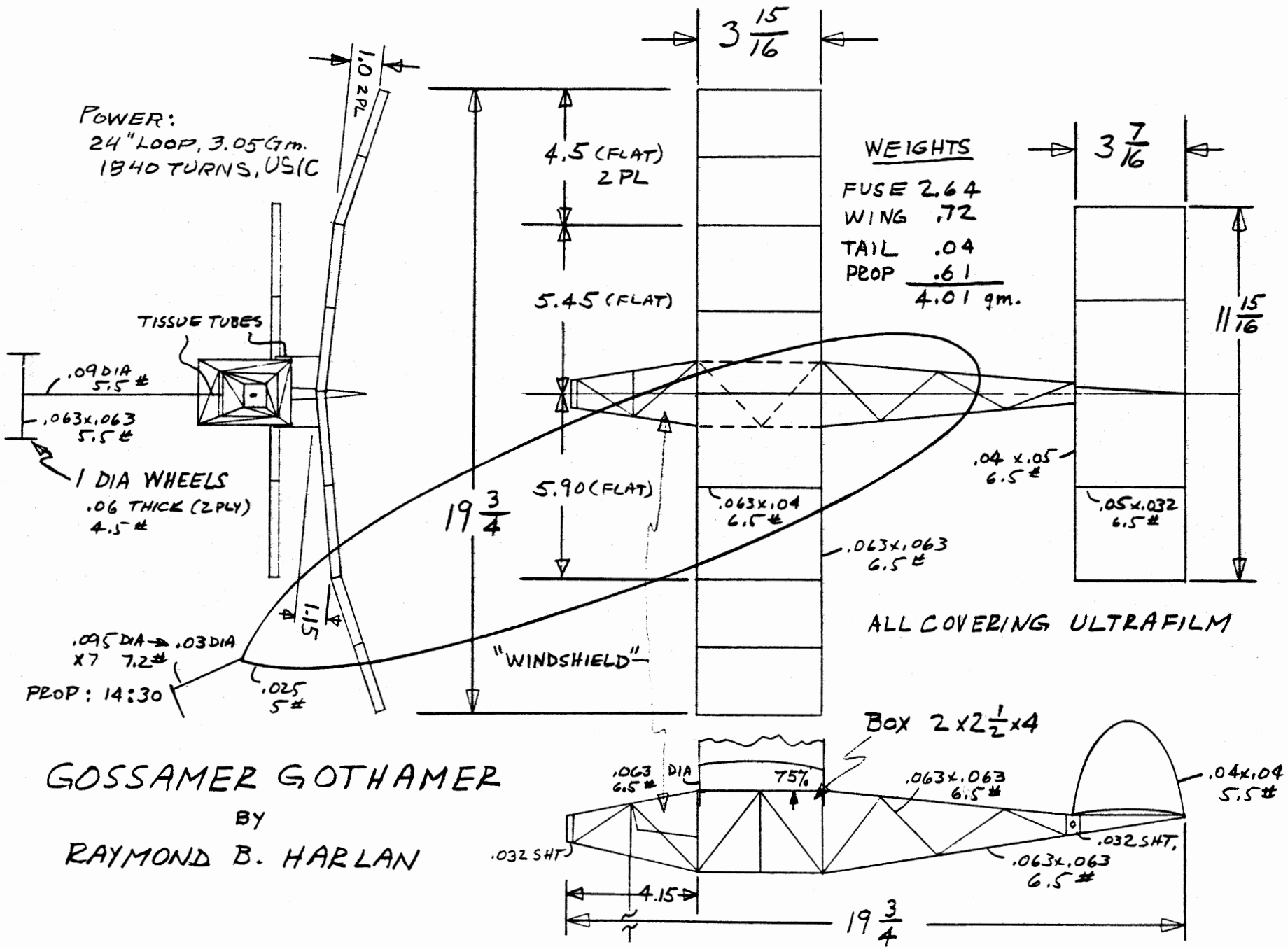
ORNITHOPTER 1st PLACE 1988 USIC 12:26

The ornithopter that did 12:16 at Johnson City in '88 was a "Klutzy Kopy of a Klassy Kieser Kthopter". The only differences were:

1. A 15" motor stick.
2. Weight was 1.7 grams (I can't seem to build light).
3. I added a small rudder in front of the elevator to help a right turn. This seemed to work only after initial torque burst. It usually climbed in a straight line and then went into a mildly climbing right circle. The top flight never touched the ceiling.
4. A loop of .060 Pirelli 16" long with around 1600 turns seemed to work well. We were all amazed when the ship landed after the winning flight almost dead stick.

I'm always baffled by the flappers, but Frank Kieser is the Guru I tip my hat to. He has such wonderful, innovative and well-considered designs ;that with all my diddling around, I almost always arrive at Frank's conclusions.





GOSSAMER GOTHAMER

BY

RAYMOND B. HARLAN

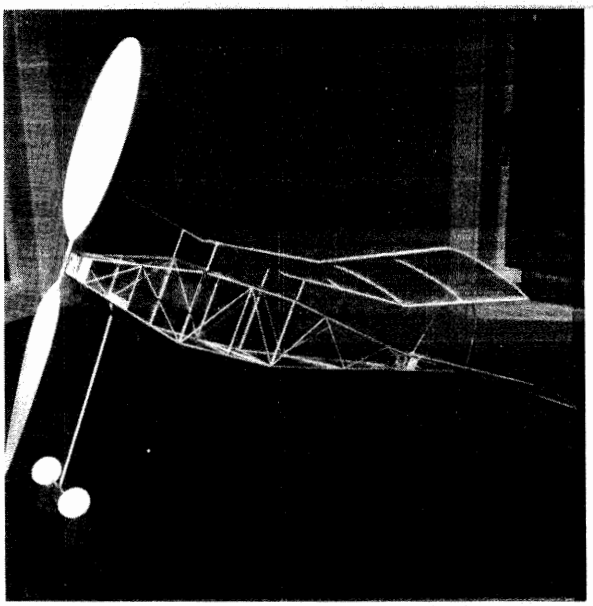
MANHATTAN 1st PLACE 1988 USIC 10:51
RAY HARLAN, Wayland, MA

When Walt Van Gorder published his Manhattan "Pieces" in Model Aviation, the article was so comprehensive that I immediately set goals for developing my own Manhattan Cabin. Since this class of model is so restricted as to be nearly one-design, there isn't much room for being creative. Only small details can be manipulated. In "Gossamer Gothamer", the wing is farther forward than Walt's, and the landing gear is a single, removable strut with a spreader bar to hold the wheels. The wing has polyhedral, which I've always appreciated. Otherwise, it is very similar to Walt's.

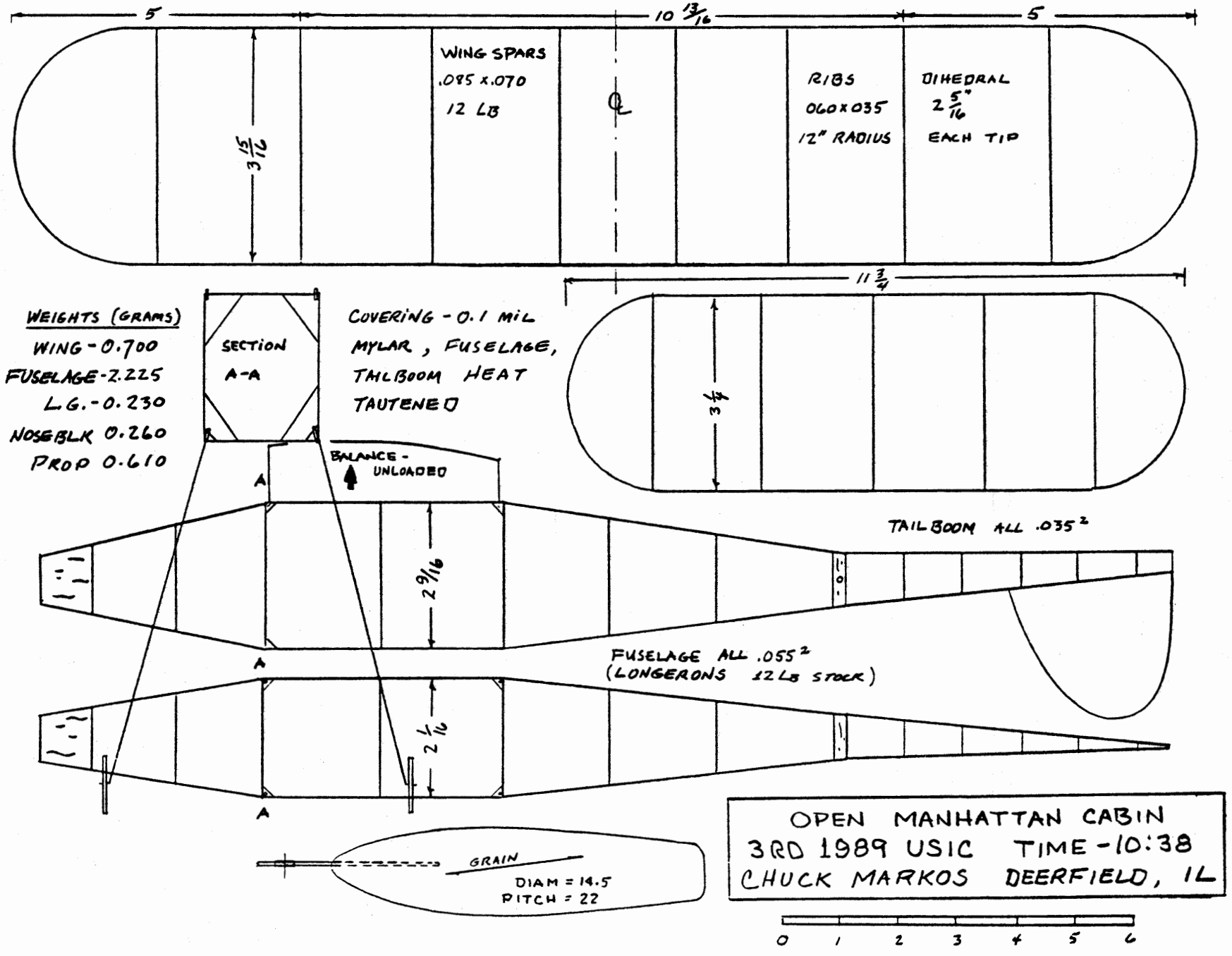
During initial layout for any competitive model, I develop an estimated weight chart, tabulating volumes x density for every piece of wood, and estimates or known weights for all other parts (glue, covering, thrust bearings, etc.) This idea of Jim Grant's is an excellent way to visualize how weight will be distributed and where some changes from the initial estimate may be made. Since most parts have round or rectangular cross-sections, their volumes are easy to compute (area x length). However, for doubly tapered spars, other formulae must be used. If you don't allow for the taper, your estimates can be way off. The weight estimate for the "Gossamer Gothamer" was 3.5 gm.; the actual model came out at 3.71 gm., so the exercise was very helpful. Two short pieces of solder glued under the CG, along the lower longerons, brought it up to weight.

One characteristic distinguishes this model from most Ultrafilm-covered models I've seen. At the 1985 Nats, Doug Barber had a Pennyplane covered with heavily wrinkled Ultrafilm. It flew noticeably slower than other models, yet performed well. Whatever the wrinkles' effect on turbulation, they didn't seem to detract from the performance, so I decided to try it. To me, the main selling point was that a slower-flying plane will have fewer opportunities to hit the girders. The film is squeezed into a tiny ball and stretched out several times. Covering with it is very easy, as it won't pull on the framework.

This model was the first Manhattan to exceed 11 minutes and won the USIC in 1988. Joe Krush beat its Cat IV time by one second at the 1989 USIC and had the unmitigated gall to apply for the record. However, he put up a more respectable margin of 24 seconds at the 1989 Nats and redeemed himself.






5
10 13/16
5
WING SPARS
.085 x.070
12 LB
RIBS
060x035
12" RADIUS
DIHEDRAL
2 5/16"
EACH TIP
3 15/16
11 3/4
3 1/4
WEIGHTS (GRAMS)
WING - 0.700
FUSELAGE - 2.225
LG. - 0.230
NOSEBLK 0.260
PROP 0.610
SECTION
A-A
COVERING - 0.1 MIL
MYLAR, FUSELAGE,
TAILBOOM HEAT
TAUTENED
BALANCE -
UNLOADED
A
TAILBOOM ALL .035²
2 9/16
FUSELAGE ALL .055²
(LONGERONS 12 LB STOCK)
2 1/16
GRAIN
DIAM = 14.5
PITCH = 22
OPEN MANHATTAN CABIN
3RD 1989 USIC TIME - 10:38
CHUCK MARKOS DEERFIELD, IL
0 1 2 3 4 5 6

MANHATTAN CABIN 3d PLACE 1989 USIC 10:38 CHUCK MARKOS, Deerfield, IL

I have built four Manhattan Cabin models. The first was grossly overweight and had trouble with its ROG takeoff because of a too high pitched prop. The second was on weight but very weak. I kept crushing the longerons during handling. The third was quite successful, posting a 9:50 to win a first at one of the West Baden USIC's. Once the event became official, two major changes in the rules were incorporated: the use of commercially available plastic films and an enlarged stabilizer. My design objectives in the present model were to use these rules changes to provide a rugged, high-performing airplane with distinctive appearance.

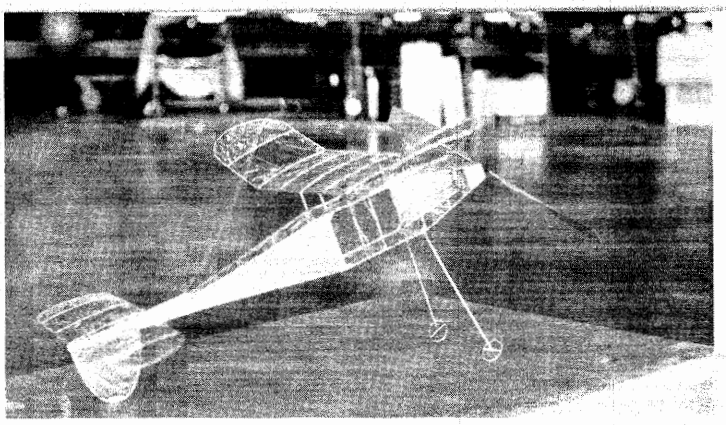
FUSELAGE: Earlier paper-covered models required diagonal truss fuselage construction to resist the torsional stress of a fully wound motor. With 0.1 mil mylar covering, heat shrinking provides sufficient torsional rigidity without the use of diagonal structural members. The extra weight saved is put into the longerons, which are 12 lb. stock 0.055 sq. As a matter of fact, no "indoor" wood is used in any of the construction. The fuselage uprights are 7-9 lb. stock. The required "box" is designed to pass processing without argument. It is built slightly oversize, and internal trusses keep it in shape after heat-shrinking the covering. Omit these trusses and the box becomes quite concave. Also, heat-shrunk covering causes less skin drag and makes more efficient use of available energy in the motor. The nose block contains an 0.015" music wire "pigtail" bearing on 1/16 x 3/16 balsa glued (with downthrust) into 3 laminations of 1/16 sheet. The propeller is thus removable as on ordinary indoor models.

PROPELLER: A large diameter (14.5") coupled with relatively low pitch (22") was used to provide both duration and ROG stability, but it requires a rather lengthy, and therefore fragile, landing gear. So the landing gear struts are in two pieces, very hard near the fuselage sockets and med hard for the lower 4". When a strut breaks, the socket is not plugged and repairs are easy. The thrust hook accepts a nylon washer O-ring winding aid, which snaps into place and is not able to twist up and out of the hook. I use the washer so that the fully wound motor can be transferred to the propeller without loss of turns. At West Baden, my thumb and forefinger became very sore after several flights from pinching the fully-wound motor during transfer; and I am convinced that the 15-20 turns lost in transfer cost me my first 10:00 flight!

WING: The wing uses very hard main spars to provide minimum flex under high torque conditions. The spars are tapered toward the tip dihedral joints. Mylar covering saves considerable weight over paper, and this weight is trans-ferred into structure wherever possible.

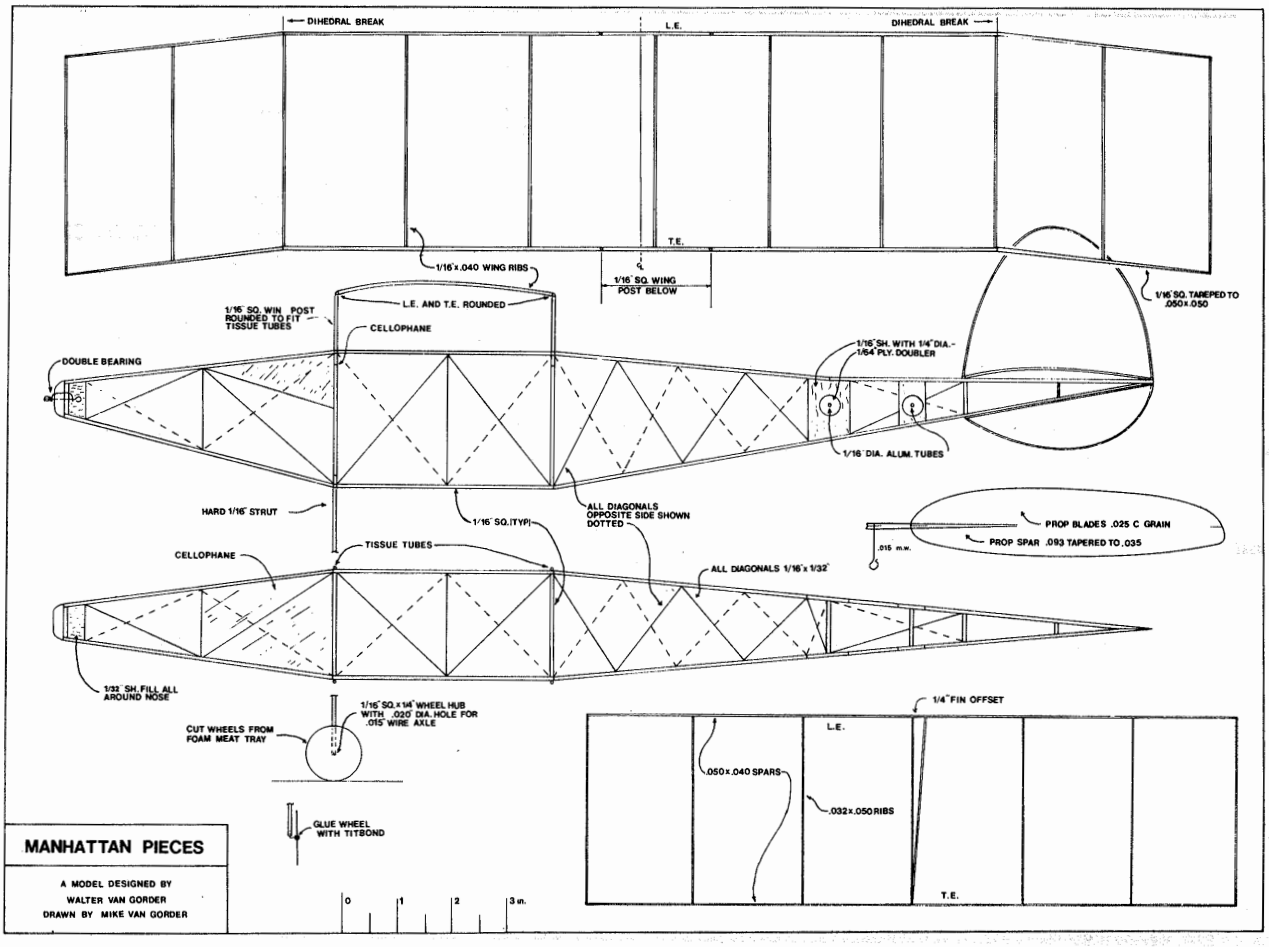
STABILIZER: The large stabilizer has two advantages over the original 8" span limit. (1) The model is stable over a greater range of varying CG's caused by changing motor sizes and knot distribution as it unwinds. (2) a better recovery from ceiling bumps is achieved - the smaller stab model would go into a shallow dive with subsequent rpm increase before climbing again at normal rpm. The better recovery results in increased efficiency.

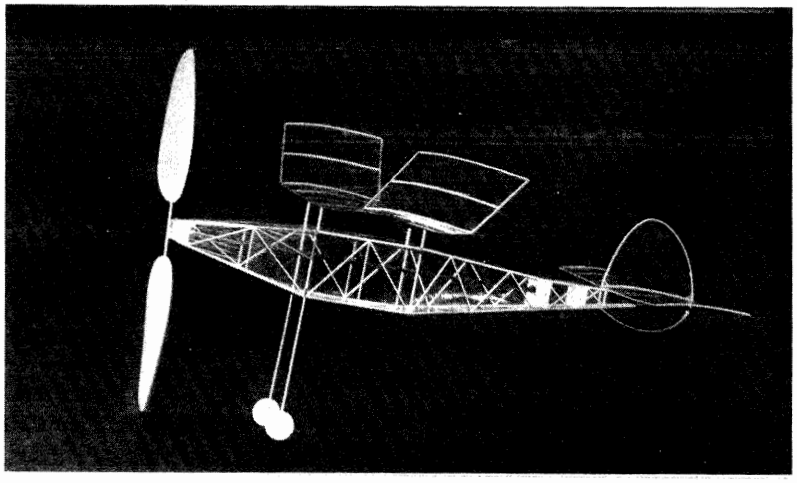
COVERING: Use 3M contact cement, thinned with toluene or Hobby-Poxy paint thinner. Brush a coat on the structure. The fuselage longerons and cross-members are treated. Hold the coated structure next to the 0.1 mil mylar and activate the adhesive with thinner applied with a brush at the juncture of wood and plastic. Overlap the sides and top/bottom covering approximately 3/32 for the fuselage. Shrink the covering only on the fuselage and tailboom with a mild iron.



MANHATTAN 1st PLACE 1987 USIC 10:50
WALTER VAN GORDER, Cincinnati, OH

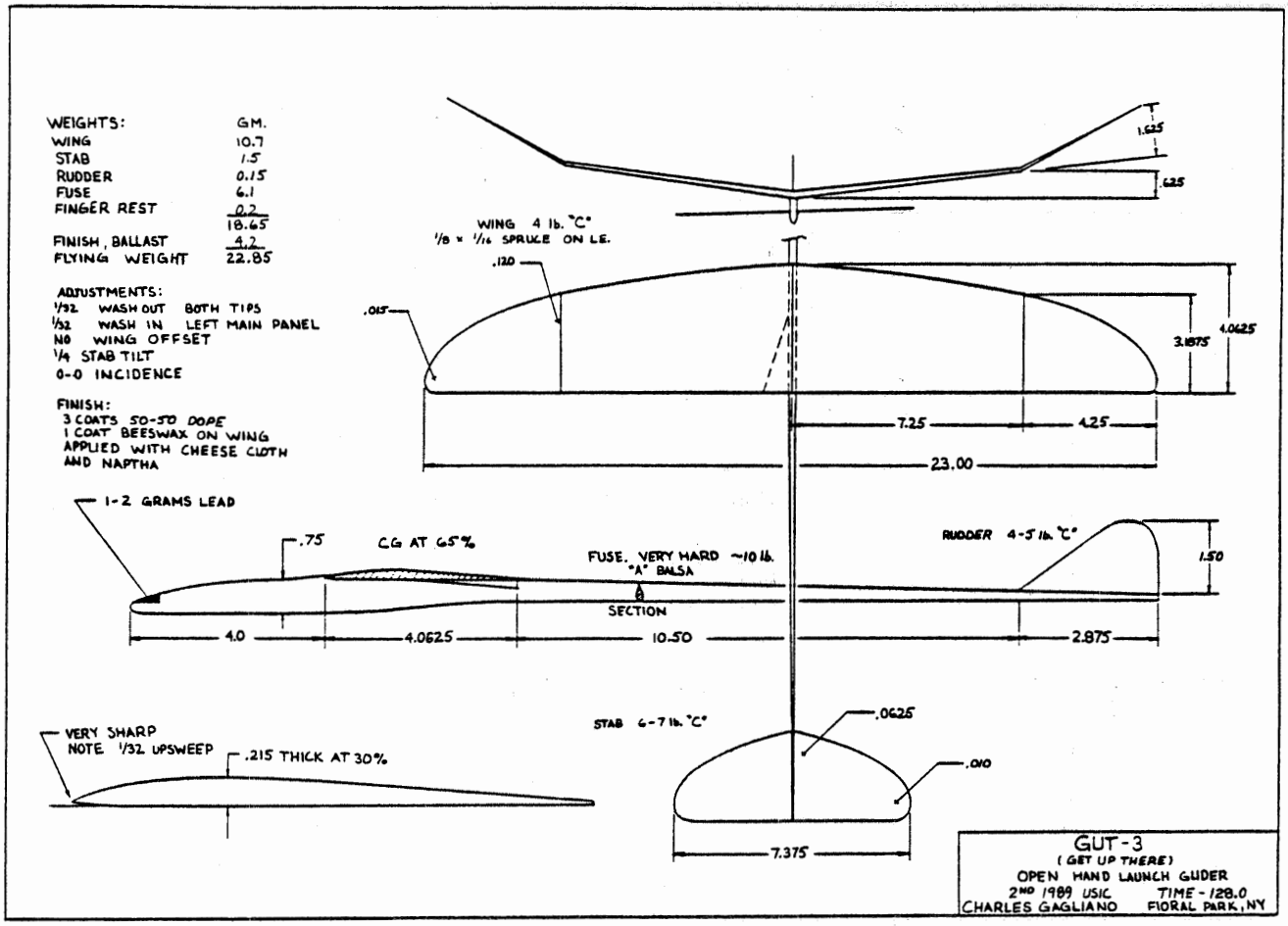
Walt's "Manhattan Pieces" has held many records and has won many contests since the early days of the Manhattan event. A full construction/flying article was published in the Jan. 1985 issue of Model Aviation. A full-size plan is available from Model Aviation c/o AMA, 1810 Samuel Morse Drive, Reston, VA 22090. They charge $3.50 for Plan 497, MANHATTAN PIECES.

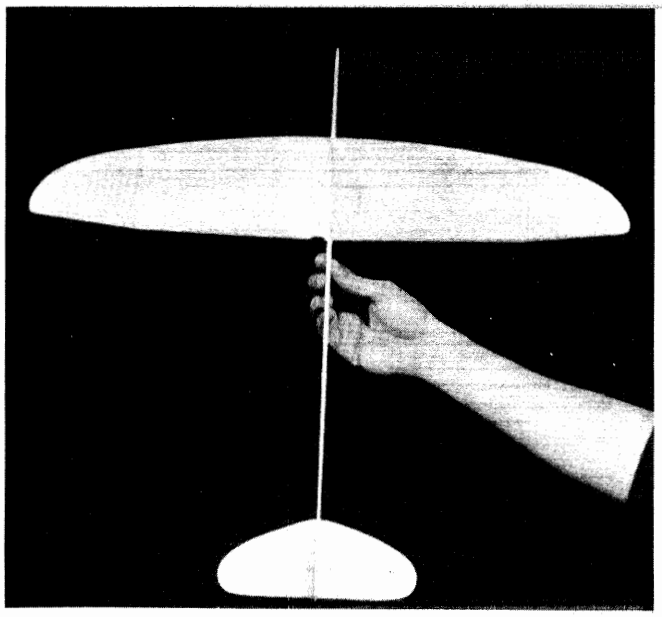




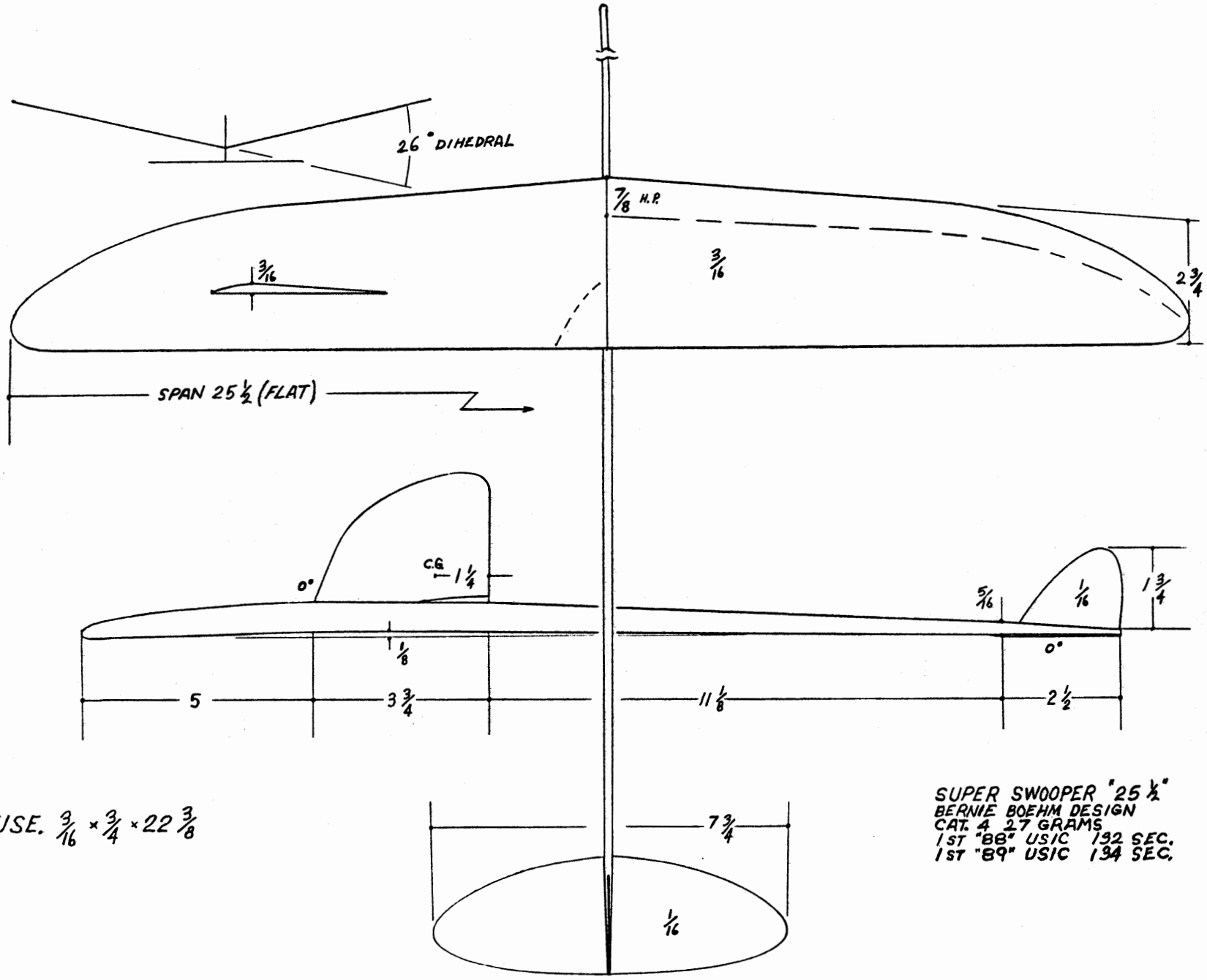
HAND LAUNCHED GLIDER 2nd PLACE 1989 USIC 128.0
CHARLES GAGLIANO, Floral Park, NY

Chuck provided a great drawing and a fine photo but no information on how he stayed within a few seconds of Glider Wizard Bernie Boehm.









FUSE. 3/16 × 3/4 × 22 3/8

SUPER SWOOPER "25 ½"
BERNIE BOEHM DESIGN
CAT. 4 27 GRAMS
1ST "88" USIC 192 SEC.
1ST "89" USIC 194 SEC.

HAND LAUNCHED GLIDER 1st PLACE 1988, 1989 USIC 132.3 - 134.8 sec.
BERNIE BOEHM, South Bend, IN

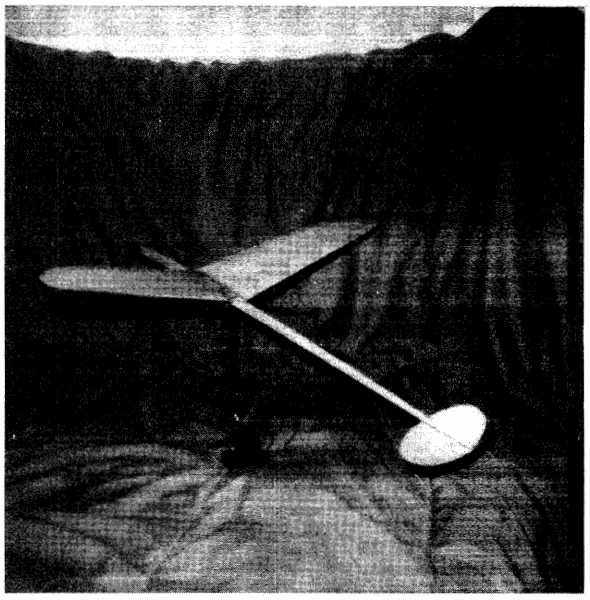
"Super Swooper", 25 1/2" span, features a relatively large, high aspect ratio, thin section, swept-back wing. The idea is that bigger is better. This design was influenced by a study that Moe Whittemore made of HLG's, with the aid of his computer. The model used in his study had 65 sq. in. of area, an a.r. of 6, weighed 12 gm., for 50-60' ceilings. The main points of his study were these:

1. A 20% increase in launch velocity increases time 22%.
2. Removing undercamber increases duration 10%.
3. A 20% decrease in section thickness increases time 10%.
4. A 20% increase in mass increases time 3%.
5. A 20% increase in area & aspect ratio increased time 3% each.

I evaluated these points one at a time:

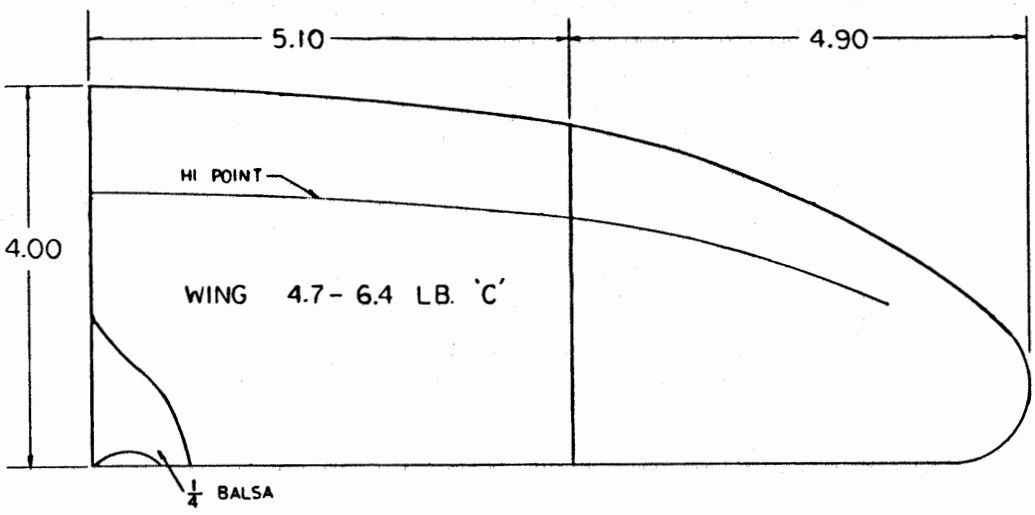
1. After you throw as hard as you can, you can eliminate 1.
2. I don't use undercamber on high ceiling gliders. Scratch 2.
3. I could do something about this one, so I tried it. I don't know whether or not it's best.
4. Mass means weight. My gliders turn out heavy enough - so I don't have any problem with heavy; I just have trouble making them light. I just let 4 take care of itself.
5. I do use this idea, but only up to a point. 100 sq. in. is the maximum under the rules, but this size is hard to throw to any decent altitude. So you just have to experiment to find the size you can throw.

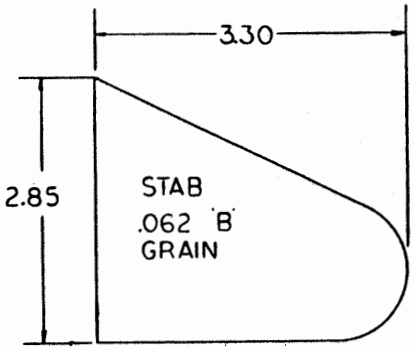
This design won two first places at Johnson City, the only place it has been flown, other than getting it adjusted, outdoors, at home. I'm not really impressed with its winning times. I feel it has the potential to do better under the right conditions. Not that conditions at Johnson City aren't good - an indoor football field - ceiling about 120 feet — I just haven't caught the right thermal yet! So try this glider - I hope you like it!

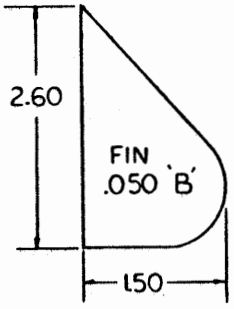


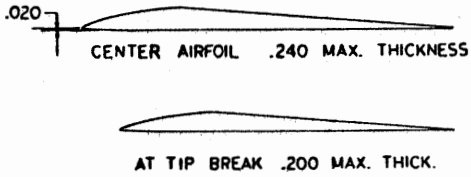


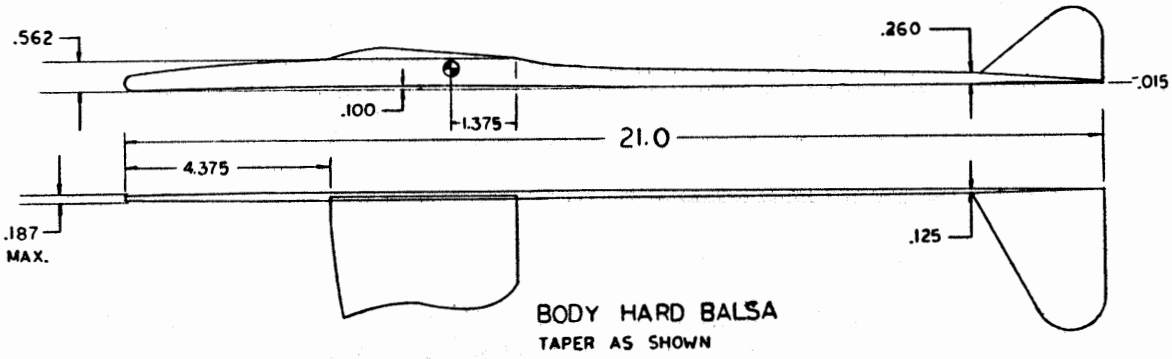
"I don't think I'll fly today...."

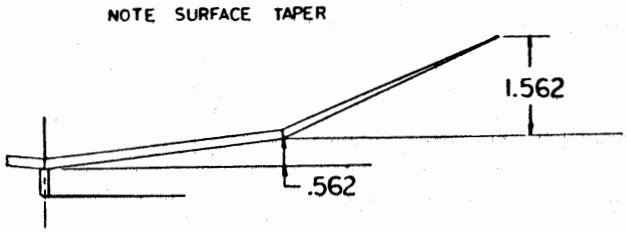










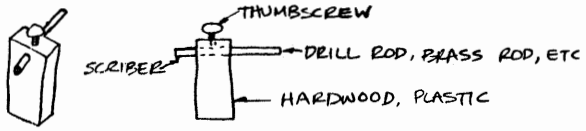


SLO - MO
INDOOR GLIDER
DESIGNED BY
OTTO HEITHECKER
DRAWN BY PAUL SHAILOR '90

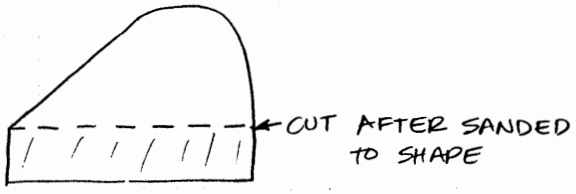
HAND LAUNCHED GLIDER 2nd PLACE 1988 USIC 125.0 sec.
PAUL SHAILOR, Mt. Clemens, MI

It's hard to believe that almost 30 years have passed since Otto Heithecker designed the Slo-Mo series of gliders in the sixties. Slo-Mo began its winning history in the Detroit State Fair Coliseum, a 65' parabolic arch building, small for ultimate Cat III performance. Otto flew an 18" version of Slo-Mo to a national record time, easily eclipsing the existing record. Immediately, almost all glider meets in Detroit and in the Midwest were won with 18" or 20" Slo-Mo's. The glider was just as successful, though not nearly as well known, as Lee Hines's Sweepettes.

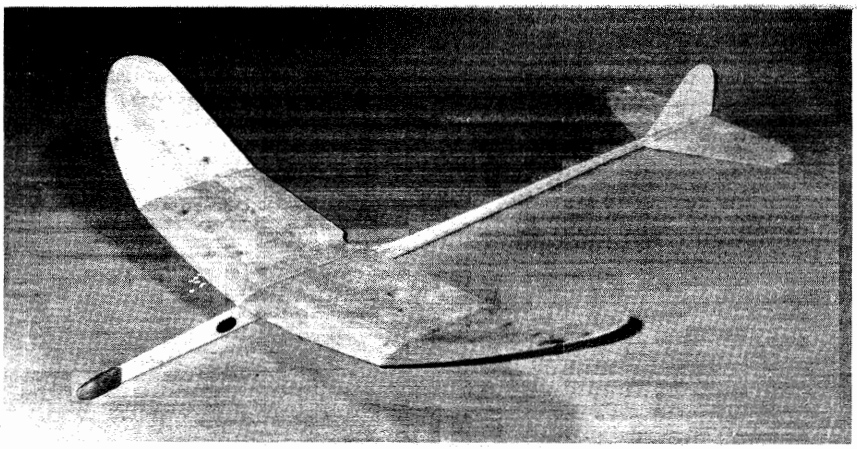
There's nothing revolutionary about this design, so I'll concentrate on some construction techniques. The wing airfoil is typical of high ceiling gliders with the high point at 28% of the chord and .020 Phillips entry (upsweep on the L.E.). To accurately form the L.E. radius and provide a groove to glue .015 monofilament, I use a marking gauge similar to the sketch. When set at .020, the scriber cuts a groove into the balsa. After the monofilament is glued in (with Ambroid), sand the upsweep into the leading edge. Then an .030 washout should be sanded into each tip. Now the wing blank is all ready to carve. Carefully maintain the highpoint location and symmetrical maximum thickness on each wing half.

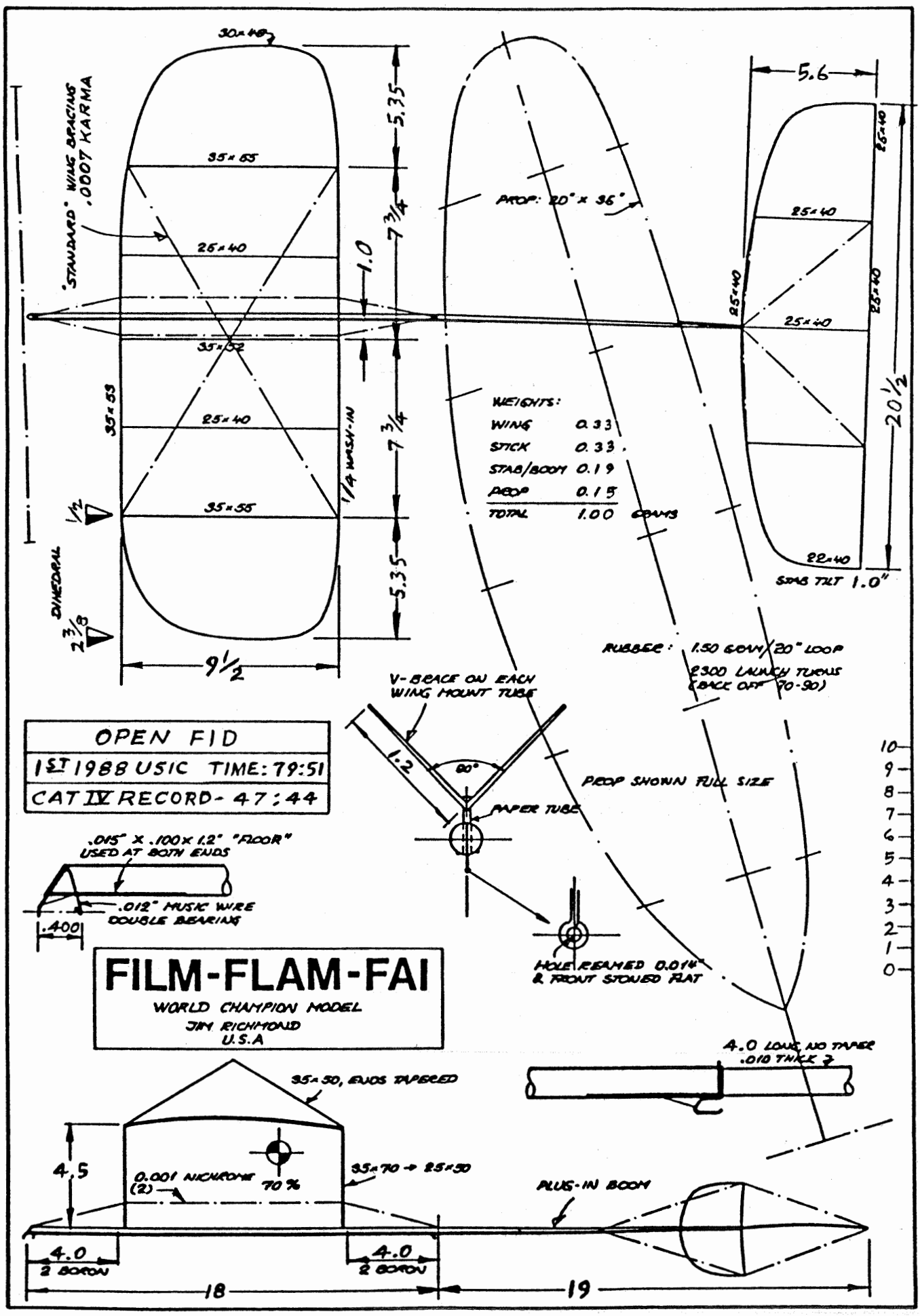


The fuselage is made from very hard, straight grained balsa. Be sure to taper the blank in top view. Tapering will allow the body to flex rather than snap upon hard landings. The stab is 1/16 light B grain, sanded to airfoil shape. Be careful to begin sanding across grain to prevent heat buildup and subsequent warpage. Finish sanding may be done with the grain to remove scratches. The fin is also light B grain. I usually leave 1/2 inch extra on the bottom edge to prevent the tips from breaking off while I am sanding this symmetrical section.



Assembly should be done accurately. Poor alignment is a leading cause of erratic launch patterns. Glider weight is somewhat governed by personal preference when flying under high ceilings, such as Johnson City. My gliders weigh 17-19 gms., but I feel that this is too light. It worked several years ago, but the new gliders will be about 20-23 grams. This weight should provide slightly higher launches with a negligible increase in the sink rate.




30×40
35×65
25×40
35×52
35×55
25×40
35×55
"STANDARD" WING BRACING
.0007 KARMA
5.35
7¾
1.0
7¾
5.35
1/4 WASH-IN
1/2
DIHEDRAL
2⅜
9½
PROP: 20" × 36"
5.6
25×40
25×40
25×40
25×40
25×40
22×40
20½
SPAS TILT 1.0"
WEIGHTS:
WING 0.33
STICK 0.33
STAB/BOOM 0.19
PROP 0.15
TOTAL 1.00 GRMS
RUBBER: 1.50 GRMS/20" LOOP
2300 LAUNCH TURNS
(BACK OFF 70-90)
V-BRACE ON EACH
WING MOUNT TUBE
1.2
90°
PAPER TUBE
PROP SHOWN FULL SIZE
OPEN FID
1ST 1988 USIC TIME: 79:51
CAT IV RECORD - 47:44
.015" X .100 X 1.2" "FLOOR"
USED AT BOTH ENDS
.012" MUSIC WIRE
DOUBLE BEARING
.400
FILM-FLAM-FAI
WORLD CHAMPION MODEL
JIM RICHMOND
U.S.A
HOLE REAMED 0.014"
& FRONT STONED FLAT
4.0 LONG NO TAPER
.010 THICK
35×50, ENDS TAPERED
4.5
0.001 NICHROME
(2)
70 %
35×70 → 25×50
PLUG-IN BOOM
4.0
2 BALSA
4.0
2 BALSA
18
19

OPEN F1D INTERNATIONAL 1st PLACE 1988 USIC 79:51
JIM RICHMOND, Carmel, IN

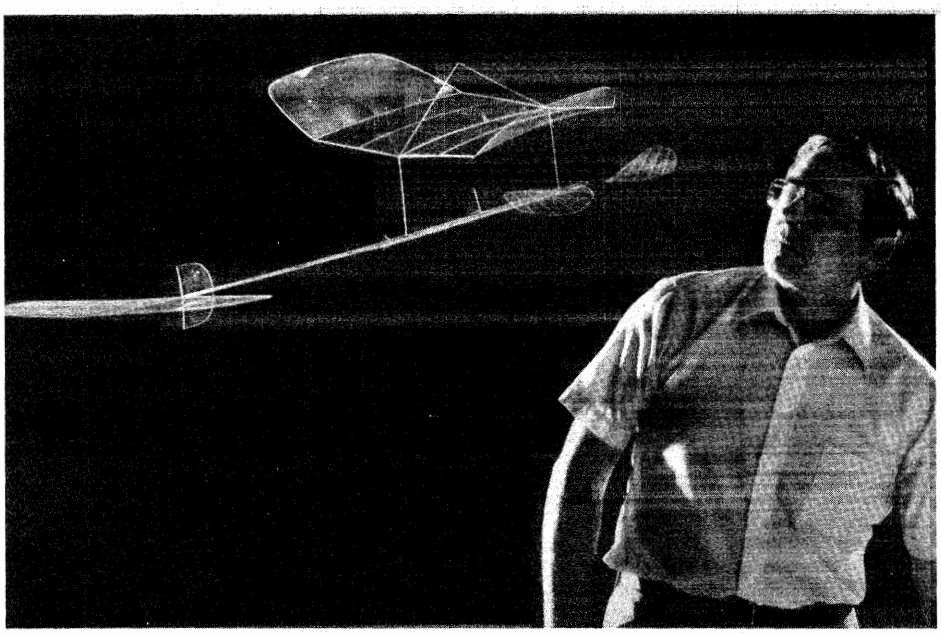
The name "Film Flam" came about as a result of the variable diameter prop "hat trick" that I came up with for the 1984 Nagoya World Championships. The plane presented here, however, is the version used at the 1986 Cardington Champs, which has a normal prop and an 18" motor stick. This is the one I flew in the 1988 USIC F1D International event.

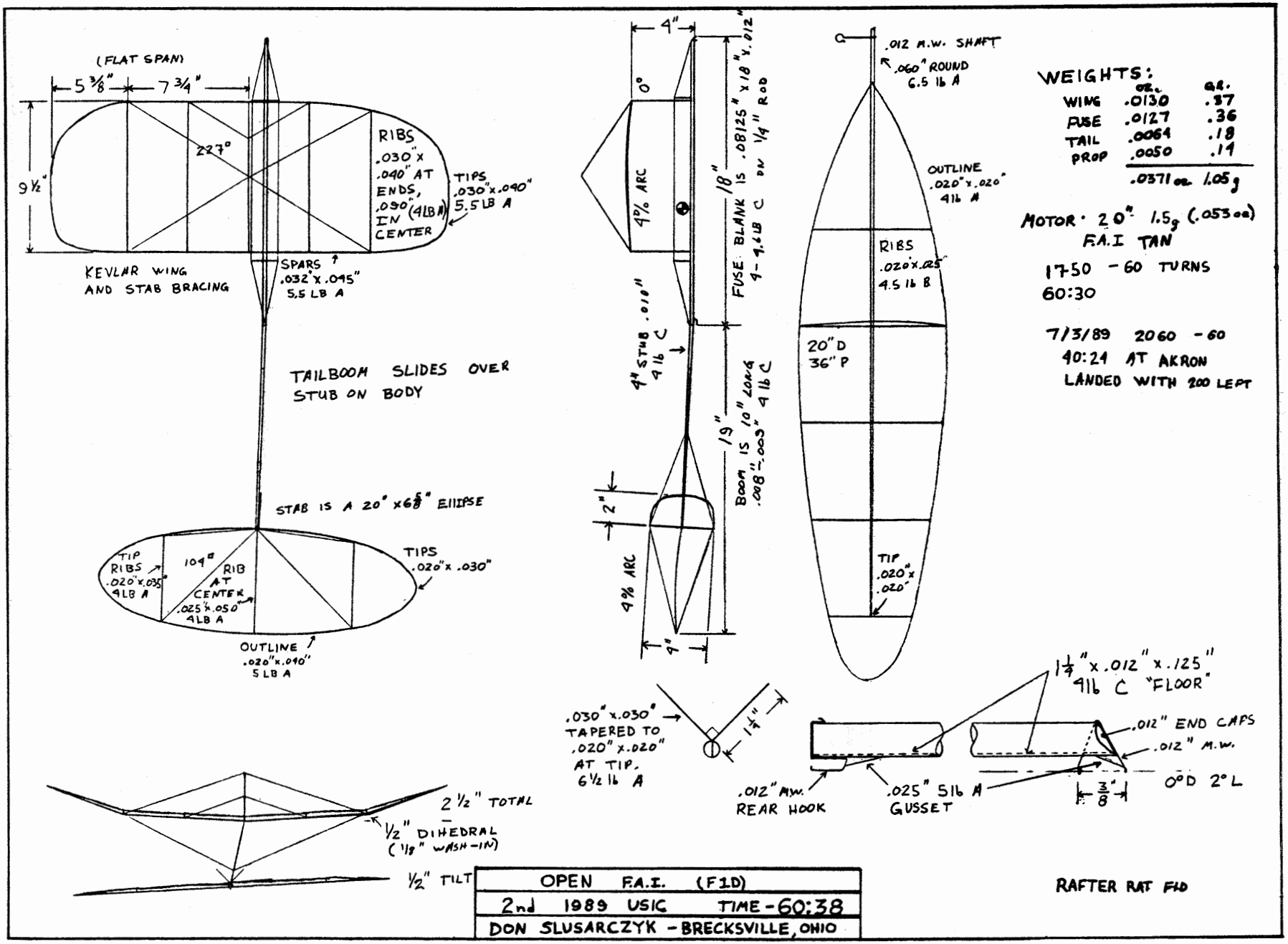
The "Film Flam" was derived from the successful "Cat Walker" design and was an effort to increase the wing area and thus reduce wing loading. The front of the wing is the "Cat Walker" shape, but 1 1/2" was added to the chord at the rear to get the new form. A larger version of the "Cat Walker" stab was used, as needed by the larger wing, and the overall length was increased.

Coming right after the World Championships, the F1D International event was a good opportunity to see how well the same type of plane could perform with a normal prop, the variable diameter prop having been used to win the World Champs. It appears that the VD prop does have a slight edge at this ceiling height.

For info regarding wood sizes and weights, airfoils, rib construction, thrust line and incidence adjustments, see the write-up in this Manual on the "Film Star".

[See Hand Launched Stick event - Ed.]





WEIGHTS:

	oz.	gr.
WING	.0130	.37
FUSE	.0127	.36
TAIL	.0064	.18
PROP	.0050	.14
	.0371 oz	1.05 g

MOTOR · 20" 1.5g (.053 oz)
F.A.I TAN
17-50 - 60 TURNS
60:30

7/3/89 2060 - 60
40:24 AT AKRON
LANDED WITH 200 LEFT

OPEN F.A.I. (F1D)
2nd 1989 USIC TIME - 60:38
DON SLUSARCZYK - BRECKSVILLE, OHIO

RAFTER RAT F1D

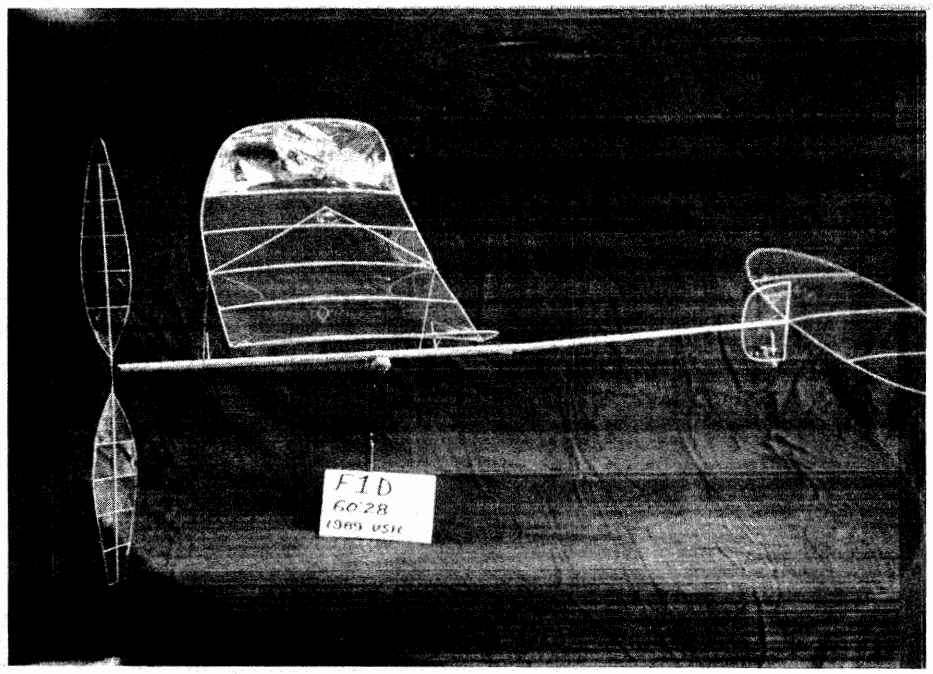
F1D INTERNATIONAL 2nd PLACE 1989 USIC 60:38
DON SLUSARCZYK, Brecksville, OH

I started flying F1D in 1987. My first models were very small in size, with 6.5" wing chords and only 30" long. The full potential of these models was achieved in the second half of 1987, at the U. S. Team Finals held in Santa Ana, California. Needless to say, I was excited to be in the Finals, since I had started flying F1D only six months before and was only 15 years old. The models I flew were maxed out at 34:34. I realized that a larger model was needed, which would float down and grab those extra few vital minutes.

I experimented with models of different wing designs, props, lengths and stabilizers. I ended up with a model having 9.5" wing chord, 18" body, a large stab (48%), and a 39" overall length. The result has been a very consistent as well as a very competitive model.

The model uses conventional microfilm building techniques and traditional materials. Unlike most other FAI models, it has no boron in it. The only high-tech material is the Kevlar bracing on the wing and tail. It should be noted that my model has only the minimum of wing bracing. The extra upper wire on the wing is to prevent the wing from getting into the "ladder" effect, when one wing is washed out while the other is washed in. This bad effect occurs only when the model's flight is disrupted severely, as from a bad steer or from a hard bump on a girder. I have never had any of my wings fail in flight with this standard type of wing bracing.

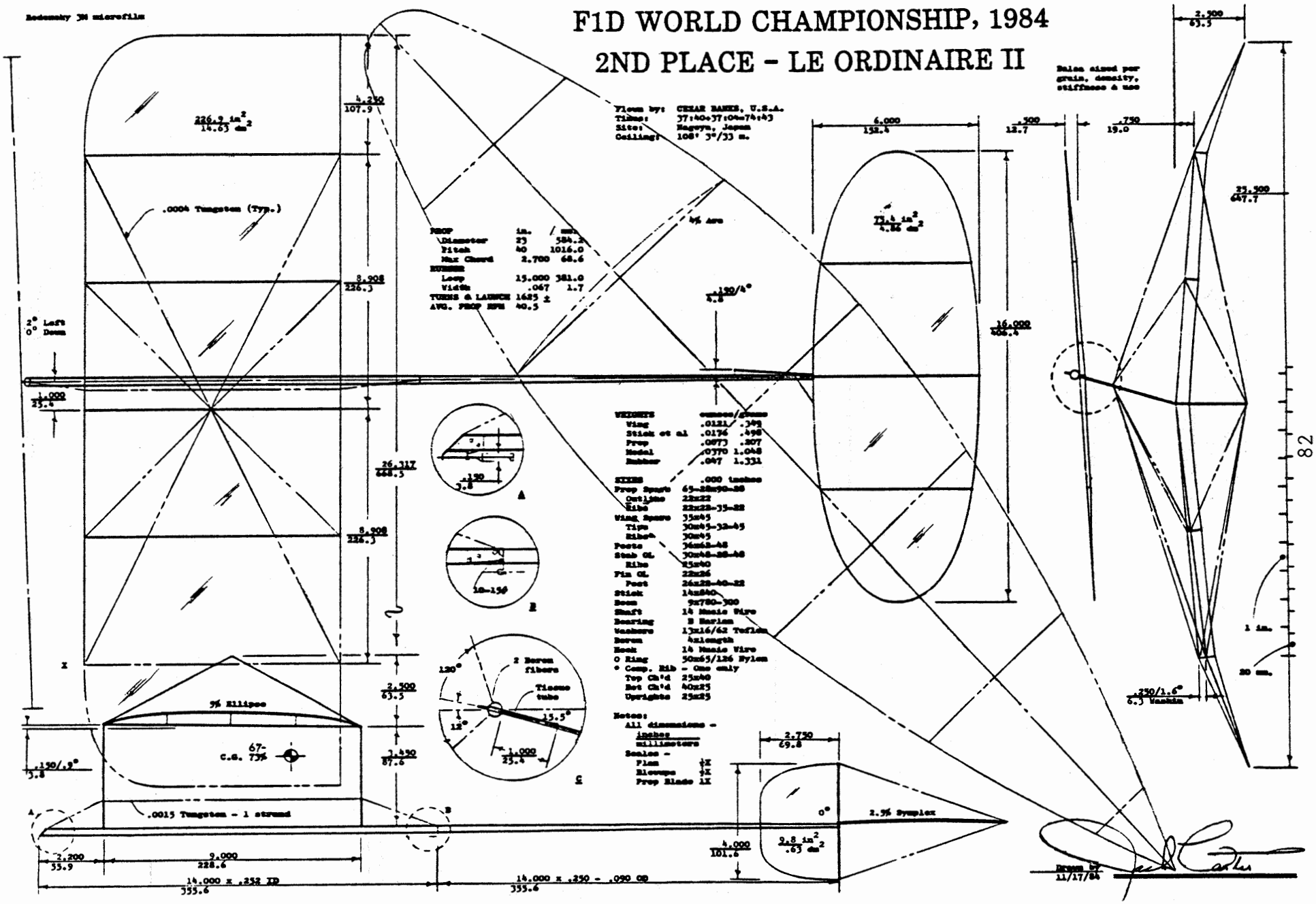
The model has proven to be a very good-flying one. During the 4th of July meet at Akron, the model made a 40:24 flight and won the Regional as well as setting a new Cat.IV record. The model flies on a piece of FAI Tan that is 20" long and weighs 1.5 grams. This design also gave me 6th at the 1989 U. S. Team Finals with two flights over 37:00.



Kodansky 3M microfilm

F1D WORLD CHAMPIONSHIP, 1984

2ND PLACE - LE ORDINAIRE II



Good F1D designs which include construction articles are almost non-existent. This detailed drawing of Cezar Banks's 1984 Nagoya ship is the next best thing. In addition to the fine design, there is a wealth of construction information there, which will help in getting a model built. Cezar's modifications listed below bring this proven design up to his 1989 version's specifications.



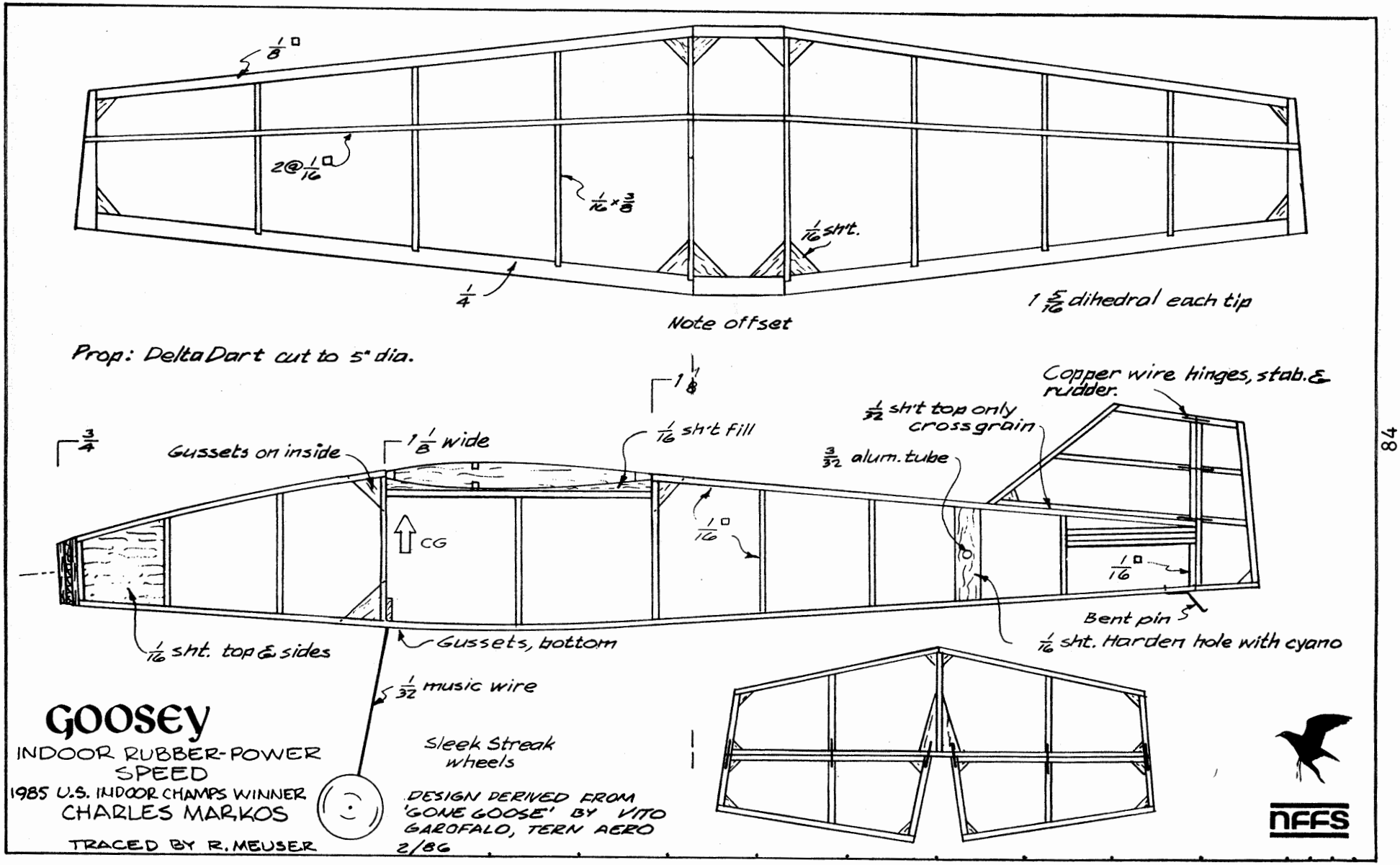
CEZAR BANKS:

The model shown on the plans and used at Nagoya '84 World Championships is very much like my current ('86 on) F1D planforms, but with two changes. The motor stick length has been increased to 16 inches, and the stab has been enlarged to 6.5 x 17 inches. Overall length is now 34.5 inches. The 16-inch motor stick is a better fit for the motors I use, and the larger stab has helped stability at initial launch.

I do most of my testing with 1/5 motors, 4/5 weighted dummy sticks to save time, conserve rubber, and also allow use of low ceiling sites like gymnasiums and meeting halls, which every community has. With careful record keeping and study of these records, plus the experience of many tests, I have been able to interpret these low ceiling test flight results into a reasonable estimate of performance to be expected in a high ceiling site.

I used Variable Pitch props at Johnson City during the '88 World Championships, and also to make the '90 team at the Kibbee Dome during the '89 Nats. These props are very tricky, to say the least, but have the potential for spectacular times in a Cat. III or lower site. I try to set my prop so that it "comes in" (starts going to lower pitch) at about the 28-32 minute mark to compensate for the "sagging" torque at this point in the flight. Of course, all of this implies that the first 30 minutes of the flight must have been optimum as far as altitude, cruise, etc., are concerned, if I am now to take advantage of the VP feature. Thus, VP is by no means a cure-all for a poorly performing model, but rather serves as an "enhancer", IF you've done everything else optimally "in the old-fashioned way", and IF the VP prop then does its thing optimally, too.




1/8 □
2@1/16 □
1/16 × 3/8
1/16 sht.
1/4
1 5/16 dihedral each tip
Note offset
Prop: Delta Dart cut to 5" dia.
1 1/8
Copper wire hinges, stab. & rudder.
1/32 sht top only cross grain
3/4
Gussets on inside
1 1/8 wide
1/16 sht fill
3/32 alum. tube
CG
1/16 □
1/16 □
Bent pin
1/16 sht. top & sides
Gussets, bottom
1/16 sht. Harden hole with cyano
1/32 music wire
Sleek Streak wheels
GOOSEY
INDOOR RUBBER-POWER SPEED
1985 U.S. INDOOR CHAMPS WINNER
CHARLES MARKOS
TRACED BY R. MEUSER
DESIGN DERIVED FROM 'GONE GOOSE' BY VITO GAROFALO, TERN AERO
2/86
nFFS

An indoor rubber speed model has to complete two airborne circuits around two strings, supported twenty feet apart by helium balloons. The calculated minimum distance is 125.6 feet, but only for a model with no dimensions and no margin of error in the flight path. Practically, a diameter of 25 feet is about as close as you can cut it. This practical consideration expands the course to a distance of 157 feet for two circuits, if the model doesn't climb much. Based on these assumptions, "Goosey" was probably traveling at close to 18 mph (ave.) but was credited with 14.2 mph to win the open speed event at the 1985 Indoor Champs held at Niagara Falls. Total elapsed time was 6.01 seconds. Actually, I believe that the flight path is not two perfect circles, as the launch angle is not tangent to the circular course, but cuts a secant (in other words, I took a short cut.)

First, the model has to hold the course for two circuits, not an easy task for any model but magnified in difficulty by the speeds these models can reach and by the great change in forces as the motor unwinds. I decided to try a high wing model to provide stability through a wide range of adjustments. I usually fly this type of model in a right-hand circular pattern, so the circle doesn't enlarge as power winds down. But the torque burst with this adjustment usually causes some squirrelly patterns at first. To use the torque burst and the rapid acceleration that comes with it, a left circle pattern was used. To keep the circle from widening, I used standard indoor adjustment: offset wing, wash in left, wash out right, 3° down and 1° left thrust. The rudder and elevators provided crucial fine adjustments.

Since the model must be airborne as it crosses the start and finish line, build light to avoid long taxi runs and to get quick acceleration to maximum speed. I used a symmetrical airfoil which supposedly generates lift only at an angle of attack. Hence it is important to launch the ROG model at the correct attitude for each flight as you study adjustments. The LG held the model in a three-point stance for each takeoff. I believe it is a bad idea to leave off the LG to reduce drag, as I noticed different patterns based on release techniques with this model. You have to fight the torque by twisting a little to the right on release, or the model will ground loop. Some models had very small wings. The wing should be large enough to control torque and sustain flight.

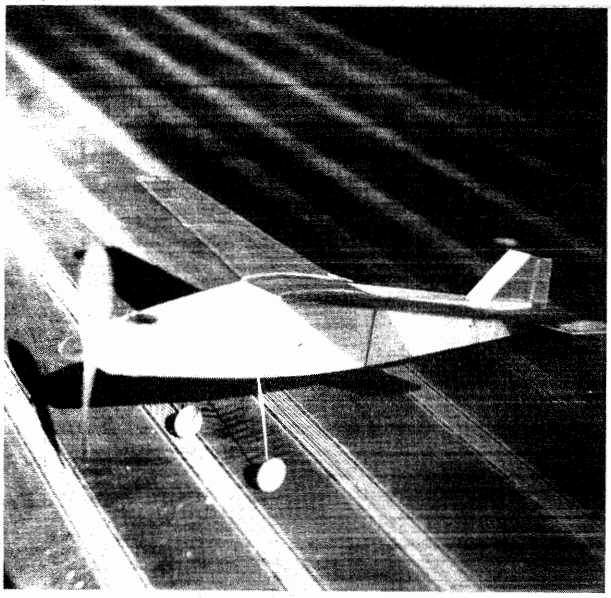
Adjustability is the next key to a successful speed flight. This model has movable tail surfaces (elevator and rudder) hinged with copper wire. I found the area of the elevator surfaces to be much too large. Slight adjustments brought extreme flight changes. The independent elevators were used to control roll and bank angles. The box fuselage holds adjustments better than a stick, and thrust adjustments with shims are easy to calibrate.

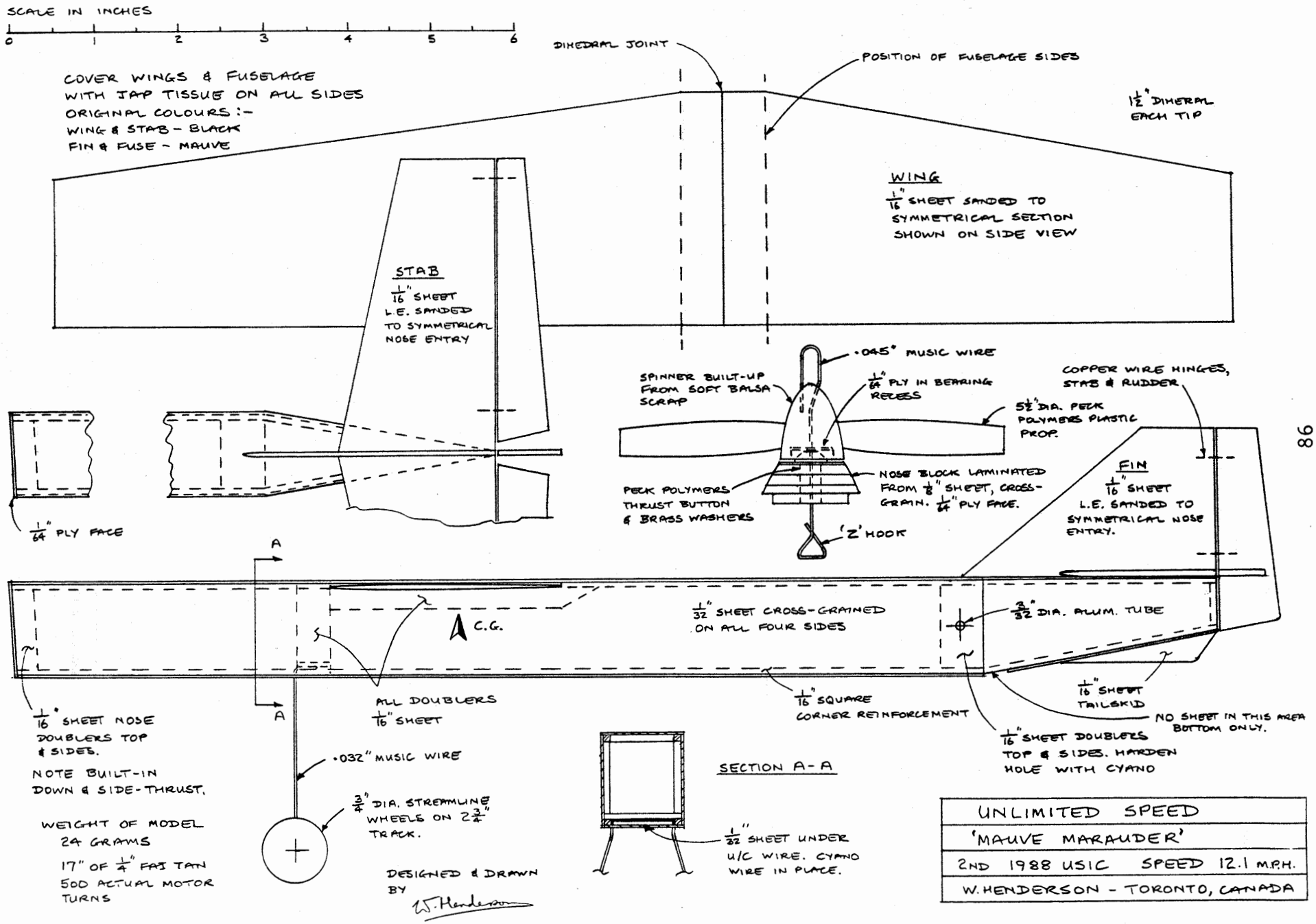
Sneak up on the optimum adjustment for the speed course. I tried to arrive at a stable configuration which would approximate the correct pattern under low power. Subsequent testing and all contest attempts were made with 4 strands of .085 Pirelli. Adjust the circle diameter with rudder and elevator. Control climb by adding weight to the nose. The winning flight stayed under ten feet altitude.

The propeller was cut down from a Delta Dart with a 1/16" aluminum tube liner. The thrust hook from 1/32 music wire got bent from collisions and was straightened twice during the event. Once it hit my shoe as I was trying to get out of the flight path after launch. I recommend an .047" thrust hook with a nylon bearing (a la P-30) for this model.

The wing was constructed with 1/16 x 3/8 rectangular rib blanks glued to the LE and TE. The symmetrical airfoil was shaped with sandpaper and the 1/16 sq. spar notches were then cut. The whole model was built on Sunday, June 16 (Father's Day) of 1985, the day before we left for Niagara... I even went to church.

The winning time of 6.01 sec. at the 1985 contest is not an all-time record. Martin Varney had a 5.49 sec. run at the 1982 Indoor Champs at West Baden, but then everything flew better there. His model, a Folkerts Toots peanut speed model, was reported to be the only indoor model ever to draw blood from an inattentive bystander who wandered onto the course. Thrills, spills, danger and life in the fast track. Try it.




SCALE IN INCHES
0 1 2 3 4 5 6
COVER WINGS & FUSELAGE WITH JAP TISSUE ON ALL SIDES
ORIGINAL COLOURS :-
WING & STAB - BLACK
FIN & FUSE - MAUVE
DIHEDRAL JOINT
POSITION OF FUSELAGE SIDES
1½" DIHERAL EACH TIP
WING
1/16" SHEET SANDED TO SYMMETRICAL SECTION SHOWN ON SIDE VIEW
STAB
1/16" SHEET L.E. SANDED TO SYMMETRICAL NOSE ENTRY
1/64" PLY FACE
.045" MUSIC WIRE
SPINNER BUILT-UP FROM SOFT BALSA SCRAP
1/64" PLY IN BEARING RECESS
5½" DIA. PECK POLYMERS PLASTIC PROP.
PECK POLYMERS THRUST BUTTON & BRASS WASHERS
NOSE BLOCK LAMINATED FROM ⅛" SHEET, CROSS-GRAIN. 1/64" PLY FACE.
'Z' HOOK
COPPER WIRE HINGES, STAB & RUDDER
FIN
1/16" SHEET L.E. SANDED TO SYMMETRICAL NOSE ENTRY.
A
A
C.G.
1/32" SHEET CROSS-GRAINED ON ALL FOUR SIDES
3/32" DIA. ALUM. TUBE
1/16" SHEET NOSE DOUBLERS TOP & SIDES.
NOTE BUILT-IN DOWN & SIDE-THRUST.
ALL DOUBLERS 1/16" SHEET
1/16" SQUARE CORNER REINFORCEMENT
1/16" SHEET TAILSKID
NO SHEET IN THIS AREA BOTTOM ONLY.
1/16" SHEET DOUBLERS TOP & SIDES. HARDEN HOLE WITH CYANO
.032" MUSIC WIRE
¾" DIA. STREAMLINE WHEELS ON 2¾" TRACK.
WEIGHT OF MODEL 24 GRAMS
17" OF ¼" FAI TAN 500 ACTUAL MOTOR TURNS
DESIGNED & DRAWN BY W. Henderson
SECTION A-A
1/32" SHEET UNDER U/C WIRE. CYANO WIRE IN PLACE.
UNLIMITED SPEED
'MAUVE MARAUDER'
2ND 1988 USIC SPEED 12.1 M.P.H.
W. HENDERSON - TORONTO, CANADA

UNLIMITED RUBBER SPEED 2nd PLACE 1988 USIC 12.1 mph WILLIAM HENDERSON, Toronto, Ontario, Canada

This model, the "Mauve Marauder", is the 3d model in a series that originated in 1985. Built specifically for the open indoor speed event, it was heavily influenced by QUAIL, Jim Lewis's outdoor speed model (NFFS Model of the Year, 1977). No. 1 in the series used tissue covered 1/16 sheet wing and tail surfaces and a heavy 3/32 sheet box fuselage. Originally intended for a multi-strand motor, it could not resist the torque of anything more than 2 strands of 1/4 rubber. It also had a bad tendency to climb, and this, combined with a difficult ROG pattern, caused veering to the right before turning left, making it a challenge to achieve two complete laps. The model did finally cooperate, giving a two-lap speed of 8.5 mph to take second to Chuck Markos at the 1985 USIC in Niagara Falls.

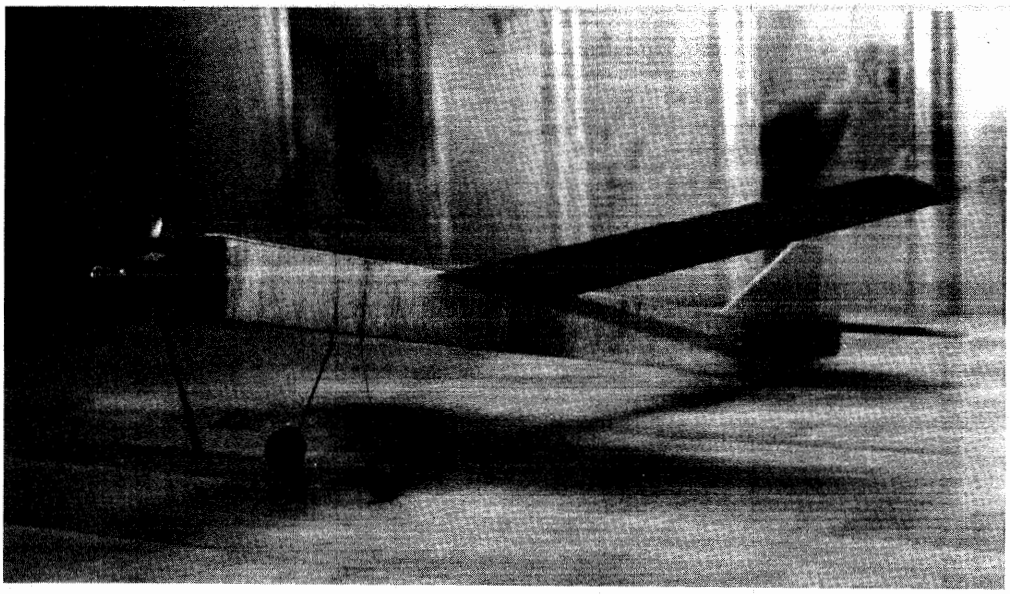
No. 2 was a completely new model for 1986, with fuselage lightened to a 1/32 sheet box and built-up flying surfaces. The wing used was a 5/16 thick symmetrical airfoil and was adjustable along the top of the fuselage. This version either climbed excessively or spun in and proved impossible to trim for level flight. The adjustable wing was a disaster, having to be readjusted for each flight and proving to be very critical on CG position; a 1/32" misplacement was enough to change the pattern from a climb to a dive.

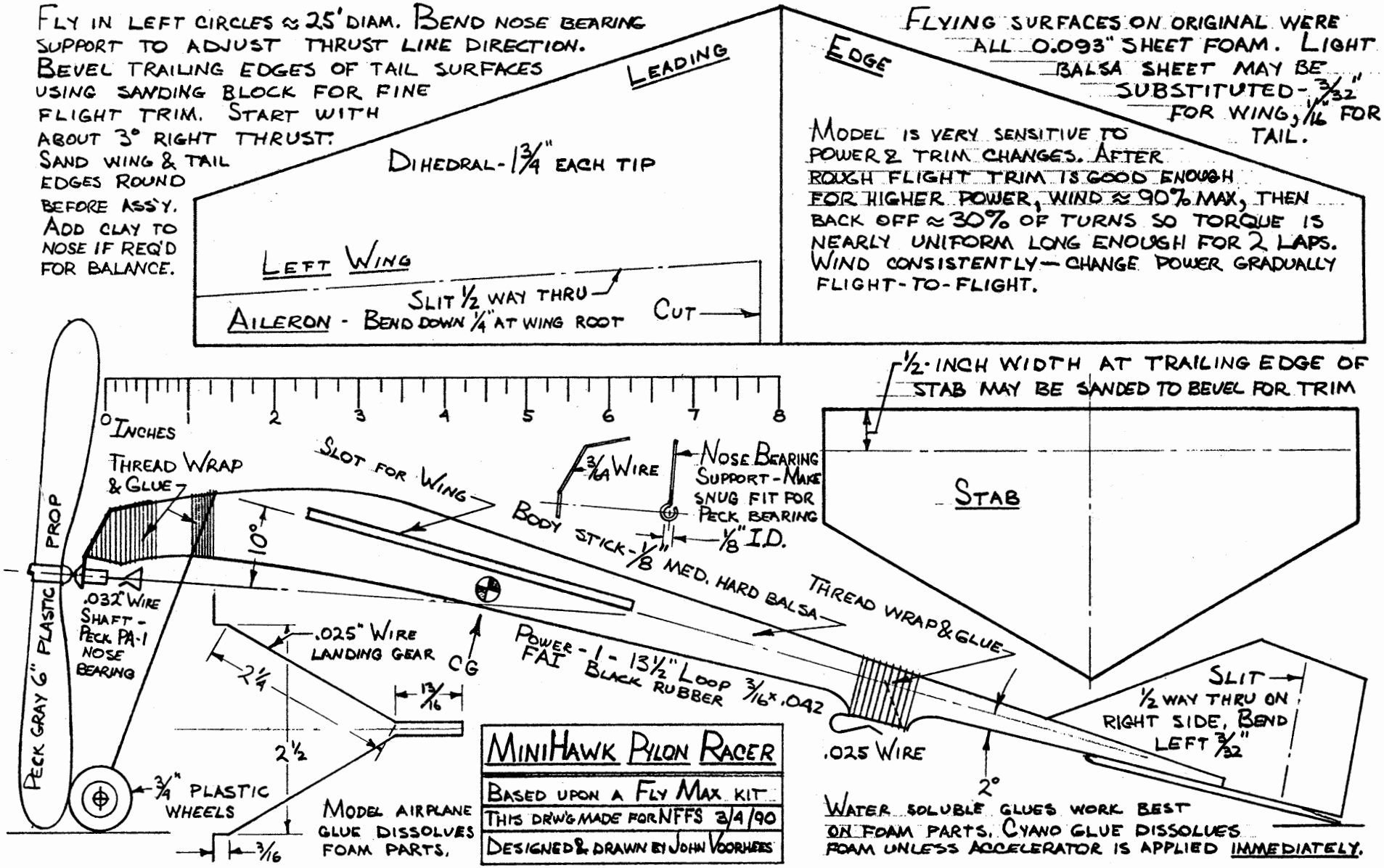
Thin, adjustable, tissue-covered 1/16 wings for 1987 did not get the model airborne long enough, and so it was back to the drawing board and a review of the pre-war rubber speed model literature. An article by Louis Garami on the Arrow Speedster (MAN, Apr 1938) gave some clues on speed-model design using tissue-covered sheet wings, especially the following statement:

> "The main features of the Arrow Speedster are, the ease with which it takes off the ground and the perfectly straight course it flies without climbing. In case the builder gets tired of this sort of flying, a built-up wing will convert the ship into a sky rocket with a climb of 1000 feet in 2 seconds." (Note that this ship flew on 32 strands of 1/8 rubber.)

The present model is the result of following Garami's advice by staying with a tissue-covered sheet wing built into the fuselage. This, combined with a much larger fin and stab, makes trimming a lot easier, since nose/tail weight plus small incidence changes on the elevators and rudder are all that is required to achieve level flight. The new model proved to be pretty tame to trim. With a little ballast in the tail, it put in a 12.1 mph flight at the 1988 USIC in Johnson City to take second place once again to Chuck Markos.

The name of the model? It was simply due to my finding some very old mauve Japanese tissue that I used on the fuselage and fin.




FLY IN LEFT CIRCLES ≈ 25' DIAM. BEND NOSE BEARING SUPPORT TO ADJUST THRUST LINE DIRECTION.
BEVEL TRAILING EDGES OF TAIL SURFACES USING SANDING BLOCK FOR FINE FLIGHT TRIM. START WITH ABOUT 3° RIGHT THRUST.
SAND WING & TAIL EDGES ROUND BEFORE ASS'Y.
ADD CLAY TO NOSE IF REQ'D FOR BALANCE.
LEADING EDGE
DIHEDRAL - 1¾" EACH TIP
LEFT WING
SLIT ½ WAY THRU
AILERON - BEND DOWN ¼" AT WING ROOT
CUT
FLYING SURFACES ON ORIGINAL WERE ALL 0.093" SHEET FOAM. LIGHT BALSA SHEET MAY BE SUBSTITUTED - 3/32" FOR WING, 1/16" FOR TAIL.
MODEL IS VERY SENSITIVE TO POWER & TRIM CHANGES. AFTER ROUGH FLIGHT TRIM IS GOOD ENOUGH FOR HIGHER POWER, WIND ≈ 90% MAX, THEN BACK OFF ≈ 30% OF TURNS SO TORQUE IS NEARLY UNIFORM LONG ENOUGH FOR 2 LAPS. WIND CONSISTENTLY — CHANGE POWER GRADUALLY FLIGHT-TO-FLIGHT.
½-INCH WIDTH AT TRAILING EDGE OF STAB MAY BE SANDED TO BEVEL FOR TRIM
0 INCHES 1 2 3 4 5 6 7 8
THREAD WRAP & GLUE
SLOT FOR WING
3/16 WIRE
NOSE BEARING SUPPORT - MAKE SNUG FIT FOR PECK BEARING
1/8" I.D.
BODY STICK - 1/8 MED. HARD BALSA
STAB
10°
PECK GRAY 6" PLASTIC PROP
.032" WIRE SHAFT - PECK PA-1 NOSE BEARING
.025" WIRE LANDING GEAR
CG
POWER - 1 - 13½" LOOP 3/16 x .042 FAI BLACK RUBBER
THREAD WRAP & GLUE
SLIT ½ WAY THRU ON RIGHT SIDE, BEND LEFT 3/32"
2¼
13/16
2½
¾" PLASTIC WHEELS
3/16
.025 WIRE
2°
MODEL AIRPLANE GLUE DISSOLVES FOAM PARTS.
MINIHAWK PYLON RACER
BASED UPON A FLY MAX KIT
THIS DRW'G MADE FOR NFFS 3/4/90
DESIGNED & DRAWN BY JOHN VOORHEES
WATER SOLUBLE GLUES WORK BEST ON FOAM PARTS. CYANO GLUE DISSOLVES FOAM UNLESS ACCELERATOR IS APPLIED IMMEDIATELY.

UNLIMITED RUBBER SPEED 3d PLACE 1987 USIC 11.27 mph
JOHN E. VOORHEES, Sidney, OH

The MiniHawk was originally designed and kitted as an easy-to-build, decent-flying outdoor rubber model for rank beginners. The indoor speed model presented here is simply the kit model with a few minor changes.

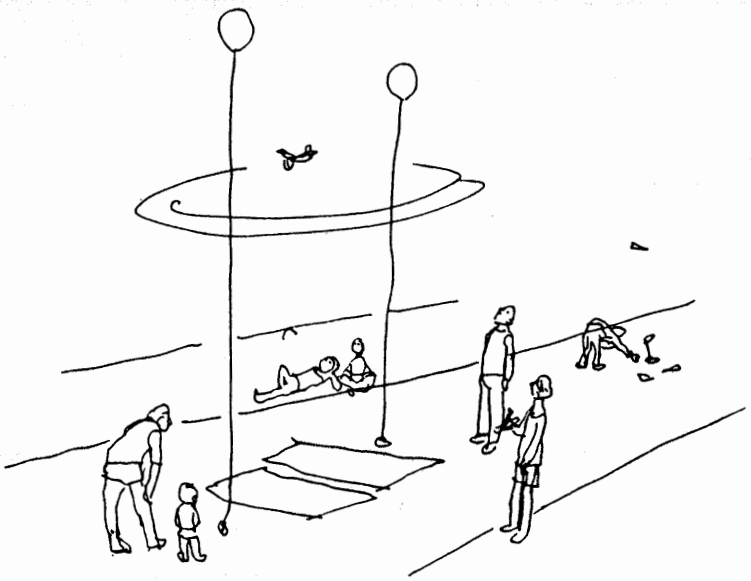
The indoor speed event is flown around two "pylons" spaced 20 feet apart. Two laps are timed following an ROG launch. The event is a lot of fun, but it can be hard on airplanes, as crashes are commonplace.

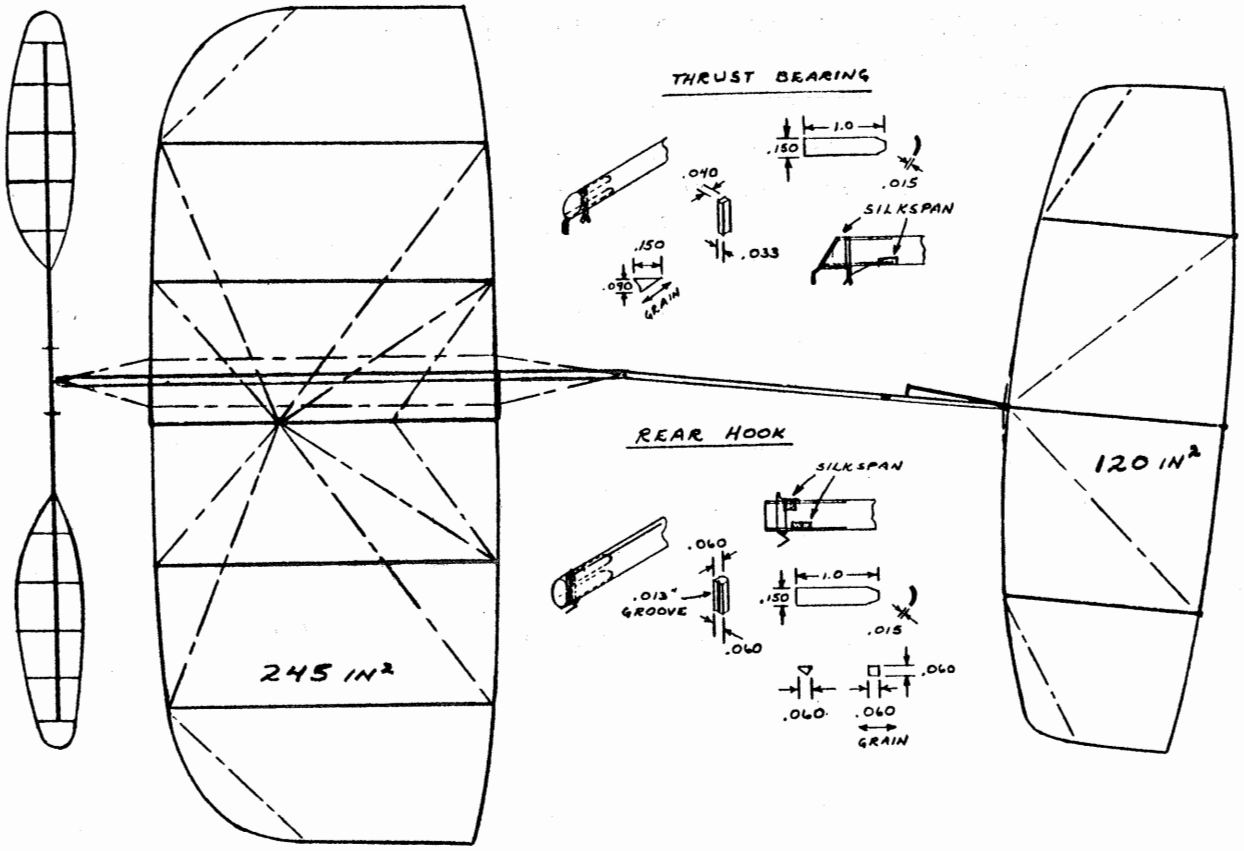
As a lazy modeler, I didn't want to invest much time in building a speed model, but I did want to participate in the event. By simply adding a wire landing gear, a different support for the prop shaft to permit thrust line adjustment, and an aileron to hold the inside wing up ... PRESTO! A pylon racer!

The MiniHawk does have some virtues for the speed event. It can take a lot of abuse and is easily and quickly repaired if damaged. The plastic prop is very efficient and tough. The open motor means that winding is fast and easy, permitting many flight attempts in a given time period. In addition, the normal CG location is at about the middle of the motor, permitting changes of motor length or cross section without changing the model's trim. The stick body offers low drag, and the thin, flat wing is also hard to beat in that respect.

The speed event really calls for a lopsided airplane that is inherently stable when flying in tight circles. To prevent excessively sharp banking, this model could probably be improved by raising the CG so that centrifugal force does not increase the angle of bank. The lift of the inside wing is increased on the MiniHawk by using a down-deflected aileron. This setting also increases drag on the inside wing, contributing to the turning tendency. With a left turn and normal prop rotation, torque tends to increase the angle of bank. Right thrust is used to offset this effect. Useful experiments might include flying to the right (with the aileron on the right wing) and raising the CG.

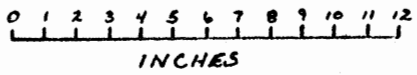
Motor torque should change very little during the timed run. It helps to use a long motor, wind it to high torque, and then back off perhaps 30% of the turns to reach a lower torque that can be sustained for two circles around the pylons.

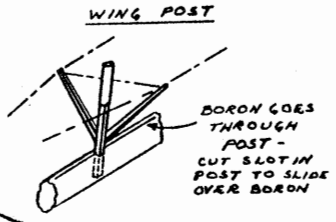




VARIABLE DIAMETER PROPELLER

23 DIA EXTENDED
19 DIA RETRACTED
36 INITIAL PITCH

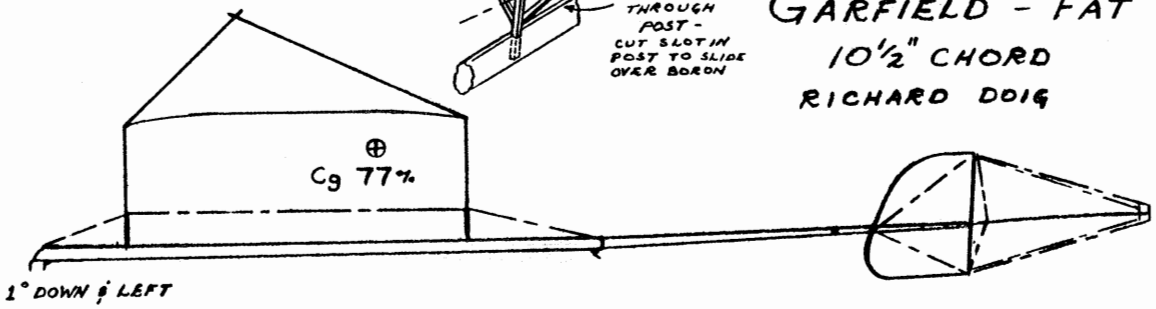




GARFIELD - FAT F1D

10½" CHORD

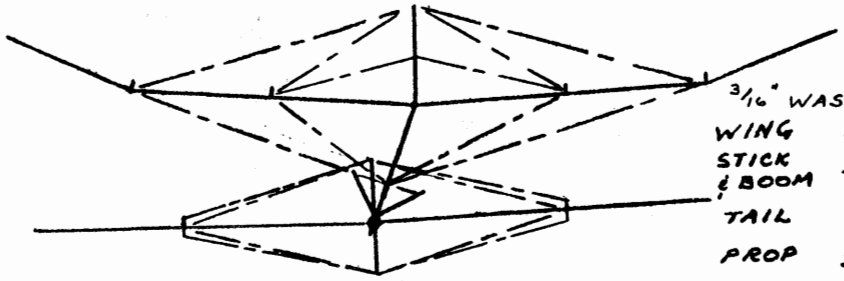
RICHARD DOIG



POWER .055"x.042" PIRELLI
18" LOOP
.053 oz (1.50g)
2300 TURNS

USIC RECORD

1ST PLACE F1D 1987 & 1989
1ST PLACE AMA STICK 1989
BEST USIC FLIGHT 38:19



3/16" WASH IN

WING	.0144	(.409)
STICK & BOOM	.0172	(.488)
TAIL	.0068	(.193)
PROP	.0109	(.309)
TOTAL	.0493	(1.399)

After the 1984 USIC, I had destroyed all my models except for a large (300 sq in) HL Stick body and tail section. I needed to build an F1D fast for Akron in 2-1/2 weeks. I had only time to build a wing, so why not size it to mate with the 300 stab I had? The F1D rules limited the span to 65 cm, so this would mean an exceptionally wide chord. The combination flew well enough (38:46) that I began to pursue it as a design all its own, named "Garfield, the fat F1D".

In 1989, times in F1D were slightly lower because of rain showers on and off during the event. I had intended to fly a 300 square inch "D" stick model in the AMA stick event, but the model hung up on its first flight, and I destroyed the wing retrieving it. So I also flew "Garfield" in AMA stick.

The model shown in the accompanying drawing, the 7th version, has performed best in medium-high ceilings. The wide chord gives exceptionally low wing loading. The second unique feature of this model is the Variable Diameter Propeller. The principle is that of the propeller developed by 5-time World Champion Jim Richmond but is built with a different hinge arrangement, using Teflon washers for bearings rather than the bent wire parts used in the Richmond design. This type of prop allows flying on very small rubber sizes, while still having enough power for a good long cruise after the prop folds. Since this version is very tricky to adjust, I am still hopeful that I can build a version using springs in place of the rubber band.

The design seems to have relatively high drag and requires more power than 9" chord models flown with the same propellers. It won't get all the way to the roof in very high ceilings (over 150'). However, once it gets up, it is a "floater", with its large surface area. The real advantage is the small rubber size; the all-up flying weight is about the same as a 9" chord model using a conventional prop.

The swept-forward cabane is a change made after I had broken several wings with conventional cabanes during retrieval and steering. It seemed impractical to run wing wires to a king post at the wing leading edge, because wires need to run forward from the king post to balance the tension. The swept-forward cabane does offer a good compromise, and I have broken far fewer wings since I went to this bracing scheme.

Another unusual feature is the wing mounting system. The lower 3/4" of the wing post is installed into the motor tube, and a 1/2" long tissue socket is used on top of this piece. The remaining 3-1/2" post has the wires attached 1/2" from the end, so that when the wing is installed, the wire locations and overall post length remain the same, but the wing will pack in a space one inch thinner. No weight is added except for one additional glue joint per post.

The current design has several other "state of the art" features, including these:

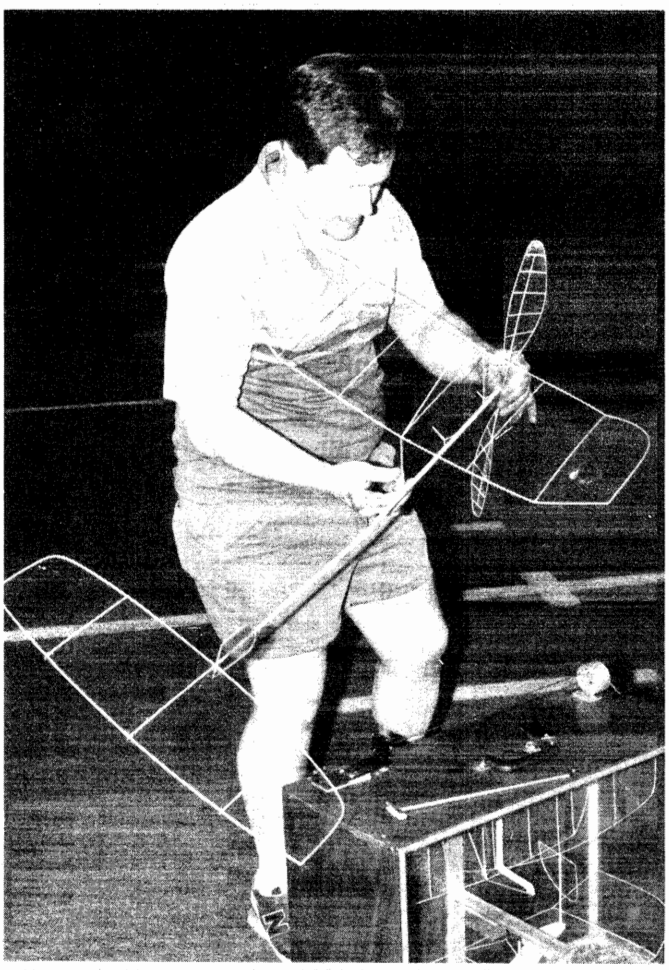
1. Adjustable stab incidence and twist.

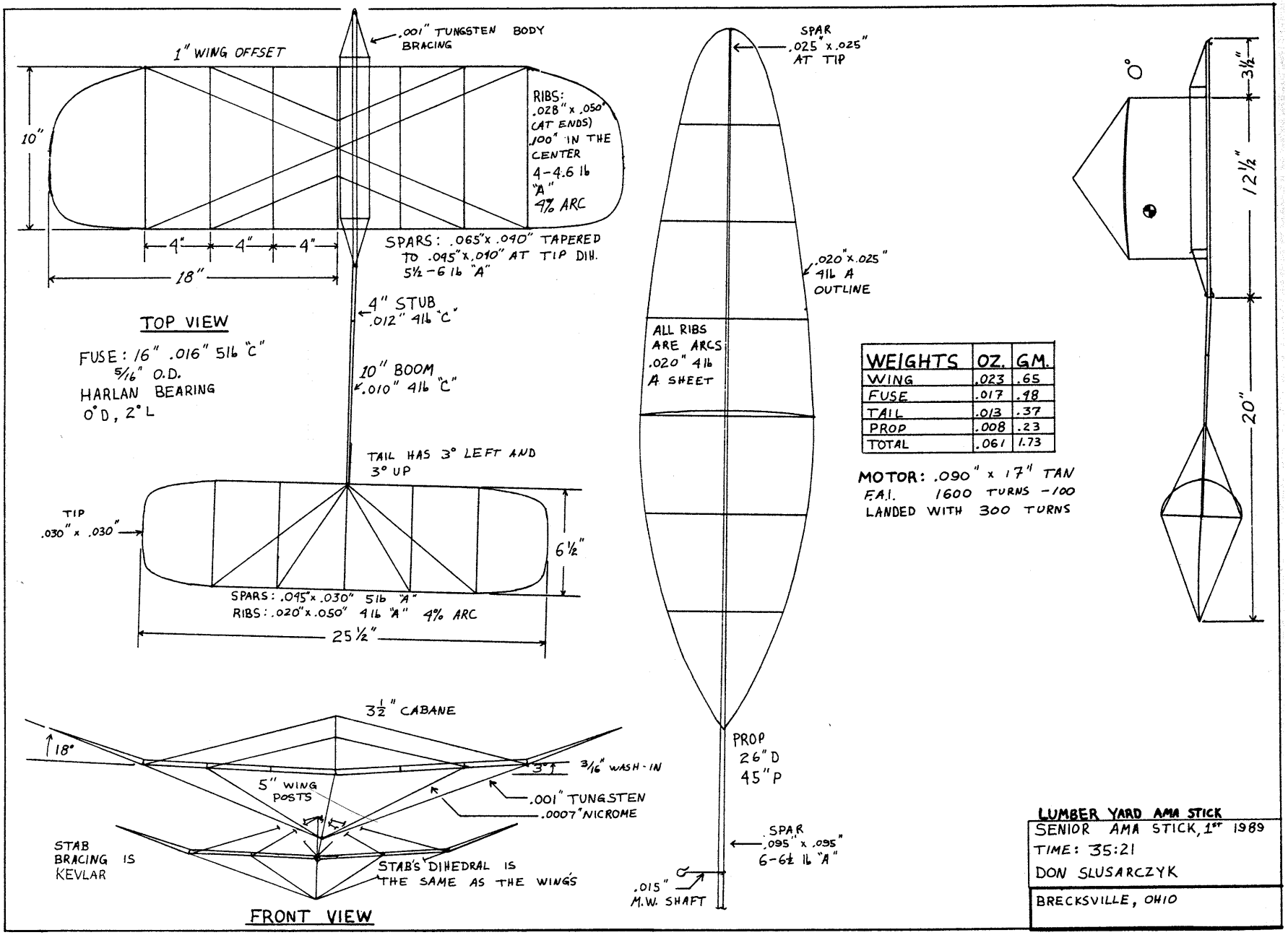
2. Fully suspended stab with no tail boom under the stab (to save weight).

3. Extensive use of boron and Kevlar filaments to add strength and save weight.

4. Plug-in tail boom. The joint is at the front of the rudder, allowing the tails to be packed in a very small box.

The primary problem I have had with this design is running out of turns. (Isn't that a problem with every design?) The Pirelli I have left simply will not take enough turns to increase the performance, so I am really looking forward to flying with the new FAI Tan rubber I've received, since my tests show that it will take more turns.





WEIGHTS	OZ.	GM.
WING	.023	.65
FUSE	.017	.48
TAIL	.013	.37
PROP	.008	.23
TOTAL	.061	1.73

MOTOR: .090" x 17" TAN
F.A.I. 1600 TURNS -100
LANDED WITH 300 TURNS

LUMBER YARD AMA STICK

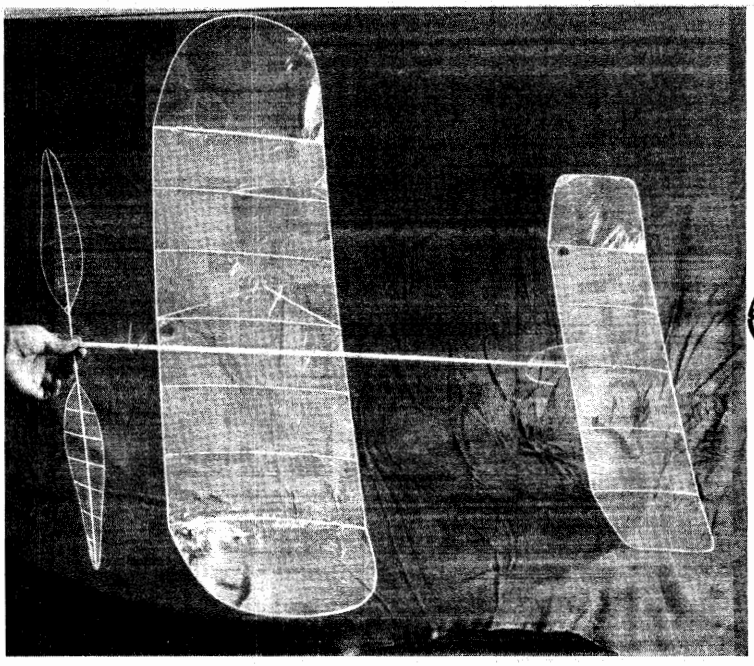
SENIOR AMA STICK, 1ST 1989
TIME: 35:21
DON SLUSARCZYK
BRECKSVILLE, OHIO

JR/SR HAND LAUNCHED STICK 1st PLACE 1989 USIC 35.21
DON SLUSARCZYK, Brecksville, OH

When I started flying microfilm, it quickly became apparent that an F1D model was not competitive in AMA Stick. The main reason was that the wingspan was restricted to 65 cm. on the F1D. I needed to design a large model, at least 300 square inches, to be competitive with the other flyers. My initial design was a stretched-out F1D, but the wing area was not great enough. So I settled on a wing of 36" span with a 10" chord. This new wing would give me an area of approximately 360 square inches.

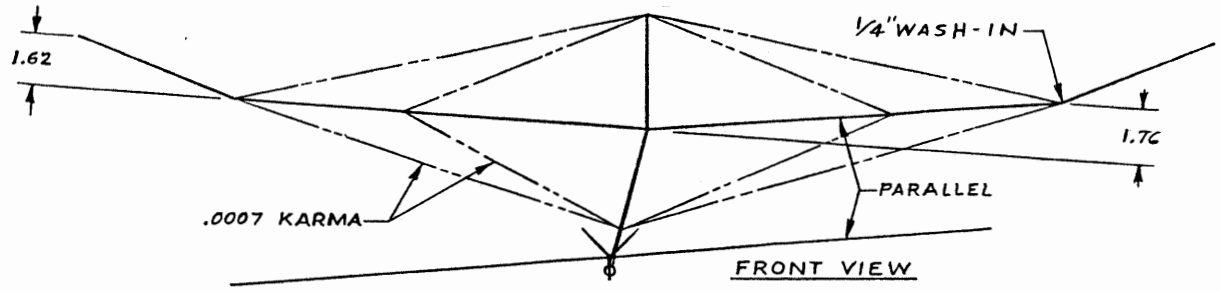
Construction of this giant model began in the spring of 1989. This model was then test-flown at the Akron Airdock a few months later. The test flights showed that the prop had too much flare in it, so a new symmetrical prop blade was drawn up and a new prop built before the 1989 USIC. One thing I wish to mention about the tail of the ship is the dihedral. The tail was one of my old F1D wings left over from a few years ago. I cut off the wires and bracing, and braced it as a normal tail. This is the reason for the dihedral. I think that a model this large needs extra stability in the tail, and the dihedral provides it.

The 35:21 flight was a great one to watch. It was the last flight up on the very last day of the meet. After I launched the model, it climbed all but about 2 feet of the available height under the box of speakers. The model drifted very little throughout the flight. When it landed, I was thrilled because it was the longest flight I had at the meet. Afterward, I found out that Richard Doig and I had tied for the high time of the meet, and we tied for high time in AMA Stick. Not bad for the model's first contest performance!





"Look out Jim. Look out Erv. Look out Bud. Here I come...."



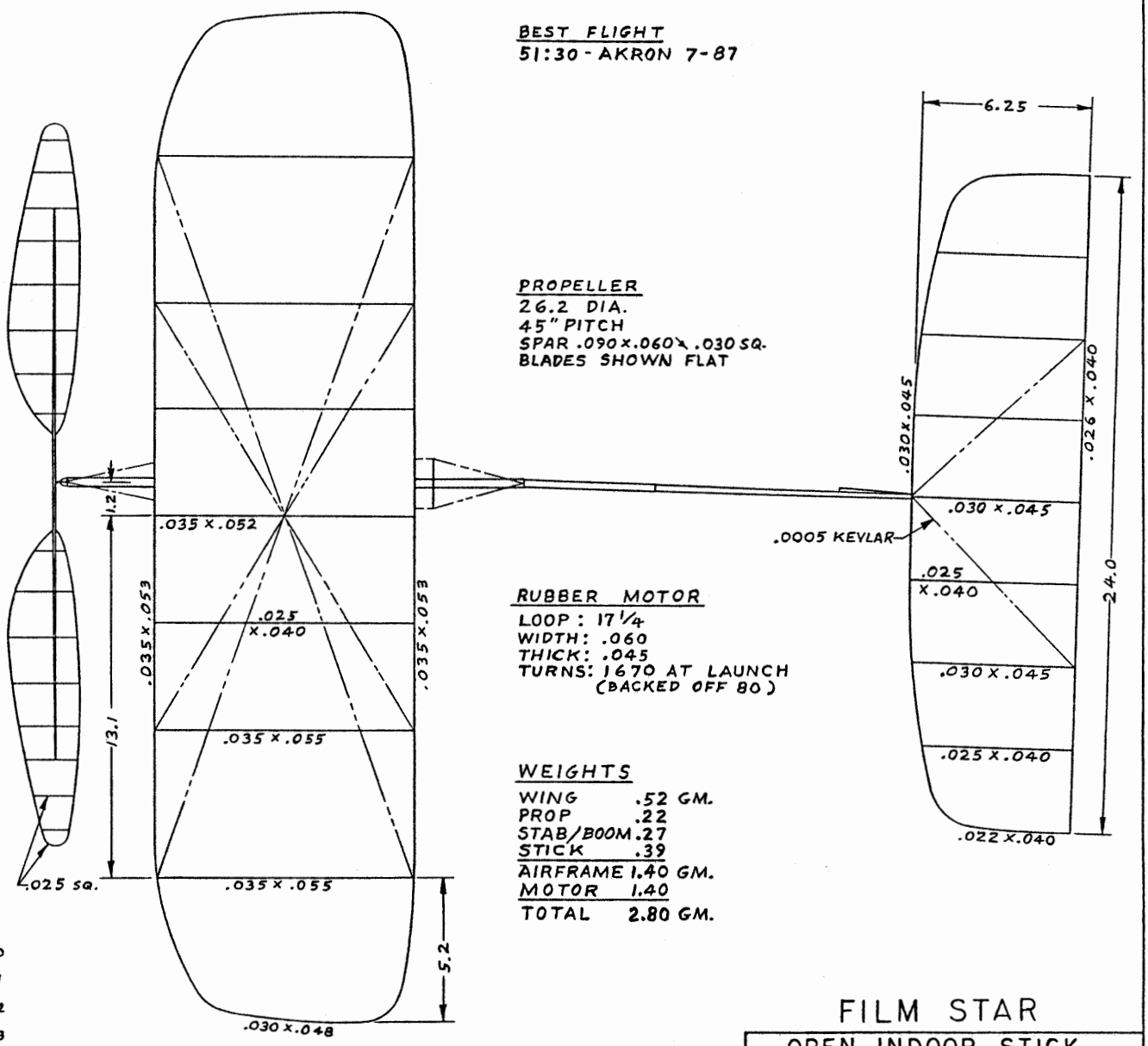
BEST FLIGHT
51:30 - AKRON 7-87

PROPELLER
26.2 DIA.
45" PITCH
SPAR .090 x .060 ↘ .030 SQ.
BLADES SHOWN FLAT

RUBBER MOTOR
LOOP : 17 1/4
WIDTH: .060
THICK: .045
TURNS: 1670 AT LAUNCH
(BACKED OFF 80)

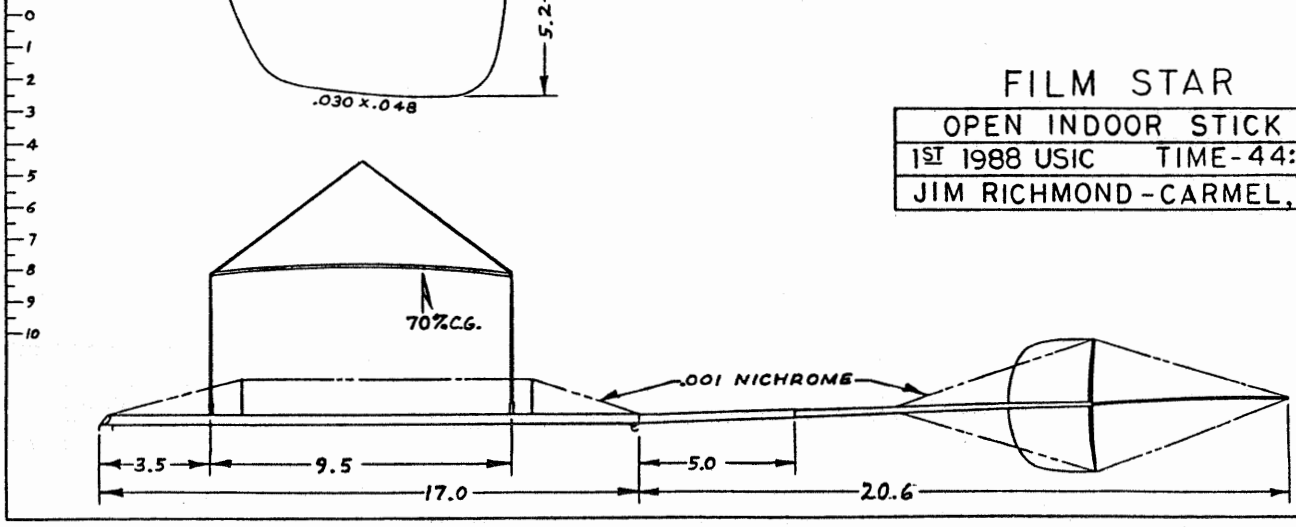
WEIGHTS

WING	.52 GM.
PROP	.22
STAB/BOOM	.27
STICK	.39
AIRFRAME	1.40 GM.
MOTOR	1.40
TOTAL	2.80 GM.



FILM STAR

OPEN INDOOR STICK	
1ST 1988 USIC	TIME - 44:47
JIM RICHMOND - CARMEL, IN.	



OPEN HAND LAUNCHED STICK 1st PLACE 1988 USIC 44:47
JIM RICHMOND, Carmel, IN

"Film Star"

As the name implies, this plane is a derivative of both the World Champs-winning "Film Flam" and the World Record-holding "Star Walker".

The "Star Walker" was an expanded version of the "Cat Walker" [cover girl on the 1988 Sympo - ed.]. Since it had been so successful, it was decided to enlarge the the "Film Flam", hoping that the plane's superior performance would also carry over into the expanded size.

It was thought that the lower wing loading afforded by the larger wing would enable the plane to achieve higher flight times. This has generally proven to be true in Johnson City, but in the 180 ft. Akron hangar, the issue is still in doubt. The times achieved have been almost equal there, at 51:30 and 52:14.

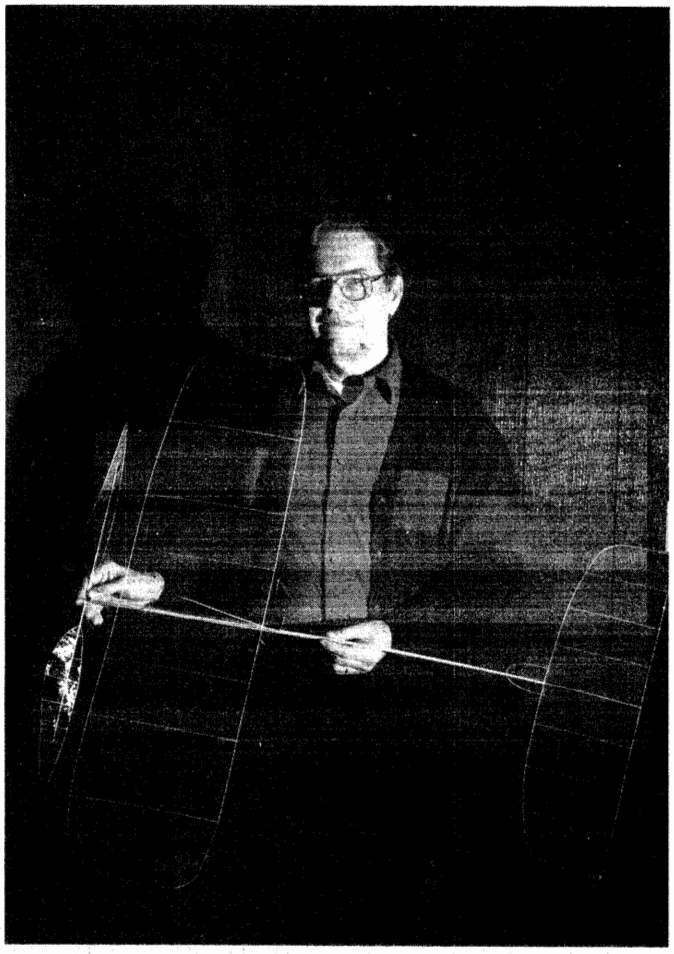
Structurally, the plane is similar to a 65 cm. F1D except that the spars in the center areas of the wing and the stab leading edge were carefully selected for strength, due to the extra stresses there. Five pound wood is used throughout except for the "C" grain .015 motor stick and .010 tail boom, as well as the "B" grain prop spar, which are all made of four pound wood.

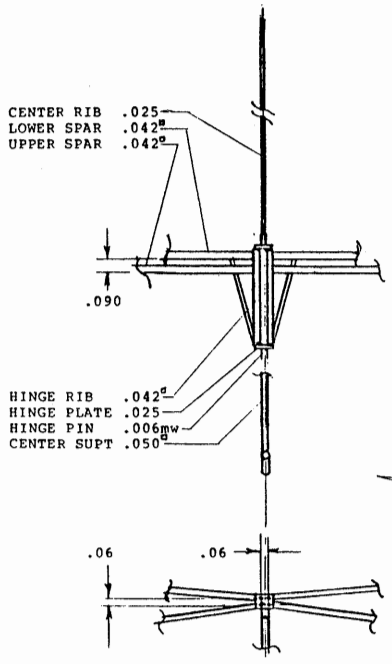
Airfoils of 3 1/2% depth were used in both wing and stab. These were bent from straight sticks rather than cut to shape, the usual method. The wing ribs have a little more bend near the ends because flight loads put more bend in the center area.

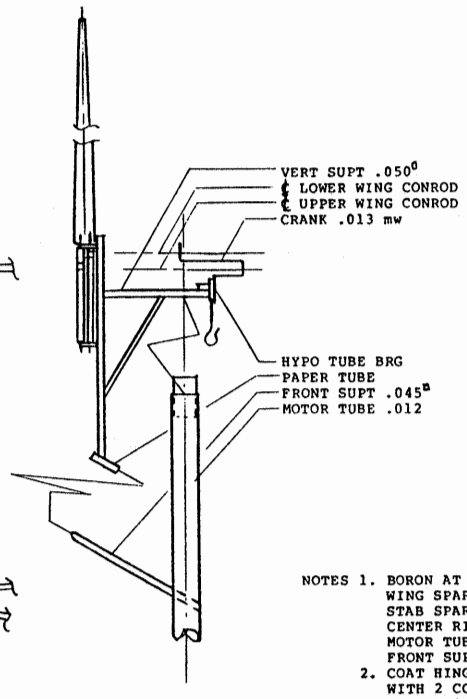
The 26" prop was borrowed from the "Star Walker" and has lots of flex and flare.

The stab was assembled with the trailing edge 3/16 higher than the leading edge, and a negative 1/16 wing incidence was found to be best.

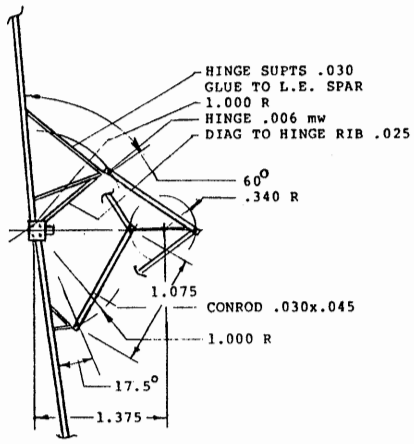
The thrust bearing, rear hook and prop shaft were made from .013 music wire, as is my usual practice. The thrust line was slightly down and left.





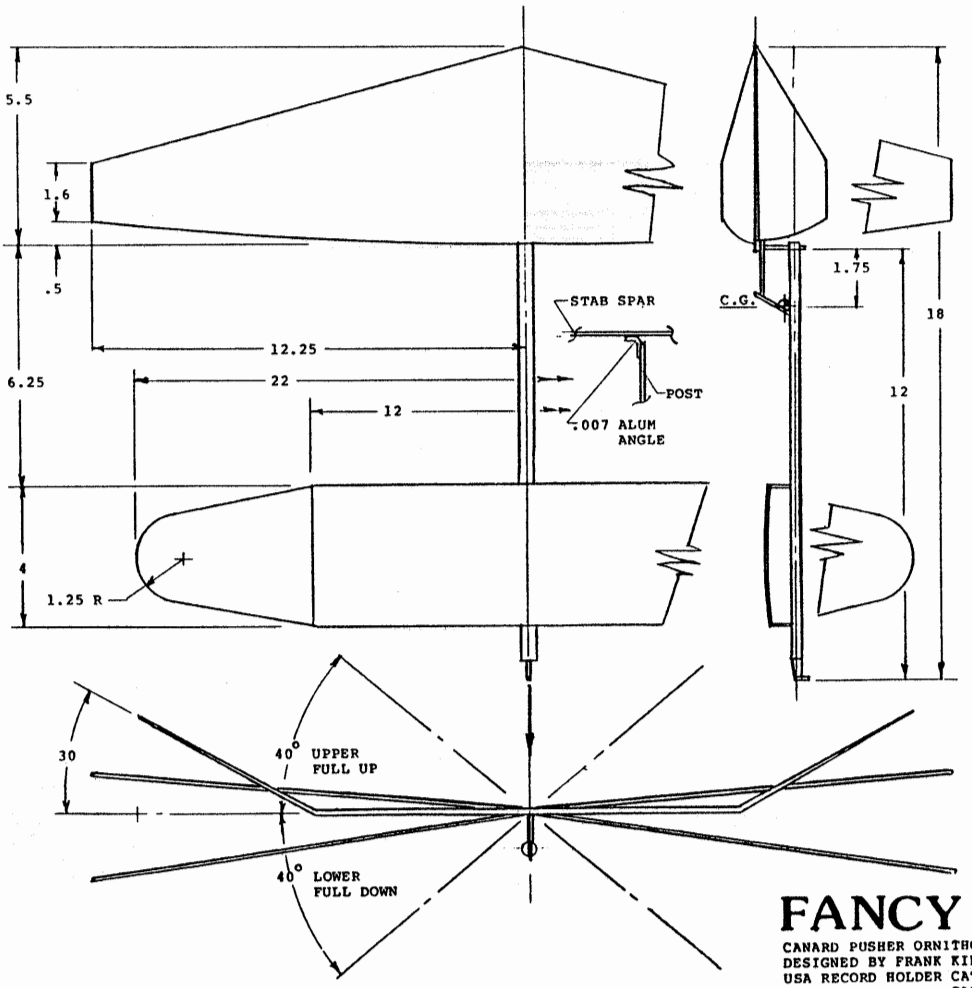


WING HINGE & SUPPORT DETAILS



LINKAGE DETAILS

NOTES 1. BORON AT FOLLOWING LOCATIONS:-
WING SPARS - TOP & BOTTOM
STAB SPARS - TOP & BOTTOM
CENTER RIB - TOP & BOTTOM
MOTOR TUBE - 5,7,&12 O'CLOCK
FRONT SUPPORT - SIDES
2. COAT HINGE PLATES AND CONROD ENDS WITH 2 COATS GLUE TO REINFORCE BEARING POINTS
3. ALL COVERING IS HARLAN 'ULTRAFILM'



WEIGHTS - GRAMS	
FLAPPER ASSEM	.65
BODY ASSEM	.33
STAB ASSEM	.32
TOTAL EMPTY	1.30
FLYING WEIGHT	2.60

AREAS - SQUARE INCHES	
UPPER WING (FLAPPING)	87.2
LOWER WING (FLAPPING)	82.6
TOTAL WING (FLAPPING)	169.8
TOTAL WING (FIXED)	0
PROJECTED (FLAPPING) (169.8 X COS 20°)	159.6
STABILIZER	77.3
STAB/PROJ (%)	48.5

MOTOR - 1989 USIC
.058 X 20 PIRELLI
1600 TURNS

FANCY GIRL III

CANARD PUSHER ORNITHOPTER
DESIGNED BY FRANK KIESER - VERO BEACH, FLORIDA
USA RECORD HOLDER CAT I - 5:54, CAT II - 10:00
CAT III - 11:32
USIC WINNER 1987 - 10:33, 1989 - 11:12

F.B.K. 1/31/90

The biplane ornithopter was first conceived and flown by J. S. White in England in the 1950's, but the configuration wasn't applied to U.S. indoor designs until Pat Deshaye designed his record-setting biplane tractor ornithopter in 1983, followed by Al Rohrbaugh and Ray Harlan with similar but much lighter designs, and ornithopter performance soared. In 1983, I became interested in ornithopters, and after a few unsuccessful attempts at monoplane designs, the biplane seemed to be the answer to the problems. It also appeared that a canard pusher would have advantages over the conventional tractor in that the stabilizer, ahead of the turbulence caused by the flapping wing, would be a more effective lifting surface. In addition, the neat linkage arrangement by Philip Watson of Australia, which put the wing motion out of phase, left to right instead of upper to lower, seemed desirable in terms of simpler and lighter construction.

Thus was born the Fancy Girl series, the name being derived from the provocative side-to-side sway of the aft end in flight, due to the forces created by the out-of-phase motion of the flapping wings. After the design was proven by record-breaking performances, others picked up the concepts. In recent years, all the top competitors and record holders use similar designs.

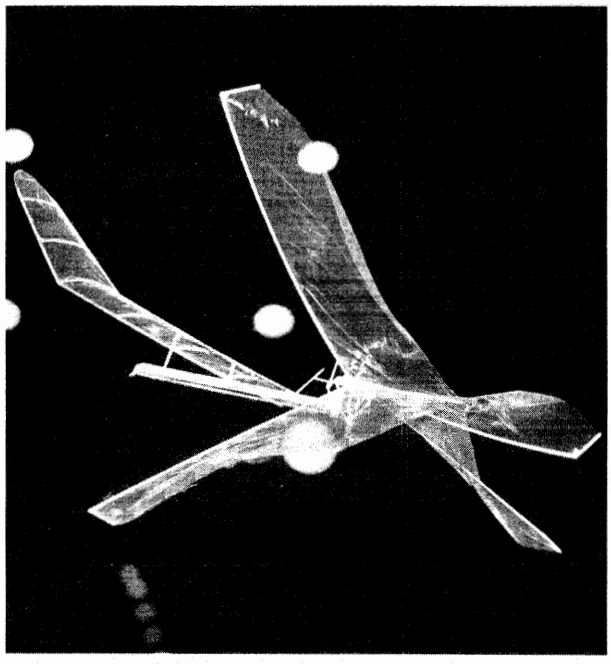
Except for the flapping wings and linkage, conventional indoor construction may be used throughout. For instance, I used a mylar-covered stabilizer with boron braced spars; Roy White used microfilm with externally braced spars. Also, I used a motor stick with only boron bracing; Joe Krush used a smaller diameter tube with external tungsten bracing. The construction is started by making four spar assemblies with boron caps, the hinge rib and hinge pins, and the tip. The spar assemblies are tack-glued to a temporary plate between the hinge ribs, being sure the spars and hinge pins are in the correct relative position. The hinge plates are coated with two coats of glue to give adequate bearing strength. The hinge pins are pushed through the hinge plates and the plates glued to the center support.

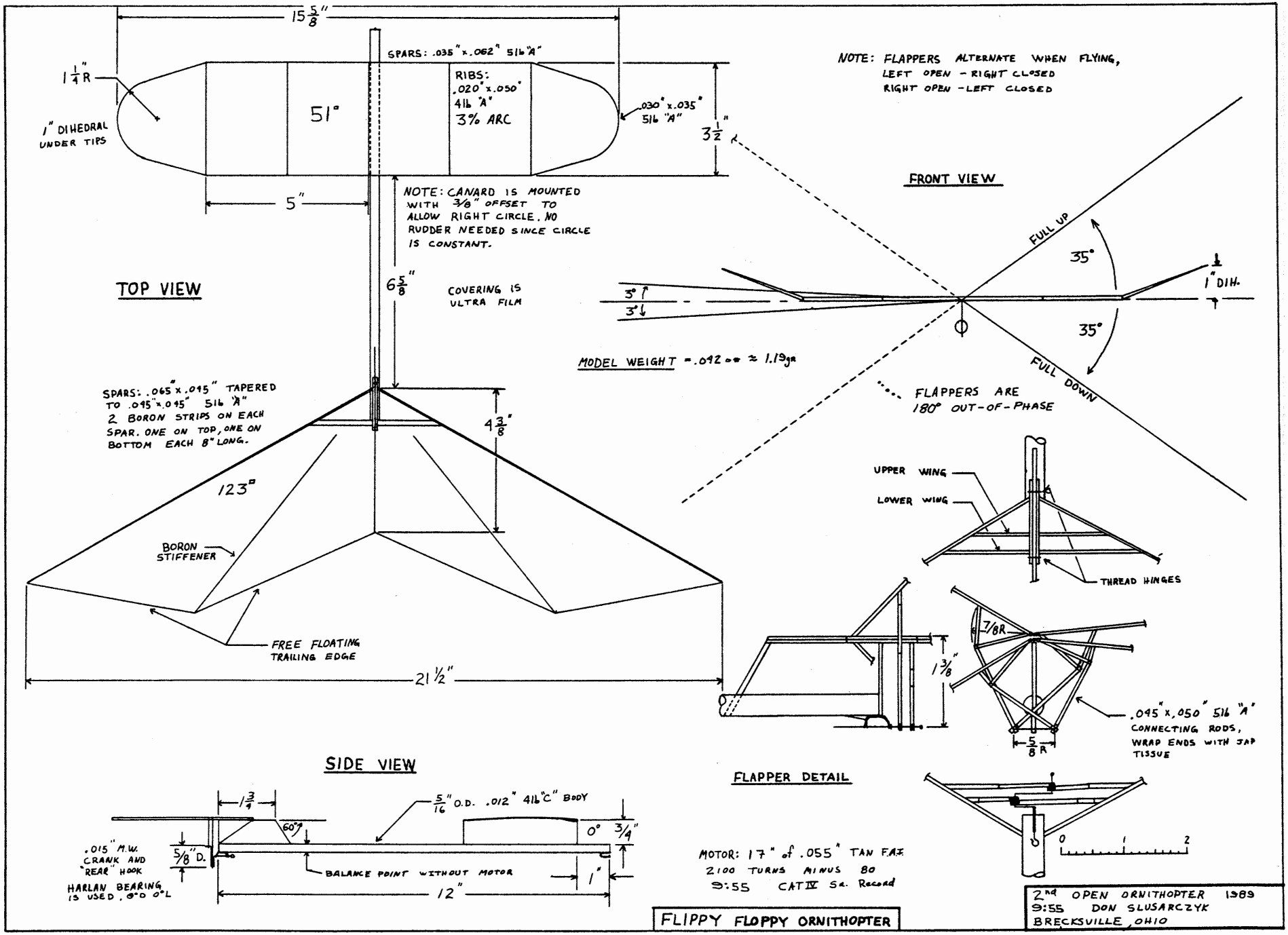
Mylar is attached to a frame, giving a smooth surface but not stretching the mylar. Contact cement is used to attach the mylar, first covering the lower surface of the lower wing and then the upper surface of the upper wing. First, the center rib is attached to the mylar, and before the spar is attached, a thread is attached to the tip and tensioned parallel to the trailing edge to deflect the spar aft as shown in the drawing. The spar, in correct position, is attached to the mylar. The trailing edge is cut with a new razor blade along a straight edge and the rest of the outline is trimmed with a hot wire.

The linkage supports are assembled to the wing spars, being careful to locate the conrod hinges accurately. The crank is assembled and attached to the center support. The conrods are cut to length and the ends coated with glue. The holes are pierced through the upper rods and the rods assembled between the crank and the wing. The lower conrod is assembled to the crank, and the bearing hole at the wing end is located with the upper and lower wings together and the crank in the correct position. After all four conrods are assembled, rotate the crank and check the wing motion. It may be necessary to redo the lower wing cranks if the wings do not come together correctly. Light weight of the flapper assembly is extremely important to obtain the correct balance of the finished model. Also, be very familiar with the AMA ornithopter rules so that the finished model will comply.

The canard design is very stable and easy to trim. Start with the stabilizer horizontal set at 0 deg. incidence. With the motor wound clockwise looking from the rear, the model should fly in a right-hand circle. Since there is no rudder, the turn is adjusted by tilting the stabilizer. Lower the right tip for more right turn. One peculiarity has been noted by many of us. At high torque, the model will turn left, and after three or four circles, abruptly change to the normal right circle. As yet, there doesn't seem to be a satisfactory explanation, and it appears that the best approach is just to let it happen.

To those who have never built an ornithopter; it isn't as difficult as it may seem. If you have problems, write me or give me a call. See the address listings in the appendix. [Larry Kruse photo]



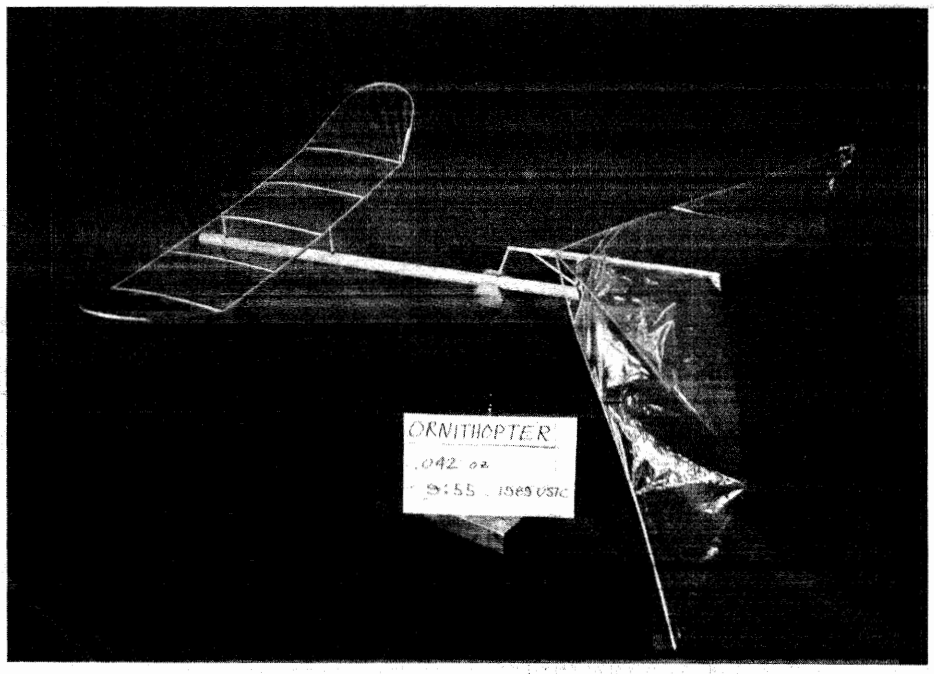

15 5/8"
SPARS: .035" x .062" 516 "A"
1 1/4" R
1" DIHEDRAL UNDER TIPS
51°
RIBS: .020" x .050" 416 "A" 3% ARC
.030" x .035" 516 "A"
3 1/2"
5"
NOTE: CANARD IS MOUNTED WITH 3/8" OFFSET TO ALLOW RIGHT CIRCLE. NO RUDDER NEEDED SINCE CIRCLE IS CONSTANT.
TOP VIEW
6 5/8"
COVERING IS ULTRA FILM
SPARS: .065" x .095" TAPERED TO .045" x .045" 516 "A" 2 BORON STRIPS ON EACH SPAR. ONE ON TOP, ONE ON BOTTOM EACH 8" LONG.
4 3/8"
123°
BORON STIFFENER
FREE FLOATING TRAILING EDGE
21 1/2"
NOTE: FLAPPERS ALTERNATE WHEN FLYING,
LEFT OPEN - RIGHT CLOSED
RIGHT OPEN - LEFT CLOSED
FRONT VIEW
FULL UP
35°
1" DIH.
3°
3°
35°
FULL DOWN
MODEL WEIGHT = .092 oz ≈ 1.19gr
FLAPPERS ARE 180° OUT-OF-PHASE
UPPER WING
LOWER WING
THREAD HINGES
1 3/8"
7/8R
.045" x .050" 516 "A" CONNECTING RODS, WRAP ENDS WITH JAP TISSUE
5/8 R
SIDE VIEW
1 3/4
5/16" O.D. .012" 416 "C" BODY
60°
0° 3/4"
.015" M.W. CRANK AND "REAR" HOOK
5/8" D.
HARLAN BEARING IS USED, 3/8" D 0" L
BALANCE POINT WITHOUT MOTOR
1"
12"
FLAPPER DETAIL
0 1 2
MOTOR: 17" of .055" TAN FAI 2100 TURNS MINUS 80
9:55 CAT IV Sq. Record
FLIPPY FLOPPY ORNITHOPTER
2nd OPEN ORNITHOPTER 1989
9:55 DON SLUSARCZYK
BRECKSVILLE, OHIO

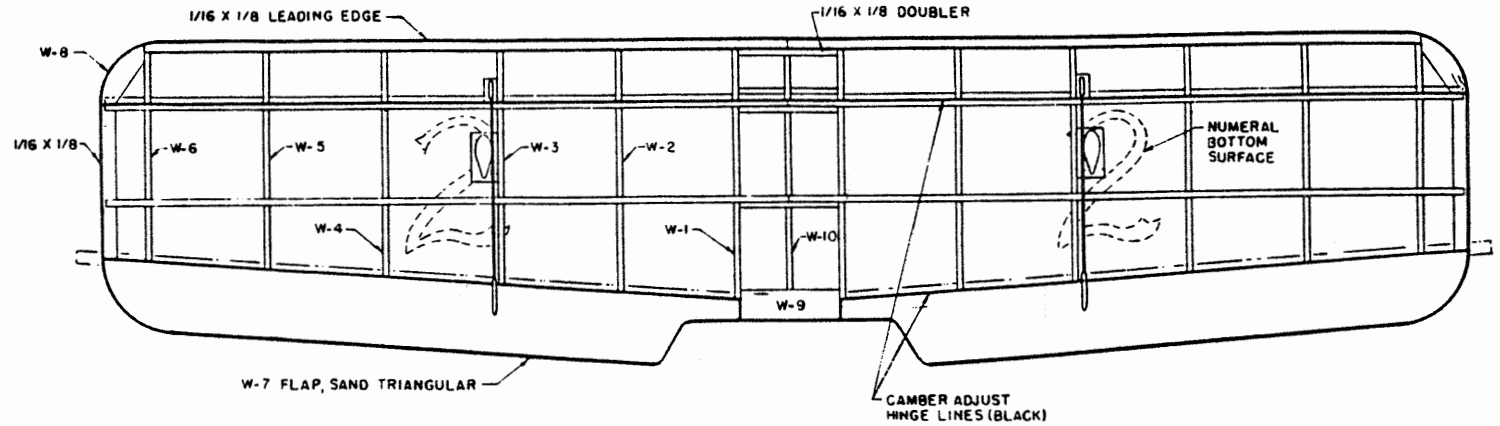
ORNITHOPTER 2nd PLACE 1989 USIC 9:55
DON SLUSARCZYK, Brecksville, OH

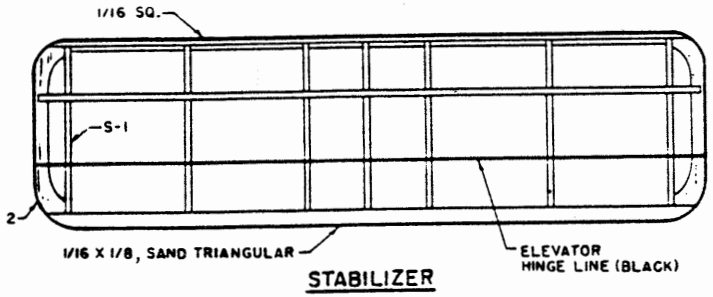
I don't really know when I first became interested in ornithopters, but I decided to build one in 1987. The first one I made was a biplane canard-pusher that weighed about 3.1 grams. Even though it was heavy, it was able to put out flights in excess of five minutes. The first one gave me an idea of what parts of the flappers are loaded the most, and where weight reductions could be made. The second one I built weighed in at 1.6 grams and would do flights around 8:00. This model, unfortunately, met its demise in a school gym when I stuck the steering pole up inside the flapping mechanisms. Anyone who has flown ornithopters knows what happens when the linkages are damaged. Anyway, I had to build a new one, and this one came out just under 1.2 grams. This is the model I am currently flying, and it has had flights pushing the 10-minute barrier.

The construction of this model is fairly straightforward. Thanks to people like Roy White and Frank Kieser, I was able to build my ornithopters using their published construction techniques. The one I am flying now is based on Frank Kieser's "Fancy Girl", which appeared in the NFFS Symposium some years ago. My ornithopter, called "Flippy-Floppy", currently holds the Cat. I, III and IV Sr. Ornithopter records.

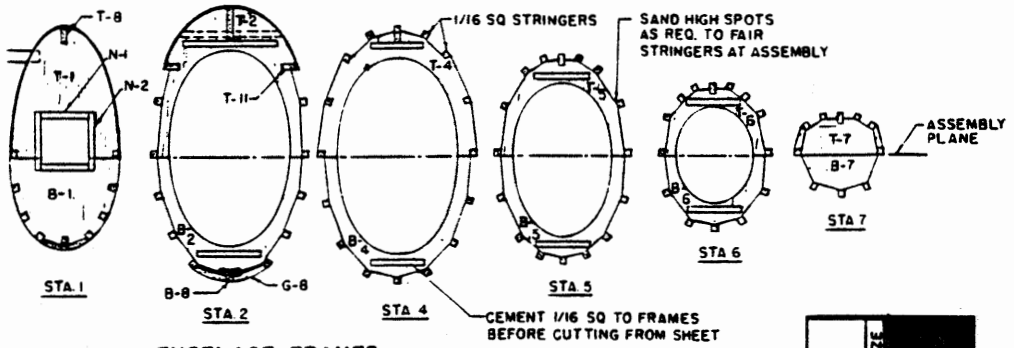
People ask me, "Where is the rudder on your ornithopter?" The answer is quite simple; I don't have one. The canard, as the plan shows, is mounted with offset. This trick gives the outboard wing an effectively longer wingspan and larger wing area, providing a constant turning force on the model. When it is launched, the circle is the same size on the way up and on the way down. The model has never shown any tendency to fly straight, either when torqued up or when running on its last turn. It is my opinion that eliminating the rudder prevents all of the hassle that comes with torque effect and the tendency to fly straight.



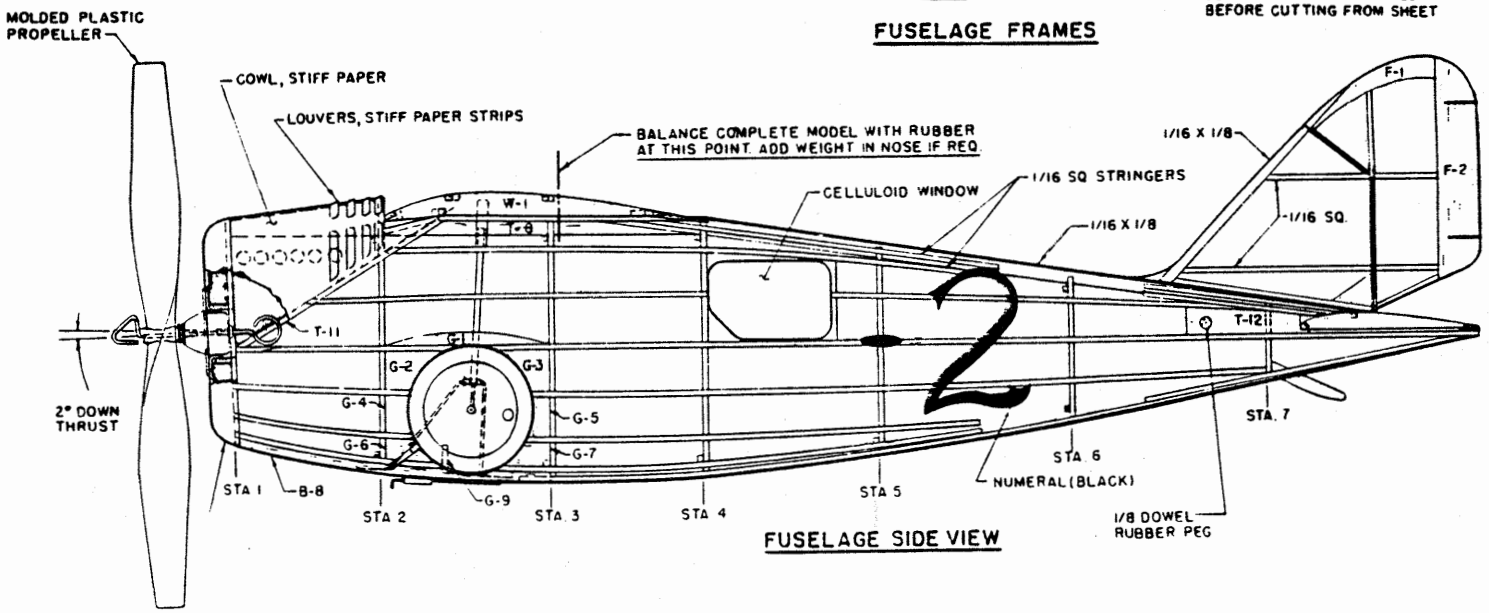




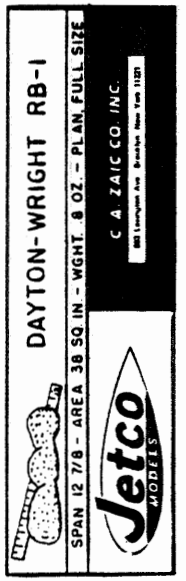
STABILIZER



FUSELAGE FRAMES



FUSELAGE SIDE VIEW



PEANUT SPEED 1st PLACE 1989 USIC 11.21 mph
CHUCK MARKOS, Deerfield, IL

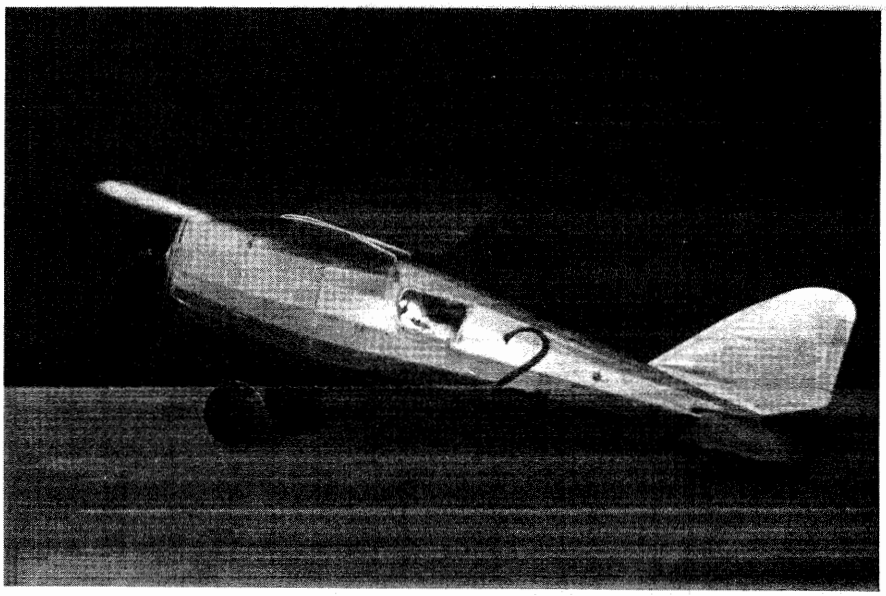
The Dayton-Wright 1920 Racer was chosen as a subject for the Peanut Speed event after a search for certain design criteria:

1. High wing for stability
2. Long fuselage for rubber motor installation
3. No drag-producing struts or rigging
4. Existing plans or kit available

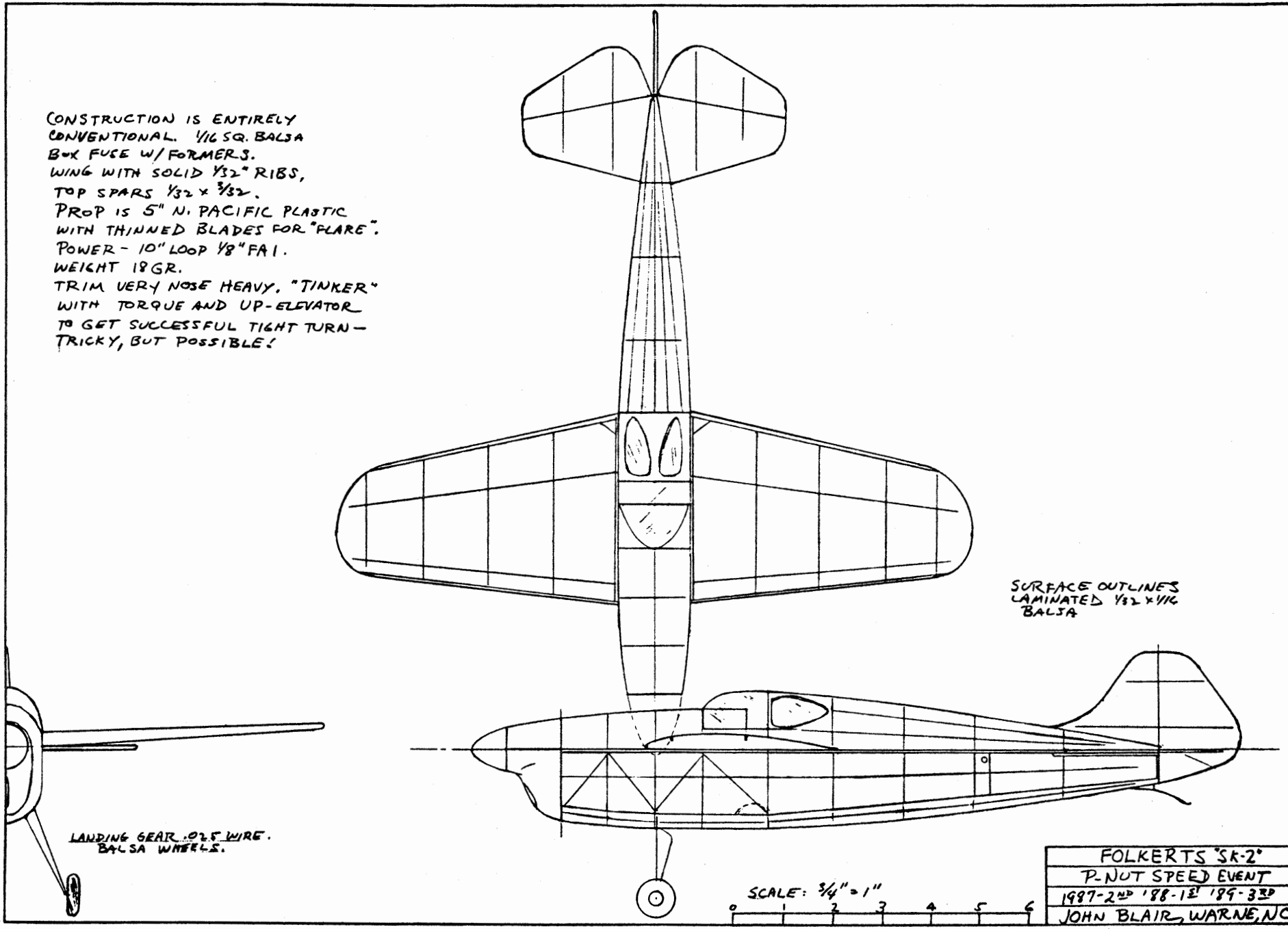
Although the barrel-shaped fuselage seems to offer considerable cross-section drag, it is quite streamlined and the noseblock area is not much more than a Lacey's. Additionally, there is no cockpit step as in most designs.

The Jetco kit was modified in several places for speed. The wing airfoil was changed to a flat bottomed section. The wing is attached with rubber band straps anchored at hooks in the fuselage. The landing gear was simplified to plain 1/32" wire struts of minimum length for prop clearance. The engine cowling area is completely filled in with sheet balsa rather than covered with bond paper to provide collision resistance. The fuselage formers were made flush with the skin to minimize tissue tears and to increase torsional rigidity. The noseblock is laminated balsa rather than the provided vacuum-formed plastic to better hold thrust adjustments. The stabilizer TE is from 1/2 x 1/16" sheet to provide easy and sure elevator adjustments. Propeller used was a 6" Tern Aero black plastic.

Flying adjustments are made with CG, wing ailerons, rudder, elevator and thrust line. I have no notes, but at least 500-600 motor turns are necessary to complete the course.



CONSTRUCTION IS ENTIRELY CONVENTIONAL. 1/16 SQ. BALSA BOX FUSE W/ FORMERS.
WING WITH SOLID 1/32" RIBS, TOP SPARS 1/32 x 3/32.
PROP IS 5" N. PACIFIC PLASTIC WITH THINNED BLADES FOR "FLARE".
POWER - 10" LOOP 1/8" FAI.
WEIGHT 18 GR.
TRIM VERY NOSE HEAVY. "TINKER" WITH TORQUE AND UP-ELEVATOR TO GET SUCCESSFUL TIGHT TURN — TRICKY, BUT POSSIBLE!



FOLKERTS "SK-2"
P-NUT SPEED EVENT
1987-2ND '88-1ST '89-3RD
JOHN BLAIR, WARNE, NC

PEANUT SPEED 1st PLACE 1988 USIC 8.9 mph
JOHN BLAIR, Warne, NC

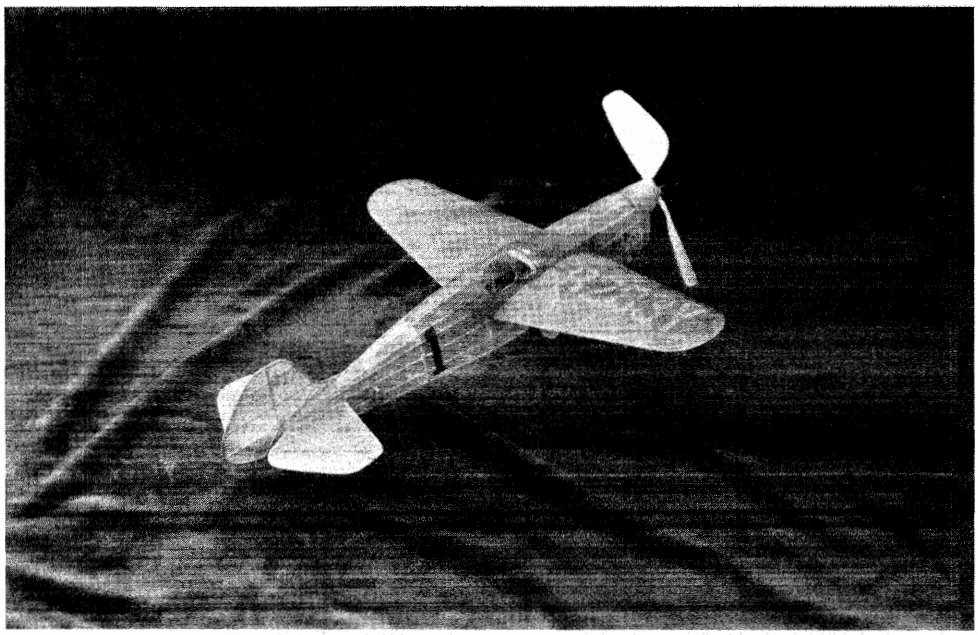
Folkerts SK-2

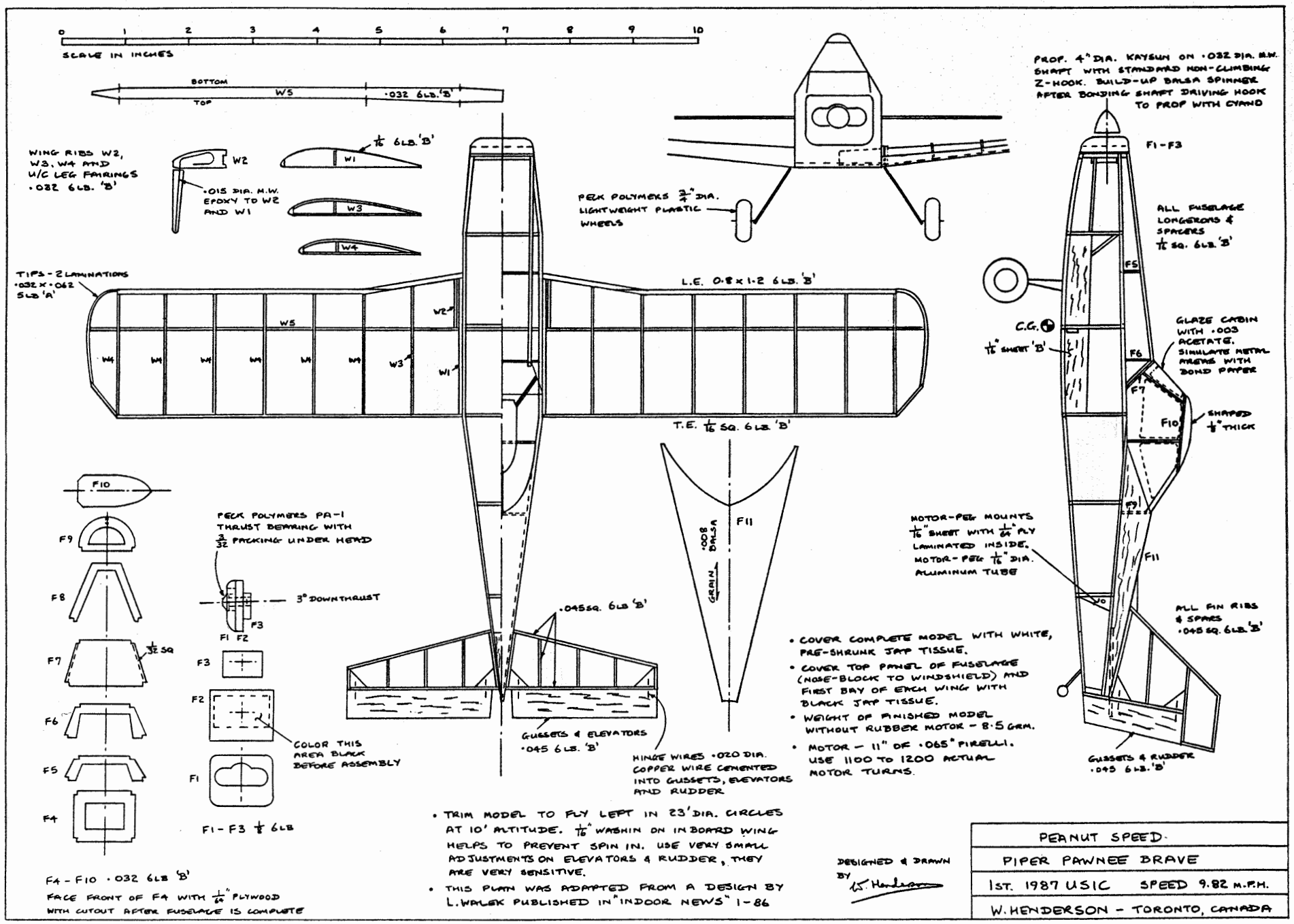
The Peanut Speed event calls for a special airplane — one which can be trimmed for very fast, tight circles at low altitude — under control. Models for this event should be built brute strong (weight is no problem) and have a proper plan form. What better setup could we have than the one evolved for the pylon racers of the 30's? As well as being beautiful creations, they are tailor-made for the job. I think Folkerts, Chester, Wittman et al would be proud of their babies doing 20-foot laps!

This Folkerts was not specifically built for the event. When I built it, several years ago, I found out that it would fly that way while trying to get it trimmed to fly in a gym. An outdoor model, it was so heavy (and so fast) that I put it away, rather than wreck it. When the Peanut Speed event at the USIC was announced, I remembered the SK-2, and as they say, the rest is history.

The model, as built, would fly a tight left circle under torque, widening out and climbing away as power came off. To get the plane trimmed for faster, tighter circles without climbing away, I proceeded as follows: add clay to the nose until considerable up elevator is required to take off. Add power by winding harder; then make minute "tweaks" to elevator, thrust line and rudder until the correct pattern is achieved (you hope!). I "wound up" (sorry) with a touch of up thrust, a bit of right rudder and about five degrees of up elevator.

When in trim, the model would make one very tight, low lap, the next a bit higher and wider, and then begin to "wander off". I say "would" because too many rolls into the floor and zooms into the wall finally took their toll. Hot Stuff finally could not get all the bits and pieces into alignment well enough to be reliable, and SK-2 is no more.





- COVER COMPLETE MODEL WITH WHITE, PRE-SHRUNK JAP TISSUE.
- COVER TOP PANEL OF FUSELAGE (NOSE-BLOCK TO WINDSHIELD) AND FIRST BAY OF EACH WING WITH BLACK JAP TISSUE.
- WEIGHT OF FINISHED MODEL WITHOUT RUBBER MOTOR - 8·5 GRM.
- MOTOR - 11" OF ·065" PIRELLI. USE 1100 TO 1200 ACTUAL MOTOR TURNS.

- TRIM MODEL TO FLY LEFT IN 23' DIA. CIRCLES AT 10' ALTITUDE. 1/16" WASHIN ON INBOARD WING HELPS TO PREVENT SPIN IN. USE VERY SMALL ADJUSTMENTS ON ELEVATORS & RUDDER, THEY ARE VERY SENSITIVE.
- THIS PLAN WAS ADAPTED FROM A DESIGN BY L. WALEK PUBLISHED IN "INDOOR NEWS" 1-86

DESIGNED & DRAWN BY W. Henderson

PEANUT SPEED.
PIPER PAWNEE BRAVE
1ST. 1987 USIC SPEED 9.82 M.P.H.
W. HENDERSON - TORONTO, CANADA

PEANUT SPEED 1st PLACE 1987 USIC 9.82 mph
WILLIAM HENDERSON, Toronto, Ontario, Canada

"Piper Pawnee Brave"

When I first ventured into Peanut Speed flying at the 1985 USIC at Niagara Falls, I took the conventional approach of building a peanut of a racing plane for this event. There is a tendency to think that if a plane flew well as a full-size racer, it should be a racer when scaled down. Unfortunately, it does not usually work that way, since you end up with a long, large-cross-section fuselage on a small wing, often with a very small tail that is not sufficient for stability in model sizes. This was the case with the first model I tried, the Nennig C3, A French mid-30's design used in the Coupe Deutsche de la Muerthe air races in Europe.

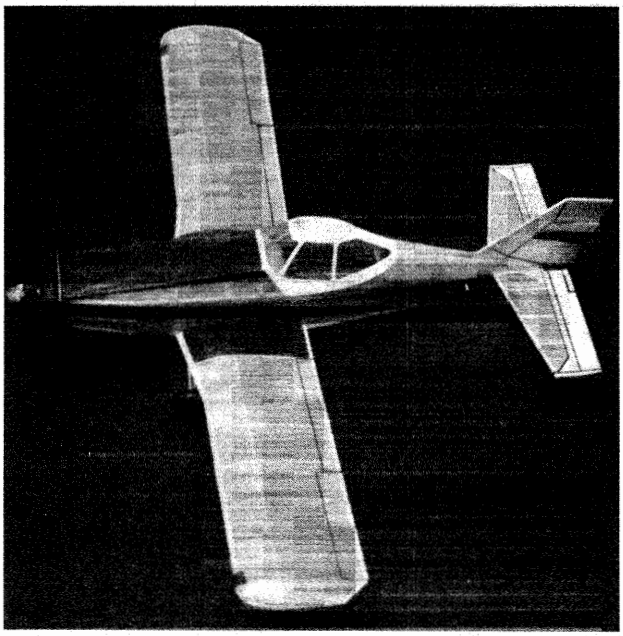
The model proved to be very difficult to trim and had become quite heavy with the extensive reinforcing I used in anticipation of large motors and higher speed. In general, the model proved to be untrimmable, even with modifications such as moveable ailerons and elevators cut into the flying surfaces. I had decided not to fly this event because of these problems, until the January 1986 issue of Indoor News arrived from Europe. In it were plans for the Piper Pawnee Brave, designed by L. Walek of Czechoslovakia for Peanut Scale. One look and I was hooked. Smallish wing; short, mostly rectangular cross-section fuselage; and a good-sized stab. Combine this with some interesting wing construction, sliced ribs over a 1/32 sheet spar, and I realized that the model would be quick to build, would not be too heavy, and had already proved to be a stable model in Europe.

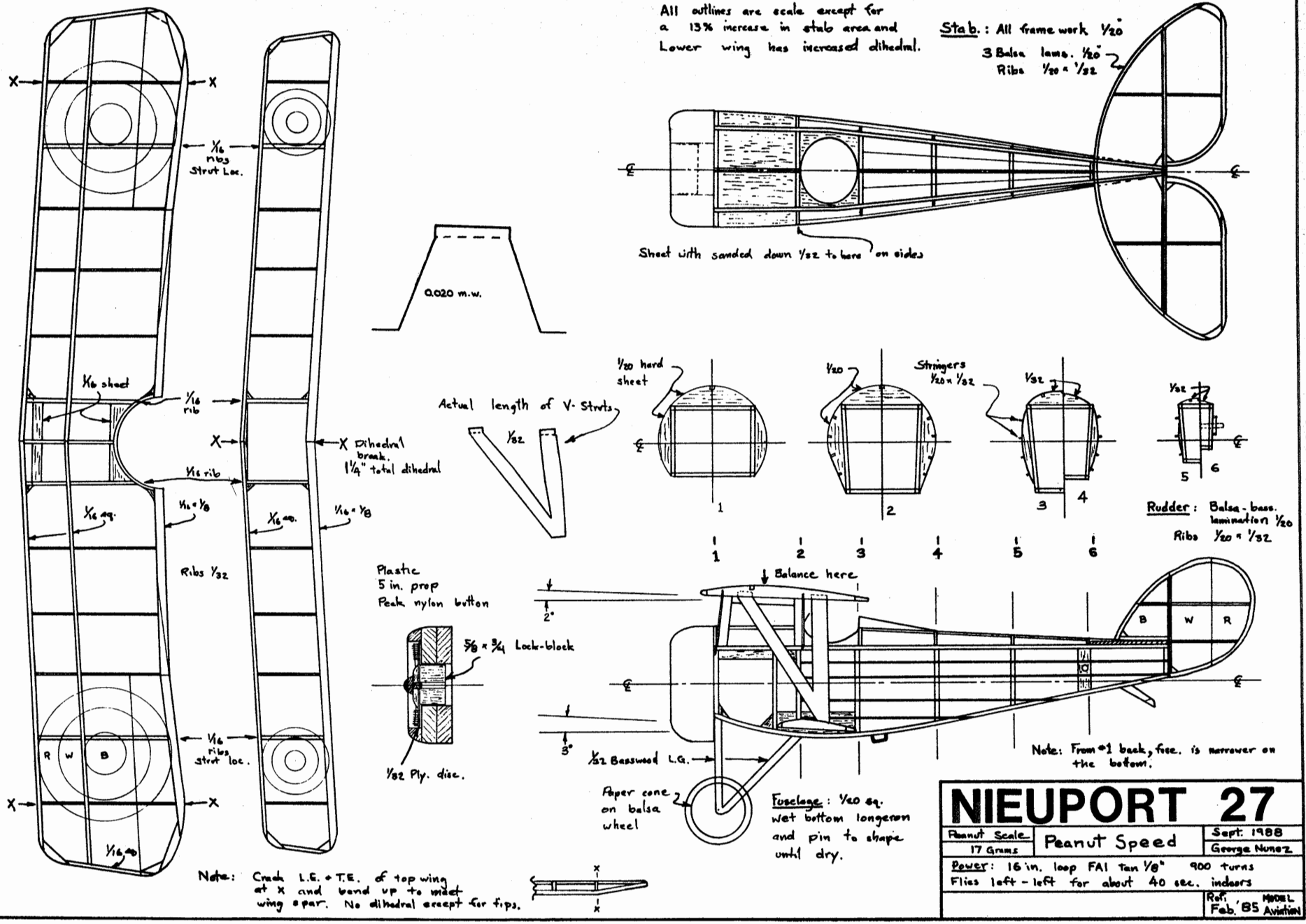
I made a few changes to simplify the construction even further, building most of the structure during a week of evenings while I was at a conference in Las Vegas in April, 1986. On completion, the model flew well, was easy to trim, and could be controlled to fly two laps level at about 10 ft. without zooming up to the ceiling. It had an unpredictable takeoff pattern and ended up not completing two successful laps in 1986, finally breaking a wing off.

The repairs proved to have corrected some problems, as had some more newly-acquired warps, giving tip washout in both wing panels. Thus, in 1987, take-offs were very predictable. The model could be trimmed for two laps with no climb, keeping about four feet above the floor. At Johnson City it flew without any retrimming to give a best flight of 9.82 mph and take 1st place.

In 1988 the model developed some very strange flight patterns and ended up clipping the marker wires or flying inside them. This problem had cleared up by 1989, but the model was noticeably slower and took only 4th place with 7.18 mph. So now it is back to the drawing board to find something similar to the Piper Pawnee Brave, but with perhaps a lower drag cockpit and maybe a slightly smaller wing.

To be successful in the Peanut Speed event, you need a light model (in order to accelerate fast) that does not have miniscule wings and stab, and that has adjustable control surfaces to make trimming for the speed pattern simple and predictable.





NIEUPORT 27

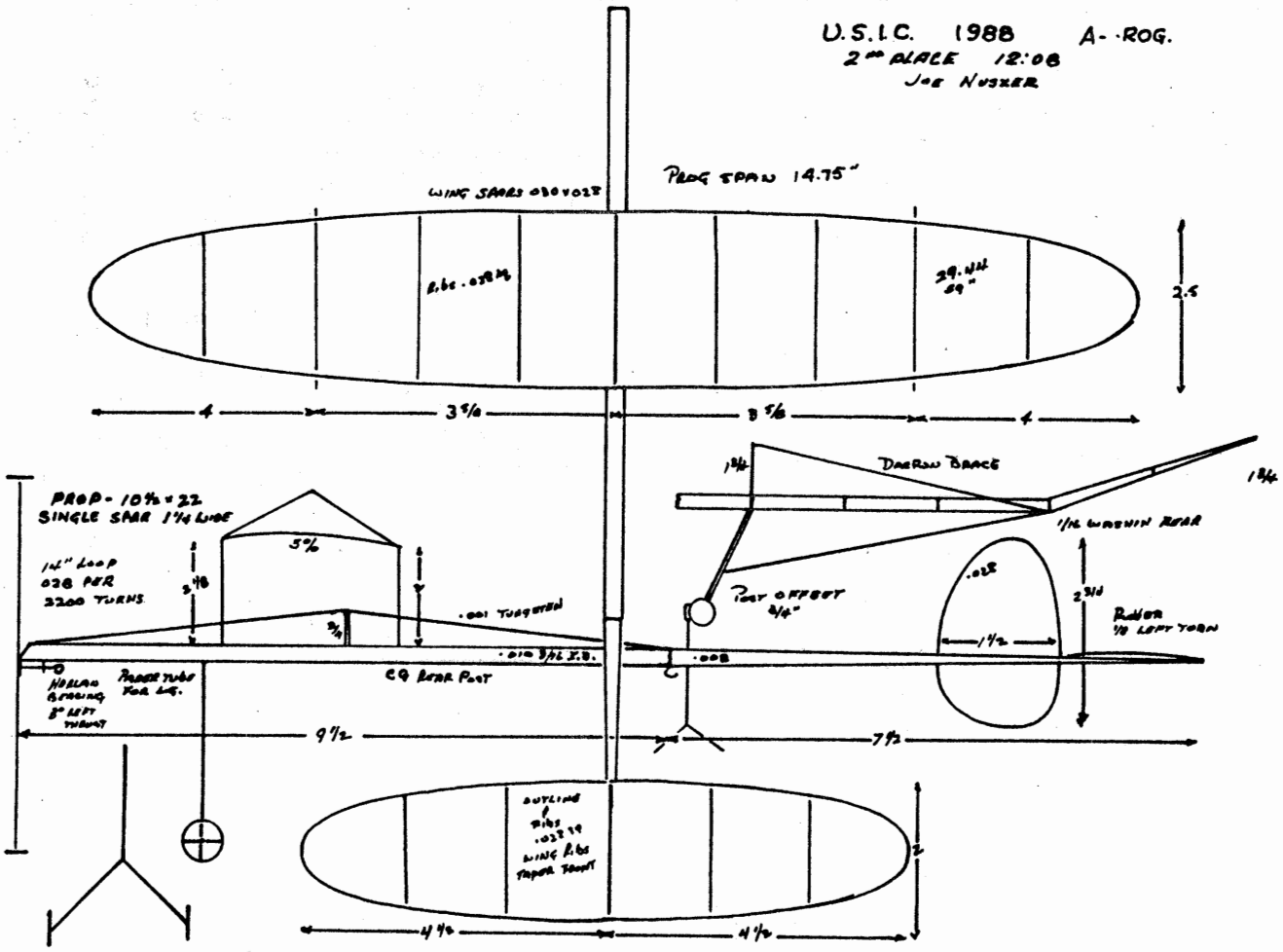
Peanut Scale 17 Grams	Peanut Speed	Sept. 1988 George Nunez

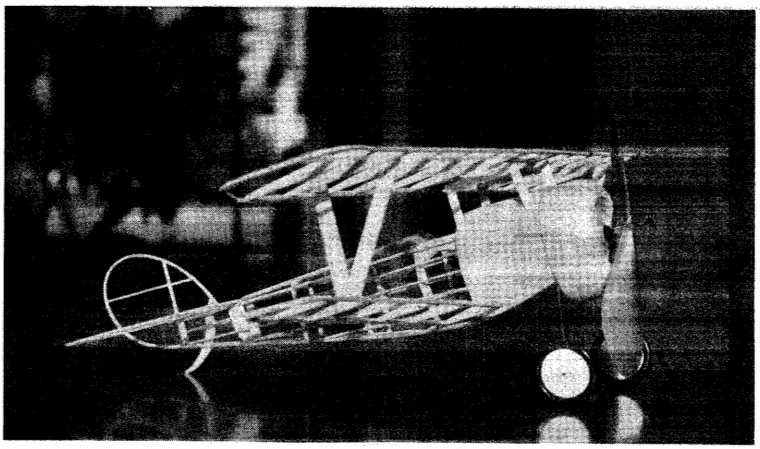
Power: 16 in. loop FAI tan 1/8" 900 turns
Flies left-left for about 40 sec. indoors

Rolf Feb. '85 MODEL Aviation

R.O.G. STICK 2nd PLACE 1988 USIC 12:20
JOE NUSZER, Middle Village, NY

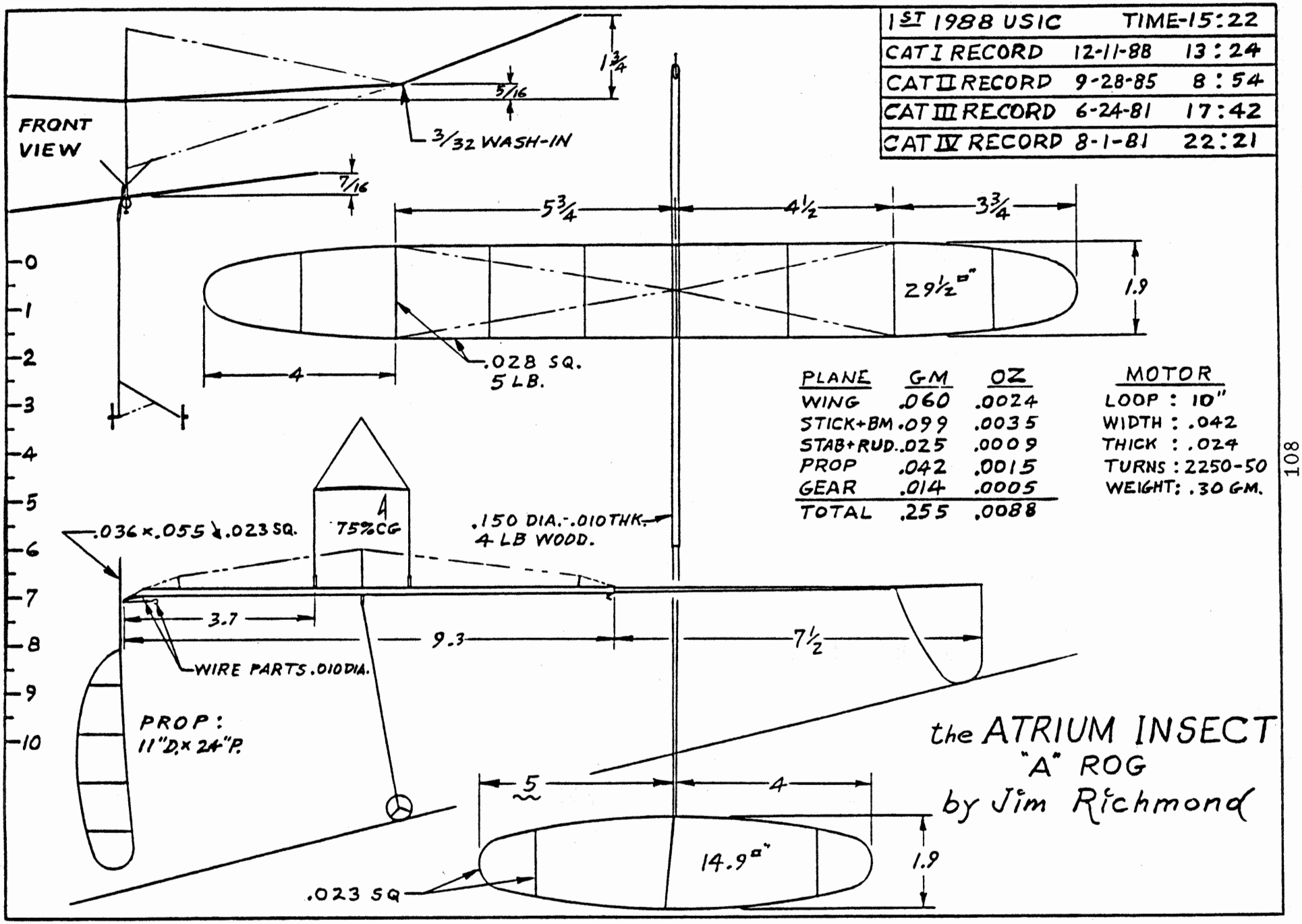
Joe was moving to Florida, and could send to us only a drawing of his R.O.G. Stick model.





PEANUT SPEED 2nd PLACE 1989 USIC 10.58 mph GEORGE NUNEZ, Miami, FL

See plan at left. George sent no explantion of how he made his classy Nieuport 27 biplane go so FAST! You'll just have to ask him at the next USIC.



the ATRIUM INSECT "A" ROG

by Jim Richmond

JIM RICHMOND, Carmel, IN

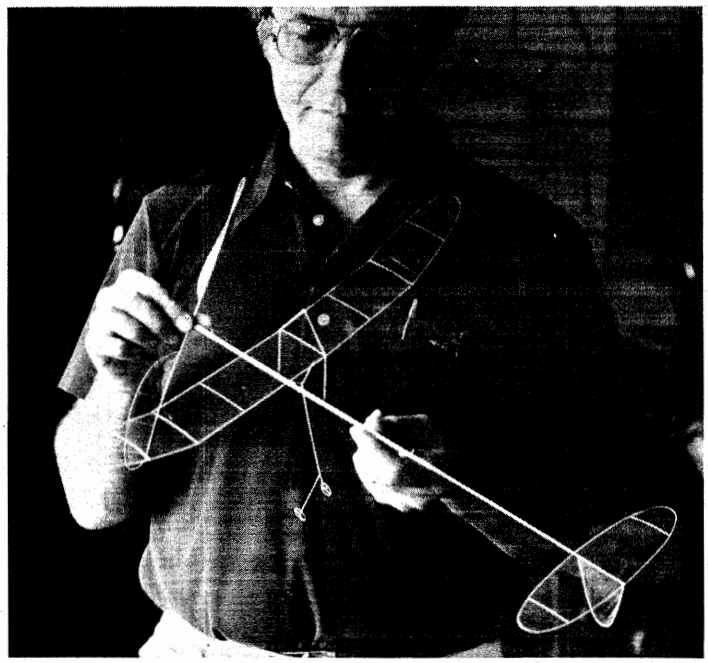
"Atrium Insect"

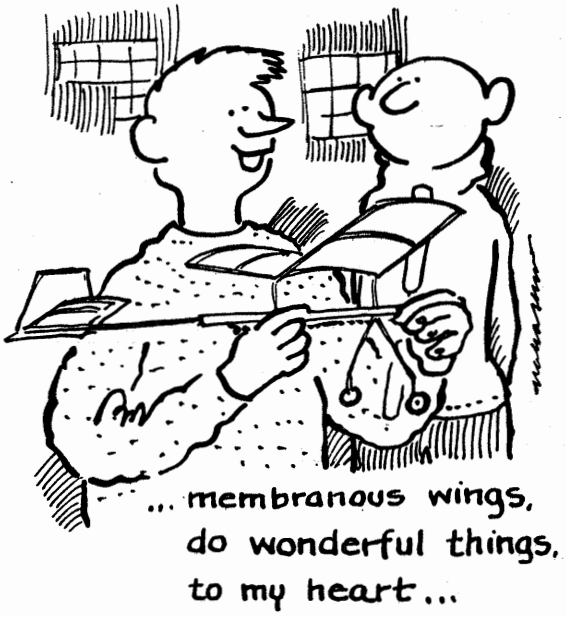
This little plane is one of my best designs, and it has been around longer than any of the other steeds in my stable of competition models.

The original version was built in the late 1960's and had a single vertical stick through the wing to which the bracing wires were attached. The wing was mounted on this stick, which plugged into the same paper tube as the landing gear. As you can see on the plan, it's not that way now. Hitting the ceiling puts more torque loading on a single stick than it can stand.

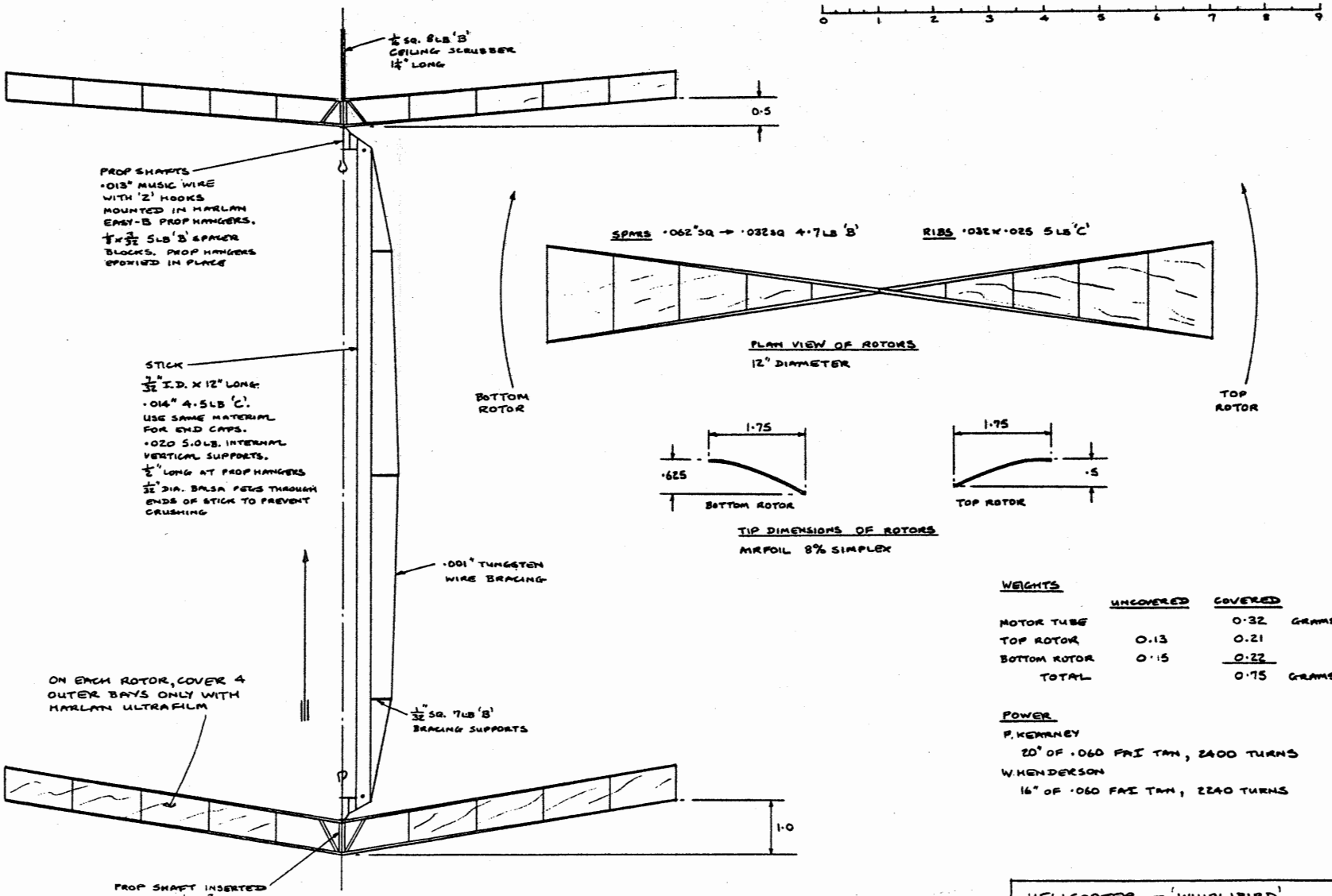
The wing was designed long and skinny to enable its 30 sq. in. to handle a larger-than-usual prop. The body and boom were also longer than usual because I think long planes fly better than short ones.

The length of the motor stick has been reduced a bit, and the left side of the stab is one inch longer than the original design - as is evident if one scales this drawing. These changes enabled the plane to handle burst torque up to the point where the plane sometimes does some barrel rolls during the climb. A little plane like this one needs this capability to get up at Akron.





Note: RICHARD OBARSKI, Sun City, FL, used Jim's "Atrium Insect" design to win first place in ROG STICK at the 1989 USIC with a 14:37 flight. Dick's model was a little heavier than Jim's.



WEIGHTS

	UNCOVERED	COVERED	
MOTOR TUBE		0.32	GRAMS
TOP ROTOR	0.13	0.21	
BOTTOM ROTOR	0.15	0.22	
TOTAL		0.75	GRAMS

POWER

P. KEARNEY
20" OF .060 FAI TAN, 2400 TURNS
W. HENDERSON
16" OF .060 FAI TAN, 2240 TURNS

DESIGNED & DRAWN BY W. Henderson

THIS MODEL IS BASED ON A BRITISH INDOOR RECORD HOLDER BY R.C. MONKS IN ZAIC - MODEL AERONAUTICAL YEAR BOOK 1955-56

HELICOPTER - 'WHIRLIBIRD'
1ST. 1989 USIC TIME 10:36
PETER KEARNEY (JR.) - TORONTO, CANADA
2ND 1989 USIC TIME 8:24
W. HENDERSON - TORONTO, CANADA

HELICOPTER	1st PLACE	1989 USIC	10:36	Peter Kearney, Toronto, Ont., Canada
	2nd PLACE	1989 USIC	8:24	Bill Henderson, Toronto, Ont., Canada

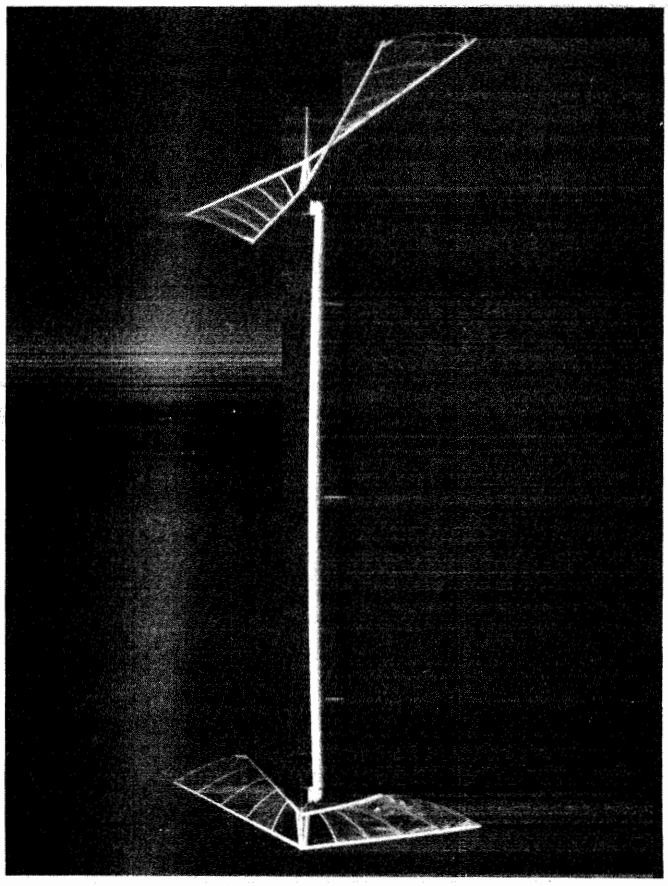
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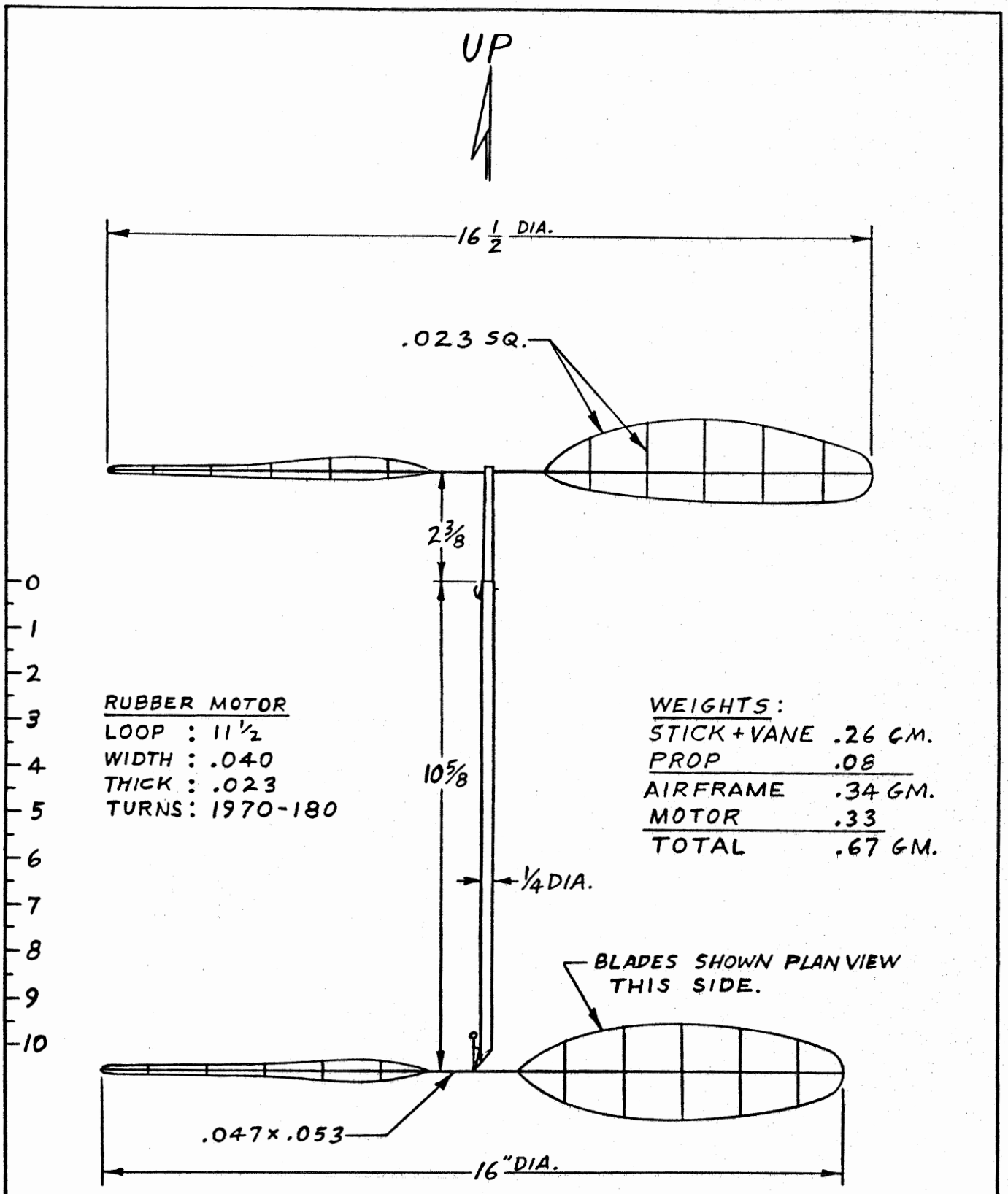
A JUNIOR winning OPEN Helicopter? Peter Kearney beat his mentor, Bill Henderson, by a WIDE margin! Indoor Lives! Peter was so busy with his scholastic work that he asked Bill to do the drawing and write-up. Bill is the designer of the winning "WhirlyBird". Bill Henderson writes:

"Early in 1989 we (Peter Kearney, a Junior flyer, and Bill Henderson, a golden oldie) discovered that there would be no autogyro event at the 1989 USIC, so we turned our attention to the Helicopter duration event. A search through all our reference files revealed that the only indoor helicopter designs that had been widely published were in pre-war and post-war Frank Zaic Yearbooks. Since there was little time to design, build and trim out a new model, we decided to adapt the simplest design we could find. It turned out to be Ray Monks' British indoor record holder in the 55/56 Yearbook. It was microfilm covered, but since there was no time to pour and cure suitable microfilm sheets, we covered the rotors with Ray Harlan's Ultrafilm. We also used two of his EZB prop hangers to keep the model as simple as possible. One or two changes in motor stick length and prop spar sizes produced a model that weighed 0.75 grams compared to Ray Monks' 0.51 gm. We kept the same rotor pitches, which were 10.75" on the top rotor and 13.5" on the bottom one, but we did change the airfoil to an 8% simplex.

The model flew extremely well from the very first flight, but made some controversial flights at the 1989 USIC when both Peter Kearney's and Bill Henderson's versions locked their top rotors into the louvered ceiling panel at the centre of the Johnson City roof. To take first place, Peter managed a 10:36 flight, using 2400 turns on an .060 x 20" FAI tan motor, while Bill took second with an 8:24 flight, using 2240 turns on an .060 x 16" FAI tan motor. This design now holds the Canadian Category 1 records with Peter's junior time of 5:13 and Bill's open time of 4:49. These records have been set using the new rules, in which both rotors must be rotating throughout the flight. In fact, on its maiden flight, which was done under a 22' ceiling, "WhirlyBird", using 1280 turns on an .060 x 16" FAI tan motor, achieved 3:57, which exceeded the then current Canadian record by 40 seconds.

From the start, the model has proved to be extremely easy to fly, having such a stable climb that it can be placed accurately on a chosen part of the ceiling on every flight. The descent is a slow spiral that adds significantly to the flight duration. Its performance has been a surprise to both Peter Kearney and Bill Henderson, but especially to Peter, who never expected to place first as a Junior in a very technical Open event."





RUBBER MOTOR

LOOP : 11 1/2
WIDTH : .040
THICK : .023
TURNS: 1970-180

WEIGHTS:

STICK + VANE	.26 GM.
PROP	.08
AIRFRAME	.34 GM.
MOTOR	.33
TOTAL	.67 GM.

NATIONAL RECORDS

CAT. I	11:07
CAT. II	7:55
CAT. IV	10:36

OPEN HELICOPTER

1ST 1988 USIC TIME: 7:55

JIM RICHMOND - CARMEL, IN.

HELICOPTER 1st PLACE 1988 USIC 7:55
JIM RICHMOND, Carmel, IN

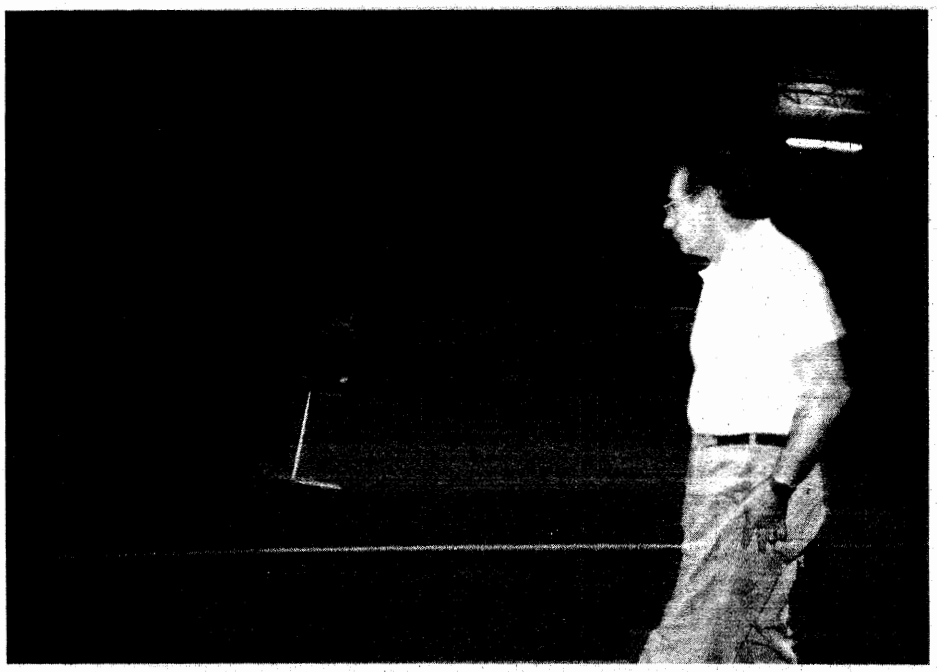
Once I realized that I could make a helicopter out of some of my old pre-weight-rule FAI indoor parts (I never throw anything away), the rest was pretty easy. I still had a pusher prop from a push-pull tandem F1D experiment, so I used that for the helicopter prop, and a regular one was used to attach to the motor stick (boom in this case).

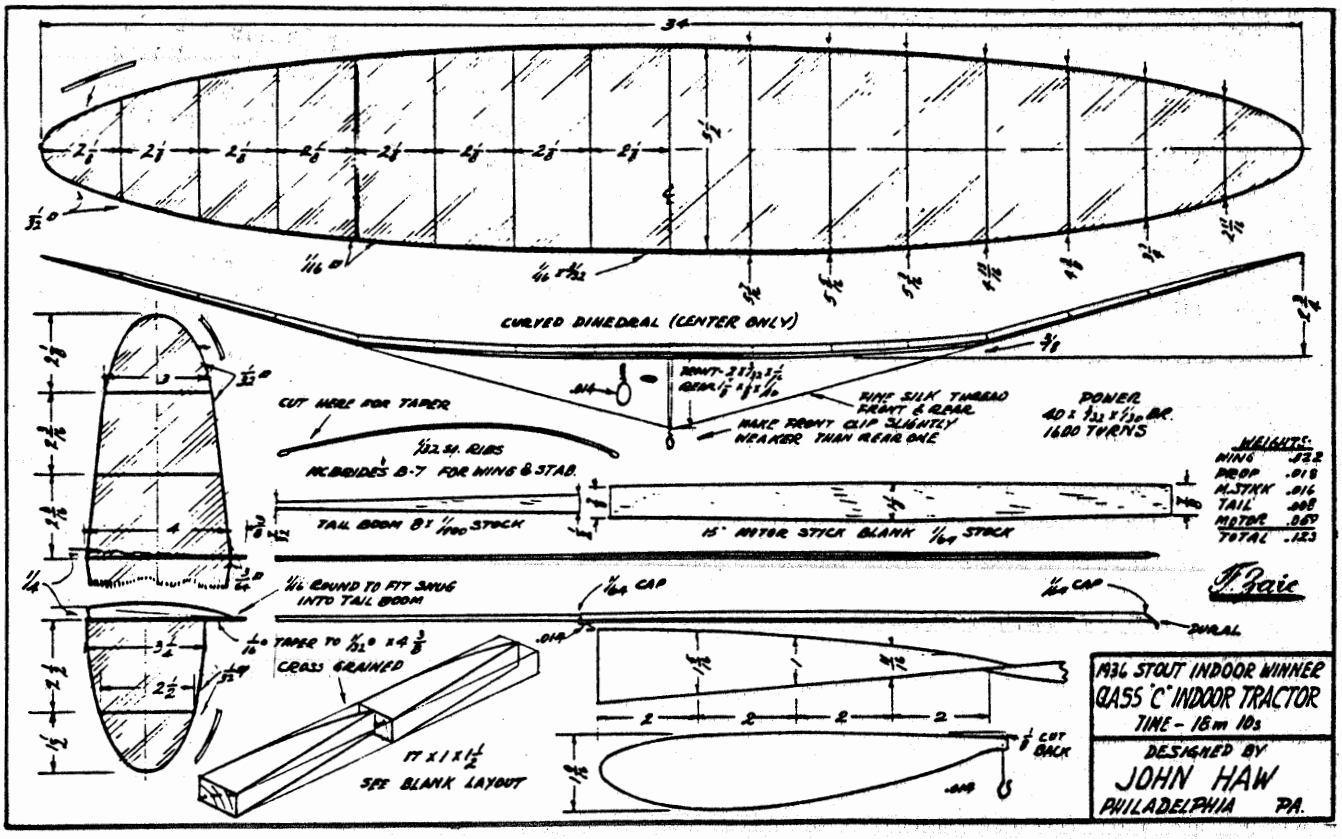
I thought I might gain some advantage from spacing the props as far apart as possible, which was the reason for the boom extension - along with a desire to have a low C.G. This low G.G. objective was the reason for locating the heavy double prop bearing at the bottom. Spacing the rotors apart would, I hoped, reduce the turbulent interference that the upper blades create for the lower ones.

The prop shaft, double bearing, and rear hook are all made of .012 music wire. The motor stick is made of 4 lb. .011 "C" grain wood, and the boom is the same, except that it is .008 thick. The rotors are made of 5 lb. wood.

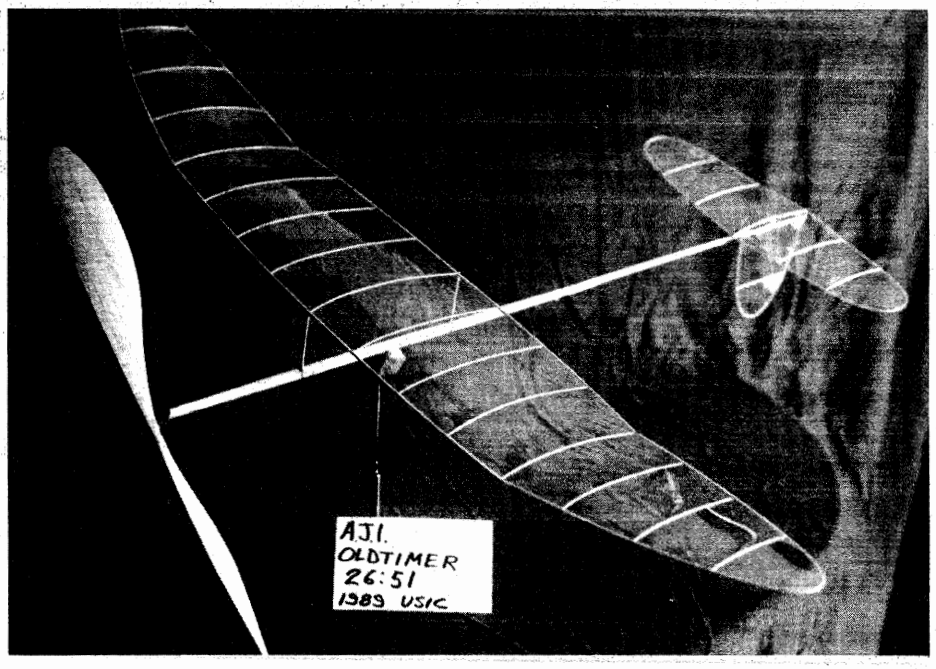
The rotor pitch was set as low as it would stand - and it still staggers around a lot getting underway.

Light weight is the key to success.





1937 Model Aeronautics Yearbook, Frank Zaic, p. 71



A.J.I. OLD TIMER 1st PLACE 1989 USIC 26:51
DON SLUSARCZYK, Brecksville, OH

Born in 1972, I was unable to live through the "Golden Age" of indoor. I have looked through the Zaic Yearbooks and wondered what it would have been like to build and fly models back then. When Tony Italiano decided to sponsor Old Timer indoor, I got excited.

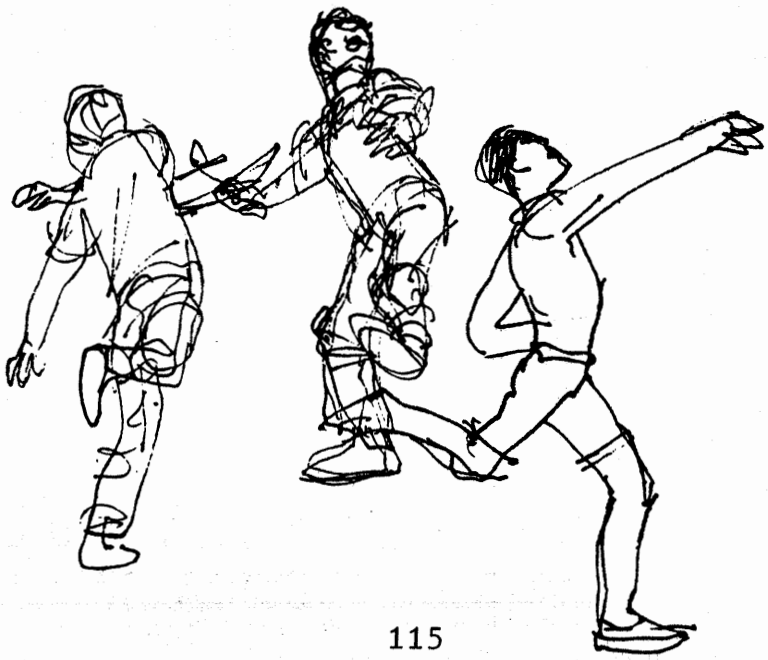
The hardest part of building an O.T. is deciding which one to build. A small Class B would be comparable to the modern Intermediate Stick, but flight times would be reduced because of the small size. The Class C size had enough wing area, but it would be difficult to transport. (I wish I knew what it was about the 36" wing that made it so popular back then.) After long hours with the Yearbooks, I decided to build the 1936 Stout Indoor Winner which was flown by John Haw of Philadelphia. This model appealed to me for three basic reasons: it has polyhedral, which increases wing strength; the Haw has lower wing bracing to stabilize its large wing span; and it has a 17" diameter prop (fairly large for a model back then).

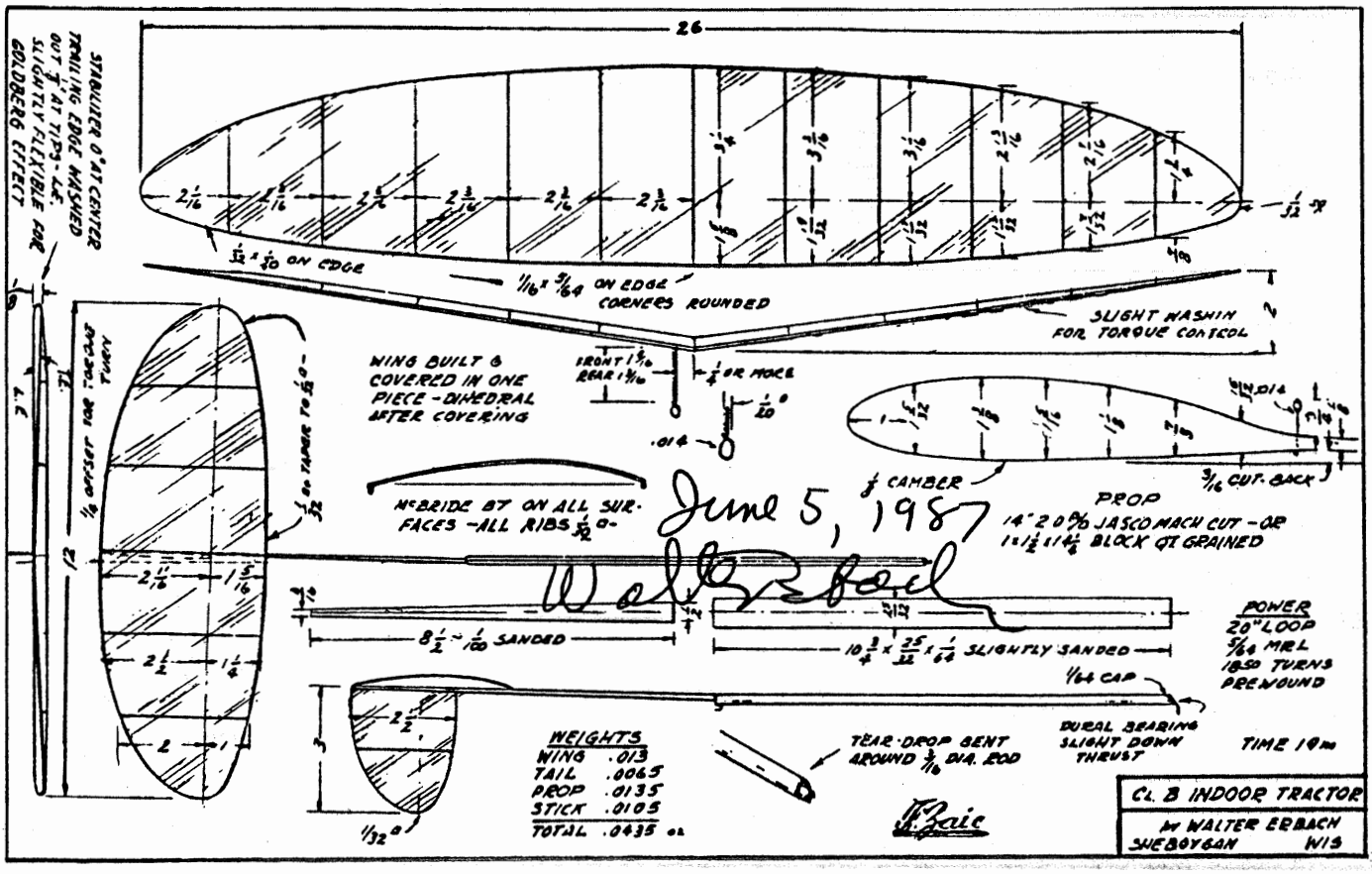
Construction of my first Haw was in 1988, and I flew it to a fourth place at the 1988 USIC. This model was fairly heavy, so a new one was built a few months before the 1989 USIC. The new one was lighter, .062 oz., and flew much nicer.

My Haw has a genuine old-style prop. Granted that it was not carved, but was formed by gluing two can-formed prop blades together at the hub. Spar props should not be allowed. The airfoil has to be the proper size and thickness; single bearings must be used if the original had one; and outlines must be followed exactly. It would follow that the prop should have the same outline, diameter and construction style as the original. The old-style reverse flare sparless props work well. The 26:51 flight had one, and climbed only 80 feet.

The motor was .080 Tan FAI rubber 18" long. The winning flight had 2050 turns minus 100, and landed with about 240 turns left.

The Haw has proven to be a very versatile flyer. Larry Loucka has one too, and we have both done very well with it. Larry placed 1st in 1988 and 2nd in 1989.





1938 Model Aeronautics Yearbook, Frank Zaic, p. 140



A.J.I. OLD TIMER 1st PLACE 1987 USIC 19:49
RONALD GANSER, Pittsburgh, PA

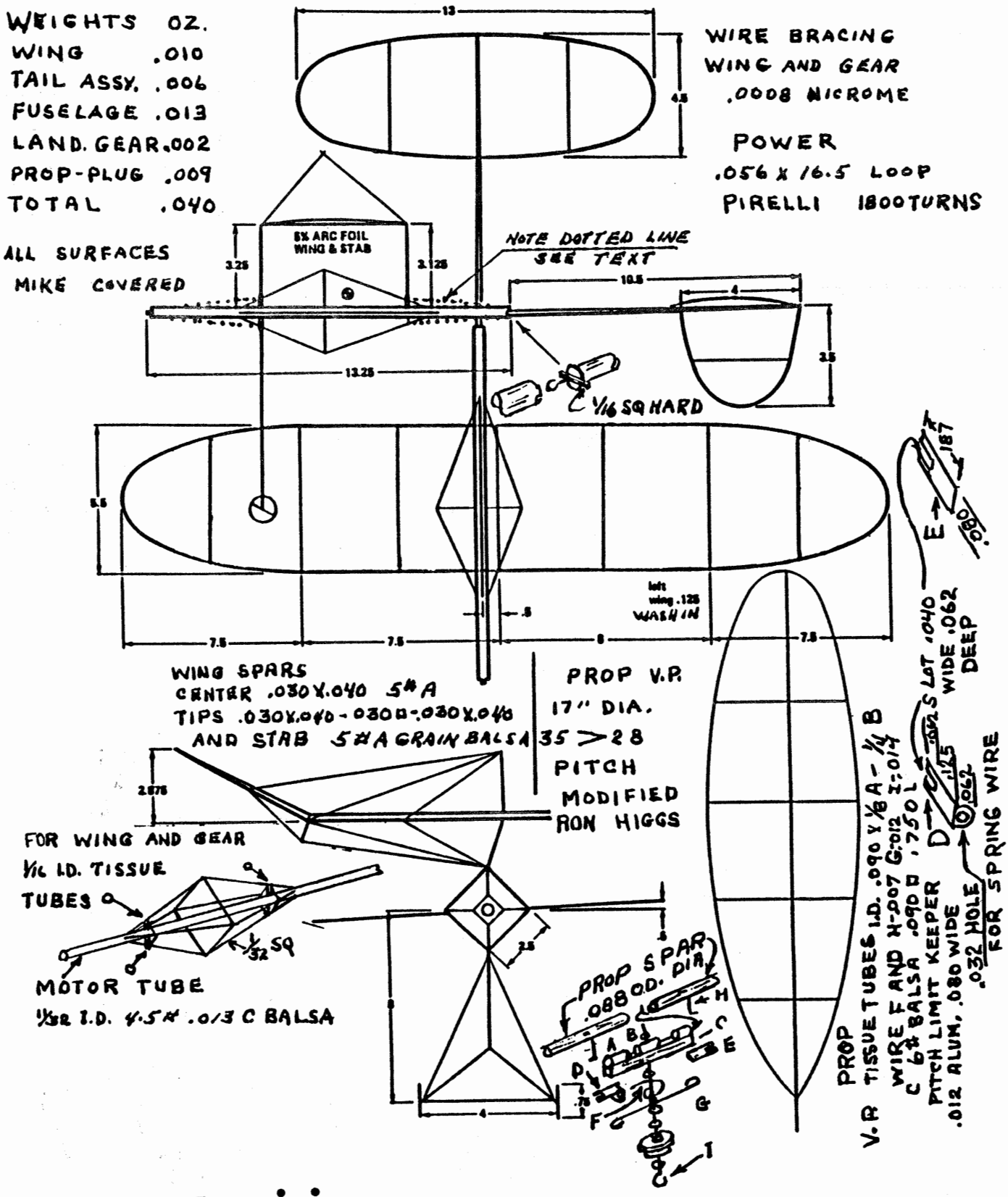
The model I flew to win the Old Timer event at the USIC in 1987 was Walter Erbach's Class B Indoor Tractor. The winning time was 19:49. The plan was from Frank Zaic's 1938 Yearbook, page 140. Walter was at the contest and was pleased to see it fly. He really enjoyed the performance of the model he had designed some 50 years ago. I had a picture taken with Walter and "our" model. I also had him date and sign the plan in my '38 Yearbook. He is a fine gentleman and a true leader in the indoor model phase of aviation.

I picked this model to build and enter because I had a 30-year old carved balsa prop that was the exact size required. At the time I didn't know that formed props (as per Pennyplane) were being permitted. I also built my model with a double bearing. When the Contest Director checked my model, I had to cut off the rear bearing, since the original model used only a single bearing.

I stayed pretty much with the plan wood sizes, and the weight was also the same. However, I used an .052 x .040 x 14" loop of Pirelli for my motor and flew with about 1750 turns. The only trouble was stalling due to lack of downthrust. I got around this by increasing the positive incidence (front post higher), decreasing the stabilizer angle (moving trailing edge down, straight in line with motor stick), and maintaining the original decalage. This change provided a slight downthrust in relation to the line of the model's flight.







Gemini DESIGNED BY: RON GANSER

OPEN CABIN
1ST. 1989 U.S.I.C. TIME 24:38
RON GANSER PITTSBURGH PA.

R.O.G. CABIN 1st PLACE 1989 USIC 24:38
RONALD GANSER, Pittsburgh, PA

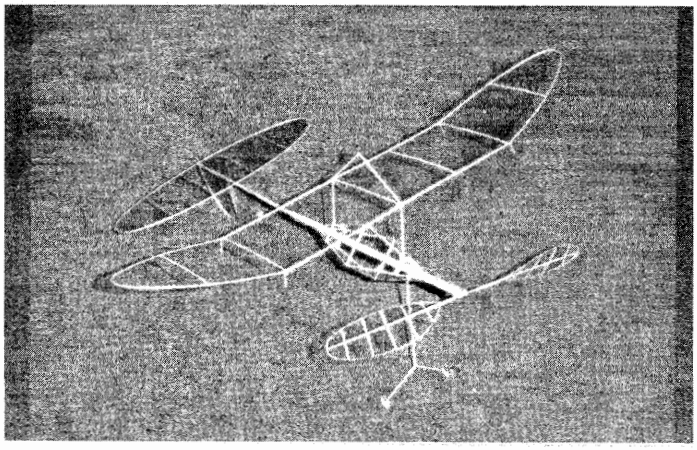
The "Gemini" cabin model design was brought about after seeing Bob Bienstein's "Low Down" cabin design using a rolled-tube fuselage. When Bob introduced the tube design, most cabin flyers went that route, with a few exceptions who stayed with a built-up or Warren truss construction. In a way, the tube idea helped the event by bringing more builders into flying cabin models, because of the easier handling. However, the event was hurt when the cross-section rule was circumvented by the use of the disk.

The cabin flyers at the 1989 USIC at Johnson City asked the Contest Board to end the prevailing uncertainty by making a clear interpretation of the cabin cross section rule. This ruling was made, and appears in the Oct. 89 issue of Model Aviation, page 131. To satisfy this rule, the superstructure on the "Gemini" must extend the length of the fuselage tube containing the motor, and it must be covered with microfilm as shown by the dotted lines on the drawing.

The "Gemini" was the first cabin model to exceed 30 minutes. It still holds the Cat. III record, set at West Baden. It was selected the "Indoor Model of the Year" by the NFFS in 1978. (See p. 86 of the 1979 Symposium.)

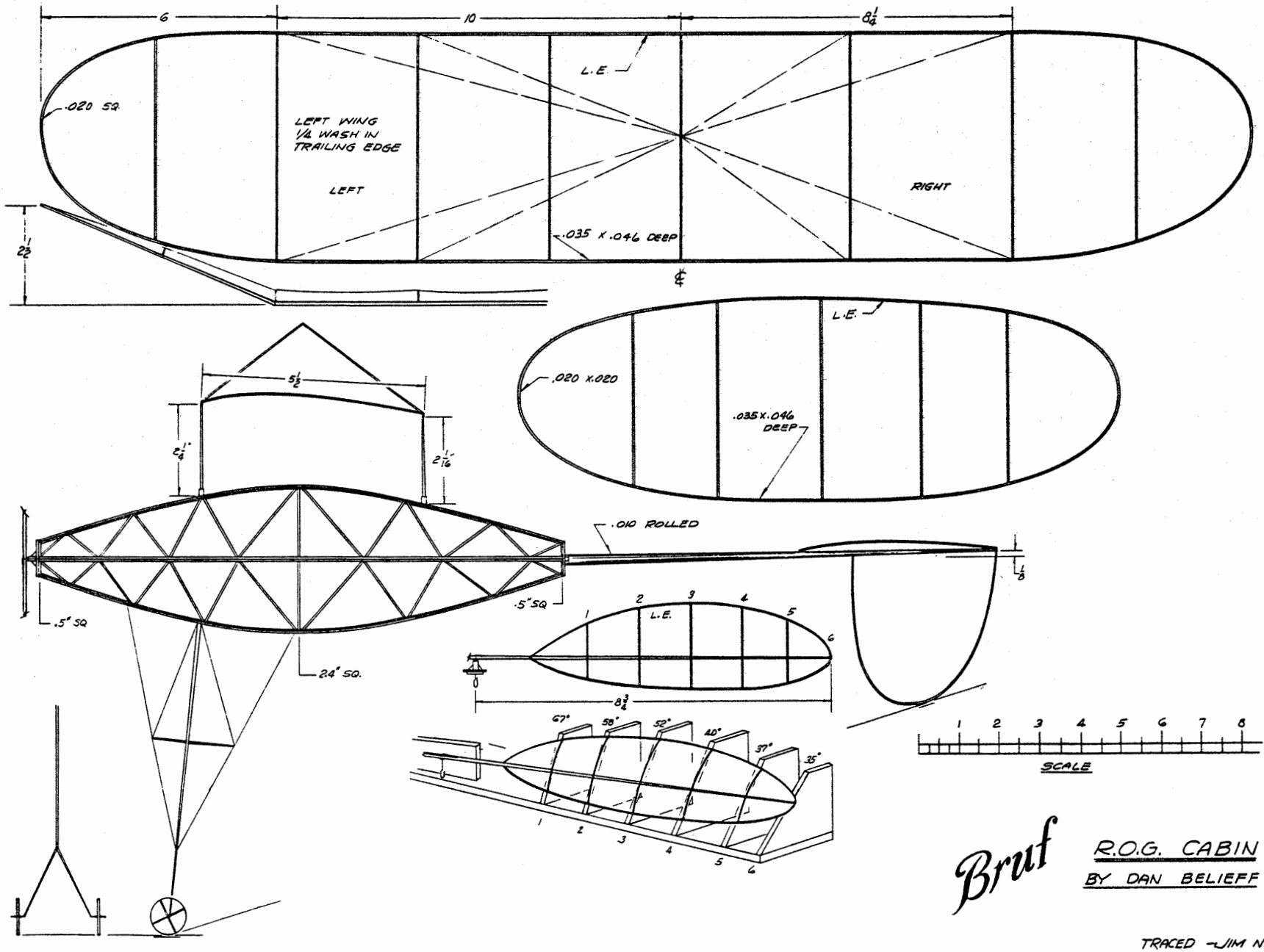
I used a variable pitch prop on the cabin model flown at the USIC, but I believe its use provides a greater advantage in ceilings below 100 ft, by avoiding hang-ups.

All those who fly cabin models say that it's a rewarding event; come join us.



DICK OBARSKI AND RON GANSER - AT THE RECORD TRIALS - GOODYEAR AEROSPACE, AKRON, OHIO




6
10
8 1/4
L.E.
.020 SQ.
LEFT WING
1/4 WASH IN
TRAILING EDGE
LEFT
RIGHT
.035 X .046 DEEP
2 1/2
L.E.
.020 X.020
.035 X.046
DEEP
5 1/2
2 1/4"
2 1/16"
.010 ROLLED
1/8
.5" SQ
.5" SQ
24" SQ.
1
2
3
4
5
6
L.E.
8 3/4
67°
58°
52°
40°
37°
35°
1
2
3
4
5
6
1
2
3
4
5
6
7
8
SCALE
Bruf
R.O.G. CABIN
BY DAN BELIEFF
TRACED -JIM NOONAN

ROG CABIN 2nd PLACE 1989 USIC 24:08
DAN BELIEFF, Sterling, VA

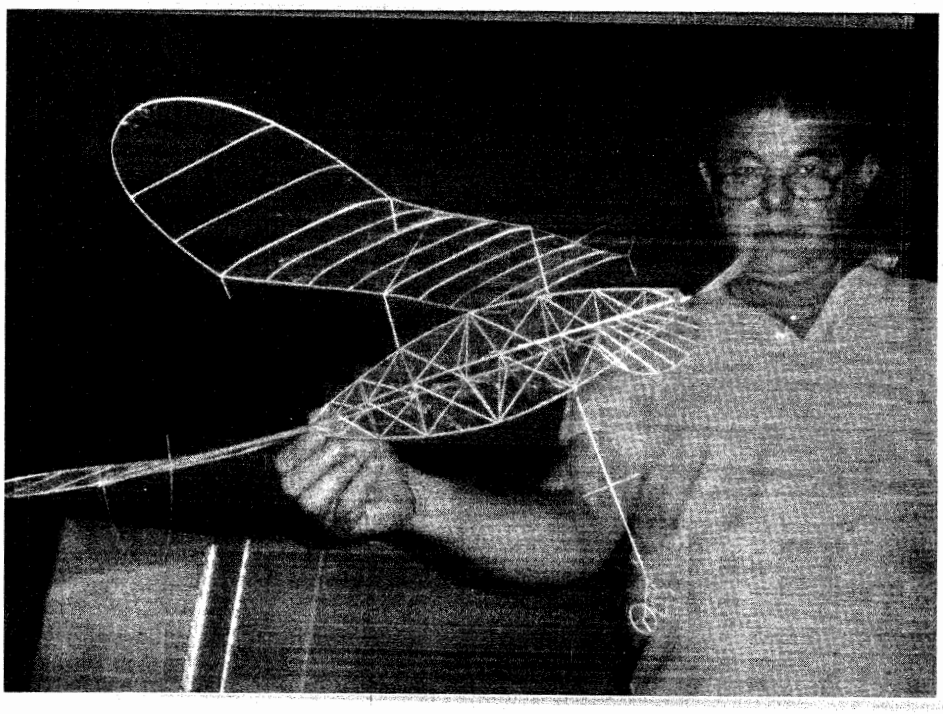
I was first influenced to build a real classic cabin model by Tom Vallee. His old Class B ship was pretty and consistent. So I said to myself, why not try a Cabin model? The first thing I must say is that Cabin is not for sissies! It will take all that you have to build one and to learn to handle the ship when you fly it. If you are successful in building and flying a Cabin model, all other indoor models are a piece of cake. I have told my buddies that a cabin model is at least a three-beer model, just to get calm enough. I don't mean to scare you off from trying one, as they provide a real thrill when you can breathe again and look up and see that old ship going up so nicely.

Flying "Bruf" is a lot of fun. As she has been fine-tuned over the years, she has behaved better. The first ship in 1983 had a habit of barrel-rolling on takeoff. I actually caught her upside down in the air about 10-15' from takeoff. Quite exciting! More offset in the wing, to its present position, has solved the problem. The 1983 ship weighed .040 oz. Through the years, the same ship has picked up .016 more and now totals .056. Before her retirement, she did her best time at her highest weight. That's backward, Buddies! But if you are lucky enough to fly the same ship for 7 years, you learn to fly it better.

If you can build a nice Manhattan, then you can build "Bruf." At .070 or 2 grams, I honestly feel that this design can do at least 15-17 minutes. The original weights (if memory serves) were these; prop .008, fuselage .014, tail .007, wing .011.

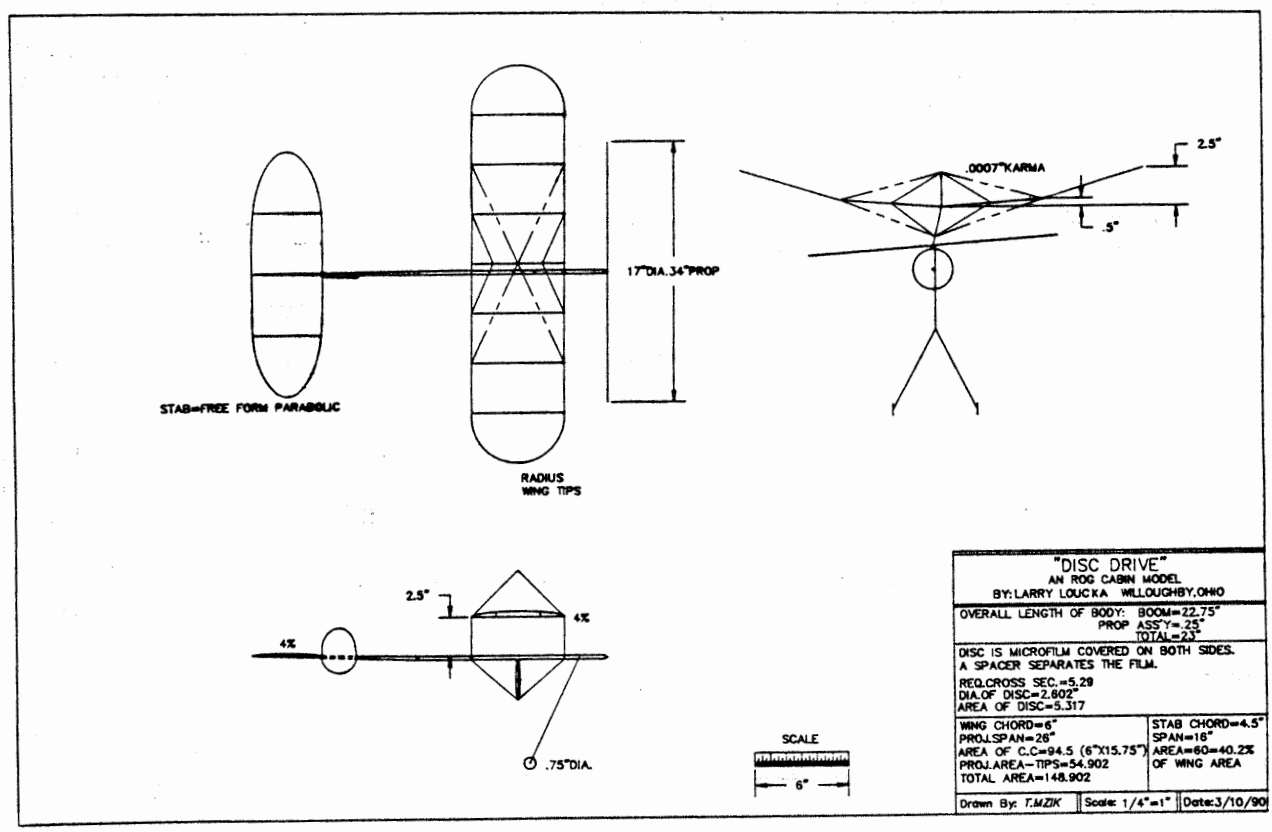
The only construction detail I feel I should talk about is the prop. My exact prop jig angles at 6 station points are given on the plan. I have used this prop with great success. It will help your Cabin model to fly very well. At least you will have a fighting chance.

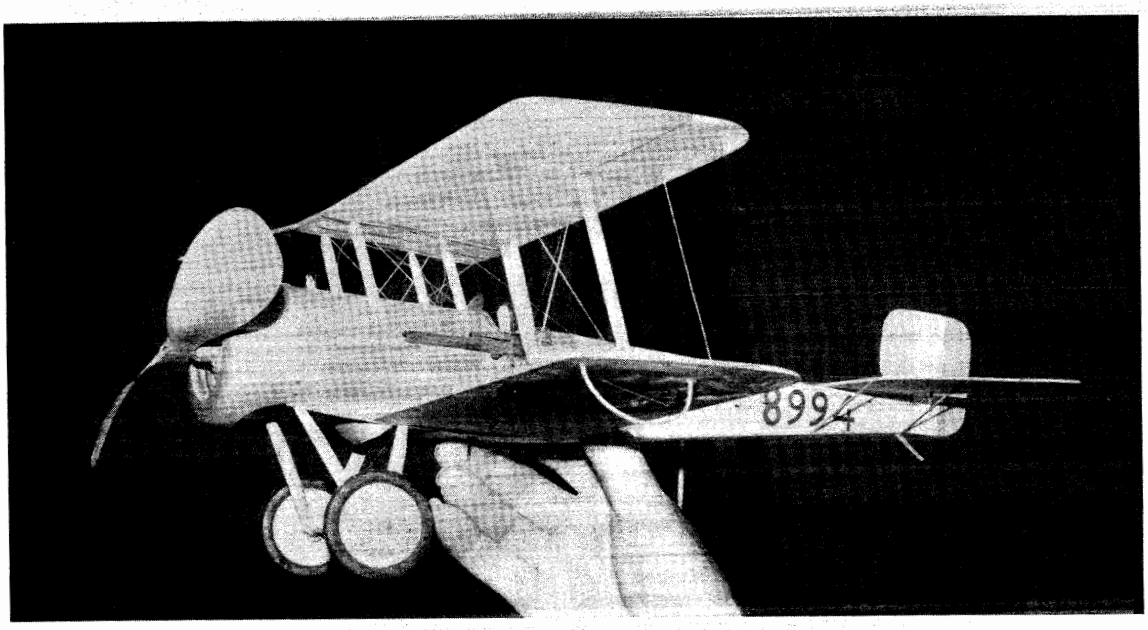
I would like to see more people try Cabin. The Nats has always supported Cabin; now we could be in trouble if no one has a Cabin event.



ROG CABIN 1st PLACE 1987 USIC 20:25
LARRY LOUCKA, Willoughby, OH

Larry won ROG Cabin in 1987 with this excellent "disc cabin" design. The rules no longer permit the use of a disc, but it is an interesting "for-the-record" design.

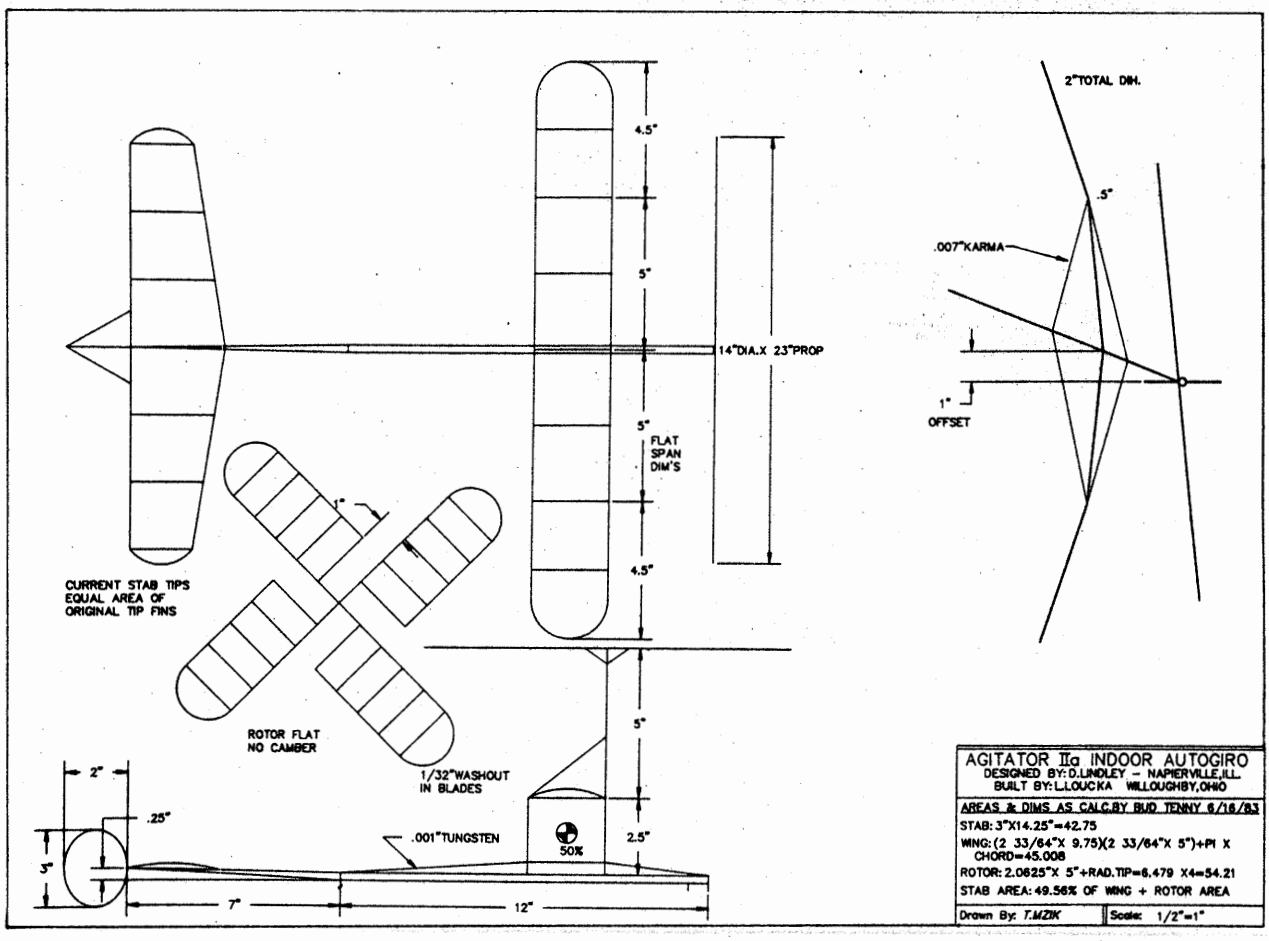




Ken Groves's perfect Bristol Scout

AUTOGIRO 1st PLACE 1987 USIC 20:25
LARRY LOUCKA, Willoughby, OH

Larry did not provide text or photos for his winning Don Lindley Autogiro design. See either Larry or Don for additional details.



Sources of Indoor Supplies

Micro-X
P O Box 1063
Lorain, OH, 44055

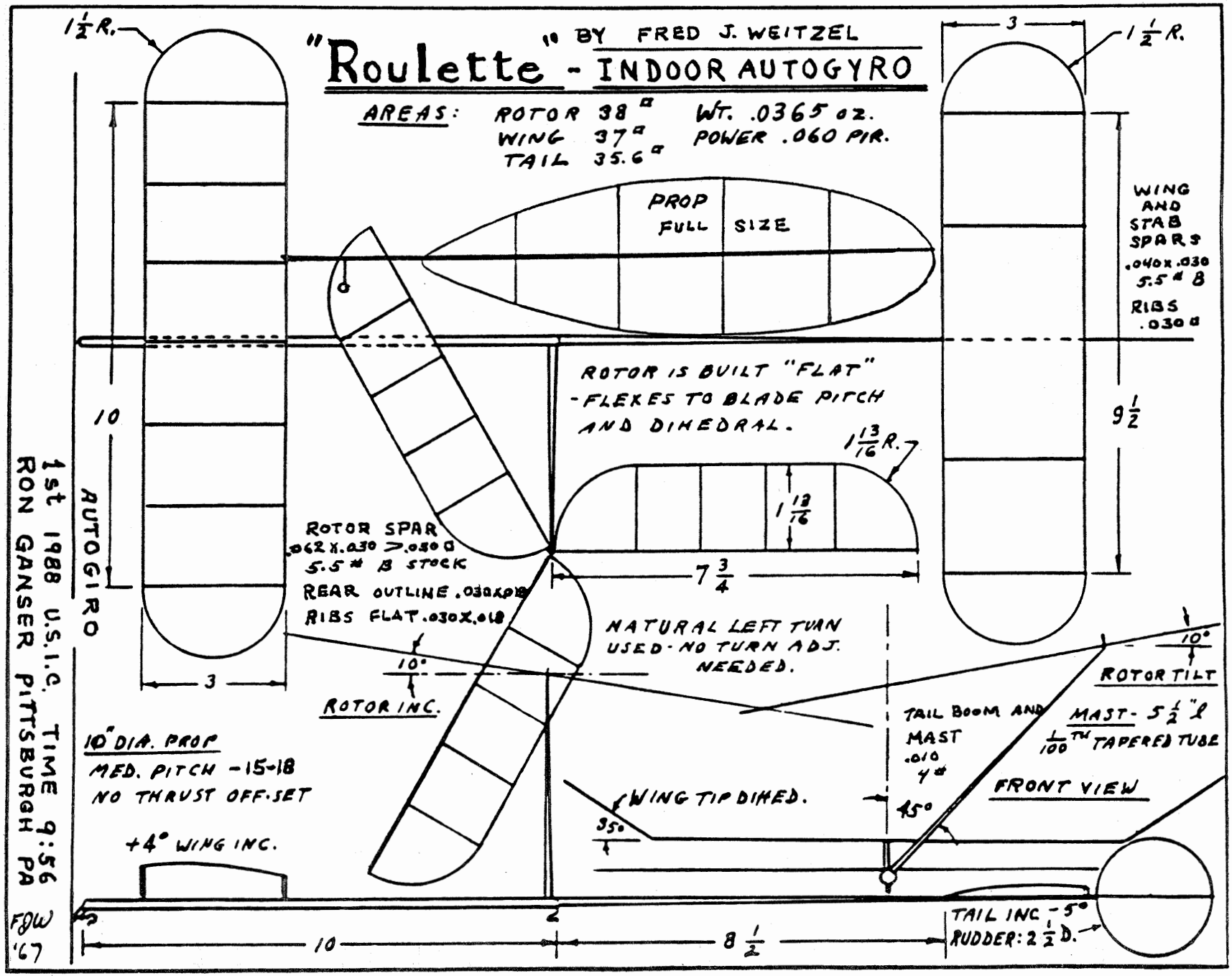
Jim Jones
3661 Ledgestone Dr.
Mount Clemens, MI, 48043

Indoor Model Supply
Box 5311
Salem, OR 97304

Ray Harlan
15 Happy Hollow Rd.
Wayland, MA 01778

Hannan's Runway
P O Box A
Escondido, CA 92025

FAI Supply
P O Box 3951
Torrance, CA 90510


"Roulette" BY FRED J. WEITZEL - INDOOR AUTOGYRO
AREAS: ROTOR 38 □ WT. .0365 oz.
WING 37 □ POWER .060 PIR.
TAIL 35.6 □
1½ R.
PROP FULL SIZE
WING AND STAB SPARS .040 x .030 5.5 # B
RIBS .030 □
ROTOR IS BUILT "FLAT" - FLEXES TO BLADE PITCH AND DIHEDRAL.
1 13/16 R.
1 13/16
9½
10
AUTOGIRO
ROTOR SPAR .062 x .030 > .030 □ 5.5 # B STOCK
REAR OUTLINE .030 x .018
RIBS FLAT .030 x .018
7¾
3
NATURAL LEFT TURN USED - NO TURN ADJ. NEEDED.
10°
ROTOR INC.
10°
ROTOR TILT
10" DIA. PROP
MED. PITCH - 15-18
NO THRUST OFF-SET
+4° WING INC.
TAIL BOOM AND MAST .010 4 #
MAST - 5½" l 1/100 TH TAPERED TUBE
WING TIP DIHED.
35°
45°
FRONT VIEW
TAIL INC - 5°
RUDDER: 2½ D.
10
8½
1st 1988 U.S.I.C. TIME 9:56
RON GANSER PITTSBURGH PA
FJW '67

AUTOGIRO 1st PLACE 1988 USIC 9:56
RONALD GANSER, Pittsburgh, PA

When I saw that autogiro would be an event at the USIC, I recalled seeing a plan of a successful design published in Indoor News and Views. I went through my collection, and in the July 1968 issue was the "Roulette", designed by Fred Weitzel. He had set a record of 8:27 with his model, and I liked his approach to torque control, using an offset rotor.

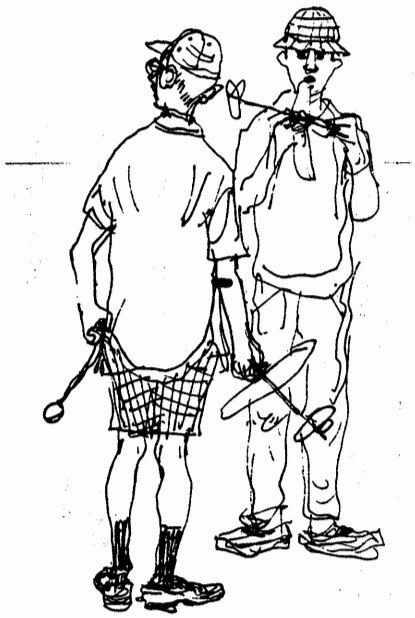
I built my model as shown on the plan, with the exception of the rudder. I had one, made up of boron, in the right size, so I used it on the autogiro. I also used a 10" diameter prop rather than the 11" one that Fred had used, to lower the torque, which causes the model to roll.

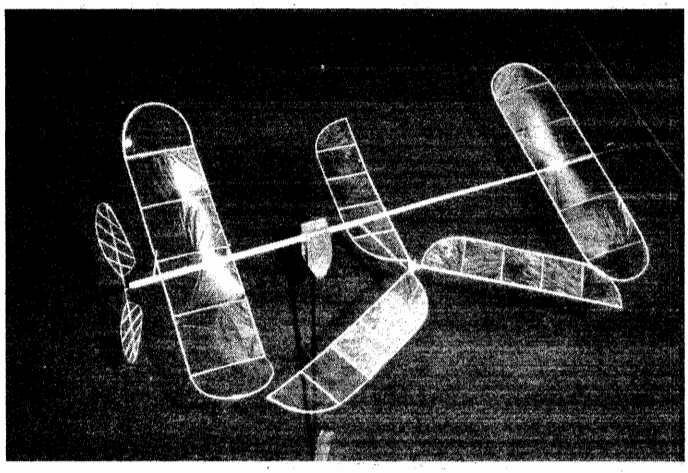
The model was taken to Johnson City untested, since I don't have a flying site in the Pittsburgh area. The model flew out of the box, so to speak, and the only thing I had to change was the motor size. I flew on a 12" loop of .050 Pirelli. I would put in 1500 turns and back off 100 to control stalling.

The model holds the Cat IV open record, 10:56, set on Aug. 3, 1988, at Akron, OH.

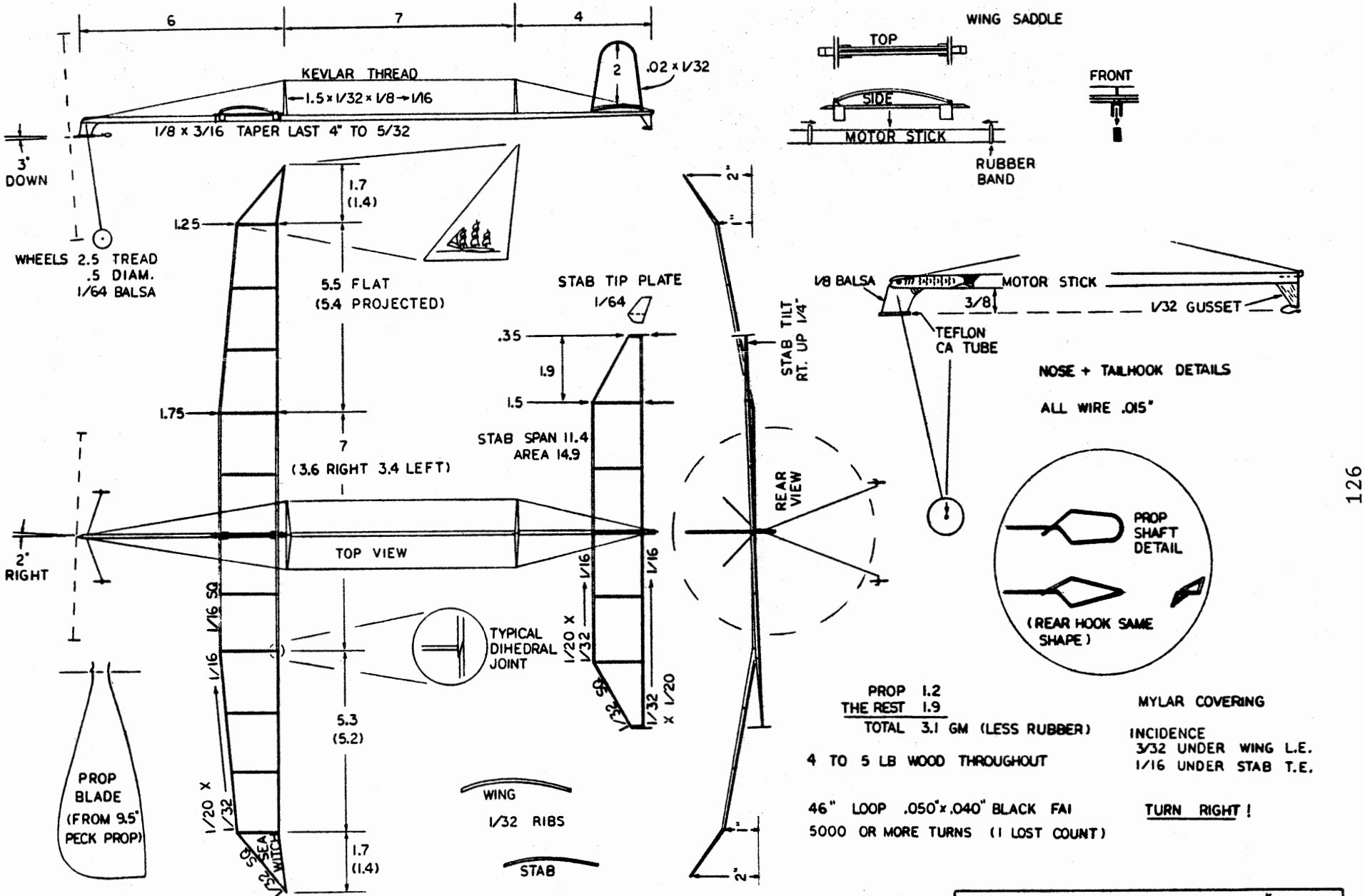
It is a sight to see, flying with the prop and rotor reflecting the colors of the microfilm which covers all surfaces.











PROP 1.2
THE REST 1.9
TOTAL 3.1 GM (LESS RUBBER)

4 TO 5 LB WOOD THROUGHOUT

46" LOOP .050" x .040" BLACK FAI
5000 OR MORE TURNS (I LOST COUNT)

MYLAR COVERING

INCIDENCE
3/32 UNDER WING L.E.
1/16 UNDER STAB T.E.

TURN RIGHT !

FEDERATION R.O.G. 'SEA WITCH'	
WINNER 1989 USIC 7 MIN 1 SEC	DAVID ARONSTEIN 1/4/90

FEDERATION R.O.G. 1st PLACE 1989 USIC 7:01 DAVID ARONSTEIN, Renton, WA

Federation ROG (FROG) is a relatively new team event that has been a lot of fun at recent Indoor Champs. Who would believe you could get 7:01 out of a class which is basically the old Baby R.O.G. with a plastic prop? Great!

"Sea Witch" is my 2nd Federation R.O.G., and it combines successful basic design principles with some lessons I learned from my first one, which followed from some basic truths of the universe:

Energy = Force x Distance; K x Rubber = Drag x (Speed x Time); Time = (K x Rubber)/(Speed x Drag). So we want to carry: (a) lots of rubber (b) slowly (c) with minimum drag.

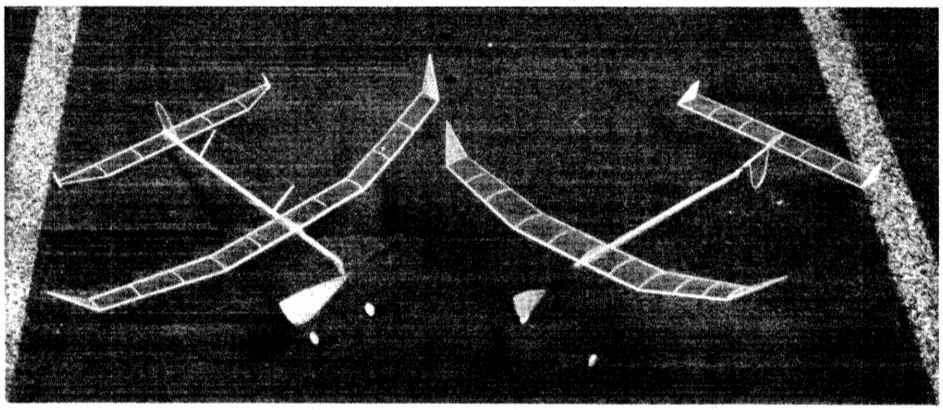
(a) is maximized with a long stick, and generous clearance between the rubber and the stick. (b) With restricted weight and area, every square inch must lift as hard as it can. An elliptical planform accomplishes this; I use a compound taper which approximates an elliptical planform, tapered from the leading edge only. (Rectangular wings don't make efficient use of all the area; the tips don't work as hard as the middle.) (c) Drag is a bear. (Specifically, a polar bear.) Two types of drag are important to us: induced drag and parasite drag. Induced (vortex) drag is as fundamental as gravity, and is inversely proportional to the square of the span, with slight improvement or degradation possible due to tip shape. So I use a large wingspan, with swept, pointed tips, which, some researchers believe, fool the air into thinking the span is just a bit bigger. Swept tips also provide a torsional weathervane, preventing the wing from tucking under. Clean and simple design minimizes parasite drag. Hence thin wire gear instead of wood, and the wing right on the stick, with no posts.

My first design was quite successful, but a couple of improvements were called for. Motor stick bending ultimately limited the performance. A braced stick could then be made even longer, yet stiffer. More drag, but MUCH more rubber. Kevlar thread, $10 from Model Research Labs, 25108 Marguer-ite # 160, Mission Viejo, CA 92692. 1 strand of the 2-strand thread is just right, and CA glue holds it.

"Look, Ma, no tailboom!" Moment arm is long enough without it. (Moment Arm)/(Wing Chord) is what matters, and it is about 7 on this airplane, which is around 97% as good as an infinitely long moment arm.

Future improvements will focus on making the model stiffer. The wing bends visibly in flight, losing valuable projected area and span. It may be that a span of more than about 19" does not pay; Sea Witch seems to fly just as well with the 2" shorter wing of its ancestor. The solid stick is an archaic feature, and all the fashionable Fed ROG flyers use tubes now. A single bracing line directly overhead should provide just enough strength.

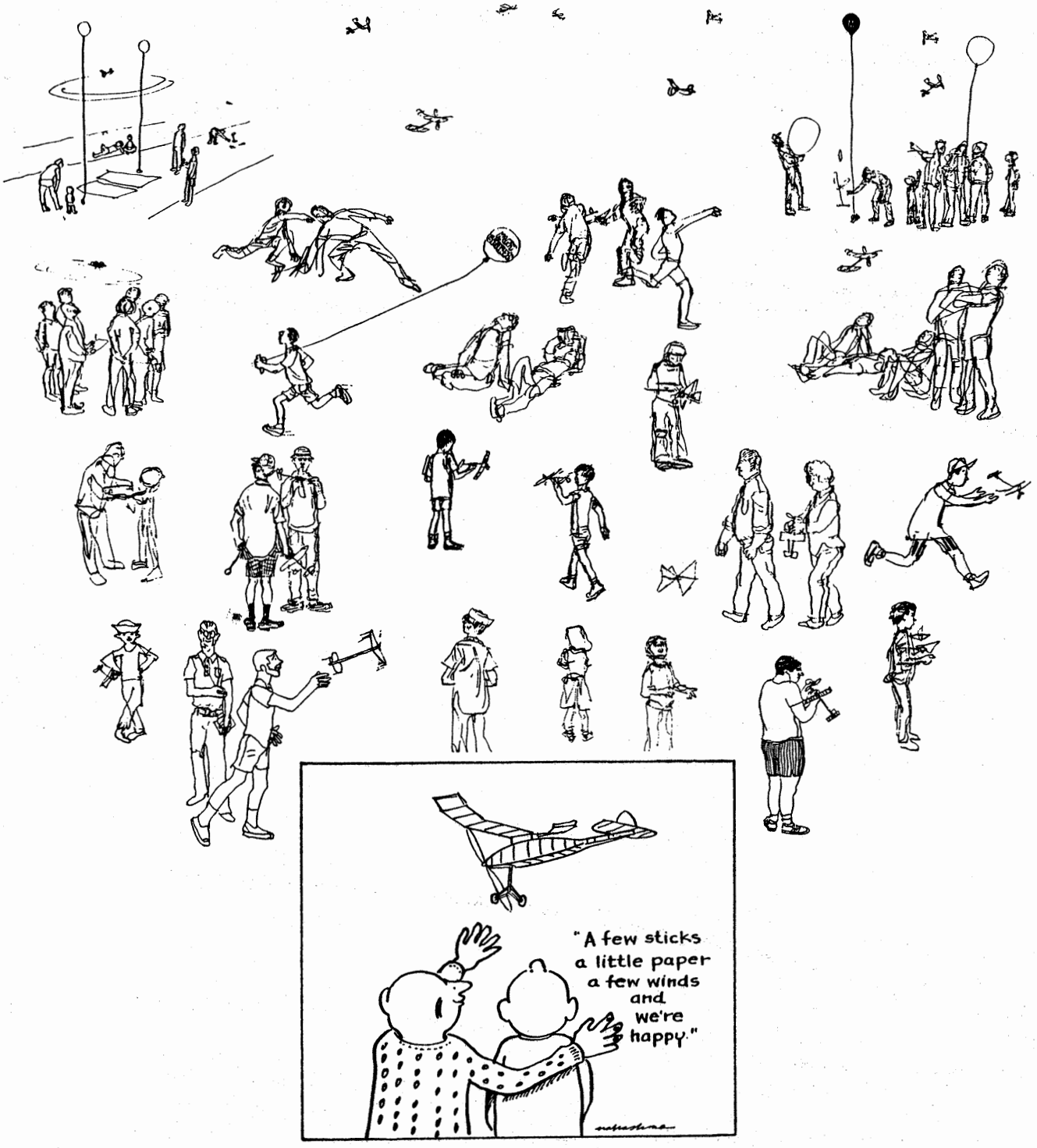
Finally, the well-equipped, serious Fed ROG flyer will have a 50:1 winder, with counter; and a bright yellow ribbon connecting himself to his stooge to keep stray passersby from walking through his motor as he winds; and a telescope to read his torque meter from halfway across the gym floor.



Sea Witch, left, and Liberty Belle, an earlier record-holder, right

COME TO

THE UNITED STATES INDOOR CHAMPIONSHIPS



THE NATIONAL FREE FLIGHT SOCIETY



The Huge, Calm, Beautiful ETSU Mini-Dome. ETSU photo.

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Mar. 30, 1990

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