R/C MODEL BUILDER

volume 9, number 89 $2.00 JUNE 1979

ISSN 0145-8175

- JEFF TRACY'S R/C CAP 20L-200 for big engines or reduction drives
- MINI - R/C "LONGSTER" for CO_2 or .010
- "STOP THAT SAILPLANE!"
- SCALE VIEWS by WESTBURG Fokker D-VII

0 74820 08545 06

You've got the desire to be a Champion.

Dreams of conquering the skies are what makes a winning pattern flier. But even the best contest competitors know that you've also got to have the right equipment. Futaba's J-series radio control systems are just that. Pure, state-of-the-art electronics with high-performance features like full programming capability, dual mixing circuitry, roll and snap roll control buttons and servo reverse switching. And serious fliers can also appreciate our water and dust proof, dual ball bearing S121 servos, modular RF boards and direct servo control.

The J-series Futabas are available in 4, 5, 6 and 8 channel systems, plus a 5 channel Helicopter system. Write now for complete technical data, because the sky's not the limit any more.

All J-series systems use quick change RF modules for band and modulation selection

Behind the 8J's back panel are 20 including 2 dual rates and 3 non-linearity functions.

Model 5JH/$749.95

Model 8JN/$799.95

We've got your radio. Futaba. 2065 East Victoria/Compton/CA/90220

Can you beat that?

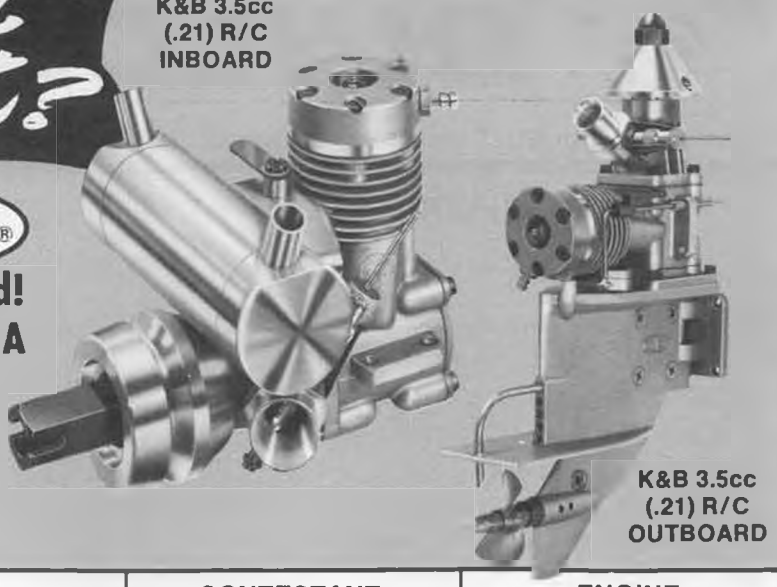
K&B

holds every record!

15 events • NAMBA Class A

How can one be better than perfect! K&B Engines hold EVERY RECORD in EVERY NAMBA INTERNATIONAL CLASS A EVENT.*

HERE THEY ARE:



		EVENT	CONTESTANT	ENGINE
Class A 1/16 Mile Straight-A-Way	1	A Hydro	Dick Aubert	K&B 3.5cc (.21)
	2	A Mono	Ed Fisher	K&B 3.5cc (.21)
	3	A Deep Vee	Ron Erickson	K&B 3.5cc (.21)
	4	A Outboard Hydro	John Havens, Jr.	K&B 3.5cc (.21)
	5	A Outboard Mono	Hal Stata	K&B 3.5cc (.21)
Class A Oval Heat Racing	6	A Hydro	Ed Fisher	K&B 3.5cc (.21)
	7	A Mono	Ed Fisher	K&B 3.5cc (.21)
	8	A Deep Vee	Ron Erickson	K&B 3.5cc (.21)
	9	A Outboard Deep Vee	Russ Moodie	K&B 3.5cc (.21)
	10	A Outboard Hydro	Ed Fisher	K&B 3.5cc (.21)
	11	A Outboard Mono	Carey Slavin	K&B 3.5cc (.21)
Class A Enduros	12	A ½ Hour Enduro	Brian Dallas	K&B 3.5cc (.21)
	13	A 1 Hour Enduro	Glenn Paykoff	VeCoy 20.5
	14	A 2 Hour Enduro	YKK Team	Veco .19
	15	A 4 Hour Enduro	YKK Team	Veco .19
	*	*As of January 27th, 1979*		

Other K&B Records in NAMBA
International Events are:

1/16 Mile Straight-A-Way

B Hydro	Don Pinckert	K&B 6.5cc

Oval Heat Racing

B Hydro	Ed Fisher	K&B 6.5cc
B Mono	Ed Fisher	K&B 6.5cc
B Deep Vee	Ed Fisher	K&B 6.5cc
XH Hydro	Bill Hornell	Twin K&B 6.5cc
CXSH	Bill Hornell	Twin K&B 6.5cc

100 Lap Team Marathon

Don Pinckert & Ronnie Hodges	K&B 6.5cc

Enduros

B ½ Hour Enduro	J. M. Fraser	K&B 6.5cc
B 2 Hour Enduro	Jerry Dunlap	K&B .40
B 4 Hour Enduro	Jerry Dunlap	K&B .40

Send for complete detailed information on Engines, Fuel, and Paint. Enclose $1.00 to cover postage and handling.

K&B

K&B MANUFACTURING
12152 WOODRUFF AVE., DOWNEY, CA. 90241

R/C MODEL BUILDER

JUNE

1979

volume 9, number 89

621 West Nineteenth St., Costa Mesa, California 92627 Phone: (714) 645-8830

CONTENTS

FEATURES

SCALE VIEWS

CONSTRUCTION

COVER: With their lovely suburban Las Vegas home as the background, Mrs. Bill (Sam) Bennett poses with her husband's CAP 20L, designed and built by Jeff Tracy and Garry Reusch of Australia, and flown in the 1978 Las Vegas Tournament of Champions by Jeff Tracy. Photo by Billy Root.

R/C MODEL BUILDER (ISSN 0145-8175) is published monthly by RCMB INC., 621 West Nineteenth St., Costa Mesa, California, 92627. Phone (714) 645-8830.

Subscriptions $20.00 per year, $37.00 for two years. Single copies $2.00. Add $3.50 per year for postage outside of U.S. (except APO and FPO).

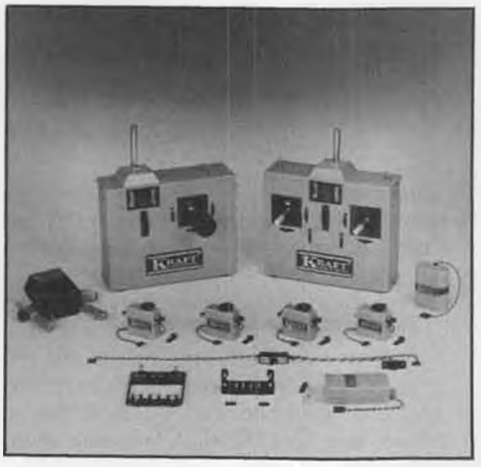
Change of address notices must be received six weeks before date of issue that new address takes effect. Send old address with new; old label preferred. Post Office will not forward copies unless you pay extra postage. Duplicate issues cannot be sent.

Second Class postage paid at Costa Mesa, California, and additional offices.

Father & Son Special

Purchase a Kraft 7-channel system and receive a 2-channel system for only $29.95 additional!

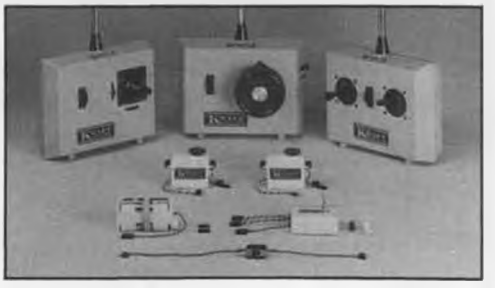
[This offer valid in the U.S.A. only.]



You save **$100** on the regular $129.95 [MANU. SUGG. RETAIL PRICE] 2-channel system by redeeming the Father & Son Coupon for a KP-2AS, KP-2AW, or KP-2A system on the frequency of your choice, postpaid from the factory.

The KP-7CS and KP-7C are contest proven, sophisticated systems with a wide variety of options.

The KP-2AS, KP-2AW, and KP-2A are the industry's finest 2-channel systems.



Quantities are limited. Orders are on a first come, first serve basis.

See your participating Kraft dealer NOW!

Write for Free Catalog

Kraft Systems, Inc. • 450 West California Avenue • Vista CA 92083 • PH. (714) 724-7146

OLDIES (BUT STILL GOODIES !)

MOST BACK ISSUES OF "MODEL BUILDER" ARE STILL AVAILABLE, THOUGH SOME ARE IN SHORT SUPPLY. ORDER NOW, WHILE THEY LAST! PRICES VARY ACCORDING TO QUANTITY REMAINING IN STOCK. NOTE SPECIAL ANNIVERSARY PRICES LISTED BELOW!

November 1971

Nancy, R/C soarer.
R/C Pattern World Championships.
Peanut Fokker D VI.
ILSF Tournament story.
Bi-Prentice, R/C bipe trainer.

Vol. 1, No. 2 $3.00

December 1971

Curtiss-Wright Junior R/C 2" scale.
R/C Twin Trainer 75" span, for .40's.
Peanut Laird LC-DC.
Volksplane 3V-1 3-views.
How to build light "wire" wheels.

Vol. 1, No. 3 $2.00

January 1972

SHOCer F/F by Mel Schmidt.
White Trash, famous R/C soarer.
Peanut Ord-Hume.
Chet Lanzo's famous rubber Puss Moth.
Curtiss Robin 3-views.

Vol. 2, No. 4 $1.00

February 1972

Minnow U/C profile scale rac[illegible]
Fokker E-[illegible] /C scale.
Al Vela's [illegible] Boy 1/2A
E-Z Bo[illegible] .A, Al Vela.
Peanu[illegible] d Flivver.
Fibe[illegible] sing over balsa, by Le Gray.
Spoiler, FAI Combat.

SOLD OUT

Vol. 2, No. 5 $3.00

Mar/April 1972

Yankee Gull R/C glider 8' to 12' span.
Miss Cosmic Wind, QM R/C Pylon racer.
Peanut Scale Bucker Jungmann.
Siebel 1/4A F/F scale.
Mr. Mulligan 3-views.
FAI power "Folder."

Vol. 2, No. 6 $1.00

May 1972

Seahorse II, R/C seaplane. For .19-.35.
D.H. Humming Bird, F/F or R/C pulse.
Peanut Fokker V-23.
Whetstone 1/2A U/C combat.
Ryan ST 3-views.
Tethered Cars, R/C sail.

Vol. 2, No. 7 $2.00

June 1972

Bob White Wakefield.
Mongster QM biplane R/C pylon racer.
Calif. Coaster R/C glider. Sheet wing.
Three profile Peanuts.
Deperdussin 3-views.
Pesco Special 3-views.

Vol. 2, No. 8 $3.00

July 1972

Fairchild 51, 1" scale, R/C or F/F.
SAM-5 A/2 Nordic.
1912 Avro G rubber.
Comanche C stand-off R/C scale.
Travelair 2000 2" scale R/C, by Editor.
Chester Jeep 3-views.

Vol. 2, No. 9 $4.00

August 1972

Bonzo standa[illegible] R/C sport pl[illegible] scale.
Counterf[illegible] ailless A/1 [illegible]ic.
Shoes[illegible] R/C QM.
Pear[illegible] aylorcraft on [illegible]ts, also big one.
Fairey Delta 3-views.

SOLD OUT

Vol. 2, No. 10 $4.00

Feb/March 1973

Profile F4U Corsair C/L stunt, .40 power.
Beecroft's Satan, Class A free flight.
Indoor Ornithopter.
Peanut Travelair 2000
PT-3 Scale Views.
Thermal hunting with R/C gliders.

Vol. 3, No. 16 $2.00

April 1973

Fabulous PEA POD, R/C sailboat.
Briegleb BG-12, scale R/C soarer.
R/C Spirit of St. Louis, semi-scale, .049-.09.
Peanut Volksplane
Finish painting of rubber scale models.

Vol. 3, No. 17 $3.00

May 1973

Bantee mini-pattern R/C 3channel, .19 power.
Woodwind A/2, all sheet covered wing.
Slope soaring technique.
Teakettle, twin-boom CO_2 pusher.
Peanut Monocoupe 110.
Aerbo, .020 Replica, OT

Vol. 3, No. 18 $1.00

SPECIAL ! ! !

MODEL BUILDER MAGAZINE'S

5th ANNIVERSARY BACK-ISSUE SALE ! !

ANY ISSUE MARKED WITH "o" 75 Cents!

ANY ISSUE MARKED WITH "●" 50 Cents!

Nov. 71	$3.00( )	May 73	o 1.00( )	Apr. 74	o 1.00( )
Dec. 71	2.00( )	Jul. 73	● 1.00( )	May 74	1.00( )
		Aug. 73	● 1.00( )	Jun. 74	● 1.00( )
Jan. 72	o 1.00( )	Sep. 73	● 1.00( )	Jul. 74	o 1.00( )
~~Feb. 72~~	~~3.00( )~~	Oct. 73	● 1.00( )	Aug. 74	● 1.00( )
M/A 72	● 1.00( )	Nov. 73	o 1.00( )	S/O 74	● 1.00( )
May 72	2.00( )	Dec. 73	● 1.00( )	Nov. 74	o 1.00( )
Jun. 72	3.00( )			Dec. 74	o 1.00( )
Jul. 72	4.00( )	Jan. 74	o 1.00( )	Jan. 75	o 2.00( )
F/M 73	2.00( )	Feb. 74	● 1.00( )	Feb. 75	2.00( )
Apr. 73	3.00( )	Mar. 74	o 1.00( )	Mar. 75	2.00( )

Apr. 75	2.00( )
May 75	3.00( )
Jun. 75	1.25( )
Jul. 75	● 1.25( )
Aug. 75	o 2.00( )
Sep. 75	o 1.25( )
Oct. 75	o 1.25( )
Nov. 75	o 1.25( )
Dec. 75	o 1.25( )
Jan. 76	o 1.50( )
Feb. 76	o 1.50( )
Mar. 76	o 1.50( )
Apr. 76	o 1.50( )
Jun. 76	o 1.50( )
Jul. 76	o 1.50( )
Aug. 76 through June 78,	1.50( )
July 78	Sold Out
*Aug. 78 to date each	2.00( )
*Nov 78	Sold out

Put a check mark ( ) by the back issues you wish to order. Magazines will be mailed by Second Class, postpaid. Foreign orders (except Canada, Mexico, FPO, APO) add 30¢ per copy. Allow about four weeks for delivery. If United Parcel Service (UPS) is desired, add 80¢ minimum for up to two magazines, or add 80¢ plus 10¢ for each additional magazine on orders for three or more. Send check or Money Order (no cash, please, and no COD's). A facsimile of this order form may be used.

Name: _____

Address: _____

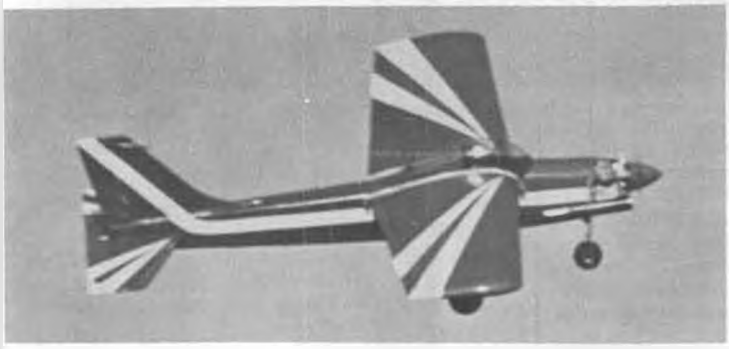
City: _____ State: _____

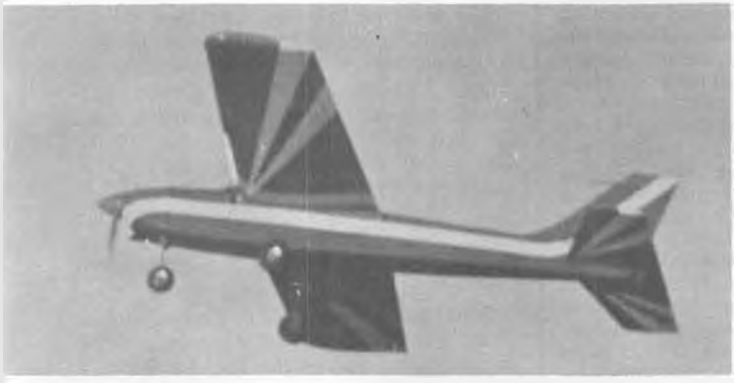
PLEASE PRINT

ZIP: _____

MODEL BUILDER, 621 West Nineteenth St., Costa Mesa, Ca. 92627

FASTEST SELLING NEW KIT WE'VE EVER PRODUCED!





Designed By Claude McCullough

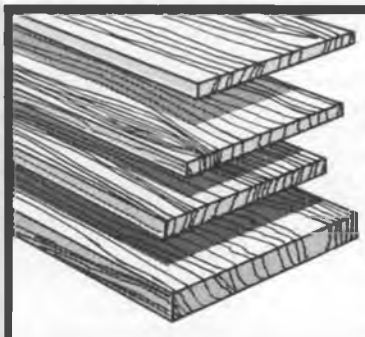
Kavalier

WITH DIFFERENTIAL AILERONS AND WING WASHOUT FOR SUPERIOR STABILITY AND CONTROL

Within six months of its introduction, the Kavalier had climbed to the No. 2 spot in our kit line and was still going up. Looking at our letter file, full of such comments as "flew right off the board, "outstanding performance" and "great stability," we can understand why. Here, for example, are some exerpts from a long and enthusiastic letter from Clayton M. Bergman, (USAF retired) of Friendswood, TX: "A few months ago I bought the first Kavalier kit sold by Clear lake Models in Clear Lake City (Houston). It was the most beautiful kit I ever bought. Everything in it was of excellent quality. . . . . I built the Kavalier and entered it in our club (Manned Spacecraft Center Radio Club) monthly meeting where plane of the month is awarded a small trophy. I covered it exactly like your picture and it was pretty if I do say so. I won the little trophy of which I am very proud. . . . . I for one know that when I buy a Sig kit I am going to get quality." See your friendly Sig dealer and join the growing crowd of Kavalier fliers!

55-1/2" Wing Span
For .29 -.40 Engines

SIG® KIT RC-39 **$44.95**



SIG BASSWOOD

New Product!

BW-008	1/16" x 1/16"	.08	BW-015	3/32" x 3/32"	.11	BW-034	1/4" x 3/4"	.43	BW-076	1/2" x 1-3/4"	.30
BW-009	1/16" x 1/8"	.09	BW-016	3/32" x 3/16"	.13	BW-035	5/16" x 5/16"	.28	BW-077	7/8" x 1-3/4"	.60
BW-010	1/16" x 3/16"	.11	BW-017	3/32" x 1/4"	.14	BW-036	3/8" x 3/8"	.33	BW-078	7/8" x 2-3/4"	.70
BW-011	1/16" x 1/4"	.13	BW-018	3/32" x 3/8"	.20				BW-079	7/8" x 3-3/4"	.95
BW-012	1/16" x 5/16"	.17	BW-019	3/32" x 3/4"	.30	Basswood Sheets (22" Lengths)			BW-080	1-3/4" x 1-3/4"	.85
BW-013	1/16" x 3/8"	.20	BW-020	1/8" x 1/8"	.11	BW-051	1/16" x 3"	.80	BW-081	1-3/4" x 2-3/4"	1.40
BW-014	1/16" x 3/4"	.28	BW-021	1/8" x 3/16"	.13	BW-052	3/32" x 3"	.85	BW-082	1-3/4" x 3-3/4"	1.90
			BW-022	1/8" x 1/4"	.17	BW-053	1/8" x 3"	.90	BW-083	1-3/4" x 4-3/4"	2.55
			BW-023	1/8" x 5/16"	.20	BW-054	3/16" x 3"	.95			
			BW-024	1/8" x 3/8"	.21	BW-055	1/4" x 3"	1.05	Basswood Carving Blocks (12" Lengths)		
			BW-025	1/8" x 3/4"	.33	BW-056	3/8" x 3"	1.25	BW-090	1/2" x 7/8"	.30
			BW-026	3/16" x 3/16"	.15	BW-058	1/16" x 4"	1.05	BW-091	1/2" x 1-3/4"	.60
			BW-027	3/16" x 1/4"	.18	BW-059	3/32" x 4"	1.15	BW-092	7/8" x 1-3/4"	1.15
			BW-028	3/16" x 5/16"	.21	BW-060	1/8" x 4"	1.25	BW-093	7/8" x 2-3/4"	1.40
			BW-029	3/16" x 3/8"	.23	BW-061	3/16" x 4"	1.30	BW-094	7/8" x 3-3/4"	1.90
			BW-030	3/16" x 3/4"	.38	BW-062	1/4" x 4"	1.45	BW-095	1-3/4" x 1-3/4"	1.60
			BW-031	1/4" x 1/4"	.19				BW-096	1-3/4" x 2-3/4"	2.70
			BW-032	1/4" x 5/16"	.23	Basswood Carving Blocks (6" Lengths)			BW-097	1-3/4" x 3-3/4"	3.70
			BW-033	1/4" x 3/8"	.28	BW-075	1/2" x 7/8"	.15	BW-098	1-3/4" x 4-3/4"	4.95

JUST OFF THE PRESS! SIG'S LATEST CATALOG - NO. 40!

" THE MODEL BUILDER'S WISHBOOK." Every modeling workshop needs a copy of the latest Sig Catalog. The complete line of Sig kits, accessories and supplies is shown, plus practically all other major companies products. Use it as a handy reference tool while designing or building a model. Featured are some helpful hints about construction, painting and other subjects by the Sig Factory Fliers. Get a copy at your friendly local Sig dealer or send $2.00 to Sig.

TO ORDER KITS AND SUPPLIES: See your dealer first! If he cannot supply you, order direct. Add $1.00 postage for orders under $10. Orders over $10 are postpaid. No C.O.D. Do not send cash. Prices subject to change without notice. Be sure to include complete address and zip code.

SIG MANUFACTURING CO., INC - MONTEZUMA, IA 50171

Big pattern ships are not new, but they're still underrated. MB's editor with his 92" span Omen, from Dec. '68 RCM, Joe Spina on the other tip. Eleven pound ship was a beautiful, smooth flier, powered by a rear rotor HP .61. Photo taken in Delaware, 1969.

from Bill Northrop's workbench . . .

• If you've gotten over the shock of seeing this June issue come out so early (actually, it's just on time!), have done your double-take at the new cover format, and have finally made your way to this column, perhaps you're ready for a few explanations.

First of all, beginning with this issue, **Model Builder** . . . excuse us . . . **R/C Model Builder** is now available at newsstands all over the U.S. and Canada, plus many countries overseas. Until now it was only sold at hobby shops and through subscriptions. Newsstand distributors demand certain things; one of which is punctuality . . . explanation Number One. Another thing they require is a cover designed to show well when it is tucked into display shelves with many other publications . . . explanation Number Two. And a cover must point up certain features in each issue and also include the funny little white rectangle with different-width vertical black lines that is used in fast checkout supermarkets . . . explanation Number Three.

Oops, one more explanation, to subscribers only. For a short period of time, **R/C Model Builder** will not be mailed in an envelope. Changes in our mailing system will not allow it for the moment. As soon as possible, we will try to cure this problem for those of you who, like ourselves, have the incurable habit of saving model magazines. We understand your desire to have a clean, untorn, uncurled copy.

WHITHER WHITTIER NARROWS

We wonder how many modelers who enjoy the use of Whittier Narrows Park are aware that Mayor Bradley, of Los Angeles, is drawing a bead on this site for a 300 meter rifle range for the 1984 Olympics. Information on this was brought to us by Cecil Weatherly, Hacienda Heights, California, in the form of an article in the February 16, 1979 issue of *Western Outdoor News*. This article points out that the present use of Whittier Narrows will be terminated forever by this modification for a mere two-week event. The article further states, *"At present, the area is being utilized by horsemen, dog trainers, the Mexican Matadors, bird watchers and naturalists.* (As usual, modelers were not mentioned, but their area represents a large percentage of the total park. wcn) *The proposed plan will not only take over the 300 meters for a rifle range, but it must accommodate the public at large (spectators) and will need to leave a safety zone because of the rifle usage. The area available at present would be reduced by at least half of its present size, if not closed permanently for the use by the community at large.*

"It is interesting to note that in the Sepulveda Basin, the Mayor's office is handling the problem with kid gloves, while in Whittier Narrows their attitude is one of indifference to the needs of the people which the area serves. . . .

". . .The problem is that the Mayor knows that there is not the same degree of public outcry for Whittier Narrows as there is for the Sepulveda Basin, and by keeping the matter hushed up, he could obtain whatever he wants in Whittier Narrows.

"[It was] further explained that alternate sites they have considered are the Riverside Gun Club and the Police Range. These two alternate sites seemed more appropriate than the usurpation of Whittier Narrows by the City of Los Angeles with adequate community input.

"If you agree, contact Pete Schabarum at 500 W. Temple St., Los Angeles, CA

Continued on page 117

MESSAGE FROM THE PUBLISHER
WALT SCHRODER

With the pain of once again being accused of attacking the temple of modeling, better known as *Model Aviation*, the AMA magazine, it is necessary to point out a few salient facts:

Ours *(R/C Model Builder)* of necessity must be a profit making and tax paying operation, or the economic facts of life take over and we become still another statistic . . . a failed small business. However, on page 70 of the May 1979 *Model Aviation*, in the section stating, 'A note about the *Model Aviation* budget,' the very small surplus is explained as being part of a planned program to include in its manufacturing costs all possible charges. This then reduces their taxes and makes it possible to pay more for articles, flash up their magazine with added color, and add more pages; all the things a profit making operation would *like* to do, but it must pay its taxes, and would have to add to its manufacturing costs by paying more for its articles, just to remain competitive and secure the best possible material . . . It all adds up to disasterville for the legitimate publisher.

And now we turn to page 74 and note their Part III . . . M.A. Income and Expenses Budget for 1979. Note under the Allocated Expenses, which is only a percent of general AMA expenses, the provision for salaries and taxes. Here we have a figure of $142,672, which when broken down amounts to an average of $35,668.00 for the four principals who operate and produce the magazine. I realize that this is not quite fair, as the number does include taxes, but by their own admission they operate to minimize taxes, and how much taxes would one have to pay for an operation that indicates only a possible net of $1372.00 for the year. Extrapolated, this would amount to a net profit of .0024 percent on the $565,720.00 projected income for the year 1979.

So we now add our two cents to the "THE APATHY ABATES" they so proudly hail on page 75 . . . and we ask this question, "How many of our readers would want to compete in their marketplace against such formidable competition? It would be the easiest job of counting hands any sergeant at arms ever had to undertake!

OVER THE COUNTER

• Novice and sport R/C'ers will be interested to learn that Ace R/C is releasing a kit for what is basically an enlarged version of Tom Runge's Alpha design, the Alpha 15. This 50-inch model follows the same general lines as its little brother, but has 425 sq. in. as compared to the Alpha's 250, and is designed to take .15 to .25 size engines and 3 to 4 channels of R/C. By the way, Tom Runge also did the design work on the Alpha 15, and if Tom designed it, you can rest assured that it's a great flier!

The Alpha 15 features a plywood fuselage, built-up wing, and complete hardware package. At $39.95, it sounds like a good deal. The kit is slated to be available sometime in April, so watch for it at your local hobby shop.

The new Alpha 15 from Ace R/C.

Also new from Ace is a high-performance needle valve assembly for Cox Tee Dee .049's and .051's. Main features are a 128 thread-per-inch needle for precise settings (especially critical with pressure fuel systems), and a nylon seal which is a tight fit on the needle to keep it from vibrating out and also to prevent air leakage around the threads. This particular needle valve assembly was designed by Dale Kirn, so it's got to be a good one. The unit sells for $3.59, and replacement needles and nylon seals are also available separately.

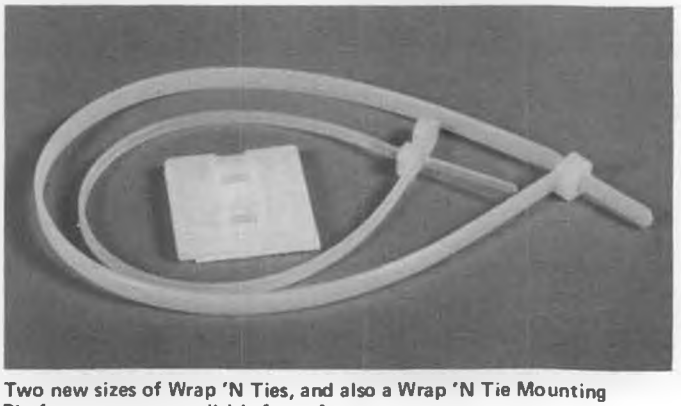
Two more sizes of those handy Wrap 'N Ties are being stocked by Ace. The medium size measures 7/64 x 8-3/16 inches, and the large ones are 3/16 x 11-1/2 inches long. These one-shot ties are great for strapping down or holding various objects together (the large one will secure anything up to 3 inches in diameter) and should find many uses in the shop and at the field. The sky . . . no, your imagination's the limit! A package of 8 medium size Wrap 'N Ties sells for $1.19, and the large ties come 6 to a package for the same price.

As a complement to the ties, Ace is also offering a Wrap 'N Tie Mounting Platform, which provides a secure anchor for anything you are mounting, such as batteries in an electric car. The platform measures 1-1/8 inches square and has an adhesive back for sticking it in place, or for more secure mounting, can be held down with a screw or bolt. A package of four Wrap 'N Tie Mounting Platforms retails for $1.19.

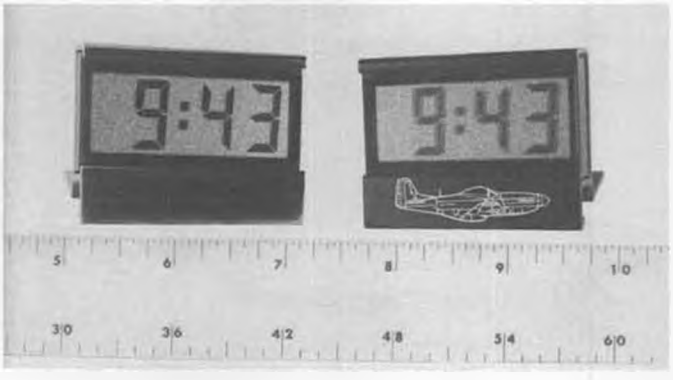
Ace R/C's fine-thread needle valve for Tee Dee .049's and .051's.

Last but not least, Ace is going to be marketing the "Mity Time" liquid crystal display clock manufactured by LCD Microsystems, Inc. This attractive little timepiece is perfect for your den, workshop, office, or as a gift . . . or how about offering these clocks instead of trophies for contest prizes? The clock module measures only 1/4 x 1 x 2 inches, and is powered by two readily available watch batteries (supplied) that will run it for better than 1-1/2 years. It can be programmed to read either hours and minutes continuously or alternate between hours/minutes and month/day every two seconds . . . a four-year calendar is in its memory.

The aluminum extrusion that houses the clock module is available in two styles: one has a black anodized finish with a side view of a P-51D screened in white, and the other is a plain chrome

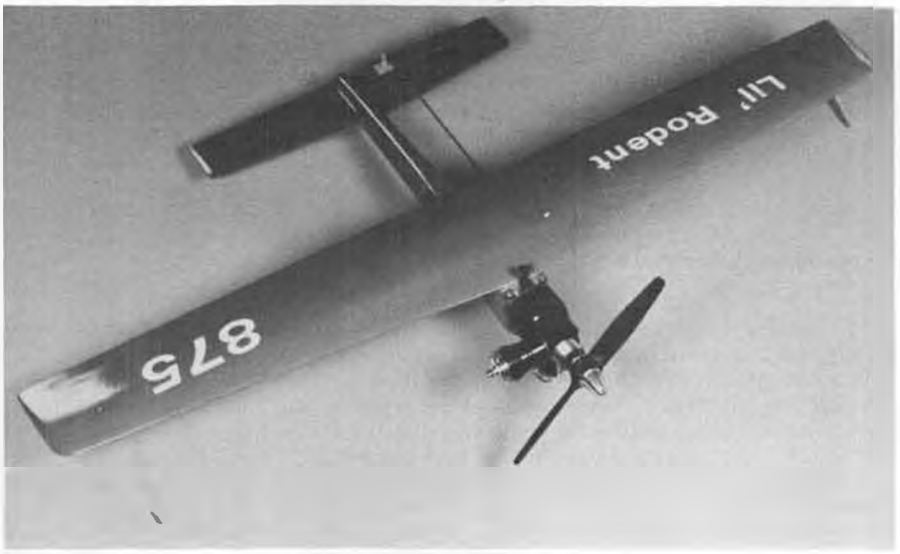


Two new sizes of Wrap 'N Ties, and also a Wrap 'N Tie Mounting Platform, are now available from Ace.



The "Mity Time" liquid crystal display clocks from Ace.

Fiberglass hull version of the 44-foot Coast Guard Lifeboat, by Dumas.



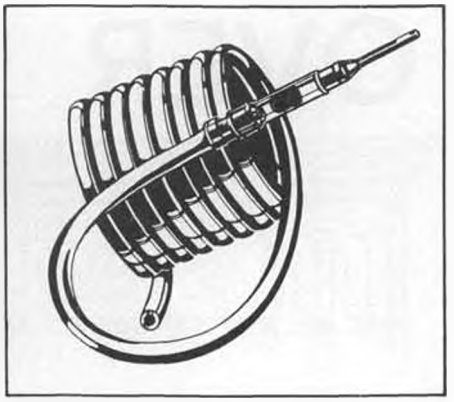
Kustom Kraftsmanship's "Lil' Rodent" 1/2A Mouse Racer.

finish that can be custom engraved by a jeweler, if you wish. Both versions are now available and sell for $30 each.

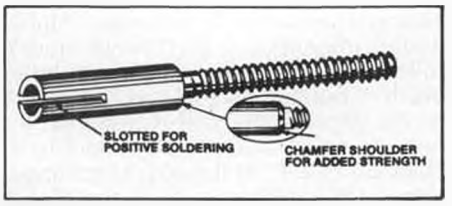
All from Ace R/C, Inc., Box 511, 116 W. 19th St., Higginsville, MO 64037.

* * *

Last month we told you about a bunch of new products being introduced by Dumas, but we're not through yet! Latest word is that Dumas is coming out with a fiberglass hull version of its attractive 44-foot Coast Guard Lifeboat, which can be built either as a USCG Lifeboat or a Royal National Lifeboat Institute Waveney Class Lifeboat. The



The "Filtered Fueler", from Sullivan.



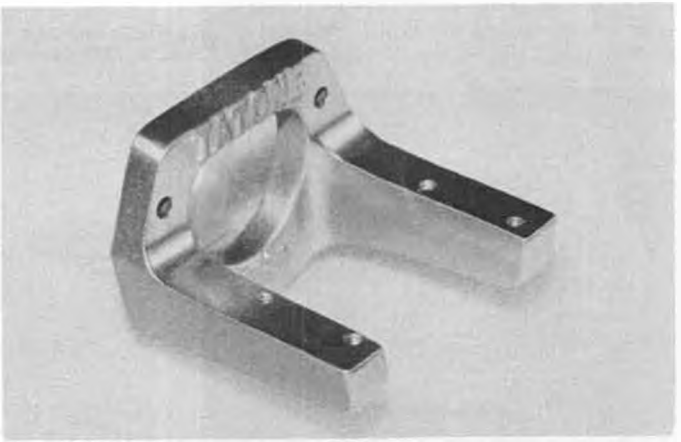
Improved threaded brass couplers, also from Sullivan.

info sheet we received didn't give a length, but we assume it's 33 inches, the same as the wood hull version (which, by the way, is still available). The kit is complete with glass hull, plywood deck and cabin parts, and all deck hardware. An optional running gear kit, No. 2311, is available for this boat.

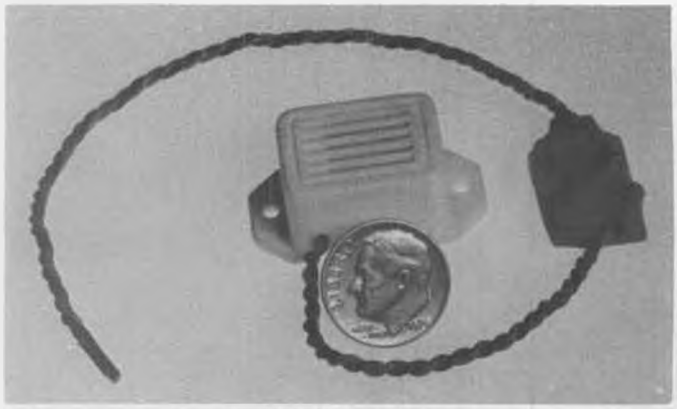
Not only did the info sheet not give a length, it didn't give a price, either. If interested, contact Dumas Products, Inc., 909 E. 17th St., Tucson, AZ 85719.

* * *

Sullivan Products is introducing an improved version of its 2-56 threaded brass couplers for 1/16 to .076 cable or wire pushrods. As shown in the drawing, a chamfer has been added at the diameter stepdown point, giving extra strength at this potential weak spot. Also, the big diameter end has been slotted so you can make sure that the wire or cable is positively soldered to the coupler; a big improvement over the old "heat it up, apply the solder, and hope for the best" type of couplers. The new slotted couplers come in a package of four for $1.00.



Two new items from Tatone: a muffler designed especially for the K&B .40, and new drilled and tapped mounts for various sizes of K&B, O.S., Super Tigre, and Enya engines.



MPS Products' "Plane Alert" electronic safety device.

A new ready-to-fly C/L plane from Testors, The "Galax IX."

Another new item from Sullivan is that firehose-looking thing in one of the drawings; it's actually Sullivan's "Filtered Fueler", and consists of four feet of heavy surgical tubing, one end of which is attached to one of the popular "Crap Trap" fuel filters and a special brass fuel nozzle. The other end of the fuel tubing plugs into your electric or manual fuel pump. The Filtered Fueler eliminates the need for a fuel can filter, and the Crap Trap gives the added bonus of letting you see that the filters are clean after back-flushing, when necessary. Retail price of the Filtered Fueler is $2.50.

From Sullivan Products, Inc., P.O. Box C, 535 Davisville Rd., Willow Grove, PA 19090.

* * *

Joe Klause, our 1/2A "Fuel Lines" columnist and head honcho at Kustom Kraftsmanship, favored us with a kit of his neat "Lil' Rodent" design, a super-competitive 1/2A Mouse Racer that is being kitted by KK. When Joe said he was going all out to make this a high-quality kit, he wasn't kidding, as our sample kit was most impressive.

The Lil' Rodent kit is finished to the point that all difficult machining, drilling, and soldering is already done; the builder is left with cutting the parts to shape (the patterns come already traced onto the wood and are all straight lines; should take about 15 minutes or so to cut 'em out), and doing the necessary carving and sanding. No doubt the biggest job in this respect would be the wing, which is a piece of 1/4-inch balsa that has to be carved to an airfoil cross-section. If that sounds like a lot of work for a 1/2A, remember that this is a full-blown competition airplane, and as such deserves a bit more work than your usual run-of-the-mill 1/2A U/C kit.

This is a top-notch kit all the way. The fuselage is notched for the stab and drilled for the landing gear mounting dowel, and the hardwood dowel inserts for the bellcrank and wingtip skid are already glued in place in the wing and sanded flush, and drilled as necessary. The hardware package is 100% complete and includes a plywood firewall already cut to size, drilled for the engine, and with blind mounting nuts installed; a completely pre-bent wingtip skid; pre-bent landing gear strut with a K&B racing wheel held in place by washers soldered on each side; a Kustom Kraftsmanship metal 1/2A bellcrank; nylon elevator horn, pre-bent pushrod; hinge material; engine mounting screws . . . well, you get the idea! All this is in addition to the top-grade balsa and spruce, of course.

The Lil' Rodent kit is available mail order direct from KK for $9.95 postpaid. Dealer inquiries are invited. Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, CA 92653.

* * *

There's something spooky going on here! That's the conclusion we came to after puzzling over the photo of the "Easy Bailer" that we received from Eastcraft Specialty Products. According to the write-up, the Easy Bailer is a one-way valve that automatically removes any unwanted water from your boat without letting water in, and requires no maintenance once installed. Don't ask us how it works, though. The gizmo in the photo looks for all the world like a short piece of tubing, but it must be a little more complicated than that. Hmmm . . . maybe it's magic. Like we said, it's sorta spooky!

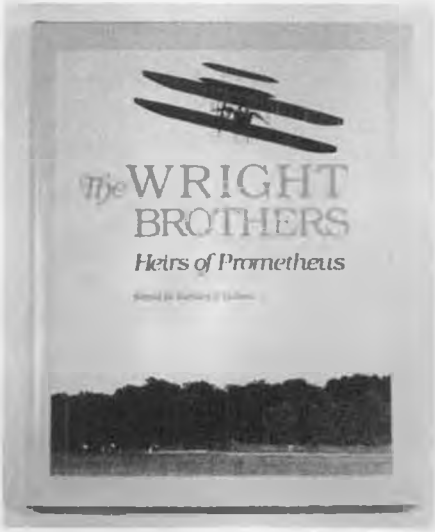
Whichever way it works, the Easy Bailer sounds like a must for *any* model boat. You can get one for $3.50 from Eastcraft Specialty Products (Marine Division), 709 Longboat Ave., Beachwood, NJ 08722. Be sure to tell 'em **Model Builder** sent you!

* * *

Tatone Products is coming out with a couple of new items to expand its already large line of high-quality model products. The first is a new muffler designed especially for the popular K&B .40 R/C engine. This unit is claimed to reduce the engine noise by 10 to 12 db with no power loss. If you've ever used a K&B .40, you know that the rotor type exhaust baffle has to be removed in order to install a muffler, leaving two

Continued on page 111

The "Easy Bailer," from Eastcraft Specialty Products.



New book on the Wright Brothers, from the Smithsonian Institution Press.

Fibreglass Evercoat's one-part "Spray Foam."

MB Editor's first ever R/C model, a Berkeley Royal Rudder Bug, with Babcock 3-tube radio and compound escapement, built in 1954. The five-pound ship was no ball of fire with the little K&B "Green Head" .15, but it flew successfully.

R/C WORLD

By BILL NORTHROP

1980 INDOOR R/C RULES

We have been getting inquiries about the second annual indoor record trials, to be held in conjunction with the next IMS Pasadena Trade Show, scheduled for January 12 and 13, 1980. This year's event touched off a great deal of interest, and many modelers are toying with ideas and designs to try to exceed the record of 23 minutes set by Hal Cover.

Although a complete set of official rules for the 1980 event have not been finalized at this time, we can at least release the basic requirements that have been developed. Based on experience and information gained at this year's event, the following aircraft specs have been established: maximum wing loading 3 oz. per sq. ft., 24 ounce maximum overall weight, and 8-foot maximum span (Hal Cover's model had a 7-foot span and a wing loading of 2-1/4 oz./sq. ft.). The 4-ounce loading permitted fairly heavy aircraft (relatively speaking), and in order to carry the larger loads, the models were getting too large for safe maneuvering in the exhibit area. It has not been decided at this time whether to maintain categories for CO_2 and rubber powered aircraft.

As for L.T.A. models (blimps or airships), competition will be based on distance covered (counting laps to the nearest 1/4-lap) in a 30-minute flying period. All-out distance simply takes too much time. An added feature for LTA's in 1980, to test maneuverability, will be a gymkhana. Beginning at a start/finish point, the blimps will be timed over a zig-zag course, followed by flying through a hoop, under a limbo ribbon, and picking up and delivering a "load" at the finishing point. The 8-foot hoop will be square in shape, made from ribbon, and suspended about 20 feet in the air. The Limbo ribbon will be 6 feet above the floor. Blimp size is optional, the larger in diameter, the tighter the squeeze!

MY FIRST R/C

The first radio controlled model this writer ever built was a Royal Rudder Bug, a reduced-size version of Dr. Walt Good's original design, and kitted by Berkeley. It had only one control, the rudder, operated by a rubber-powered escapement, which was typical of the majority of radio controlled model aircraft in the mid-'50s. The radio was a borrowed 3-tube Babcock, operating through a sealed relay, a compound Babcock escapement. Owner of the radio had two receivers . . . we shared

MB editor's second R/C ship, and first of many bipes, the Barnstormer, designed by Jack Luck. Pulse rudder, Arden .09 glow.

Sam Sugg, of DC/RC, and his Bonetti Troublemaker, Super-suit to defeat below zero Washington, D.C. area winter. Fitz-DC/RC photo.

the transmitter when flying.

Remember, this was in the days of super-regenerative receivers . . . the tuning was so broad that if used today, it could be operated by any transmitter in the whole band! Consequently, the waiting line was quite long, as only one plane could fly at a time. Think about *that* the next time you're waiting to fly on just one of the many frequencies available!

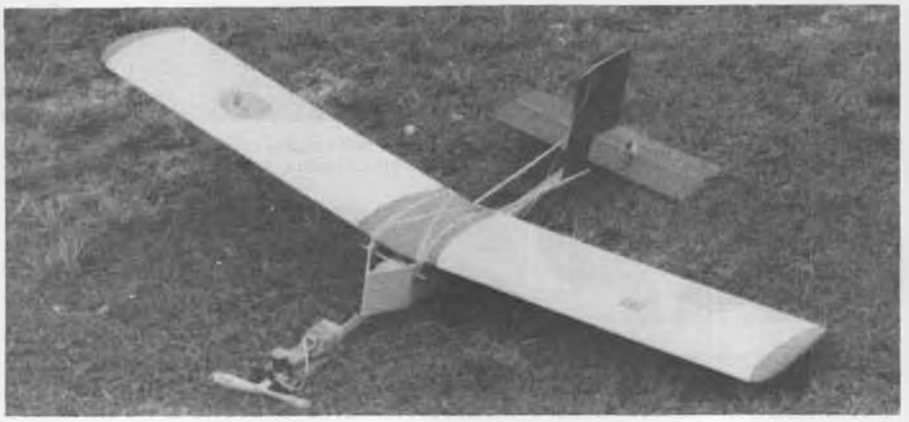
Our 62 inch span Rudder Bug was powered by one poor little K&B .15 "Green-Head". With the Babcock radio requiring 135-volt "B" batteries, 1-1/2-volt "A" or filament batteries, a 15-volt bias battery, and 3 volts to operate the escapement (no rechargeables existed then), the combined load brought the aircraft weight up to about five pounds. The first time we checked the balance of the completed aircraft, a finger was placed under each wingtip, one-third chord aft of the leading edge, and while we lifted, the fuselage stayed on the ground as the dihedral increased at an alarming rate!

Without further delay, the wing was back-shopped; the top covering being removed, so that 36-inch lengths of 3/32 and 1/8-inch music wire could be wrapped and glued to the two main spars. The top leading edge was also sheeted, followed by cap strips on the tops of all ribs.

When everything was finally buttoned up, and the ship balanced, we headed for a selected spot at the local golf course, which featured a long slope approximately equal to the expected glide angle . . . plenty of time to try our first control of a free-moving aircraft. Seems dull now, but those first long glides with the ship turning left or right at *our* command, will never be forgotten.

We won't bore you with the subsequent powered flights. Obviously, the power loading restricted the aircraft to long takeoff runs, casual left and right turns, a few steep banks, and occasional landings within a 100 yards of the transmitter. It never crashed as long as we owned it.

LIAHO (July '73 MB) featured an open-air radio installation. Layout subsequently copied by European kit manufacturer, though radio was enclosed in built-up fuselage.



The "Knock-About", knocked together by Charles Ricci, Pompano Beach, Florida. Could call it "R/C on a Stick". Fuselage (?) is a piece of 1/2 x 3/4 x 37-inch hardwood. More info in text.

Incidentally, we were raised by fine parents who helped us to understand that all individuals are rated on their own merit, and not pre-judged according to their color, race, or religion. Consequently, we were entirely uninhibited, and had no thoughts of racial overtones when we painted the Bug black, and named it "Dark Meat". In fact, the only time the Bug flew away in a strong wind and was lost, a black gentleman found it several days later and brought it back to us. He refused any

Continued on page 113

Brrr. Two coats yet! Fred Fisher and his Foam Cub, with 3-Channel, .25 power.

Another DC/RC Stalwart braves the cold... Jack Braun and his TD .051 Mach-None.

Fred Fisher and his "Flying Mazda", Wankel .30 powered "Sticker" . All DC/RC-Fitz Pics.

LEAD PHOTO BY BILL NORTHROP, ALL OTHERS BY BILL BENNETT

Australian Jeff Tracy and his CAP 20L in the ready box on first day of the Las Vegas Tournament of Champions, 1978. Model was one of largest entered, second only to Prettner's winning Dalotel. Quadra powered original. Reduction-drive units can also do the job.

CAP 20L

By JEFF TRACY
and
GARRY REUSCH

This large scale model offers a rare combination of beauty, aerobatic ability, and flight realism. For 1.5 to 2.4 engines or reduction units.

• *"The rules of the recent Tournament of Champions required the competitors to fly a large stand-off scale airplane. Most of the models were outstanding, but the one that attracted me the most was Jeff Tracy's CAP 20. It was not only a beautiful model, but the size and flight characteristics were perfect for the new contest format.*

"After a close look at the model and seeing how well it flew, I decided that there must be some way for a Las Vegas slicker like myself to con a Kangaroo rancher like Jeff into donating his airplane to the cause . . . me! My approach was uncomplicated; I simply kept telling Jeff how great the airplane was and how much I would like to have one. This much admiration plus several cases of Michelob was just too much for Jeff, and, being the good friend that he is, he finally gave in with the statement, 'Okay, mate, after the contest it's all yours.' After that, each time he flew the plane, I crossed my fingers and prayed a lot . . . especially when he was doing a rolling circle.

"I have been flying the model for the last four months and I can honestly say that I have never owned an airplane that I enjoyed as much as I do the CAP 20. It will do everything that a pattern airplane can do, and does it at a much slower speed and in half the airspace. It does beautiful snaps at a speed that makes it easy to stop with the wings level and the airplane still on heading. Several top American fliers, namely Joe Bridi, Don Lowe, and Don Weitz, have flown the CAP 20 and all of them loved the plane and felt very comfortable flying it. It is very rare to find a taildragger model that is so easy to fly that everyone who has flown it, including myself, has had no problems with takeoffs and landings. In fact, with the help of a gentle breeze, it lands so slowly that it almost seems to hover with absolutely no tendency to tip stall. What more can I say? It's a great airplane . . . do yourself a favor . . . build one!" William G. Bennett.

Not a bad buy for two cases of Michelob! New owner of Jeff's T.O.C. CAP 20L, Bill Bennett (left) during an informal flying session at the North Las Vegas field, several months later.

FOREWORD BY JEFF TRACY

This model of the CAP 20L was designed specifically for the 1978 Tournament of Champions held in Las Vegas, Nevada, and has resulted in a truly outstanding aircraft. No credit is taken for the overall design, as it is basically true to scale . . . the only deviations are in the wing section and a minor change to the fuselage width. The project was started with the idea of achieving a model that would be highly aerobatic and perform in a realistic manner with a low flight speed, a la the full-size prototype. To this end, the size of about 1220 sq. in. was arrived at and the Quadra engine chosen as power.

The first prototype of the model followed scaling up of the 20:1 three-

Flight shot of the full-scale CAP 20L, reproduced from company brochure. Ship derives its shapely fuselage and distinctive wing planform from the French Emeraude lightplane. Jeff's model represents a 200-hp Lycoming powered version.

Jeff's CAP 20L in a fly-by at Las Vegas. Ship is an exceptionally smooth, stable flier, yet performs the snap maneuvers without difficulty. Sharp leading edge at outer end of wing panels, as detailed on plans, helps to stall the tips.

view plans we had acquired from the factory in France. This model was constructed entirely from foam, with the exception of the fin, rudder, and ailerons, which were built up. Due to our inexperience with this size of model and to our choice of covering material and the size of construction materials used, this first model weighed 21 pounds plus when completed. We were very disappointed with this result, but the aircraft did in fact fly, and performed well enough to indicate we were on the right path, even if the model was basically unsatisfactory as designed.

The real problem was how to cut 5 or 6 pounds off the weight of the aircraft and still maintain the required strength in the airframe to withstand the flying loads required. The problems were overcome by going to a fiberglass fuselage and redesigning the construction of the wing. These methods are clearly shown in the plans. Flight tests of the two models using the glass fuselage indicated that we really did have an outstanding aircraft. Although a change of pace for a long-time pattern flier, this aircraft is indeed capable of performing *all* the maneuvers in a very realistic manner and has proven to be a real joy to fly.

We intend to build at least two more and will experiment with different powerplants and prop sizes to see if we can further enhance the already good performance (incidentally, we found the best prop for the Quadra and this aircraft to be a Zinger 18x8).

The glass parts and the full kit should be available from Bridi Hobby Enterprises by the time you read this.

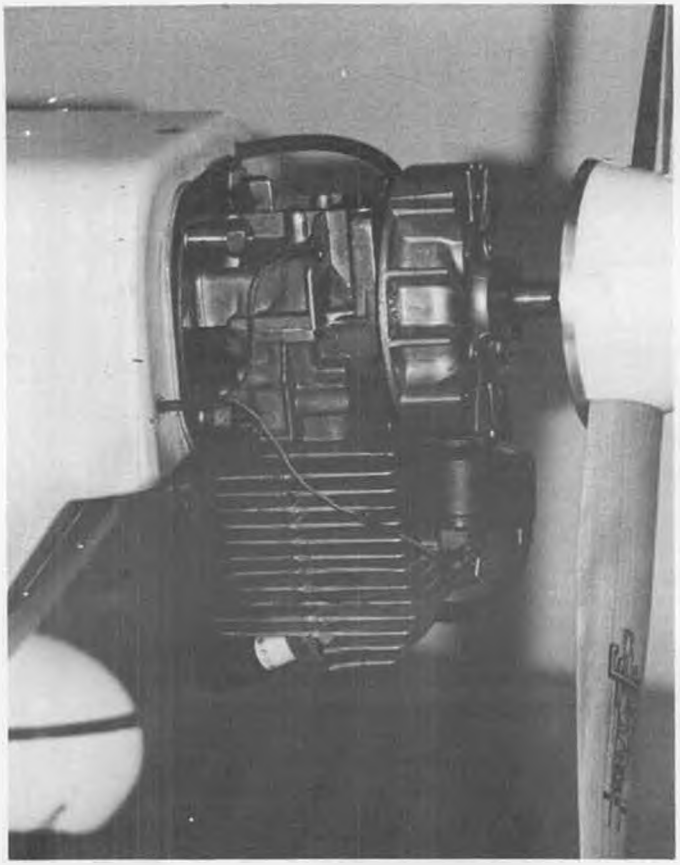
This project has been a most rewarding one, and we are proud to be able to share it with you. Please let us know if you have any questions or problems with this model by writing to Jeff Tracy, P.O. Box 911, Shepparton, Victoria, Australia 3630.

FULL SCALE NOTES

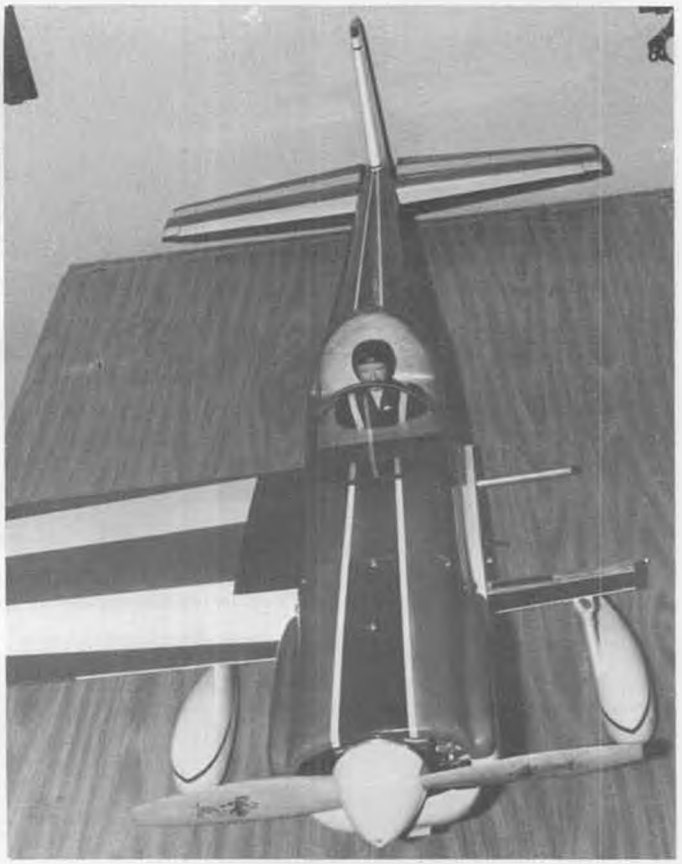
C.A.A.R.P. (Cooperative des Ateliers Aeronautiques de la Region Parisienne) took over production of the Scintex-Aviation Super Emeraude in 1965, which helps explain the similarity of the CAP 20 to the pleasing lines of that French light aircraft. Prior to the CAP 20, the company built a prototype C.P. 100 side-by-side, two-seat aerobatic version of the Emeraude.

The CAP 20 (CAP might be the 1st, 3rd, and last letters of the full C.A.A.R.P. name) series began with a single-seat version of the CAP 10, first flown in 1969. The CAP-20L ("leger", or "light") is a lightweight version of the CAP-20, totaling 1322 pounds at takeoff. The span is 24 ft., 4-1/2 in., and a maximum cruising speed of 168 mph is available with the 200-hp Lycoming. The latter version is the scale subject chosen by co-designers Garry Reusch and Jeff Tracy to meet the requirements of the 1978 Las

The combination wing beam and landing gear mount takes all flight and landing loads. It's eight laminations of 1/8 spruce laid up with epoxy. Canopy is molded plexiglass.



Quadra mounted correctly . . solid! So-called shock-mounting allows it to move, causing vibration. Minor engine mods explained in text.



Best results have been with Zinger 18 x 8 prop. Note aft aluminum tube wing dowel, for assuring proper wing alignment.

Vegas Tournament of Champions.

GENERAL BUILDING NOTES

The tendency in quarter scale and larger model airplanes is to overbuild. Unfortunately, this produces overweight airplanes with marginal performance. Every effort has been made to produce a lightweight yet sturdy airframe.

Selection of balsa is very important. Excessive glue and finishing materials add greatly to the weight and compound balance problems.

Accuracy is very important. The foam "gloves" (the blocks that are left over when cutting out a foam core) are used when sheeting the surfaces and therefore must be as accurate as the cores themselves. Skinning of the foam surfaces is done with a thin epoxy adhesive rather than conventional water or latex-based contact cements. Besides being lighter, the epoxy is stronger and more stable. To prevent excessive epoxy from seeping into the cores, coat all foam surfaces with shellac just prior to covering.

WING

For transport reasons, the wing consists of 3 separate pieces: left panel, right panel, and center section.

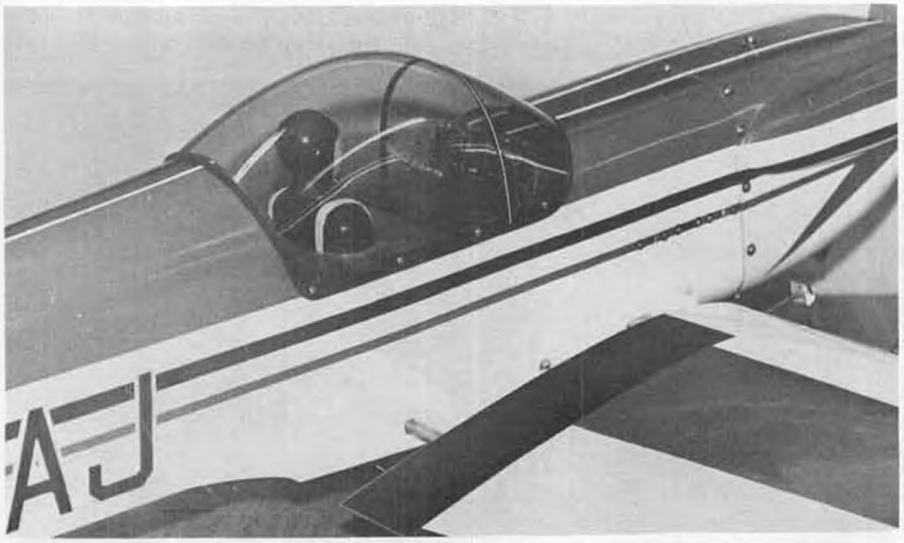
Two separate cores are required per wing panel. The elliptical planform is formed by the ailerons and the curved leading edge. The combination of a straight-tapered outboard panel and an elliptical leading edge when shaped, automatically create a perfect sharp-nosed snap strip on the outboard third of the wing. The center section and inboard wing panels are of constant chord and section, having a rounded leading edge profile throughout.

Before proceeding further, the wing beam and its U-boxes must be constructed. The beam acts as both landing gear and wing mount. As such, it is designed to withstand flight and landing loads. The beam is fabricated by laminating 8 sheets of 1/8 spruce with a slow-curing epoxy glue. Machine to dimensions on plan view.

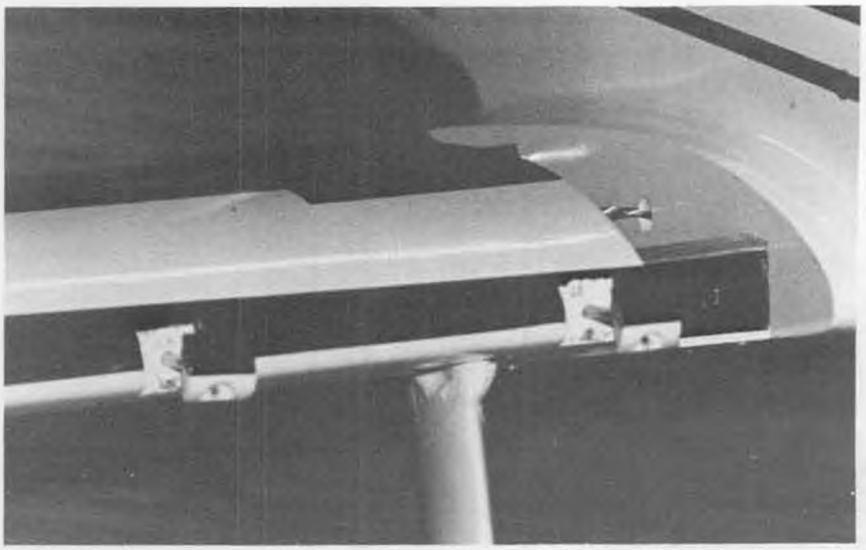
The next step is to build the beam U-boxes. These are designed to telescope onto the beam, encasing it very snugly around the top and sides. The sides and tops of the U-boxes are built of 1/8 spruce and inner faces lined with 1/16 ply.

Cut all 5 foam wing cores per templates and plan view. Butt join the inboard and outboard wing panel cores. Remove foam from inboard core and install the 3/16-inch full-depth balsa false trailing edge. Epoxy 1/16 ply W-2 in position. Add 1/16 balsa wingtip plates and 1/8 balsa aileron root plates. Epoxy 1/16 full-depth ply plates in position for pin tubes near roots of wing panels.

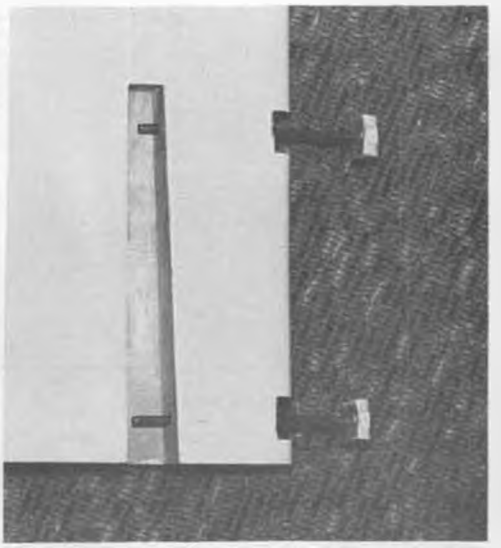
Place the wing panels in their top gloves on a hinged board set at 3-1/2° total anhedral. Space the panels 8-1/8 inches apart on chordline to allow for the center section and two W-1's. Slip



Canopy and cowl are held in place with sheet metal screws through grommetted holes. Canopy and cockpit "floor" remove for access to radio compartment.



Locking pins slide through holes in wing beam to keep everything together when assembled. Finish is acrylic laquer over dope/tissue.

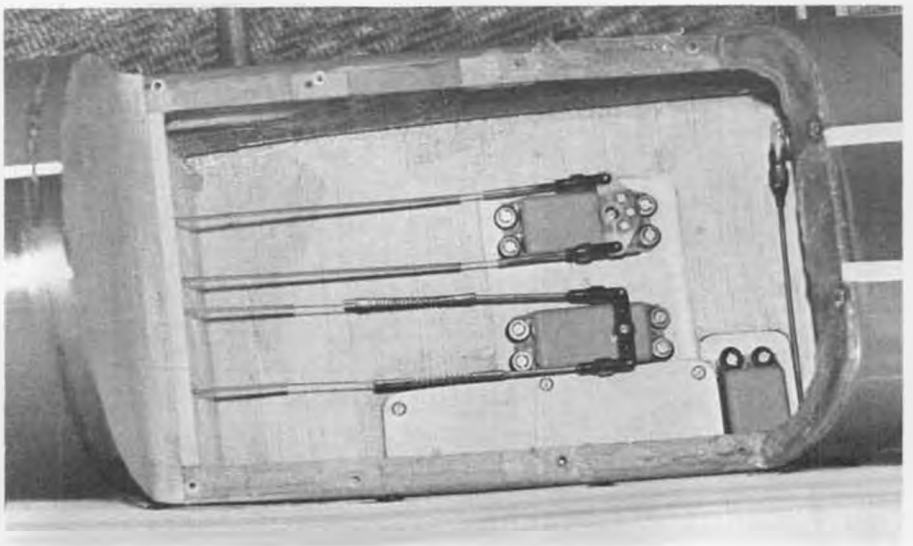


U-shaped box in bottom of wing panel fits over wing beam. Locking pins go through the whole thing to keep it together.

the U-boxes over the beam and carefully cut out foam to house the boxes in the wing, using W-2 as a guide chordwise, making sure to keep wing panels in alignment with each other in all aspects. using a slow-cure epoxy, install the wing U-boxes with the beam still in place for alignment. Trim off sections of the U-box which are protruding below the camber of the wing. Top and bottom spruce spars and spruce fill around the box are recessed into the foam.

Again, fit the beam into the wing panels and replace wing on anhedral board. Using a long drill bit of the same outside diameter as the 1/8-inch I.D. aluminum and brass wing pin tubes, drill through the 1/16 ply front tube bearer, U-box, beam, and rear tube bearer. Aim to pass through the beam slightly above the center of the beam's leading edge. Slip the aluminum tube into the hole before continuing. Repeat procedure for next hole and other wing panel. Remove the aluminum tubes and beam after drilling all holes. Epoxy the full-length aluminum tubes in the wing panels. After curing, remove the portion of the tube crossing the U-box. The beam holes themselves are bushed with 1/8-inch I.D. brass tubing.

Make up the wing pins of 1/8-inch diameter music wire per plan and check fit. They should be very snug.



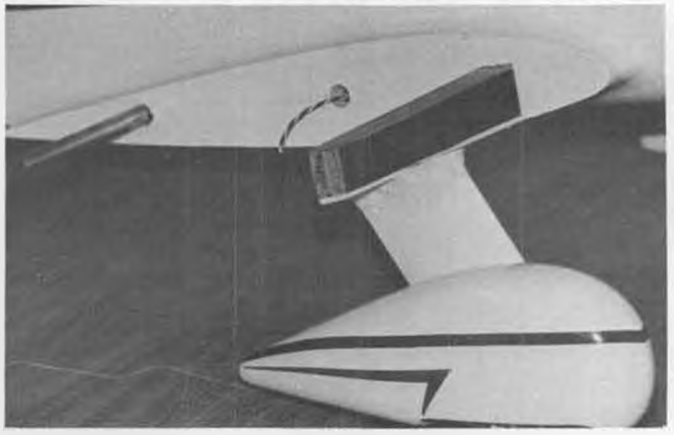
Remember when radios were big enough to *need* all this space? Note weight saving control cables to tail surfaces, in place of usual push rods.

Aileron servo bays must be cut into the bottoms of the wing panels. Line the bays with 1/16 balsa and use 1/8 ply rails to mount the servo tray. Inset hardwood blocks for rear wing tube on bottoms of both panels. Sand cores in preparation for sheeting.

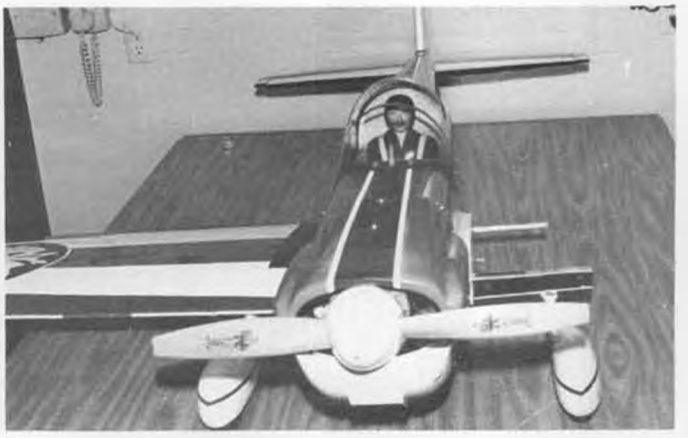
Make a rear view template of the false trailing edge of the wing where it forms the aileron bay, marking definite top and bottom. Set this template aside for aileron jig construction.

Using the foam gloves, cover wing panels with full-length 1/16 balsa sheets.

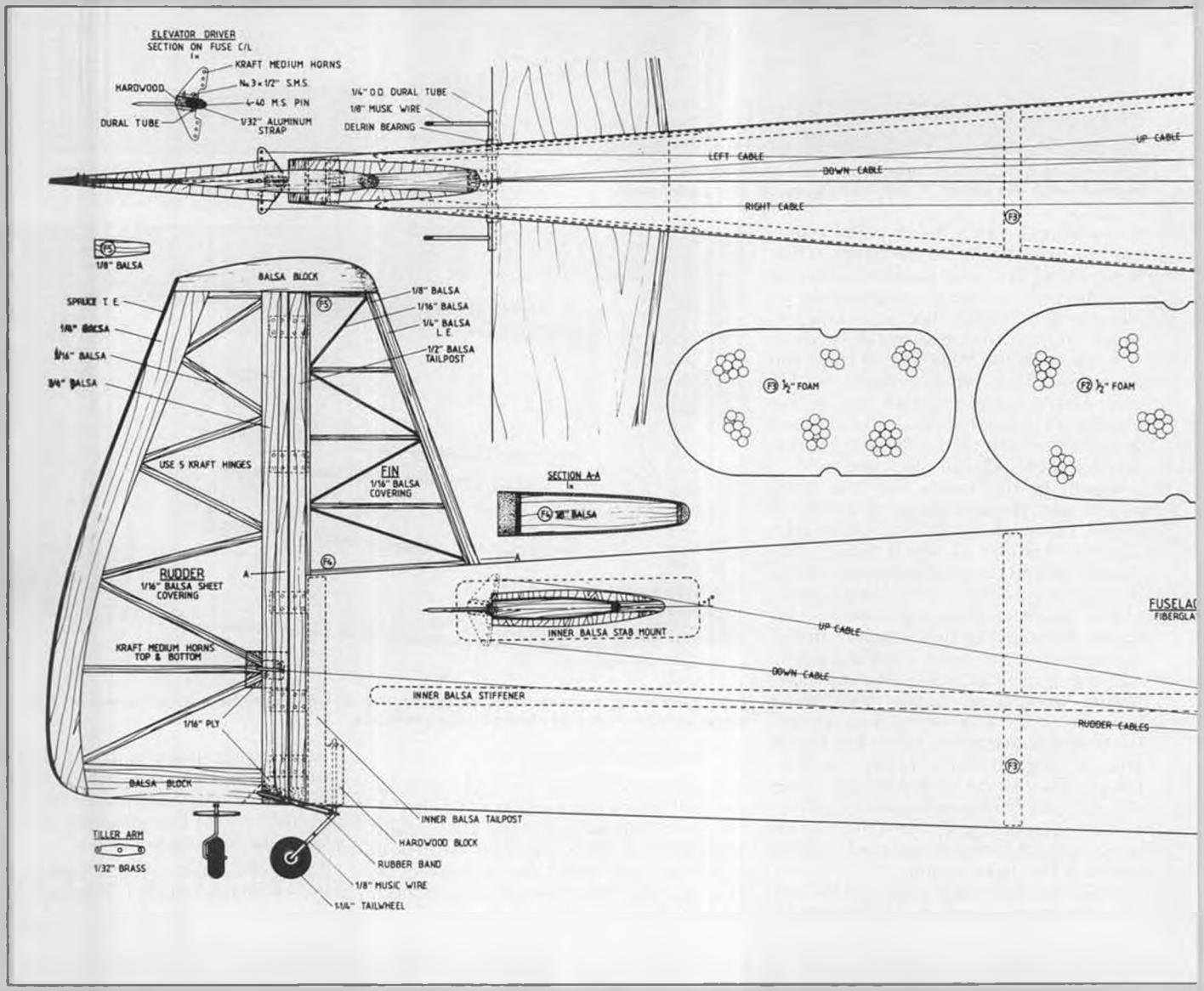
Continued on page 99

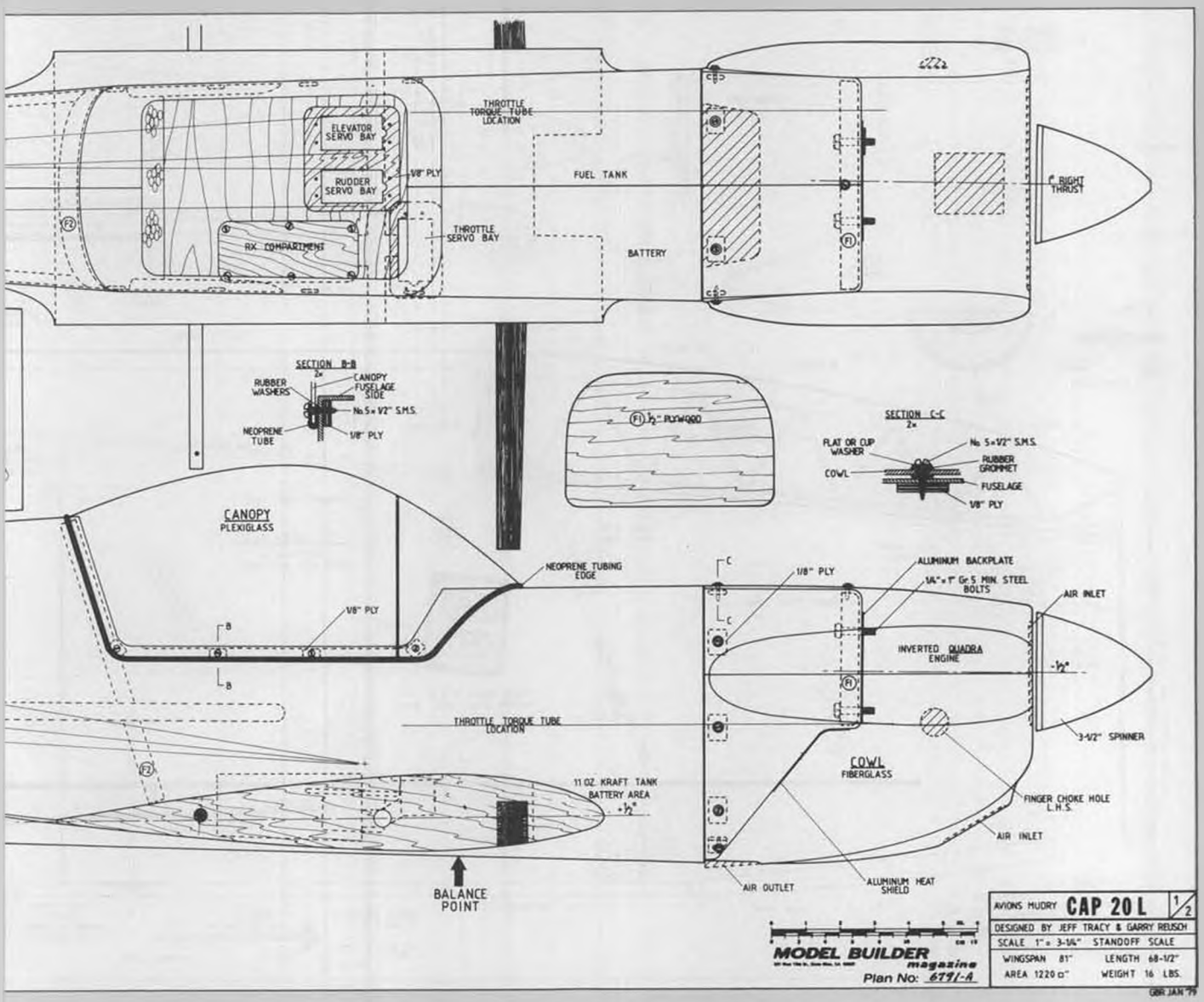


Sturdy laminated beam that takes most of flight and landing loads. Aileron connector protrudes from wing root.

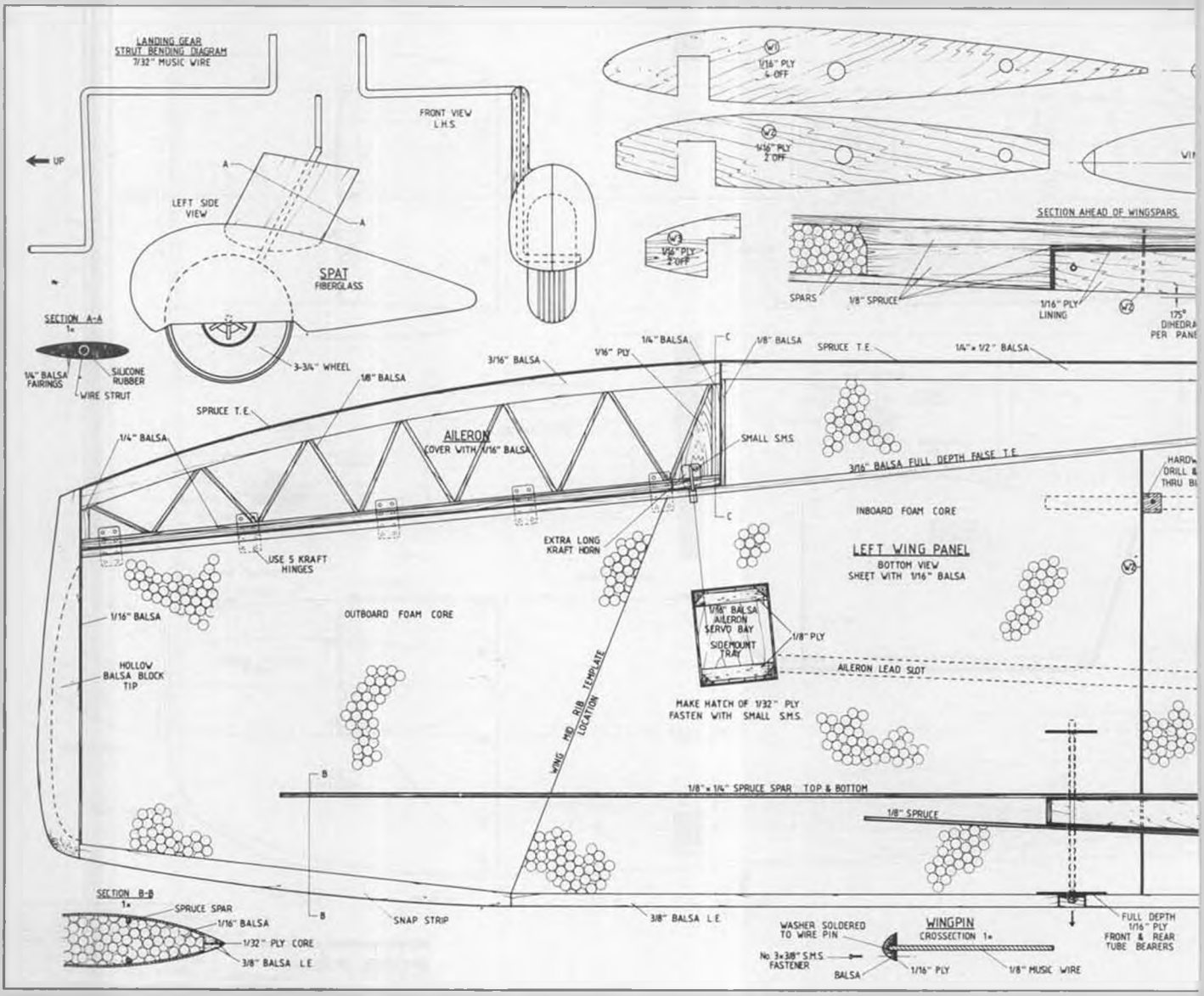


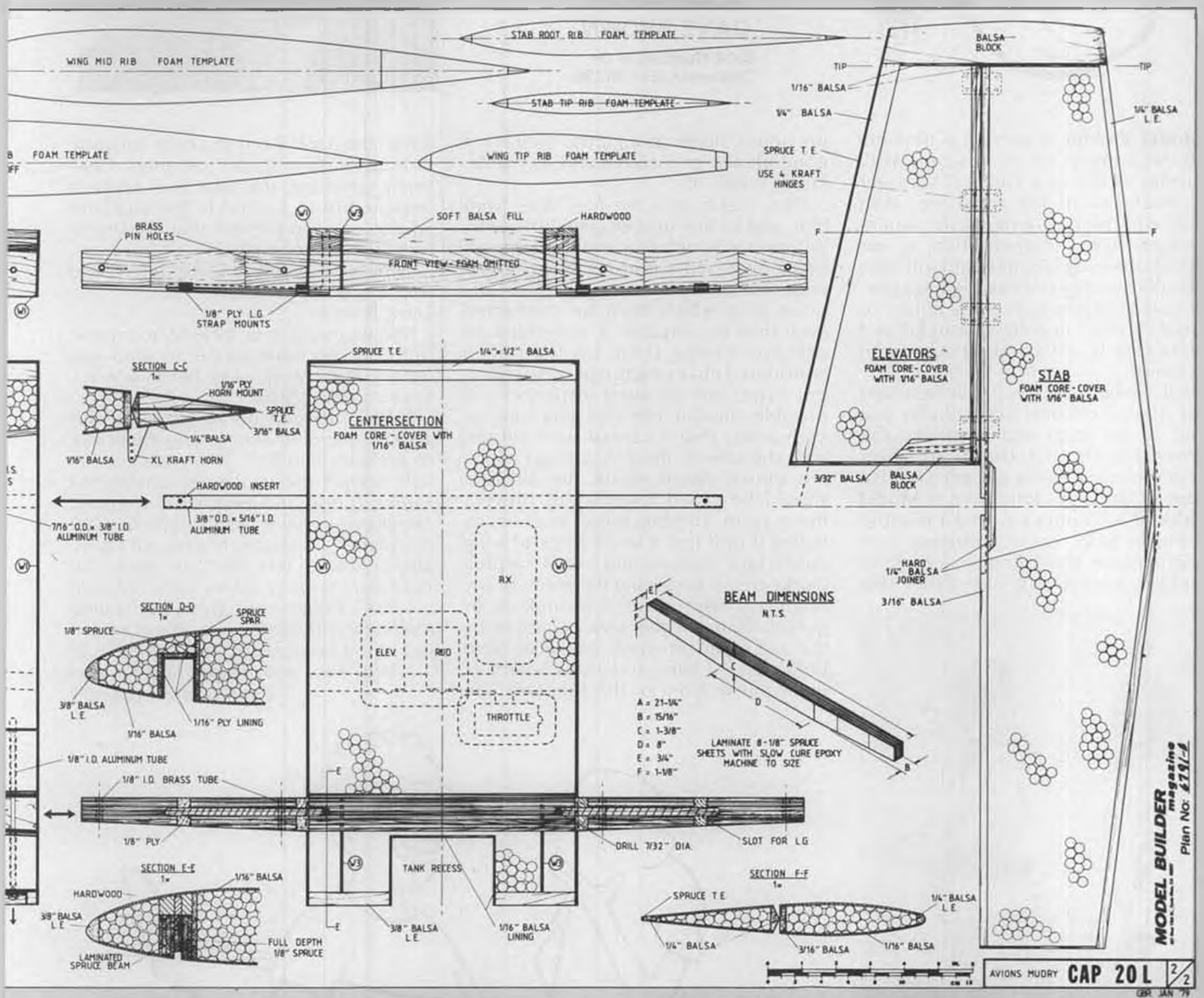
Another view of partially assembled CAP 20L. Wing and horizontal stabilizer are sheet balsa epoxied over foam cores.


ELEVATOR DRIVER
SECTION ON FUSE C/L
KRAFT MEDIUM HORNS
HARDWOOD
No 3 x 1/2" S.M.S.
4-40 M.S. PIN
DURAL TUBE
1/32" ALUMINUM STRAP
1/4" O.D. DURAL TUBE
1/8" MUSIC WIRE
DELRIN BEARING
LEFT CABLE
DOWN CABLE
RIGHT CABLE
UP CABLE
1/8" BALSA
BALSA BLOCK
SPRUCE T.E.
1/8" BALSA
3/4" BALSA
1/8" BALSA
1/16" BALSA
1/4" BALSA L.E.
1/2" BALSA TAILPOST
USE 5 KRAFT HINGES
FIN
1/16" BALSA COVERING
SECTION A-A
1/8" BALSA
RUDDER
1/16" BALSA SHEET COVERING
KRAFT MEDIUM HORNS TOP & BOTTOM
1/16" PLY
BALSA BLOCK
INNER BALSA STAB MOUNT
INNER BALSA STIFFENER
RUBBER CABLES
INNER BALSA TAILPOST
HARDWOOD BLOCK
RUBBER BAND
1/8" MUSIC WIRE
1 1/4" TAILWHEEL
TILLER ARM
1/32" BRASS
1/2" FOAM
1/2" FOAM
FUSELAG
FIBERGLA



FULL SIZE PLANS AVAILABLE – SEE PAGE 116


LANDING GEAR
STRUT BENDING DIAGRAM
7/32" MUSIC WIRE
UP
FRONT VIEW
L.H.S.
LEFT SIDE
VIEW
SPAT
FIBERGLASS
3-3/4" WHEEL
SECTION A-A
1/4" BALSA
FAIRINGS
SILICONE
RUBBER
WIRE STRUT
1/16" PLY
4 OFF
1/16" PLY
2 OFF
1/16" PLY
2 OFF
SECTION AHEAD OF WINGSPARS
SPARS
1/8" SPRUCE
1/16" PLY
LINING
175°
DIHEDRA
PER PANE
3/16" BALSA
1/16" PLY
1/4" BALSA
1/8" BALSA
SPRUCE T.E.
1/4" × 1/2" BALSA
1/8" BALSA
SPRUCE T.E.
1/4" BALSA
AILERON
COVER WITH 1/16" BALSA
SMALL S.M.S.
3/16" BALSA FULL DEPTH FALSE T.E.
INBOARD FOAM CORE
USE 5 KRAFT
HINGES
EXTRA LONG
KRAFT HORN
LEFT WING PANEL
BOTTOM VIEW
SHEET WITH 1/16" BALSA
1/16" BALSA
OUTBOARD FOAM CORE
1/16" BALSA
AILERON
SERVO BAY
SIDEMOUNT
TRAY
1/8" PLY
HOLLOW
BALSA BLOCK
TIP
AILERON LEAD SLOT
WING MID RIB TEMPLATE
LOCATION
MAKE HATCH OF 1/32" PLY
FASTEN WITH SMALL S.M.S.
1/8" × 1/4" SPRUCE SPAR TOP & BOTTOM
1/8" SPRUCE
SECTION B-B
1×
SPRUCE SPAR
1/16" BALSA
1/32" PLY CORE
3/8" BALSA L.E.
SNAP STRIP
3/8" BALSA L.E.
WASHER SOLDERED
TO WIRE PIN
No. 3×3/8" S.M.S.
FASTENER
BALSA
WINGPIN
CROSSECTION 1×
1/16" PLY
1/8" MUSIC WIRE
FULL DEPTH
1/16" PLY
FRONT & REAR
TUBE BEARERS



FULL SIZE PLANS AVAILABLE – SEE PAGE 116

Flight INSTRUCTOR

Conducted by
DAVE BROWN
8534 Huddleston Dr.
Cincinnati, OH 45236

• **Model Builder** is starting a new era with this issue as we all welcome Walt Schroder as the new General Manager and Publisher of the magazine. Walt brings with him a tremendous amount of experience and dedication to the model publishing business and will most assuredly be a big asset to this magazine. The only problem with this addition to the staff is that I now have both Bill and Walt to raise H--- with me if I'm late with a column!

Well, flying season is finally here and most of our readers are probably just about to go forth and challenge the elements with first flights on their winter creations. If you can get a hold of a copy of last year's June issue of **Model Builder**, this column covered a number of hints to help you in preparing your equipment for this flying season. After checking everything out, using this previous column as a guide, then it is a good idea to go through and, as I call it, "Idiot Proof" it.

First, make sure the fuel lines, vent line, and fill line (if used) are sufficiently different in length to prevent them from being switched while refueling. Color code the aileron, retract, flap, or any other plug which must be connected each time the airplane is assembled, to prevent mixing them up (I've even considered changing the plugs to different types on my own airplanes). If possible, mount the charging plug in such a way that it cannot be confused with the aileron plug. Any plugs which are buried down inside the airplane should be taped together to prevent them from coming loose after many flights (I find that a small piece of wing saddle tape stuck on one side of the plug works great). Wrapping the inside of any fiberglass fuselage with Monokote or polyurethane in the area occupied by the radio can prevent the wires from being chafed bare, and a small piece of foam put in front of the fuel tank can keep the tank from pushing forward, cutting or kinking the fuel lines. Generally speaking, the idea is to make it impossible to assemble the airplane wrong, so as to prevent that disaster or lost flight in competition.

Now we'll go on to some letters, and this first one is a beaut!

Dave Brown:

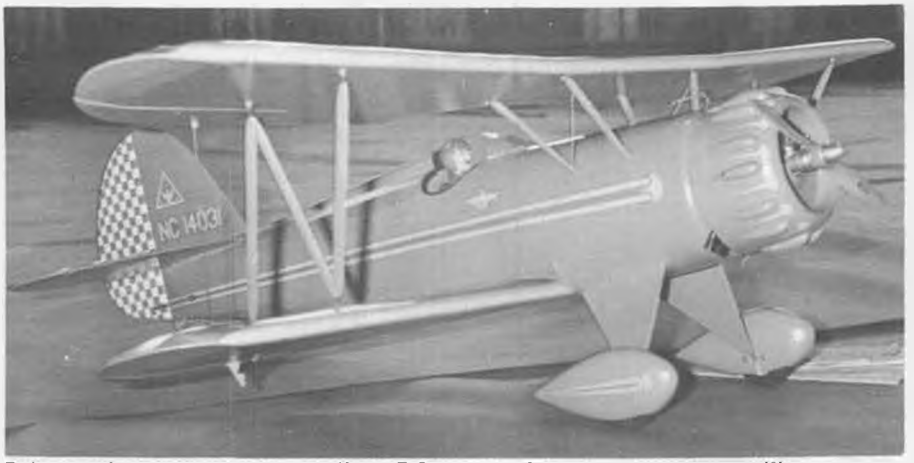
"So you want to be a Flight Instructor, huh? So you want people to send you letters, huh? Well, okay here's one . . . your column stinks!

"Well, probably not to everyone, but at least to a lot of people who might like to get started in R/C. Two years ago my wife bought me an already constructed Lanier Transit and Heathkit 5 channel. The previous owner had installed a .60 in this plane . . . so I bought a Fox .60. I have always liked to take my Ukies out to the field and start my engines without hassle . . . Fox's Eagle is just great, but taxiing the plane with all that power and weight just cost a lot of props, so I bought a .35 . . . yep, Fox, and installed it. Kit says

Continued on page 90

Judging by the look on Sally Brown's face, we'd say she wasn't too impressed by Dave's last maneuver during the 1978 Las Vegas T.O.C.

"You can get one. All it takes is a down payment."



Duke Horn's pretty blue-and-cream Waco F-3 was one of the three Platt-designed Wacos entered in Sport Scale at the 1978 Lake Charles Nats. Photo taken by Tom Stark.

1 TO 1 SCALE

By BOB UNDERWOOD PHOTOS BY AUTHOR

• The eastern sky had lightened and the somber black changed moment-by-moment with streaks of color. The cirrus reflected the awakening sun about to climb the horizon. Blades of grass were bathed in pristine crystals of dew. Still air, freshened by a night of rest and cooled by the preceding hours of darkness, felt delicious to the skin, but experience served notice that the full-blown day would climax in the same searing summer mood. *(Easy does it, woodwinds, your drowning the violin section! wcn)*

Muffled sounds of small creatures revealed the busy preparations for the new day's birth. Another sound began to fill the air as larger creatures made their presence known. Machines and humans worked their way into the scene, quietly working in preparation for another kind of day.

As the rays of gold fingered their way above the dark earth's line, they were caught, reflected from the white outlines of a magnificent craft posing majestically in the vast open space. Fabric traced the gaunt outlines of framework, hanging in loosened, wrinkled folds.

The senses combined the ingredients to form a composite that would fill the enthusiast with longing nostalgia.

The "Jenny" was perfect. Wires welded the parts into one with the precision of a spider's home. Varnished layers tracing graceful arcs formed the propeller, and a myriad flickering fingers rested on the ancient engine. The "Jenny" was beautiful and it fit so wonderfully into this early morning scene. It was right out of a barnstormer's diary, or an early aviator's flight training.

But it wasn't.

The scene occurred at Dayton, in the summer of 1976, during the Nats. The "Jenny" belonged to Charles Nelson, a gentleman with a love for the craft and the love was reflected in the perfect way the model was executed.

Several things make that event a memorable one. As that model sat in the dewy, damp environment, the fabric was lifeless and limp. As the sun warmed the air and burned the dampness from the grass, the fabric slowly tightened as if telling the many gathered about, "I'm ready!"

Imagine, standing around watching fabric shrink! But what we saw that day was the essence of scale modeling. It isn't a perfect model or any one thing. It's the sum total of many experiences. In the case of the "Jenny", it was the perfection of the model, the love lavished by Charles, and many other things, not the least of which was the slow, elegant flight through which the pilot put the craft.

That's scale modeling . . . a feeling.

I first met Charles Nelson at a contest in Davenport, Iowa about 1973. He showed up with an early "Jenny" that he had made just to "fool around with". I was flying the Wittman "Bonzo", and as a member of the EAA and living in the Midwest, Charles was quite familiar with the little red racer. Since it was the first contest he'd ever attended, we kinda teamed up and set up shop under my shelter.

The "Jenny", which was very nicely done, had gone through many, many flights. As I recall, the big model sported a tired old Enya .60 which produced only marginal power. When we were to fly, the day had produced a typical Midwest wind that whistled across the hilltop

Continued on page 96

Fliteglas Models' Ralph White with his P-51 that won Sport Scale at the '78 Nats. Tom Stark photo.

Al Lobaito's Stolp Starlet at the '79 WRAMS Show. Model spans 75 inches, powered by Webra .91, guided by Kraft. A real nice job!

This Bridi AT-6, equipped with Giezendanner electric retracts, was on display in the Giezendanner booth at the '79 WRAMS Show.

Dr. Stan Pfost, NSS President, struggles with his big Condor at the 4th Annual Tangerine Soaring Champs. Uses slot-type spoilers.

"Oh my God, what did I step in now?" Cecil Haga pauses before launching his 2-meter Shuttle at Tangerine meet in Florida.

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY AUTHOR

Gary Crumb launching his Mini T-quila, a scaled-down Aquila with a T-tail. Spans 77".

• Recently I had the unique opportunity to compare R/C soaring, east and west. I took part in the Fourth Annual Tangerine Soaring Championships, Orlando, Florida, then flew my two-meter Olympic 650 on the island of Oahu, Hawaii. Let me share this with you.

I arrived a day early in order to catch the two-meter contest that preceded this year's Tangerine Championship. The flying site was a converted cow pasture owned and freely provided by Dr. Stan Pfost, President of the National Soaring Society. Grass covers a large open area surrounded by tall pine trees. Forty of us took part in the two-meter contest, and there were more than twice that number in the events that followed. The Tangerine consisted of seven-minute precision/duration and tricathelon events. All pilots cooperated, but unfortunately the weather did not.

For example, I signed in late for the two-meter contest (due to poor airline connections). The wind was strong and gusty. The clouds ranged from misty to murky. The rain waited until I launched. Then it poured! I got off at high altitude and was certain to make at least five minutes. But being more concerned with the condition of my craft than points, I immediately brought it down to a safe landing . . . then ran for cover. Dave Elias let me share his wagon in the rain. We had a long heart-to-heart talk, during which I learned about his lovely wife, his Kestrel 19 (which incidentally took first place in the scale event), and the Multiplex spoilers he uses on this craft . . . a neat installation. I understand these spoilers are produced in West Germany, and work with precision.

The contest was called until the rain stopped. But long before I had my second chance at the winch, the rain returned in earnest.

Notable individuals were present. Dr. Walt Good, past President of the AMA, flew in his usual fine style. Don Clark provided a draft of the new rules for AMA national Records for R/C Sailplanes (this as a result of the challenge to him posed at a recent executive board meeting of the National Soaring Society). Briefly stated, the rules recognize classes A, B, C, and D with respect to duration, thermal duration, declared distance, open distance, closed course distance, altitude, and speed. The initial record claims for class C sailplanes for duration, thermal duration, and declared distance must exceed the LSF Level V tasks (8 hours, 2 hours, and 10 kilometers, respectively). There are no minimums for classes A, B, and D. I expect these rules to be approved in the near future, so we're off and running. Take your pick and aim to set a record.

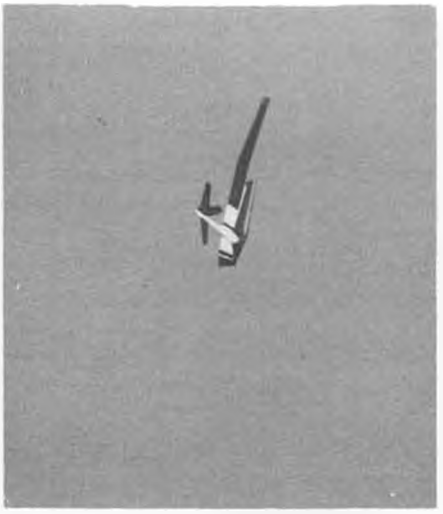
Cecil Haga flew his Shuttle in the two-meter contest, and his Legionair took First Place Overall in this Tangerine. Blaine Miller flew the Bird of Time. Joe Ruth walked off with the two-meter prize.

Gary Crumb, of the R/C Soaring Association of Palm Beach, demonstrated his Mini T-quila (a cut-down Aquila having a 77-inch span and 7-1/2

Cecil Haga again, this time with his big Legionair. This is one of the most popular sailplanes for multi-task soaring events.

Dave Elias walking back after a flight with his Soarcraft Kestrel 19, which he flew to 1st place in scale at Tangerine meet.

Gusty winds folded a lot of wings at Tangerine contest. Note towline is still attached.



Another bird with a broken wing, looks like it might be a Sailaire.

inch chord with glassed-over wood fuselage). It weighs in at 30 ounces and sleeks through the sky, a picture of grace and beauty. John Gunsaullus built a new sailplane around Hobie Hawk wings. It derives full efficiently from these wings and makes the craft handle well at the same time.

As the day wore on, the wind took its toll. It was not uncommon to see planes leaving the winch line with only one wing attached. I was advised that the best procedure in such high winds is to fly slowly and drift downwind, then descend rapidly and fly back upwind through the slower moving air. But this takes guts. Some planes didn't make it back to the open area. Some escaped danger . . . others were strained through the trees. The weather never let up. I became discouraged.

From there I visited Miami, Washington DC, San Diego, and on to Honolulu, still carrying my two-meter ship, but without having another opportunity to fly. It rained that Thursday night in Honolulu. Friday it rained (but the weather forecast said "possible clearing on Saturday," so I stayed). Saturday it rained, with winds consistently above 30 knots (the weather forecast indicated "clearing tomorrow"). Sunday it rained most of the day, and the winds continued unabated. That morning I met with Paul Strona, who has lived in Honolulu for the past 14 years. We swapped stories, then he took me to their flying sites. We launched the Olympic 650 into howling winds on the windward side of the island (ballasted with a pound of lead). I brought it down because of windburn and tearing eyes.

Then he took me to their thermal site, a large filled-in swamp with a special parking area. Ben Clerx showed me his Kalihe, a five pound (without ballast), 133 inch sailplane. He uses spring-loaded flaps (to protect them during landing) and a releasable two hook. His Hoerner tips point down (although they might just as well point up). For those interested, he uses an 8-1/2% Clark Y with Phillips entry airfoil and full flying stab and elevator. Ben showed me plans for his next sailplane, a 16-foot span bird. Mark Chung has a Flying Frigate which uses flaps, ailerons, rudder, elevator, and movable winglets. It weighs in at five pounds and has a 6% thick wing. I didn't see this one fly, but I hear tell it's really worth watching.

Returning to the States, I had an opportunity to visit Frank Zaic, a Modeller Emeritus if there ever was one. Frank authored the many Model Aircraft Annuals which described progress through the late 30's and on into the 40's. He designed the Thermic 100, and many other classic aircraft, including the Floater, which in turn inspired the

Dick Eagle launches his Sterling Diamant at Torrey Pines. Model not often seen with R/C.

Paul Strona (right), Ben Clerx (left), and Ben's younger brother, Ray, were Dr. Larry Fogel's hosts at Honolulu soaring site.

Well-known R/C pioneer, Dr. Walt Good (left), and Don Clark attended the Tangerine contest, flew a Pierce Paragon.

Ben Clerx shows off his "Kalihe". Ship spans 133 inches, weighs 5 lbs. empty, and features spring-loaded flaps.

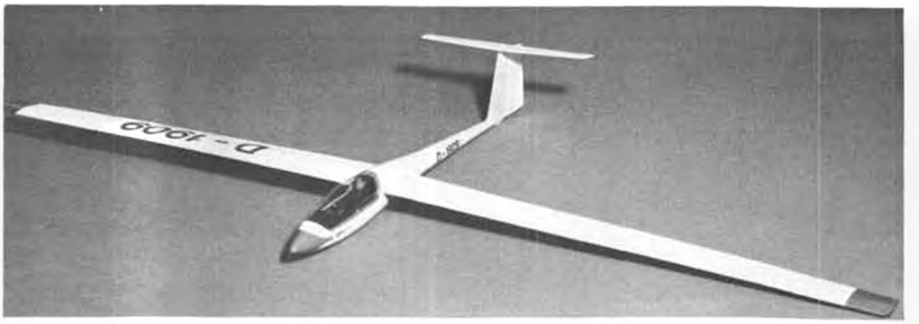
Olympic and Aquila. Incidentally, in the 40's about 2,000 Thermic 100 kits were sold at $10 each.

Frank earned his full-scale sailplane license on June 9, 1933 (personally signed by Orville Wright). He remembers his first experience in a full-scale sailplane (soloing on his very first day in the cockpit). In those days, you learned the feel of the plane while it was towed by a car, and, if all looked well, you were airborne!

Frank is now experimenting with wider wings and larger lifting surface areas. He sees significant advantage in increasing the washout . . . slower speed yet controllable landings. With a little urging, he took me through the history of model aviation . . . the *American Boy* magazine in the early 30's, and on through successive stages in the development of our hobby/sport. You can still obtain kits for his Scout G-72, which fits into a box 8 by 8 by 21-1/2 inches (including the transmitter, hi-start, and so forth), the Metric G-80, and the Floater, by ordering these directly from Jasco. Box 135, Northridge, CA 91324. If you've never flown a Zaic plane, you haven't shared a wonderful experience. (Few know that Frank's second hobby is a combination of travel and photography. His exhibit of color prints is breathtaking.)

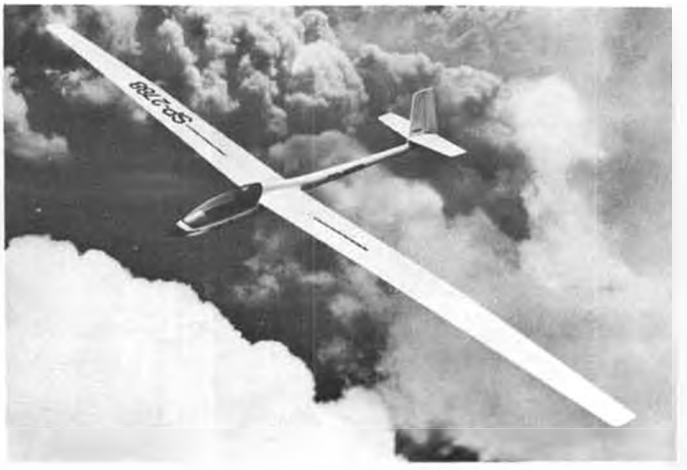
Windspiel Models, 1844 W. Glenoaks Blvd., Glendale, CA 91201, offers a number of high quality sailplanes imported from Modellbau Wanitschek of West Germany. These include some beautiful large-scale planes. Their ASW 19 is a 1/5 scale of the 19-meter single-seater standard class sailplane. The model spans 3,000 millimeters with an 18.3 to 1 aspect ratio. The Orlice is a replica of the 15 meter sailplane developed by the military academy at Brunn, CSSR. The span of this V-tail sailplane is 3400 millimeters. The LSD Ornith comes in at a 3530 millimeters span with 20.66 to 1 aspect ratio. The Jantar 2 simulates the well-known Polish sailplane of 20.5 meter span. This model spans 4100 millimeters. Aspect ratio is 23.6 to 1, with an airfoil changing from root to tip. The HP 18 was built by Bryan Aircraft. This

Continued on page 95



Windspiel Models is importing some really beautiful scale sailplanes made by Modellbau Wanitschek of W. Germany. From top to bottom, they are the AS-W19, Jantar I, LSD Ornith, and HP-18. These are big models and cost a bundle, but are worth it.

Rick Schrameck and his highly-modified Ridge Runner, which he calls the Shark I. Spans 7-1/2 feet and is super fast.



Another of the beauties imported by Windspiel is the Jantar 2. Model spans 4100 mm (about 13-1/2 feet!).

THAT SAILPLANE!

By DAVE THORNBURG . . . Full down elevator isn't the only way to get your bird into the center of the circle, as our resident Glider Guru shows. A 3rd servo may be the best investment you'll ever make!

• I was timing for Rick Pearson at the '76 LSF Tournament in Santa Rosa, on the flight when his Sailaire spoilers failed to open. The ground turbulence that morning was surprisingly desert-like . . . the air close to the ground was warm and jumpy and as full of holes as a hippie T-shirt . . . and a lot of good pilots had already fallen short about halfway through a "normal" landing pattern. Rick Pearson is one of those crafty types: he watches boobs like Thornburg, and he learns from their mistakes. Rick Pearson had no intention of landing short. He came in low and hot and clean, and at the very last minute he pulled full spoilers.

And nothing happened . . . his spoiler servo had died.

I was too busy counting him down to notice, but I gathered from his blood-curdling shout and the way he backed over me that something was amiss. So I glanced up from the stopwatch. Here came an eight-pound airplane, cutting a 150-inch slice out of the smog at an altitude calculated to prune the Thornburg family tree. *This will not do,* I thought, dropping gracefully to earth. (Rumors that I fainted are false and malicious gossip, started, no doubt, by the people who had to throw water on me afterwards.)

Fortunately, the Sailaire didn't kill anyone of importance, although a couple of hasty religious conversions were reported from over by the winches, where the ship finally came to rest. But the incident served to point out the biggest single drawback to the use of glidepath devices; *they're worse than worthless if they fail.* Of course, the same argument applies to almost anything . . . captive towhooks, birth-control devices, fourth-year med students . . . they're all worse than worthless if they fail.

Let's assume that they seldom fail. Let's assume that they're always installed with care, thoroughly checked out before contests, serviced regularly, and never, never left unhooked. The question still remains: *are they worth the trouble?*

Yep.

They're the best substitute I know for hours and hours of landing practice . . . practice in judging the wind direction and velocity and stability; practice in estimating glidepath in a dozen different air conditions, from booming lift to molasses-sink; practice in estimating just how far your plane is going to slide on any particular landing surface at whatever groundspeed with which you happen to come into the circle. To make all of these estimations correctly, and pull off a 96-point landing with your two-channel ship, is an admirable talent . . . like being able to divide six-decimal numbers in your head. But people who haven't a natural bent for it, or don't want to practice for years, can't be blamed for buying a six-digit pocket calculator . . . or a spoiler servo.

Unfortunately, the big drawback to most spoiler designs is that they don't lend themselves to retrofitting . . . if they weren't built into the wing from the beginning, they're difficult to install later. So in addition to the three wing-mounted spoilers, we'll talk about some fuselage-mounted devices as well, because they are much easier to retrofit on an old glider.

Figure 1 shows a bottom-surface spoiler. In installation and effectiveness it really isn't that different from the conventional top-surface spoiler featured in most U.S. kits. Toss out a bottom-surface spoiler at high speeds and it will pitch your nose upwards, which is a pleasant change . . . conventional spoilers usually pitch the nose down. The bottom spoiler has this disadvantage: if you land with it deployed, you may damage it. But it has one advantage that many folk feel makes it

FIG. 1

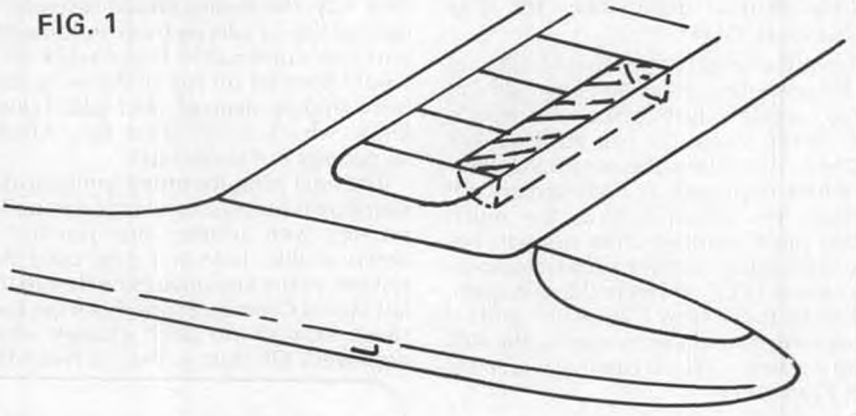
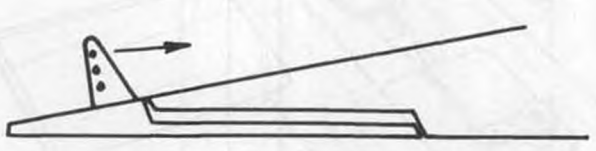
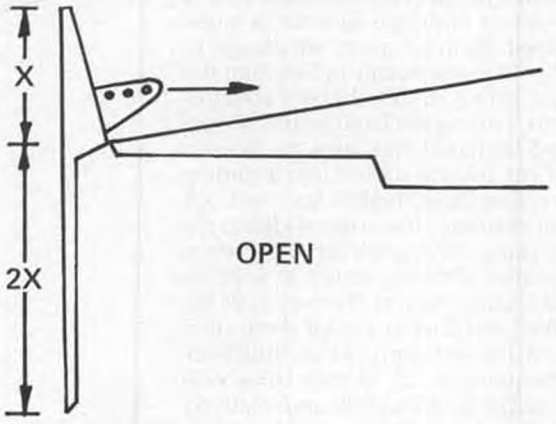


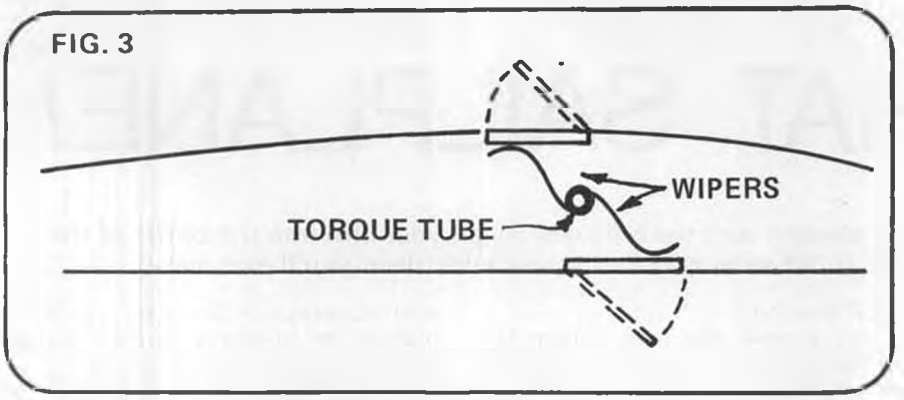
FIG. 2



CLOSED



OPEN



worth the risk: it is potentially a bit "cleaner" aerodynamically. Because it resides (lurks? I get tired of the same old verbs. . .) on the bottom of the wing, it's in a slower air stream than it would be on top, so it probably causes less airfoil disruption (i.e., drag) at high speeds, when it's supposedly in the undeployed state.

Herb Semmelmeyer used bottom-surface spoilers on his "Elliptical" (see February 1979 **MB**, p. 50). After much experimenting, he arrived at the figures of 3.9% to 4.2% of total wing area, and an aspect ratio of five or six to one for the spoiler size and shape. This works out to something near 1.25 by 7.5 inches per spoiler, for a 950 square inch model. An additional bonus Herb gets with this type spoiler is a bit higher launch when they are deployed to only about 10° (Herb's spoilers are hinged at 60% chord, much farther rearward than usual). Normal deployment for drag purposes is 35-45°.

I might as well confess that I built a set of these spoilers into one of my "Bird of Time" models, just to see what they'd do. Made them far too wide (1-7/8 inches). They threw the nose up violently when deployed at high speeds. Of course, my personal Birds are much more pitch-sensitive than normal, because I insist on running such ridiculously rearward CG's. If I were doing it again, I'd make them 12 by 1.25 inches, and I'd darn sure move them forward to the 40% chord point . . . Herb can live with 60%, but I just can't.

Figure 2 shows my favorite glidepath device, a trailing edge dive brake. I first saw these creatures in London in 1972: a chap out at Ivinghoe Beacon (a slope site) used them to good advantage to land his 100 inch floater in between the two or three dozen baby carriages ("prams," in English English) that always seemed to materialize atop the Beacon whenever anyone started into a landing pattern. The Dave Hughes *Soaring* book (p. 148) attributes the original idea to the Norwegians. *(Followers of FAI Pattern are familiar with this device as used by World Champ Hanno Prettner over the past few years. wcn)* I used them on a series of T-tailed sport planes built back in Albuquerque . . . 99 inch ships with genuine Eppler 387 airfoils and relatively low (6-7 oz.) wing loadings . . . and they would STOP those airplanes dead! No radical pitch changes, either . . . but in those days I was flying more conventional (30-35%) CG locations. Whether they would blank the stabilizer on low-stab designs, I can't say. My guess would be that if the plane has a conservatively large (15% or more) stab area, and a normal CG, stab blanking isn't likely to be much of a factor. Although it would still serve as an acceptable excuse for missing a landing.

I placed my dive brakes right at the wing roots, for easy servo hookup, and made them about 6 inches long by 2-1/4 inches wide. The best proportion for avoiding the usual spoiler-on/spoiler-off pitch change seemed to be around 2:1. That is, twice as much flipper below the wing as above.

Looking at the drawings now, I can't imagine why it never occurred to me to try hinging the brake on the *bottom* of the wing rather than the top, as shown. That way, the device would resemble a normal flap or aileron from underneath, and the vulernable front edge of it would then be on *top* of the wing, safe from landing damage. As I said, I don't know why I never tried this. Maybe somebody out there has?

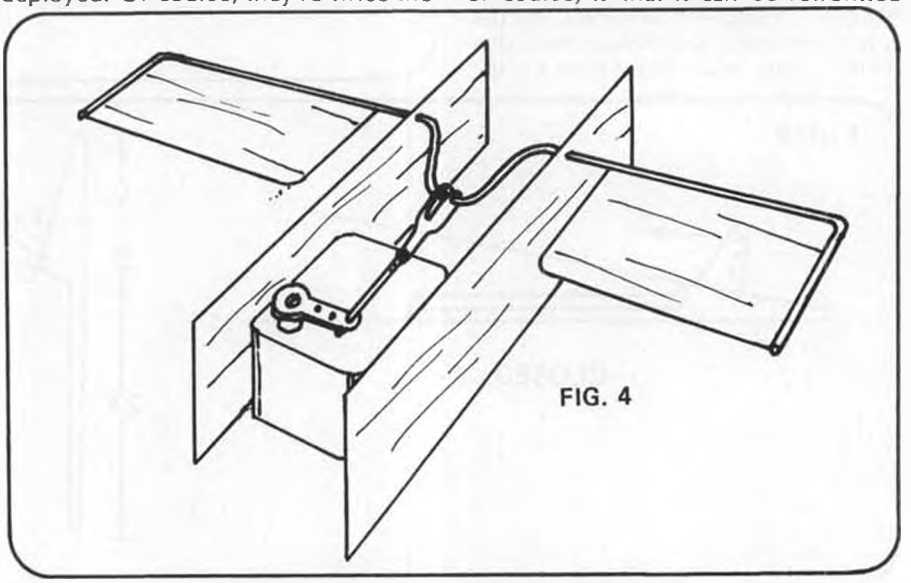
The final wing-mounted spoiler in our roundup is simply a conventional spoiler on top, with another one just like it down under. LeMon Payne used this system on the Legionaires he flew in the last World Champs. Properly set up, they cause little or no pitch change when deployed. Of course, they're twice the trouble to build and maintain, but some folk (me included) will go to any length to avoid violent pitch changes . . . especially when your ship is two feet off the deck and just screaming across the far edge of the landing circle!

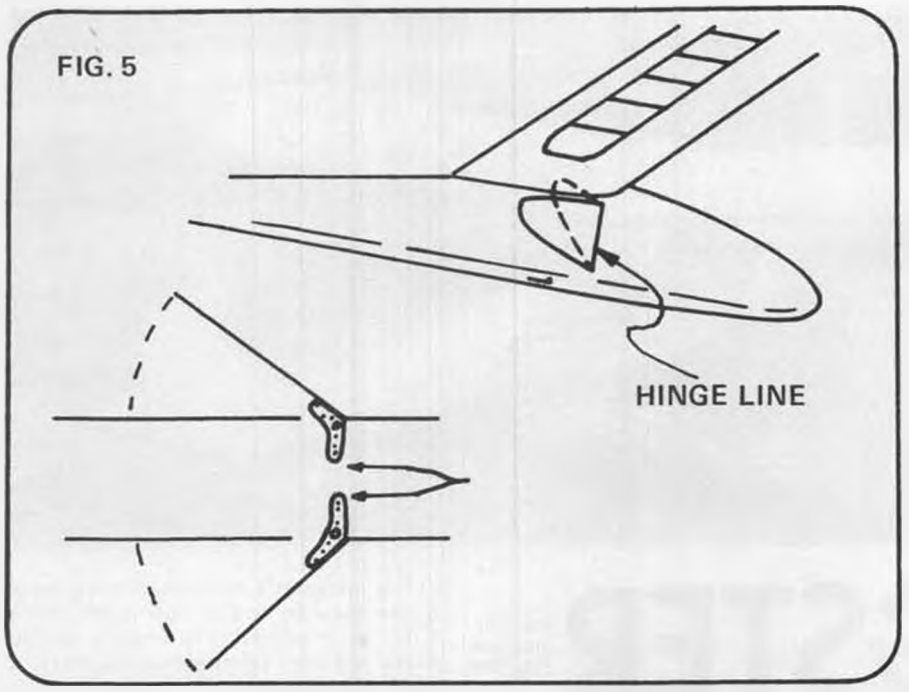
John Rimmer, of Victoria, Texas, has given this top-and-bottom spoiler system a new twist: he activates them via a torque tube and two wipers (see Figure 3). This necessitates hinging one of the spoilers backwards . . . i.e., mouth into the breeze . . . but John says it shuts tight with no problems, at least on the lightweight ships he designs and flies.

RETROFIT DEVICES

The unlikely-looking device in Figure 4 is something I came up with for slowing down airplanes that don't have built-in spoilers. It isn't very clean, in the closed position, but I found it a great help in making the transition back to three-channel flying after years of rudder-and-elevator only. I made mine from 1/16 wire and 1/16 plywood . . . double-stick tape on either side of the servo held it all together. Toughest act was to stick the flippers to the wire: silk and dope "bandaids" was my solution. The entire gizmo slides into the open fuselage bay underneath the wing, with the axle protruding through 1/16 slots cut through the wing saddle. In the closed position, the spoiler blades lie flat against the bottom surface of the wing . . . bend them to the proper dihedral angle by trial and error. Deployed, they rotate down 45-60°, much like the bottom-surface spoilers shown in Figure 1. If you build one of these creatures, don't show it to anyone, unless you're prepared for a volley of wisecracks ("It'll never fly, it ain't got no back wing," etc., etc.). Where you position the axle along the chord depends a lot on your particular airfoil . . . start at about the 10% point and experiment from there.

Take a good look at Figure 5. Herb (where have I heard that name. . .) Semmelmeyer has been thinking again, and here's his latest thought for glidepath control. It's a fuselage-mounted dive brake with a *lot* of advantages. First, of course, is that it can be retrofitted





without too much ripping and tearing. Second, it cleans up the wing airfoil; people are someday going to discover the importance of this, as we become more performance-oriented in the sport. Third, it concentrates the spoiler "mass," in both open and closed modes; everyone who's flown wing-mounted spoilers has noticed the sense of heaviness they give your wings when they're open. Herb claims this device eliminates that heavy-winged, sluggish feel on the rudder. Admittedly, these spoilers aren't quite as effective as a wing-mounted spoiler; they don't "spoil" wing lift as much as simply induce drag. But Herb feels that the added maneuverability they give makes up for it. "Besides," Herb says, "it's neat to kick them open when the plane's coming right toward you and watch the fuselage swell up like a toad."

Herb is one of those rare folk who tackle any problem very carefully and logically, taking copious notes and making changes slowly, methodically, one at a time. He spent hours flying three different airplanes with pieces of cardboard taped in place to simulate these flippers, so when he tells me to hinge them 5-10% back from the leading edge to get minimum pitch change, I'm willing to do it without too much argument. In fact, I'm doing it in my next plane.

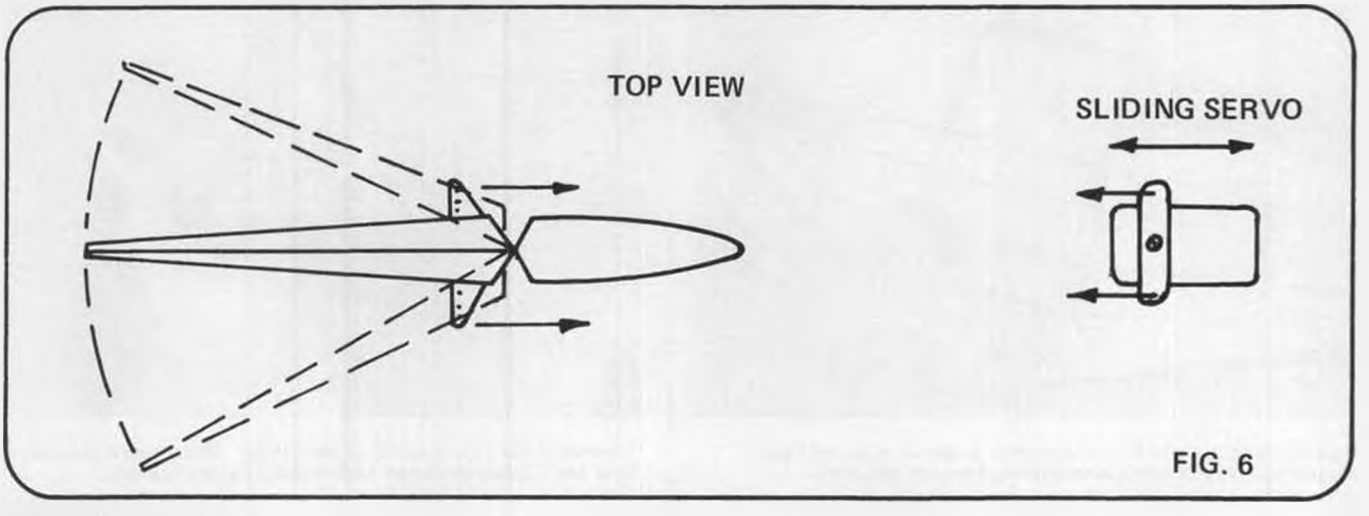
Two other glidepath devices are worth passing mention. One of these is a "drag chute," a parachute that's deployed at the end of the flight just like some full-scale sailplanes do. Whenever I mention that I've played with drag chutes in the past, and I'm thinking about doing so again, somebody always brings up reliability: "They fail too often, and just when you need them most." Try telling that to your Uncle Bork, the skydiver! A parachute is just as reliable as the person who packs it. Find out how your chute works best, and pack it that way every time, and you won't have any trouble with reliability.

Which is a good thing, because drag chutes will give you headaches enough in other ways. If you pack them and strap them outside the fuselage, they cause beaucoup drag. Put them inside a trapdoor, and the cutout weakens your fuselage. Fasten them to the tail of the plane (which seems like the logical place) and they'll open out and relieve you completely of the pilot function: you won't be able to steer the ship at all! (They have to be fastened very close to the CG, and as high on the fuselage as possible, so that they exert their drag in approximately the same vertical and horizontal planes as the airplane's total drag component.) If you make their tether line too long, or fail to put a large enough hole in their center, they will whip about like a cow's tail back there, and usually manage to snag on a tall weed about fifty feet downwind of the landing circle. And, of course, they're as irrevocable as suicide: once you throw the switch, there's no turning back, so if you hit unexpected down air on the final...

For all their faults, I get a perverse satisfaction out of playing with drag chutes. They're a real novelty on the field, definitely not recommended for the serious competitor, but a lot of fun for those folk whom *Aeromodeller* calls

Continued on page 90

Joe McClaran's original "Split Tee" design that he flew at the 1975 LSF Tournament at Mile Square Park in So. Cal. Features the dive brake/spoiler shown in Fig. 6 below. Joe reports that at less than full separation, there is still directional control. Photo by Taylor Collins.



PHOTOS BY AUTHORS

LONGSTER

By LE GRAY and CURTIS CHRISTEN . . . CO_2 R/C Scale? Why not? This little cutie is easy to build and can be flown indoors or out.

• Les Long could be introduced in any number of ways, with any number of glowing descriptions: the Father of Light Aircraft; the founder of aircraft homebuilding. Overstatements? Of course. But, without doubt, Les Long was an innovative pioneer during aviation's adolescence. His work has yet to receive appropriate recognition.

With specific reference to lightplanes, he was a giant. He was also a man of fortunate circumstance. Though the CAA (later FAA) had effectively regulated away most all national potential for homebuilt aircraft, one state offered haven for amateur aeronautical genius. Long was a resident of Oregon, and that state alone allowed freedom to his talents. Les Long flourished. Unfortunately, the rest of the country was denied the promise of his productivity.

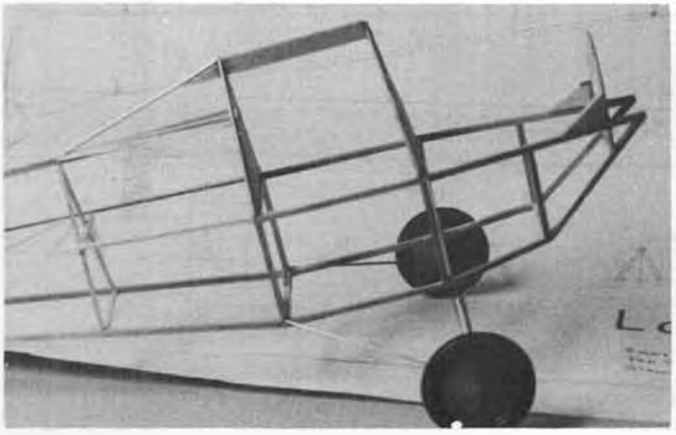
One of Long's most appealing creations was a small, single-place parasol, the Longster . . . often identified as the Henderson-Longster or Longster III. Quite advanced in many of its features, the Longster utilized a steel tube fuselage (though brazed and riveted rather than welded) and was powered by a horizontally-opposed engine.

The common pacing factor in the development and advancement of small aircraft was, as now, lack of suitable powerplants. Many homebuilts of the era staggered into the air with modified automobile or motorcycle engines. These units had unacceptable power-to-weight ratios and only marginal reliability, but they were available and they were relatively inexpensive. Early Long aircraft carried these cast-iron burdens. The subject Longster was first powered by a 20-hp converted four-cylinder Henderson motorcycle engine. Later it was fitted with an opposed twin, designed by Les Long, which incorporated cylinders from a Harley-Davidson engine. The new engine developed some 30 hp and undoubtedly provided a more flyable craft.

The Longster's performance was adequate even by today's standards and a C-65 or modified VW engine would make it a very competitive machine. It seems incongruous that updated Longsters are not now crowding workshops and dotting sport airstrips across the nation. With its simplicity, the current interest in minimum-machine flying, and the wave of nostalgia washing the land, the Longster surely is a candidate worthy of serious consideration by present day homebuilders. It certainly has personality and a friendly hound-dawg kind of appeal. Construction could hardly be more basic. It is unique, unusual, and a stable platform, and most assuredly would be fun to fly. A real crowd pleaser, so to speak.

For these same reasons, a model Longster is fun, too. Make it a CO_2 powered, R/C indoor model and the project provides an interesting challenge.

Flights to date with the prototype model indicate that the concept is feasible. With currently available CO_2 powerplants, the miniature Longster offers limited duration, and the twin-cylinder Brown motor is definitely recommended. Efficiency of the airframe/powerplant combination is marginal, however, and improvement is needed. And it's a fascinating challenge



Nose structure details. If you've built a couple of stick-and-tissue models before, you won't have any trouble with this one.

Closeup of the motor and tank installation. Model uses a 10cc main tank and 1-3/4cc condenser tank (hidden behind firewall).

. . . if you're into that sort of thing.

Increased tankage for longer motor runs is certainly needed. However, this becomes a rather sophisticated pressure vessel problem which should not be approached by us amateurs. Gas under the pressures useful for this purpose can be dangerous. Expend your talents in other areas and use only commercially manufactured tanks. These units are a lot more than just soldered, sheet brass containers.

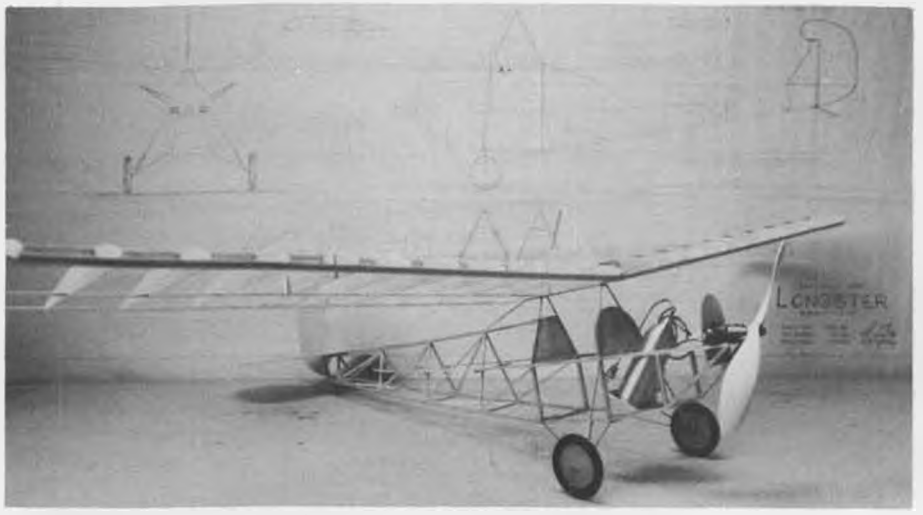
Where most of us can work effectively . . . and safely . . . for improved performance is in propeller/motor efficiency. An experimental program that trades propeller pitch versus motor duration for best climb/distance performance will be very rewarding. A simple sheet aluminum propeller will allow rapid, on-field changes with minimum fuss or expense. Those individuals or groups who accept the challenge and extend the general performance of this or this type model may well enjoy the satisfaction of pioneering a new class of sport/competition . . . indoor R/C scale.

If an indoor flying site is not open for use, a nearby Little League diamond will serve on calm evenings during soccer season. Or a tennis court. And if a little, dinky radio is not readily available, the Longster makes a fine free flight model.

A rather obvious modification is the installation of a Cox .010 engine. This calls for a bit of beefing around the nose and sort of shoots the indoor philosophy right in the old empennage, so to speak . . . but fun is the name of the game. And fun it will provide . . . R/C or no. So go forth, do with, and be joyous. Or whatever.

Anyone who grew up with Megow, Comet, Scientific or other stick-and-tissue models will have no difficulty with the Longster. Nor will a cultist of the Peanut Scale mania. Even so, a few building hints . . . especially the recommended sequence of construction . . . are in order. Pay attention.

Fuselage ready for covering. Nose section covered with card stock prior to adding tissue. If you want a longer motor run and can stand the noise, a Cox .010 would be just right.



Completed basic structure is quite light, closely follows the construction of the full-size Longster. The flying wires are functional, so don't leave 'em off.

CONSTRUCTION

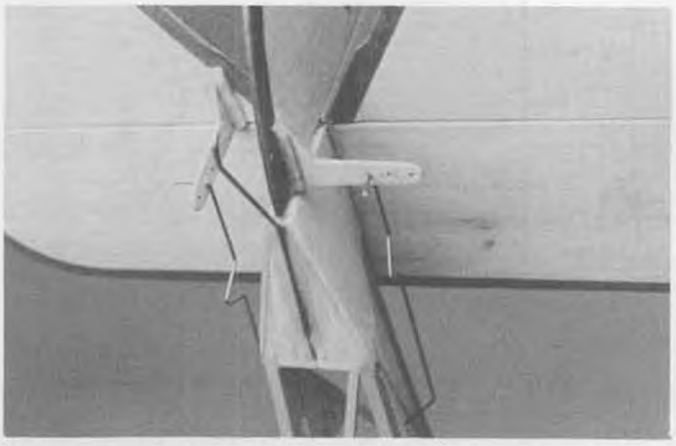
1) Build forward fuselage (3/32 sq. balsa) complete with firewall and cabane bulkheads but without 1/64 plywood floor. Position completed forward fuselage subassembly over top view with rear cabane bulkhead located precisely on drawing and with subassembly square and centered. Elevate front end of subassembly so that bottom of forward cabane bulkhead is EXACTLY 3/8 of an inch above building surface, using fuselage subassembly alignment template either side. (See reference dimension on side view plan.) Check squareness and centering of subassembly with plans and block and pin securely in place.

2) Build 1/16 sq. balsa "A" frame bulkheads for fuselage tailcone directly over plans. These units consists of side pieces and a center cross brace stringer support piece. Build carefully and cut lengths accurately.

3) Fuselage tailcone is built over projected true length (broken lines) of top view plan. Position bottom 3/32 sq. balsa tailcone longerons over drawing, glued to the bottom of rear cabane bulkhead. Add 1/16 sq. balsa cross braces between longerons. Add 1/16 balsa aft end. Add pre-bent 1/64 plywood floor. Add 1/16 balsa gussets.

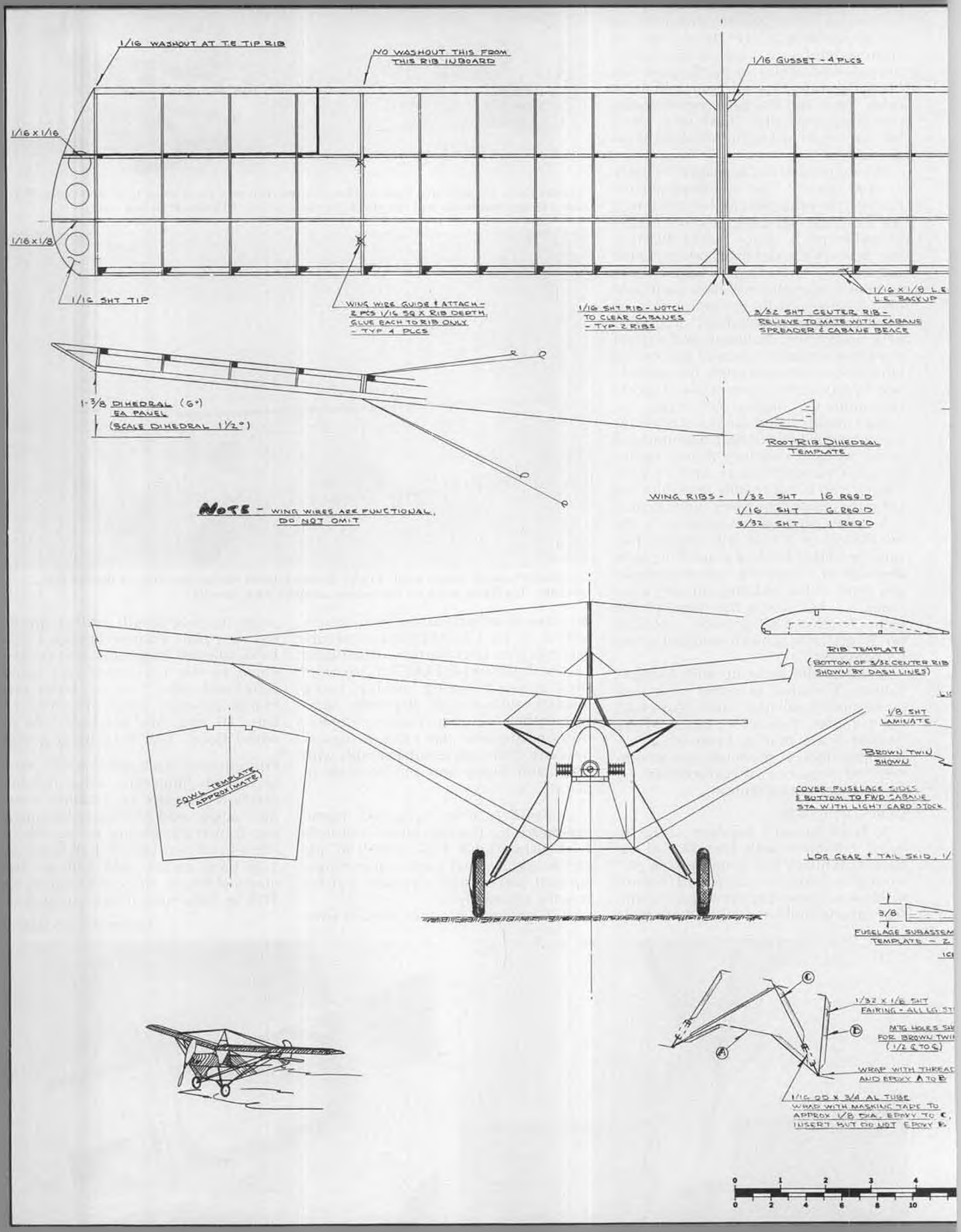
Position and attach tailcone "A" frames to bottom longerons, using bulkhead erection template to establish proper slant angle. Add 3/32 sq. balsa tailcone top longeron, gluing to top of "A" frames and rear cabane bulkhead. Add 1/16 balsa gusset. Add 1/16 sq. balsa diagonal braces, sides and bottom. Add 1/16 sq. balsa side stringer on each side

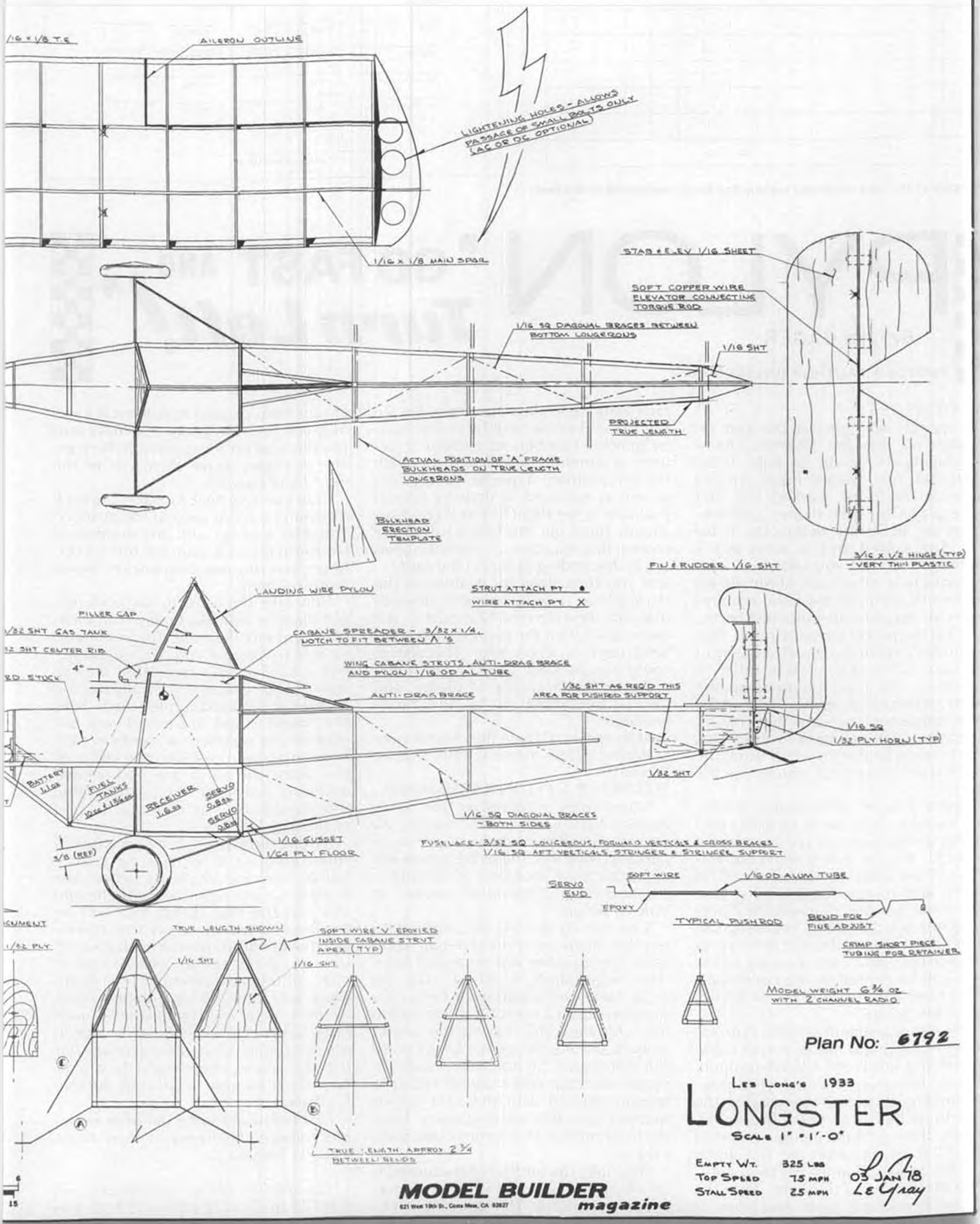
Continued on page 101

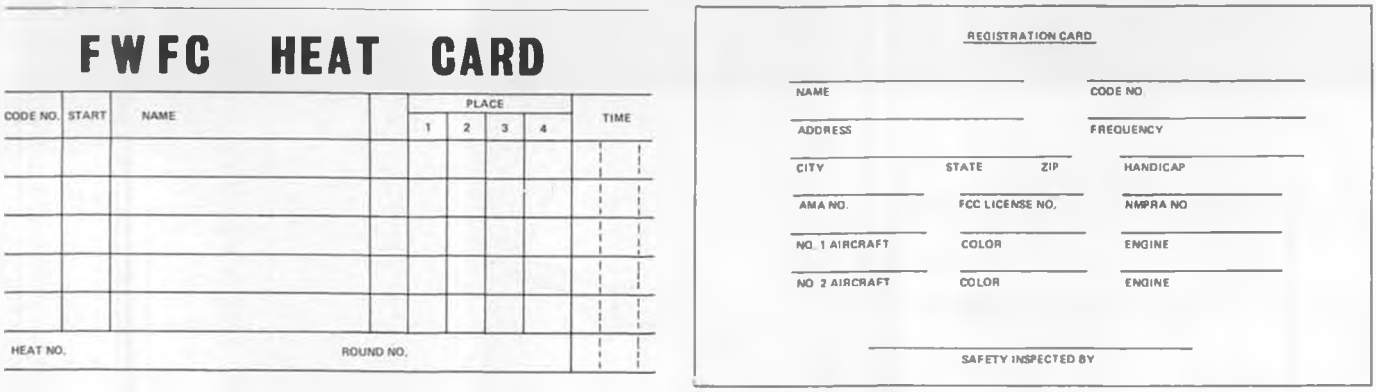


Control linkage hook-up detail. V-bends in pushrods wires are for adjusting the pushrod length.

A lightweight, super-small radio is a must for this model. Prototype uses a Cannon rig, 100 ma. battery mounted in the nose.


1/16 WASHOUT AT TE TIP RIB
NO WASHOUT THIS FROM THIS RIB INBOARD
1/16 GUSSET - 4 PLCS
1/16 x 1/16
1/16 x 1/8
1/16 SHT TIP
WING WIRE GUIDE & ATTACH - 2 PCS 1/16 SQ X RIB DEPTH, GLUE EACH TO RIB ONLY - TYP 4 PLCS
1/16 SHT RIB - NOTCH TO CLEAR CABANES - TYP 2 RIBS
3/32 SHT CENTER RIB - RELIEVE TO MATE WITH CABANE SPREADER & CABANE BRACE
1/16 x 1/8 LE
LE BACKUP
1-3/8 DIHEDRAL (6°) EA PANEL
(SCALE DIHEDRAL 1½°)
ROOT RIB DIHEDRAL TEMPLATE
NOTE - WING WIRES ARE FUNCTIONAL, DO NOT OMIT
WING RIBS - 1/32 SHT 16 REQ'D
1/16 SHT 6 REQ'D
3/32 SHT 1 REQ'D
RIB TEMPLATE
(BOTTOM OF 3/32 CENTER RIB SHOWN BY DASH LINES)
1/8 SHT LAMINATE
BROWN TWIN SHOWN
COVER FUSELAGE SIDES & BOTTOM TO FWD CABANE STA WITH LIGHT CARD STOCK
LDR GEAR & TAIL SKID, 1/
3/8
FUSELAGE SUBASSEM TEMPLATE - 2
COWL TEMPLATE (APPROXIMATE)
1/32 x 1/8 SHT FAIRING - ALL LG
MTG HOLES SH FOR BROWN TWI (1/2 ℄ TO ℄)
WRAP WITH THREAD AND EPOXY A TO B
1/16 OD x 3/4 AL TUBE WRAP WITH MASKING TAPE TO APPROX 1/8 DIA, EPOXY TO C, INSERT BUT DO NOT EPOXY B.
0 1 2 3 4
0 2 4 6 8 10


1/16 x 1/8 T.E.
AILERON OUTLINE
LIGHTENING HOLES - ALLOWS PASSAGE OF SMALL BOLTS ONLY (AC OR DC OPTIONAL)
1/16 x 1/8 MAIN SPAR
STAB & ELEV 1/16 SHEET
SOFT COPPER WIRE ELEVATOR CONNECTING TORQUE ROD
1/16 SQ DIAGONAL BRACES BETWEEN BOTTOM LONGERONS
1/16 SHT
PROJECTED TRUE LENGTH
ACTUAL POSITION OF "A" FRAME BULKHEADS ON TRUE LENGTH LONGERONS
BULKHEAD ERECTION TEMPLATE
3/16 x 1/2 HINGE (TYP) - VERY THIN PLASTIC
FIN & RUDDER 1/16 SHT
LANDING WIRE PYLON
STRUT ATTACH PT •
WIRE ATTACH PT X
FILLER CAP
1/32 SHT GAS TANK
1/2 SHT CENTER RIB
CABANE SPREADER - 3/32 x 1/4, NOTCH TO FIT BETWEEN Λ 's
WING CABANE STRUTS, ANTI-DRAG BRACE AND PYLON 1/16 OD AL TUBE
4"
RD. STOCK
ANTI-DRAG BRACE
1/32 SHT AS REQ'D THIS AREA FOR PUSHROD SUPPORT
1/16 SQ
1/32 PLY HORN (TYP)
1/32 SHT
BATTERY 11 oz
FUEL TANKS 10oz & 15oz
RECEIVER 1.6 oz
SERVO 0.8 oz
SERVO 0.8 oz
1/16 SQ DIAGONAL BRACES - BOTH SIDES
3/8 (REF)
1/16 GUSSET
1/64 PLY FLOOR
FUSELAGE - 3/32 SQ LONGERONS, FORWARD VERTICALS & CROSS BRACES
1/16 SQ AFT VERTICALS, STRINGER & STRINGER SUPPORT
SERVO END
SOFT WIRE
1/16 OD ALUM TUBE
EPOXY
TYPICAL PUSHROD
BEND FOR FINE ADJUST
CRIMP SHORT PIECE TUBING FOR RETAINER
TRUE LENGTH SHOWN
SOFT WIRE "V" EPOXIED INSIDE CABANE STRUT APEX (TYP)
1/16 SHT
1/16 SHT
TRUE LENGTH APPROX 2 3/4 BETWEEN BENDS
MODEL WEIGHT 6 3/4 oz WITH 2 CHANNEL RADIO
Plan No: 6792
LES LONG'S 1933
LONGSTER
SCALE 1" = 1'-0"
EMPTY WT. 325 LBS
TOP SPEED 75 MPH
STALL SPEED 25 MPH
03 JAN 78
Le Gray
MODEL BUILDER magazine
621 West 19th St., Costa Mesa, CA 92627



FWFC HEAT CARD

CODE NO.	START	NAME		PLACE 1	2	3	4	TIME

HEAT NO. ROUND NO.

REGISTRATION CARD

NAME CODE NO.

ADDRESS FREQUENCY

CITY STATE ZIP HANDICAP

AMA NO. FCC LICENSE NO. NMPRA NO

NO. 1 AIRCRAFT COLOR ENGINE

NO. 2 AIRCRAFT COLOR ENGINE

SAFETY INSPECTED BY

Examples of the heat cards and registration cards mentioned in the text.

PYLON "GO FAST AND *Turn Left!*"

By JIM GAGER

PHOTOS BY AUTHOR UNLESS NOTED

LAS VEGAS '79?

It appears we jumped the gun on announcing that the NMPRA Championship Races would be held in Las Vegas this year. Seems there are still some details to be worked out, and more planning with firmer commitments are necessary before this is for real. Stay tuned and as soon as it's confirmed we'll let you know.

Thanks to a letter from Al Alman, we last month outlined the basic requirements for people and equipment necessary for running a pylon race. This month we'll cover the actual handling of the race. One of the more difficult aspects of the race is setting up the matrix; errors of having two fliers on the same frequency, the same fliers having to repeatedly fly against each other, etc., are common problems when using the shuffle-card system of setting up the heats.

Wayne Yeager, of Romulus, Michigan, has taken the time to develop a prearranged matrix system and has made it available. We can testify to its correctness and usefulness, as we have used his system and found that it works. One additional benefit of using this premade matrix is that all the heat cards can be filled out prior to the start of the races and a master heat card showing all the races can be posted so the contestants will know when and against whom they'll be flying.

One minor problem with the matrix as presented is that it makes no provision for moving the fliers' takeoff position. This can be easily remedied while making out the heat cards by moving the columns of figures (after the first round, that is); the right hand column is moved to the left and becomes the 1st column . . . the other columns are then automatically moved to the right. After the second round the same procedure is followed down through the 4th round. At this point, everyone will have had a race using each takeoff position; the 5th round can then be mixed (column-wise) by drawing numbers to see which column of numbers is assigned to which takeoff position. I prefer to use this system as opposed to drawing takeoff positions at the flight line as if you have already filled out the heat cards at the scoring headquarters . . . *and* the names are in descending order on the card . . . *and* you then draw for position at the starting line . . . *and* the order is different than that shown on the heat card . . . it is more difficult for the contest workers to keep track of who's who. This system could also be used for F1 races if you drop the handicapping of planes, and this is becoming more and more prevalent.

At this point, I'll turn the column over to Wayne and his matrix system. Thanks, Wayne!

SETTING UP A PYLON RACE MATRIX

Many times a contestant has to fly back-to-back heats or has repeats. By repeats I mean flying the same person or persons twice. The following system will eliminate these problems. It's simple to use and takes a minimum amount of time to set up.

Start out by leaving the registration number blank on the contestant entry card. This number will be added later. After registration is closed, take the entry cards and group each frequency together. Form a vertical column on the left with the cards having the largest amount on one frequency (many times this will determine how many heats are required to complete a round). Form the second column with the next largest number on a different frequency. Form the third and fourth columns in the same manner.

Then take the oddballs (small amount on a frequency) and fill out the columns as near as possible. The object here is to have each column with the same number of contestants. Trade frequency groups from column to column if it will help you even things out. Just make sure you move all on a frequency. If there are any shortages, leave them out of the right hand column.

Check and recheck to make sure each frequency is in one vertical column only. You may end up with any number of frequencies in a column but never, never have any one frequency in two or more columns.

Now take the cards in each column, put them in individual piles, turn them over, and mix them up. This is done so no one will accuse you of giving someone a hard or easy race. After mixing, reform your columns vertically starting with the top left and number them. Your first round is now in front of you. Just read off the numbers or names in each horizontal row to see who races who. At this point the cards are not needed anymore. Just make up the remaining rounds with the chart shown at the end of this article.

If using three-plane heats because of a small amount of entries or a large number on one frequency, ignore the numbers in the right hand column and use just the first three. You will be required to use the chart that corresponds with the number of heats you end up with. If you end up with a single in one column, move another column down and leave the top numbers blank so there are at least two planes in each heat. Never give someone a free ride in the first round. Make them earn it! After the first round, there could be a one-plane heat because of attrition, but that is allowed.

First below are some different examples followed by the matrix chart. Hope it works for you. . .

Example: 22 entries, frequencies are; 6 on 72:16, 5 on 72:08, 4 on 72:32, 3 on 72:24, 2 on 72:40, 1 on 53:10, and 1 on 53:40.

Group as follows:

1. 72.16 7. 72.08 13. 72:24 19. 72.32
2. 72.16 8. 72:08 14. 72:24 20. 72:32
3. 72:16 9. 72:08 15. 72:24 21. 72:32
4. 72:16 10. 72:08 16. 72:40 22. 72:32
5. 72:16 11. 72:08 17. 72:40
6. 72:16 12. 53:10 18. 72:40

After checking to make sure each frequency is in one column only, number each column starting with the top left. Noting there are 6 heats required to complete a round, refer to the 6-heat chart for the remaining rounds. In this example numbers 23 and 24 are not used.

Example:

30 entries, frequencies are; 6 on 72:16, 5 on 72:08, 5 on 72:32, 6 on 72:24, 4 on 72:40, 3 on 53:10 and 1 on 53:40.

Group as follows:

1. 72:08 10. 72:32 19. 28. 72:24
2. 72:08 11. 72:32 20. 29. 72:24
3. 72:08 12. 72:32 21. 30. 72:24
4. 72:08 13. 72:32 22. 72:16 31. 72:24
5. 72:08 14. 72:32 23. 72:16 32. 72:24
6. 72:40 15. 53:10 24. 72:16 33. 72:24
7. 72:40 16. 53:10 25. 72:16
8. 72:40 17. 53:10 26. 72:16
9. 72:40 18. 53:40 27. 72:16

As you can see, with 30 entries you would hope to use the 8-heat chart but the large number on a few frequencies forces 9 heats and that requires a larger chart. You end up with 3 four-plane heats and 6 three-plane heats. You could move the third column up to the top which would give you 6 four-plane heats and 3 two-plane heats, but three-plane heats are more desirable than two, so I moved the third column down.

Again you would not use numbers 19, 20, 21, 34, 35, and 36. Your first heat would be 1, 10, and 28.

One more example:

20 entries, frequencies are; 7 on 72:16, 5 on 72:08, 3 on 72:32, 2 on 72:24, 1 on 53:10, 1 on 53:40, and 1 on 27:045.

Group as follows:

1. 72:16 8. 72:08 15. 72:32
2. 72:16 9. 72:08 16. 72:32
3. 72:16 10. 72:08 17. 72:32
4. 72:16 11. 72:08 18. 53:10
5. 72:16 12. 72:08 19. 53:40
6. 72:16 13. 72:24 20. 27:045
7. 72:16 14. 72:24

Again you can see that 7 on 72:16 requires 7 heats even though there are only 20 entries. If you tried to arrange 4-plane heats, there would be some 1 and 2-plane heats, again an undesirable condition for the first round. Using the 7-heat chart, number 21 and the right hand column would not be used.

For any rounds, try to use a minimum of 5 heats or there will be repeats and back-to-back heats.

Okay, all the hard work has been done and it's time to start having fun.

Call a pilots' meeting and explain the following points:

On starting procedure . . . allow 90 seconds from when the Starter indicates the clock has started. If the contestants agree that they all want the flag to drop when everyone is running and ready, do so; if, however, they cannot agree on

Continued on page 84

5 Heat Rounds				
1 6 11 16	1 7 13 19	1 8 15 17	1 9 12 20	1 10 14 18
2 7 12 17	2 8 14 20	2 9 11 18	2 10 13 16	2 6 15 19
3 8 13 18	3 9 15 16	3 10 12 19	3 6 14 17	3 7 11 20
4 9 14 19	4 10 11 17	4 6 13 20	4 7 15 18	4 8 12 16
5 10 15 20	5 6 12 18	5 7 14 16	5 8 11 19	5 9 13 17
6 Heat Rounds				
1 7 13 19	4 9 14 19	2 12 16 19	3 12 14 22	6 8 15 22
2 8 14 20	5 10 15 20	3 7 17 20	4 7 15 23	1 9 16 23
3 9 15 21	6 11 16 21	4 8 18 21	5 8 16 24	2 10 17 24
4 10 16 22	1 12 17 22	5 9 13 22	6 9 17 19	3 11 18 19
5 11 17 23	2 7 18 23	6 10 14 23	1 10 18 20	4 12 13 20
6 12 18 24	3 8 13 24	1 11 15 24	2 11 13 21	5 7 14 21
7 Heat Rounds				
1 8 15 22	1 9 17 25	1 10 19 28	1 11 21 24	1 12 16 27
2 9 16 23	2 10 18 26	2 11 20 22	2 12 15 25	2 13 17 28
3 10 17 24	3 11 19 27	3 12 21 23	3 13 16 26	3 14 18 22
4 11 18 25	4 12 20 28	4 13 15 24	4 14 17 27	4 8 19 23
5 12 19 26	5 13 21 22	5 14 16 25	5 8 18 28	5 9 20 24
6 13 20 27	6 14 15 23	6 8 17 26	6 9 19 22	6 10 21 25
7 14 21 28	7 8 16 24	7 9 18 27	7 10 20 23	7 11 15 26
8 Heat Rounds				
1 9 17 25	4 11 18 25	1 15 21 27	4 9 22 27	1 13 24 28
2 10 18 26	5 12 19 26	2 16 22 28	5 10 23 28	2 14 17 29
3 11 19 27	6 13 20 27	3 9 23 29	6 11 24 29	3 15 18 30
4 12 20 28	7 14 21 28	4 10 24 30	7 12 17 30	4 16 19 31
5 13 21 29	8 15 22 29	5 11 17 31	8 13 18 31	5 9 20 32
6 14 22 30	1 16 23 30	6 12 18 32	1 14 19 32	6 10 21 25
7 15 23 31	2 9 24 31	7 13 19 25	2 15 20 25	7 11 22 26
8 16 24 32	3 10 17 32	8 14 20 26	3 16 21 26	8 12 23 27
9 Heat Rounds				
1 10 19 28	1 11 21 31	1 12 23 34	1 13 25 28	1 14 27 31
2 11 20 29	2 12 22 32	2 13 24 35	2 14 26 29	2 15 19 32
3 12 21 30	3 13 23 33	3 14 25 36	3 15 27 30	3 16 20 33
4 13 22 31	4 14 24 34	4 15 26 28	4 16 19 31	4 17 21 34
5 14 23 32	5 15 25 35	5 16 27 29	5 17 20 32	5 18 22 35
6 15 24 33	6 16 26 36	6 17 19 30	6 18 21 33	6 10 23 36
7 16 25 34	7 17 27 28	7 18 20 31	7 10 22 34	7 11 24 28
8 17 26 35	8 18 19 29	8 10 21 32	8 11 23 35	8 12 25 29
9 18 27 36	9 10 20 30	9 11 22 33	9 12 24 36	9 13 26 30
10 Heat Rounds				
1 11 21 31	4 13 22 31	1 19 27 35	4 11 28 35	1 17 23 39
2 12 22 32	5 14 23 32	2 20 28 36	5 12 29 36	2 18 24 40
3 13 23 33	6 15 24 33	3 11 29 37	6 13 30 37	3 19 25 31
4 14 24 34	7 16 25 34	4 12 30 38	7 14 21 38	4 20 26 32
5 15 25 35	8 17 26 35	5 13 21 39	8 15 22 39	5 11 27 33
6 16 26 36	9 18 27 36	6 14 22 40	9 16 23 40	6 12 28 34
7 17 27 37	10 19 28 37	7 15 23 31	10 17 24 31	7 13 29 35
8 18 28 38	1 20 29 38	8 16 24 32	1 18 25 32	8 14 30 36
9 19 29 39	2 11 30 39	9 17 25 33	2 19 26 33	9 15 21 37
10 20 30 40	3 12 21 40	10 18 26 34	3 20 27 34	10 16 22 38
11 Heat Rounds				
1 12 23 34	1 13 25 37	1 14 27 46	1 15 29 43	1 16 31 35
2 13 24 35	2 14 26 38	2 15 28 41	2 16 30 44	2 17 22 36
3 14 25 36	3 15 27 39	3 16 29 42	3 17 31 34	3 18 33 37
4 15 26 37	4 16 28 40	4 17 30 43	4 18 32 35	4 19 23 38
5 16 27 38	5 17 29 41	5 18 31 44	5 19 33 36	5 20 24 39
6 17 28 39	6 18 30 42	6 19 32 34	6 20 23 37	6 21 25 40
7 18 29 40	7 19 31 43	7 20 33 35	7 21 24 38	7 22 26 41
8 19 30 41	8 20 32 44	8 21 23 36	8 22 25 39	8 12 27 42
9 20 31 42	9 21 33 34	9 22 24 37	9 12 26 40	9 13 28 43
10 21 32 43	10 22 23 35	10 12 25 38	10 13 27 41	10 14 29 44
11 22 33 44	11 12 24 36	11 13 26 39	11 14 28 42	11 15 30 34
12 Heat Rounds				
1 13 25 37	1 14 27 40	1 15 29 43	1 16 31 46	1 17 33 38
2 14 26 38	2 15 28 41	2 16 30 44	2 17 32 47	2 18 34 39
3 15 27 39	3 16 29 42	3 17 31 45	3 18 33 48	3 19 35 40
4 16 28 40	4 17 30 43	4 18 32 46	4 19 34 37	4 20 36 41
5 17 29 41	5 18 31 44	5 19 33 47	5 20 35 38	5 21 25 42
6 18 30 42	6 19 32 45	6 20 34 48	6 21 36 39	6 22 26 43
7 19 31 43	7 20 33 46	7 21 35 37	7 22 25 40	7 23 27 44
8 20 32 44	8 21 34 47	8 22 36 38	8 23 26 41	8 24 28 45
9 21 33 45	9 22 35 48	9 23 25 39	9 24 27 42	9 13 29 46
10 22 34 46	10 23 36 37	10 24 26 40	10 13 28 43	10 14 30 47
11 23 35 47	11 24 25 38	11 13 27 41	11 14 29 44	11 15 31 48
12 24 36 48	12 13 26 39	12 14 28 42	12 15 30 45	12 16 32 37

STRICTLY SAIL

By ROD CARR

• Having spent the last two weeks indexing about 180 pages of model yachting columns that I've written over the last 9 years, I noticed some conspicuous weak spots. Most of them seem to be in areas where I feel less than technically expert (there are those who say that there are no such areas. but that I am willing to make up anything rather than appear at a loss). The truth is that like most everybody else in model yachting, I've picked up a bit here and a bit there. No school for skippers exists, nor for that matter does information on basics like hull design, sail aerodynamics, or other subjects written specifically for the modeler. Most of us spend our time transposing the information written for a forty foot sailboat's skipper into something that the owner of a fifty incher can use.

Luckily, just when the clouds were the darkest, along came the silver lining that we have been needing. The designer of the BONE 50/800, Karl Kirkman, has offered to provide us with a series of articles on aspects of design for model yachts in particular. This month I'd like to present the first in the series, the remainder to follow at irregular intervals. In each case, I've taken the liberty of massaging Karl's original manuscript from an editorial standpoint. Any confusion that results is the manifestation of my clumsiness. Karl's original manuscript is short and to the point. My efforts at embellishment are made to tie the comments directly to the model yachts. Karl spends his 40 hours a week managing the towing tank at Hydronautics, Inc., in Laurel, Maryland. It is to be expected that he views the design process as a somewhat wider landscape than we might.

• • •

DESIGN PHILOSOPHY

A meaningful discussion of design must deal not only with the technical aspects of detail design, but with the philosophy and approach to overall design. It must be understood that design in this context combines all the aspects necessary for delivering a potentially winning boat to the starting line of some pre-selected major competition. Thus, more than naval architecture and radio control systems analysis is required. The designer must put the whole package together. He must supervise the construction and tune-up so that the boat reaches its peak performance just at the start of the chosen event . . . some way in the future.

One aspect of design is *HARMONY*. At first it may seem to be a purely esthetic consideration. The trained eye can take in the totality of form and function, assess the completeness and consistency of the interrelated facets and judge that, "She looks just right." More than esthetic considerations are required to provide this harmony in a new design. The various components of the yacht must work and interact together. Naval architects regularly speak of this as the design spiral.

This process may be represented by the sketch in Figure 1. While the order of the considerations may not be fixed, the designer starts by selecting some characteristics (like a 50 inch LOA if the boat is to be a 50/800) and then proceeds in some order to check that a consistency in the design develops. Starting with the LOA dimension for example, the designer would check weights, sketch out a structure, lay out a hull shape, select a rig, check the stability, estimate speeds on various points of sail and then arrange the machinery necessary for adjustment while underway. Continuing on the spiral he then modifies the original dimension as required by his other choices, etc. Given a reasonable original choice, the design converges throughout the process and results in a homing-in on a particular configuration. But there are cases where the design does not converge. Maybe the chosen design cannot be built to the required weight, and the spiral diverges. There are two reasons for devoting our attention to the design spiral:

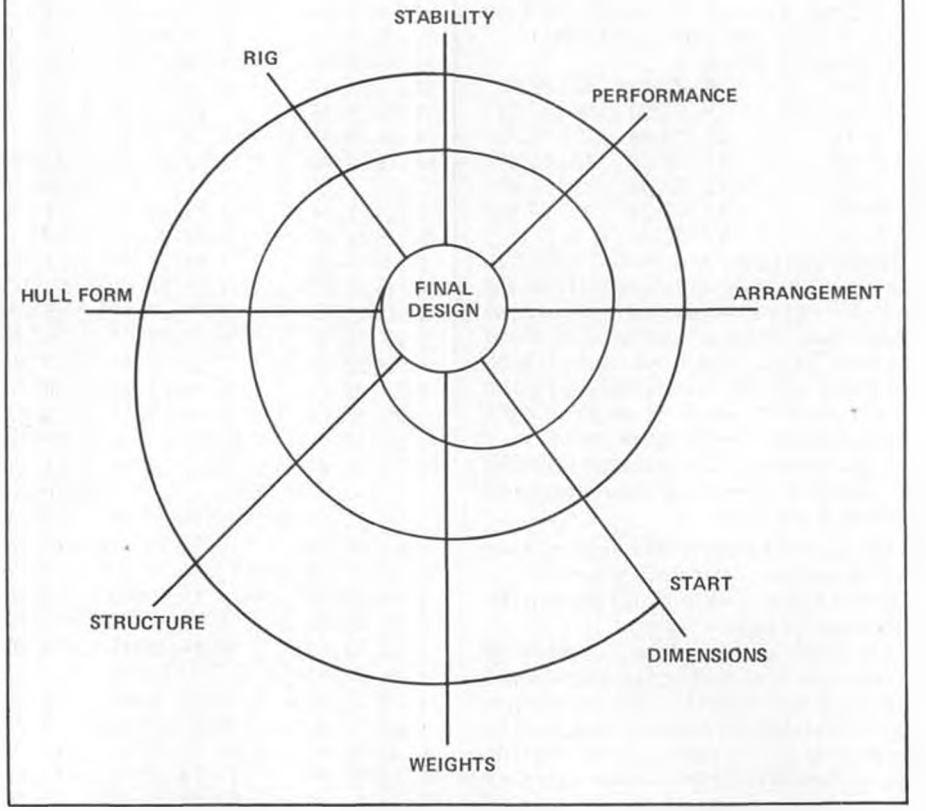
1. An ill-conceived first-cut design *cannot* be forced to work out. Inexperienced designers frequently substitute hope for reasonable expectation and continue to try to make a design work on paper when the spiral is clearly diverging. One should instead cultivate the intellectual honesty to quit a design as soon as a divergent spiral is recognized.

2. One cannot design only hulls or only rigs or only construction plans. A whole system must be assembled. Many of the ideas which have proven themselves in the BONE development have been previously attempted one at a time. The key to the success has been the integration of all the parts in functioning unit.

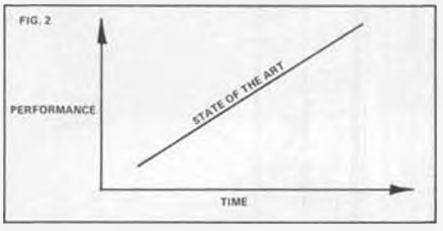
Few designers work in a vacuum to produce competitive boats. A skill essential to maintaining sustained and consistent top performance as a yacht designer is the ability to observe variations between yachts, culling out the good features and reasons for success. These discoveries may then be incorporated in subsequent designs with harmony. Willy-nilly copying of this keel and that hull and that rig will probably be fruitless. The opportunity to study competitive boats and to understand their performance must not be missed.

In general, the latest designs dominate the prize lists. This is undoubtedly a combination of the boat and the skipper. Usually, the best and newest boats

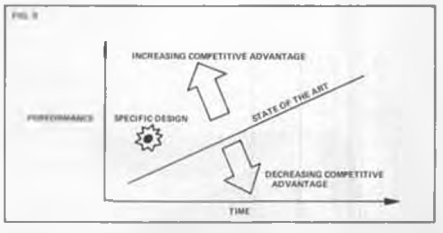
FIG. 1 THE DESIGN SPIRAL



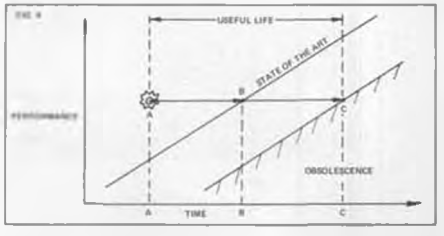
are driven by the best skippers, as there seems to be a direct connection between desire to win and the efforts that are expended in support of that desire. For the remainder of this discussion, let us accept the idea that regardless of skipper skill, potential boat performance follows a curve of improvement as time proceeds. This statement of progress can be shown in graphical form as Figure 2. Note that we have not put measureable quantities on the axis for time of performance. Performance is representative of speed around a race course, and time is some kind of a reference calendar time. Another way of saying this is that with the passage of time, designers are able to provide faster boats with a competitive advantage.



There is little reason to assume that the state-of-the-art line will bend over and become horizontal. At least in the 50/800 class, progress has been continuous since 1930!!! Even so, the class went through a radical change of philosophy in the 1970-1975 era as the emphasis changed from vane-sailed boats to their radio controlled progeny. Figure 3 indicates the goal of developing a new design. One hopes that the design will be above the general state-of-the-art at the time it is put into competition, and will enjoy a competitive advantage.

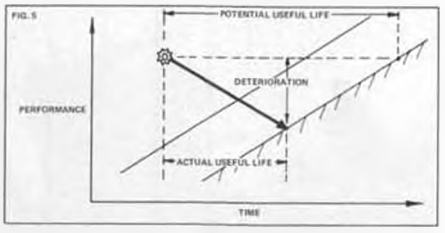


We can now trace the impact of time on this particular design and unearth some interesting properties. First, the design will remain above the state-of-the-art as time proceeds for a measurable time (A to B) in Figure 4. There is a



further time period (B to C) during which the design is less competitive, but approaches obsolescence. At the present time, I'd say that the typical AB time span is about 1 to 1.5 years. The BC time is indeterminate, but I would imagine it is more on the order of 4-6 years. Clever skippering can have a saving effect on boat performance. The best example of skipper skill extending a design's competition life is the efforts of 50/800 Class Secretary Stan Goodwin on behalf of his WARRIOR. Originally designed as a vane boat, Stan was still sailing the WARRIOR in 1978 and doing very well with it. I do have to report that the new WARRIOR III is now on the water, proving the inexorable progress of the state-of-the-art ramp. In the figure, the total time from A to B to C is termed the *useful life* of the boat. It is interesting to note that in the 50/800 class, by the time a boat has been proven and is available commercially as a fiberglass hull it is very nearly at point B, just about at the state-of-the-art. Now, in a mixed fleet of older boats, the new boat will do very well indeed, since it is less obsolete than its fleet mates. But at the upper levels of competition, like the top 5 at the National Championships, a commercially available boat is going to be at a disadvantage. (Read between the lines . . . if you don't want to build all the time . . . consider a one-design.)

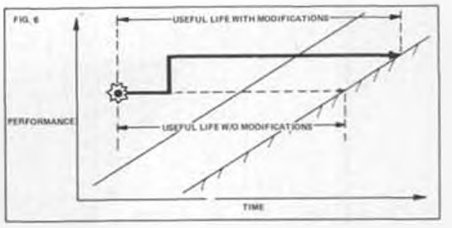
In Figure 4 we show a horizontal path of the new design. Other paths are possible. Figure 5 shows what happens to a new design which is allowed to deteriorate. The usual problem is failure to take care of the sails. Stretched leeches, broken battens and so forth act just like barnacles growing on the bottom. Cleaning the hull well between regattas is often ignored. Fresh water algae will dry on the hull underbody and make it rough, increasing drag. We see in the figure a shortening of the useful life of the boat as a result of this neglect.



I've given a number of clinics for various classes of boats over the years. I never fail to be amazed at the inadequacies that the skipper swore he was going to fix . . . LAST YEAR. Yet here he is again, and that widget still needs to be fixed. No wonder he is still down in the middle of the fleet. Many times, a skipper goes off in search of a replacement for his boat, when what he really needs is to go over it with a fine tooth comb and set right all those little details that are continuously robbing him of boatspeed.

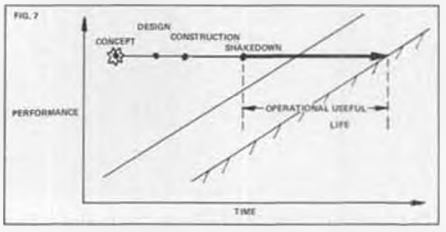
A strategy exists for extending the life of an existing design. This is the time honored method of modifications.

Figure 6 shows a step increase in performance by incorporating a modification on an existing design. One sees a significant extension of its useful life by so doing. One should be warned that there are modifications which result in a step *decrease* and a shortening of the

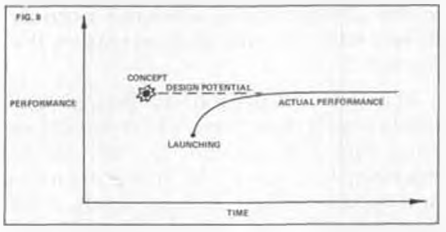


boat's utility. You really need to have a yardstick for comparison if you decide to modify. The best bet is your sailing partner who makes no changes on his boat while you are changing yours.

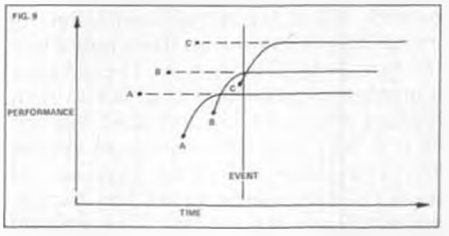
The practical requirements of design, construction, and shakedown complicate our picture of a new design's lifetime. In Figure 7 these phases are added to the boat's lifeline. It is clear that one must minimize the preliminary phases in order to maximize competitive advantage.



Up to this point we have assumed that a new design sails up to its potential speed from the time it is launched. More realistically, there is a period of adjustment and tuning as the quirks of the new boat are sorted out and handled. Figure 8 shows this in a schematic way. This work-up time is important if one is shooting for a specific competition. In my experience I think that the period between launching and reaching design performance is probably 4-8 months. It requires as much competition sailing as can be fitted in. The yardsticks are better, the fleets are bigger, and the skipper skill gets honed at the same time the boat is being shaken down.

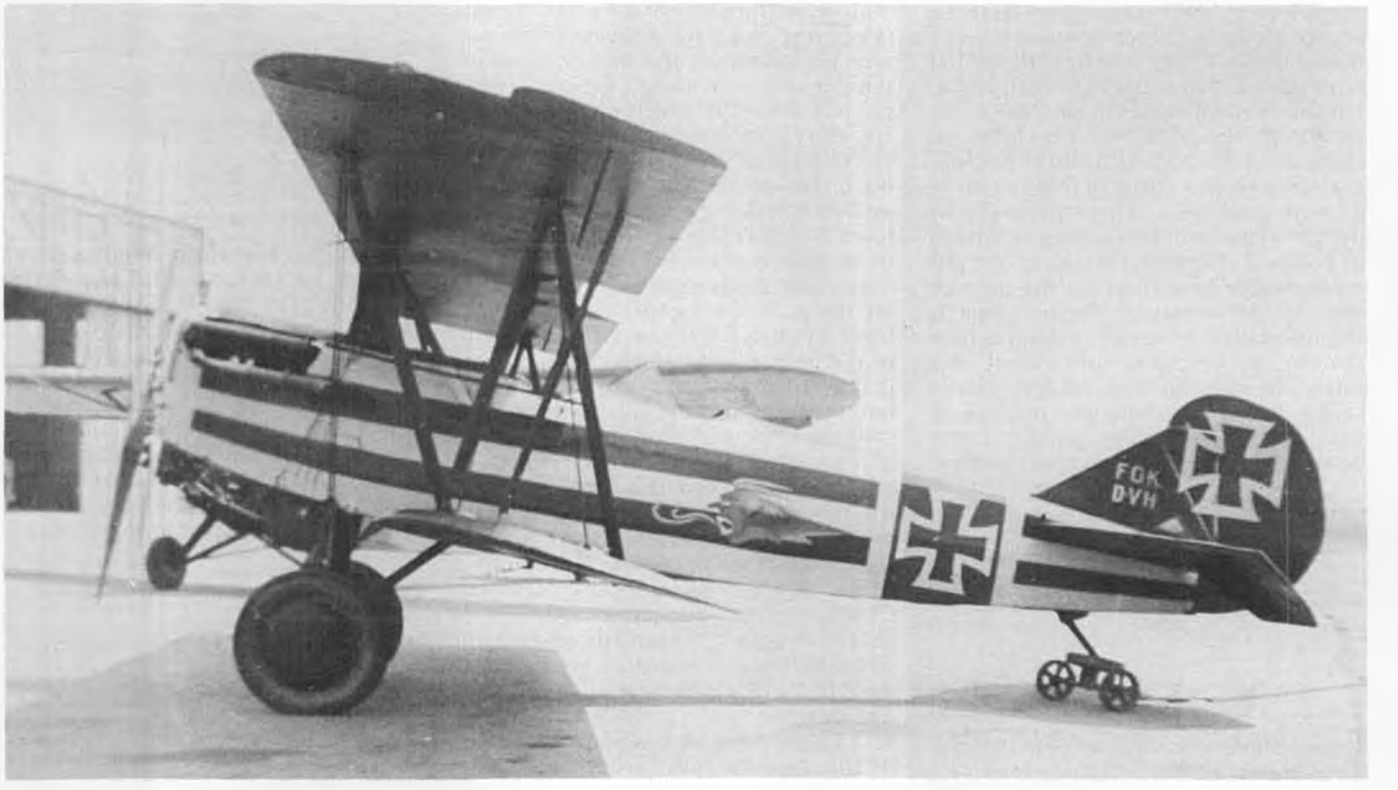


The work-up time becomes especially crucial when the goal is top performance in a specific event, such as a National Championship. Figure 9 shows



design A is started too soon and is outbuilt by B. Design C waits too long

Continued on page 102



The famous "Wichita Fokker," actually a Travel Air 3000 modified to look like a D-VII for the movie "Men With Wings." Aircraft is powered by a Hisso engine. Lloyd Stearman never admitted nor denied that he copied the Fokker rudder.

FOKKER D-7

PART TWO

Drawings by: NICK KARSTENS
Text by: PETER WESTBURG

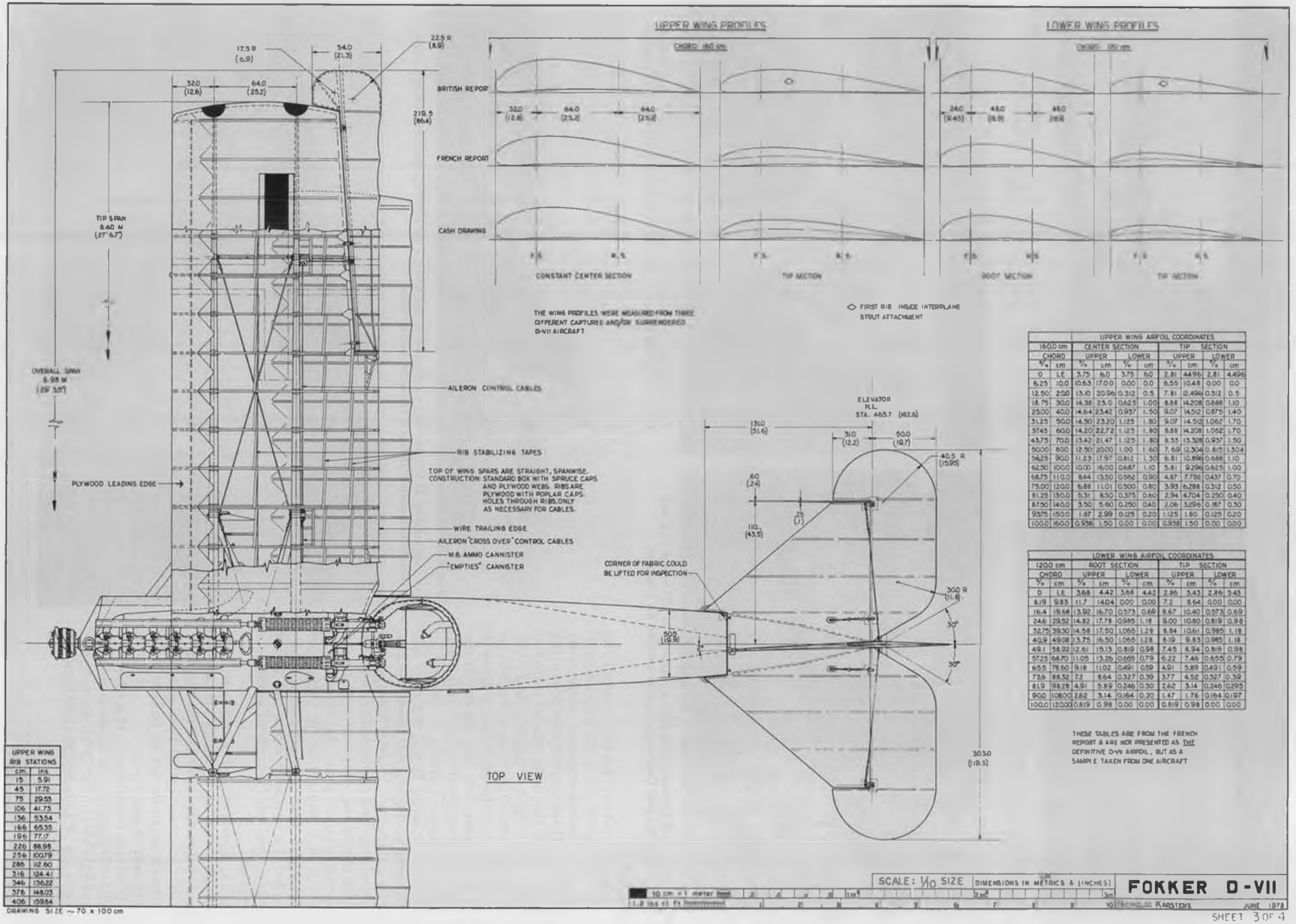
● The 160-hp Mercedes, though reliable, lost power at altitude. A new engine emerged which was "height compensated". The BMW 185-hp water-cooled engine had three carburetors in one; a main and two side carbs. The main carburetor furnished all the fuel mixture up to half throttle. Beyond half throttle, some fuel flowed through the side carburetors, and at high altitude the pilot opened secondary butterfly valves in the auxiliary carbs, allowing more air to mix with the fuel and increasing the power.

The DR. I triplane had a jinx, several pilots losing their lives when the upper wing failed in torsion. Shoddy workmanship left wing ribs understrength, and when abrupt aileron loads were applied, the ribs failed. The jinx apparently transferred to the D-VII, a few catching fire in mid-air for no good reason. Lt. Friedrichs bailed out of his D-VII when it caught fire and though he did not survive, he lived long enough to provide a clue. It was discovered that the incendiary ammunition used had a low flash point; the heat of the engine ignited some cartridges, which in turn ignited the ever-present fuel vapors. That is why one sees photos of engine cowlings with differing versions of louvers and cooling holes and rectangular holes in the radiator allowing cold air to blow through a duct directly over the ammo boxes. These temporary fixes lasted until a new incendiary bullet was

Herman Goering was a sales pilot for Fokker after the war, is shown here delivering a D-VII to Sweden where it set a new Swedish altitude record.

An early Dutch D-VII in pine green. The airplane was new and in immaculate condition.

1979



UPPER WING RIB STATIONS	
cm	ins
15	5.91
45	17.72
75	29.55
106	41.73
136	53.54
166	65.35
196	77.17
226	88.98
256	100.79
286	112.60
316	124.41
346	136.22
376	148.03
406	159.84

DRAWING SIZE — 70 x 100 cm

160.0 cm CHORD		UPPER WING AIRFOIL COORDINATES							
		CENTER SECTION				TIP SECTION			
		UPPER		LOWER		UPPER		LOWER	
%	cm	%	cm	%	cm	%	cm	%	cm
0	LE	3.75	6.0	3.75	6.0	2.81	4.496	2.81	4.496
6.25	10.0	10.63	17.00	0.00	0.0	6.55	10.48	0.00	0.0
12.50	20.0	13.10	20.96	0.312	0.5	7.81	12.496	0.312	0.5
18.75	30.0	14.38	23.0	0.625	1.00	8.88	14.208	0.688	1.10
25.00	40.0	14.64	23.42	0.937	1.50	9.07	14.512	0.875	1.40
31.25	50.0	14.50	23.20	1.125	1.80	9.07	14.512	1.062	1.70
37.45	60.0	14.20	22.72	1.125	1.80	8.88	14.208	1.062	1.70
43.75	70.0	13.42	21.47	1.125	1.80	8.33	13.328	0.937	1.50
50.00	80.0	12.50	20.00	1.00	1.60	7.69	12.304	0.815	1.304
56.25	90.0	11.23	17.97	0.812	1.30	6.81	10.896	0.688	1.10
62.50	100.0	10.00	16.00	0.687	1.10	5.81	9.296	0.625	1.00
68.75	110.0	8.44	13.50	0.562	0.90	4.87	7.792	0.437	0.70
75.00	120.0	6.88	11.01	0.500	0.80	3.93	6.288	0.312	0.50
81.25	130.0	5.31	8.50	0.375	0.60	2.94	4.704	0.250	0.40
87.50	140.0	3.50	5.60	0.250	0.40	2.06	3.296	0.187	0.30
93.75	150.0	1.87	2.99	0.125	0.20	1.125	1.80	0.125	0.20
100.0	160.0	0.938	1.50	0.00	0.00	0.938	1.50	0.00	0.00

120.0 cm CHORD		LOWER WING AIRFOIL COORDINATES							
		ROOT SECTION				TIP SECTION			
		UPPER		LOWER		UPPER		LOWER	
%	cm	%	cm	%	cm	%	cm	%	cm
0	LE	3.68	4.42	3.68	4.42	2.86	3.43	2.86	3.43
8.19	9.83	11.7	14.04	0.00	0.00	7.2	8.64	0.00	0.00
16.4	19.68	13.92	16.70	0.573	0.69	8.67	10.40	0.573	0.69
24.6	29.52	14.82	17.78	0.985	1.18	9.00	10.80	0.819	0.98
32.75	39.30	14.58	17.50	1.065	1.28	8.84	10.61	0.985	1.18
40.9	49.08	13.75	16.50	1.065	1.28	8.19	9.83	0.985	1.18
49.1	58.92	12.61	15.13	0.819	0.98	7.45	8.94	0.819	0.98
57.25	68.70	11.05	13.26	0.655	0.79	6.22	7.46	0.655	0.79
65.5	78.60	9.18	11.02	0.491	0.59	4.91	5.89	0.491	0.59
73.6	88.32	7.2	8.64	0.327	0.39	3.77	4.52	0.327	0.39
81.9	98.28	4.91	5.89	0.246	0.30	2.62	3.14	0.246	0.295
90.0	108.00	2.62	3.14	0.164	0.20	1.47	1.76	0.164	0.197
100.0	120.00	0.819	0.98	0.00	0.00	0.819	0.98	0.00	0.00

THESE TABLES ARE FROM THE FRENCH REPORT & ARE NOT PRESENTED AS THE DEFINITIVE D-VII AIRFOIL, BUT AS A SAMPLE TAKEN FROM ONE AIRCRAFT

SCALE: 1/10 SIZE | DIMENSIONS IN METRICS & (INCHES)

FOKKER D-VII

Kagstrom

JUNE 1978

The Dutch East Indies Air Force flew D-VII's in the early '20's. Powerplant is a British Siddeley Puma engine.

A captured D-VII and British officers. An early directive ordered all officers to remove spurs before entering the cockpit, but the officer nearest the camera is wearing his.

Canadian ace McKeever poses with a captured D-VII which has had its guns removed and Canadian insignia painted on fuselage.

These German air cadets visited the U.S. before WW-II to inspect this D-VII belonging to Paul Mantz. Note addition of wing wires.

developed.

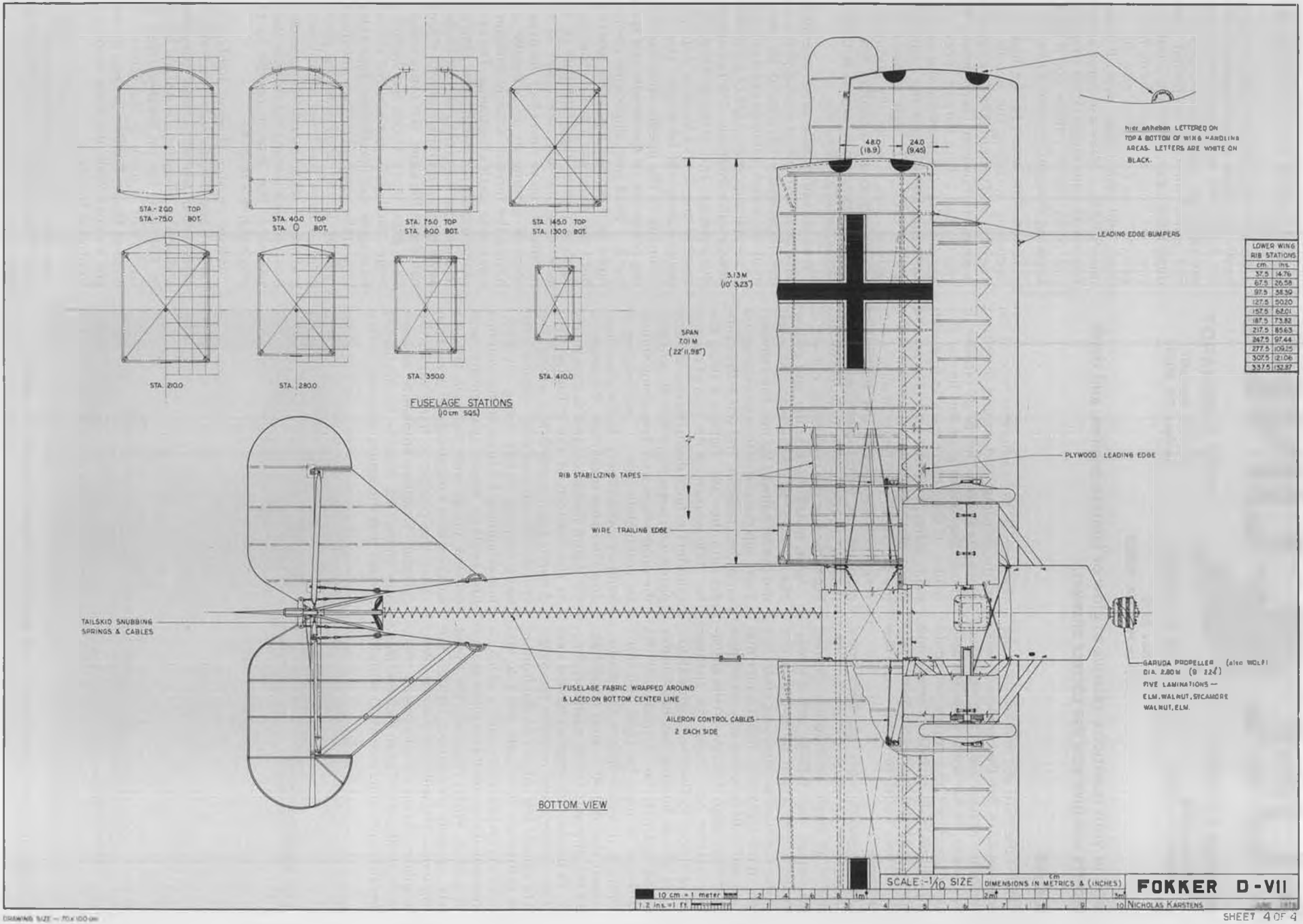
(Author's Note: When I started the plans of the D-VII, I soon discovered that no authorities agreed on the wing geometry. There were differences in the ordinates of the wing ribs of captured British and French airplanes. And there is little agreement in many of the 3-views published over the years in the taper of the wing spars. Mr. A.J. Shortt, of the National Museum of Science and Technology, Ottawa, Canada . . . where an excellent restored D-VII, the only one with some of the original fabric remaining, is on display . . . says: "The spar/rib relationship had us confused until we disassembled the wings for restoration. Your assumption about the front spar is correct; it is straight along the upper surface. The rear spar is identical to the forward, i.e., straight along the upper surface. The lower wing configuration is the same."

Nick Karstens, who more or less willingly took over the D-VII project, has done an admirable job on the plans. He has produced what I believe to be the most accurate set of Fokker D-VII plans ever drawn.)

It is impossible to describe the multitudinous color schemes and markings employed on the D-VII. Best sources for this are : Profile No. 25 and Munson's *Fighters 1914-1919*. •

This surrendered D-VII has had its guns removed and a new cowling installed. Object ahead of the thumbnail windshield is a faired-in tachometer.

Famous WW-I German ace Emil Meinecke (right) was a test pilot for Fokker after the war, delivered aircraft to the many European companies that ordered the D-VII.


STA. -200 TOP
STA. -750 BOT.
STA. 400 TOP
STA. 0 BOT.
STA. 750 TOP
STA. 600 BOT.
STA. 1450 TOP
STA. 1300 BOT.
STA. 2100
STA. 2800
STA. 3500
STA. 4100
FUSELAGE STATIONS
(10 cm SQS)
48.0 (18.9)
24.0 (9.45)
3.13 M (10' 3.23")
SPAN 7.01 M (22' 11.98")
Pilot aileron LETTERED ON TOP & BOTTOM OF WING HANDLING AREAS. LETTERS ARE WHITE ON BLACK.
LEADING EDGE BUMPERS
LOWER WING RIB STATIONS
cm | ins.
37.5 | 14.76
67.5 | 26.58
97.5 | 38.39
127.5 | 50.20
157.5 | 62.01
187.5 | 73.82
217.5 | 85.63
247.5 | 97.44
277.5 | 109.25
307.5 | 121.06
337.5 | 132.87
PLYWOOD LEADING EDGE
RIB STABILIZING TAPES
WIRE TRAILING EDGE
TAILSKID SNUBBING SPRINGS & CABLES
FUSELAGE FABRIC WRAPPED AROUND & LACED ON BOTTOM CENTER LINE
AILERON CONTROL CABLES 2 EACH SIDE
GARUDA PROPELLER (also WOLF)
DIA. 2.80 M (9 2.2")
FIVE LAMINATIONS —
ELM, WALNUT, SYCAMORE
WALNUT, ELM.
BOTTOM VIEW
SCALE: 1/10 SIZE
DIMENSIONS IN METRICS & (INCHES)
10 cm = 1 meter
1.2 ins. = 1 ft
FOKKER D-VII
NICHOLAS KARSTENS
SHEET 4 OF 4

FUEL LINES

GEORGE ALDRICH
P.O. Box 1426
Mission, TX 78572

JOE KLAUSE
P.O. Box 2699
Laguna Hills, CA 92653

OTTO BERNHARDT
17119 S. Harvard
Gardena, CA 90247

Send in your questions, relative to glow or ignition engines, and these experts will give you the correct answers.

KLAUSE

• This is the third and final article of the series on 1/2A Tee Dee engine rework. The other articles are in the April and May issues. If for some unimaginable reason you don't have copies, you could swipe them from a friend, or send some money to **Model Builder** for them. Walt, Bill and your buddy probably would like the latter.

At this point, work has been completed on the parts of the engine, they've all been meticuously cleaned and coated with WD-40, and it's reassembly time. Begin by slipping the plastic carburetor housing onto the front of the crankcase. You'll notice that it's keyed to fit only one way, so be sure to carefully align it. Screw on the aluminum retainer nut. Using the spanner part of the No. 1530 wrench, tighten it until the plastic housing has been firmly seated against the shoulder of the crankcase. It must be tight, but don't overdo it, or you'll deform the plastic.

Insert the WD-40 coated crankshaft, add the phenolic thrust washer (February '79 production engines have a steel thrust washer), and position the thrust plate against the splines on the front of the crankshaft. Now, add the 5-40 machine screw, spinner and a prop to tentatively keep the thrust plate against the splines. When you have the thrust plate squarely positioned, tighten the prop screw. This will force the plate onto the splines. When it's fully seated, there should be about .010 of an inch end play. Liberally apply some more WD-40 inside the case, in the carburetor hole of the plastic housing, and around the thrust plate area. Spin the prop rapidly to check the tracking of the tips of the blades. If they don't track in line with each other, remove and realign the thrust plate. Further, when you strike the prop with your finger, it should spin very freely for four or five seconds or more. If not, then something's wrong. Possibly it's because of a particle of dirt, but whatever the problem is, correct it.

Next, install the cylinder and piston. The best way to do this is to first insert the piston halfway up into the cylinder. Then, slip the end of the connecting rod onto the crankpin, and screw the cylinder into the case. Tighten it using the No. 1530 wrench on the flats of the top cylinder fin. Juice down the cylinder and piston with some more WD-40, and give the prop a hard spin. Everything should be completely free . . . no binding or hang-ups whatsoever. As the prop slows down to its last revolution, the weight of the piston should cause it to slide nicely to the bottom of the cylinder. If it doesn't, again, something's wrong. The cylinder/piston may even require a tad more lapping. Before doing any additional lapping, I'd suggest that you first just reclean them, reassemble, and recheck things with that spin test. It's amazing how a minuscule bit of dust can cause the piston to hang up in the cylinder. I cannot emphasize enough how important it is to be absolutely certain that the entire assembly is free and easy. Any binding between the moving surface will mean an extended break-in period and/or degraded performance.

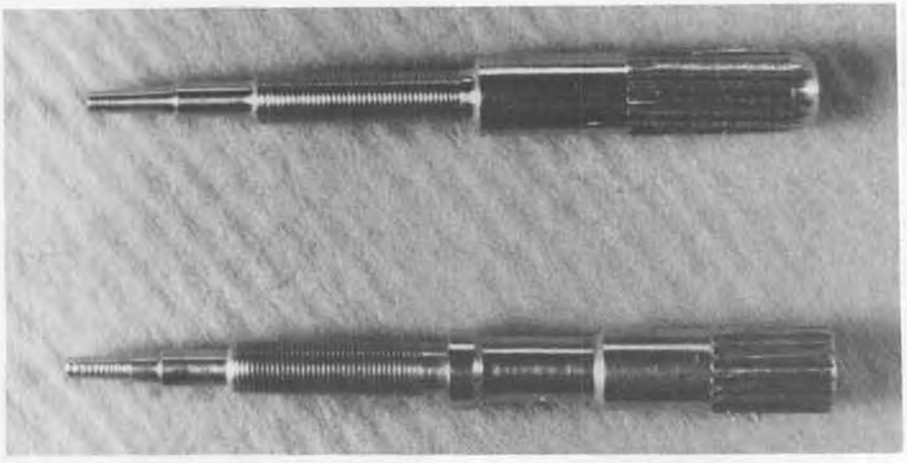
Install the backplate and the glowhead. Use three copper gaskets under the head. This will mean a lower compression ratio which is desirable for the first part of the break-in period. Later, depending upon the nitro content of your fuel, you can reduce the number of gaskets. Give the prop a nice flip, and don't pull your finger away. If everything's right, a blade will come around and whack your finger rather smartly. If you really felt it, I think you'll smile, knowing that you've done a fine job.

You're now down to the final procedure of installing the needle valve assembly and venturi. The Cox assembly is adequate, however, I recommend that you install a fine thread, precision needle valve. It will enable you to easily and confidently adjust the carburetor setting even with high pressure fuel systems. This is especially pertinent if you expect to use a bladder type tank such as is common in combat, R/C pylon racing, and speed events.

Fine thread needle valve assemblies have been around for several years, and they'll probably be around for many more. However, a fine thread is only one of several important parts of a precision needle valve assembly. The fit between the internal and external threads is another one. If it's a loose or sloppy fit, performance will be erratic. The concentricity of the needle valve seat with the centerline of the needle and spray bar is a third one. Illustrative photography of these two is not very practical, but I can show you a picture that highlights a fourth important part of the assembly, namely, the taper of the needle. If you've never had the experience of twisting in on a needle and having the mixture actually enrichen, I can assure you it's frustrating. The cause of this usually is a rough taper. One way to check out the quality of the needle of any engine is to simply run your thumbnail down the taper. If it's very smooth, it's a good taper. If you feel bumps or ridges, well, let's just say that it could have been machined better. Take a close look at the tapers of the two fine thread needles in the accompanying photograph. I think you'll see what I mean, and why I recommend that you use a Kustom Kraftsmanship needle valve assembly. The shorter needle in the photograph is from KK.

Whatever you choose, tighten the venturi and needle valve assembly in place. Your rework is now complete, and you're ready for a test stand break-in. For some tips on break-in, read the Fuel Lines column in the January '79 issue of **Model Builder**. Say you haven't got a copy? Well, this time swipe one from your buddy.

Next month, I'll have some suggestions about things you can do to Cox reed valve engines to really make them go. •



All needle valves are *not* created equal! Look closely at the taper and see text for details.

BERNHARDT

• Now that you have finished re-porting the crankshaft, we can proceed with the cylinder sleeve. All miniature engines are divided into two types: lapped piston and ringed piston. Engines with lapped pistons depend upon very close tolerance between the piston and cylinder wall for good compression, whereas engines with ringed pistons depend upon either one or two piston rings for compression sealing, with the piston itself fitting rather loosely in the cylinder. The bypass and exhaust ports of a lapped piston engine consist of a single slot, each without vertical interruptions, while the ports of a ringed piston engine consist of many individual ports with vertical dividers between them. These dividers act as retainers for the piston rings and keeps them confined within the cylinder. Regardless, if your cylinder liner is of single or multiple openings, the method of port relieving will vary only slightly.

Before starting, let's review what we are trying to accomplish, which is to increase the quantity of combustible fuel into the cylinder from the crankcase. To do this we must smooth out or steamline any obstruction or baffle that may hinder the smooth flow of combustible gas. On almost all model two-cycle engines, the first gas obstruction is the cylinder liner skirt, or bottom edge of the liner which is located directly under the bypass port. As finished by the manufacturer, this lower edge of the cylinder liner presents a blunt, rough face to the onrushing gas traveling to the cylinder. A turbulence or braking action is generated which impedes the gas flow, which results in a less than full gas charge into the cylinder. This is the first gas obstruction to be eliminated, and we will do this by streamlining, using the bench grinder.

With a pencil, draw down two lines from the outside corners of the bypass port to the lower cylinder skirt. It is between these two lines that we must streamline the outer edge of the bottom edge of the cylinder liner. Wear your safety glasses and work slowly so as not to overheat the work piece. The grinding wheel should be freshly dressed for free cutting. The obstruction to smooth gas flow is the thickness of the cylinder liner at the bottom, and our purpose is to reduce this thickness to a minimum; 1/64 of an inch would be an acceptable and practical thickness. The tapering contour should extend up from the bottom about 1/4 of an inch and be confined between the two pencil lines. The shape of this contour should be similar to the rear half of a Clark-Y rib outline. Dip the cylinder liner frequently in water to keep it from overheating.

Modern cylinder liners are all hardened and ground, and if heated to a bue color, the hardness can be affected and distortion could occur. This could ruin the entire cylinder liner, so don't push too hard and don't grind too long in one spot. Do not thin the edge to less than 1/64 of an inch. When the contouring is completed, the surface will be still quite rough, but we will take care of that later.

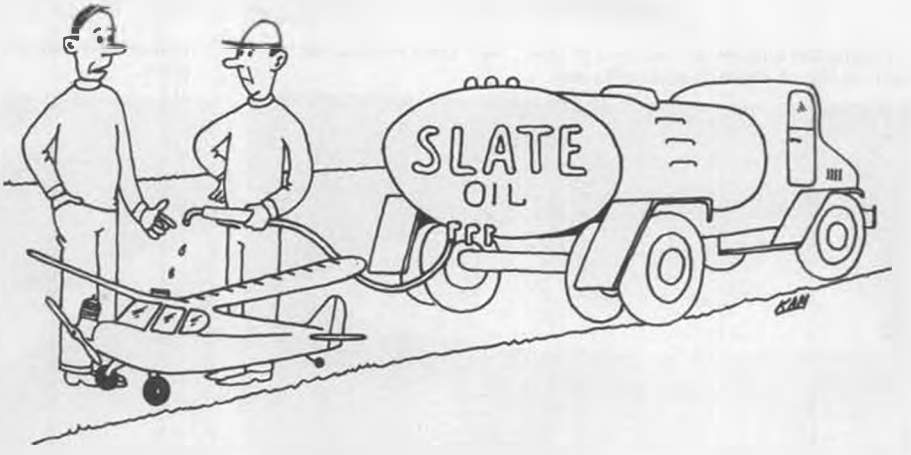
The last refinement to the cylinder liner will be performed on the lower edge of the bypass port. As received from the manufacturer, this bypass port, as mentioned earlier, consists of an unfinished slot for lapped pistons or a series of broached holes for ringed pistons. These unfinished passages create turbulence pockets which greatly impede the flow of gas to the cylinder. This turbulence can be minimized by contouring the lower edge of the bypass port exactly as we did with the bottom edge of the cylinder liner. Engines with lapped pistons will have a single milled slot for a bypass port, and the relieving or fairing can be done with a bench grinder as before. Engines with ringed pistons will have many small ports and will require using the Dremel Tool and carbide bit that was used to smooth out the crankshaft. Remember to wear gloves when using the carbide burr, as the steel slivers are extremely irritating. Don't forget the safety glasses.

The contour of this reshaped edge should be the same as you did to the bottom of the cylinder sleeve, but in reverse. Do not thin out the edge to less than 1/64 of an inch. Take your time and do not overheat. Never let the carbide burr touch the inner surface of the cylinder liner or the upper edge of the bypass port. Frequently inspect your work and look for imperfections. When satisfied that you have done as good a job as you are capable with the grinding wheel and Dremel Tool, we are ready for the final finishing of the cylinder liner.

For this operation I use and recommend a "flap" wheel. For those not familiar with this valuable tool, it consists of many individual segments of emery cloth formed in the shape of a wheel or disc, and used in place of the conventional grinding wheel. When revolved by the grinder motor, the emery cloth segments are thrown out and held stiff by centrifugal force, yet are pliable enough to "give" when an object is brought to bear against them. My bench grinder turns 3600 rpm and with this I use a 6-inch diameter flap wheel, 1 inch wide, 320 grit. Us it as you would a buffing or polishing wheel. The finish will be most rewarding, approaching that of a polished surface. Again, work slowly, as this abrasive cloth wheel can impart enough heat to "blue" steel and thereby affect the temper or hardness of the steel. Flap wheels may be purchased from most commercial hardware stores and can be obtained in different diameters, widths, and grits.

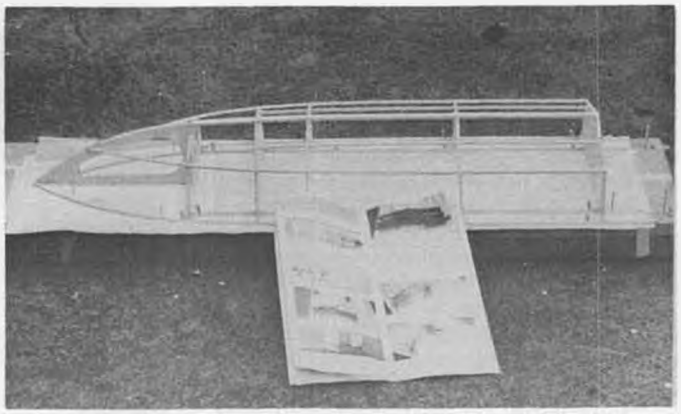
Before reassembing your engine, all parts must be cleaned in solvent to remove all abrasives and steel chips and then given a light coat of oil. NEXT MONTH: "EVEN MORE POWER!" •

Eckhardt Calver, of Asheville, N.C., sent in this photo of the pride and joy of his engine collection; an Elf Four. Collectors are currently paying over $1000 for these engines . . . when they can find them!



SAY, WHAT SIZE TANK YOU GOT IN THAT THING?

The "Mighty Dolphin" kit features die-cut plywood bulkheads and keel, spruce stringers, and plywood for the sides, bottom, and deck.



The basic framework is quick and simple to construct, and is built upside down on a flat building surface.

R/C POWER BOAT'S

By JERRY DUNLAP . . . This month, Jerry presents a review on the "Mighty Dolphin" kit from Steve Muck's R/C Boats, the HB .40 Marine engine, and the 2-channel Kraft R/C system.

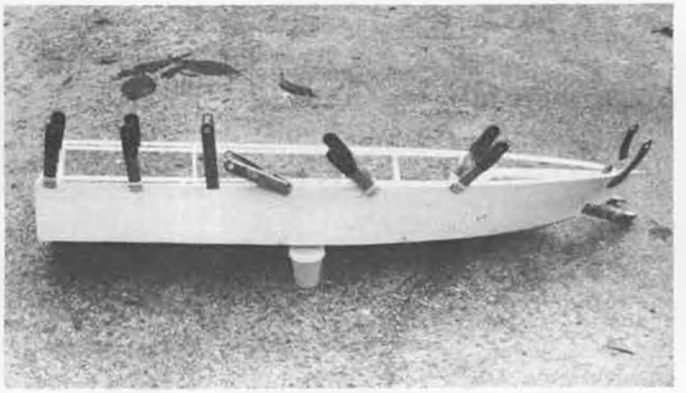
PHOTOS BY AUTHOR

• It doesn't happen very often in my reviewing of different model boating offerings that I am able to assemble all new equipment for one article. This review began with Steve Muck offering me one of his new wooden deep vees, the "Mighty Dolphin," to build and write up for **MB**. Although Steve is still pretty new to the model boat manufacturing and supply business, he certainly hasn't wasted any time getting a variety of different boats and accessory packages into the hands of model boaters.

The boat featured in this article is the third of the "Dolphin" series that begins with the "Lil Dolphin" for .10 size engines, progresses to the "Dolphin" for either a .21 inboard or even the .21 outboard, and concludes with the "Mighty Dolphin" for .40 size engines. The "Dolphin" series is based on what is known as the day cruiser design. All the "Dolphins" feature open cabins on the decks. This makes for a semi-scale appearing hull and also allows tremendous ease of access to fuel tanks, engine, radio equipment, and linkages. I have thought for some time that the day cruiser design was a super neat idea for model boating, and have designed boats of my own using this concept.

Since releasing the "Dolphin" series, which was aimed more at the sport boating market than the competition deep vee clientele, Steve Muck's R/C Model Boats has developed and released the "Streaker" series for all-out deep vee competition. The "Streaker" series now includes a boat for the .21

Clamping the bottom ply sheeting in place. Map tacks are used to hold middle of sheeting against frames.



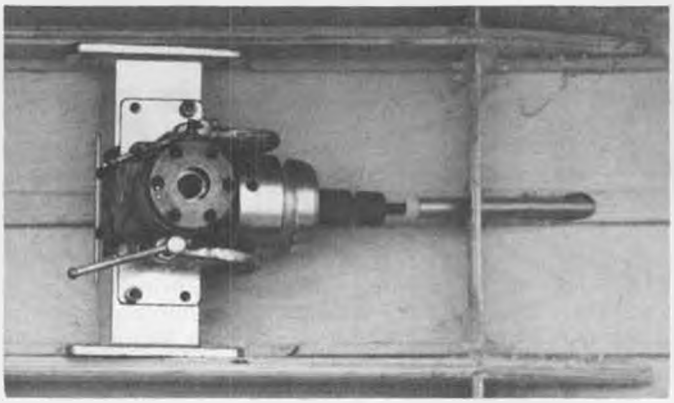
Clamps and map tacks are also used to hold the side sheeting in place.

Engine bearers and deck stringers in place, ready for plywood deck sheeting.

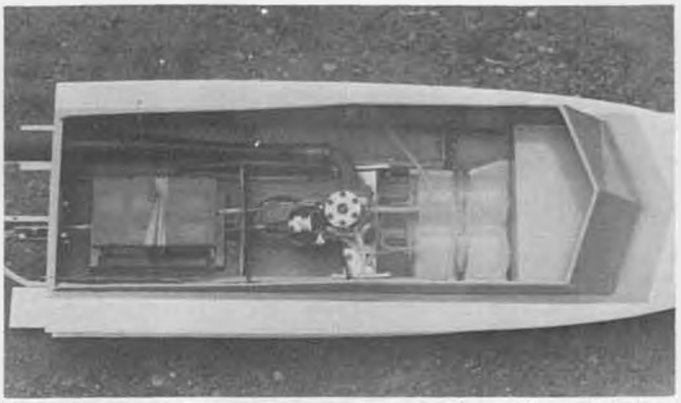
Masking tape, map tacks, and clamps are used to hold the deck sheeting in place.

The flex drive cable and tube installation. Make the hole in the hull oversize, then fill with epoxy and micro balloons.

The bottom and side ride strakes are pinned in place while the glue dries.



Top view of the hardware installation with the K&B Multi Mount, Norco coupler, and Steve Muck Cable Drive.

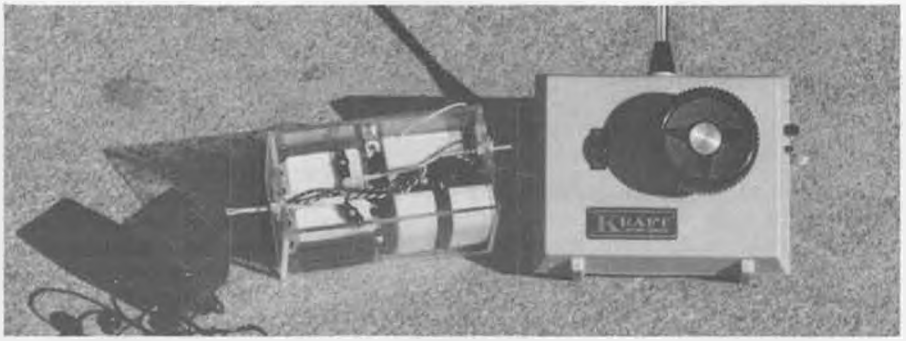


Radio and engine installation. Two 8-oz. Sullivan tanks provide the fuel supply to the H.B. .40 Marine.

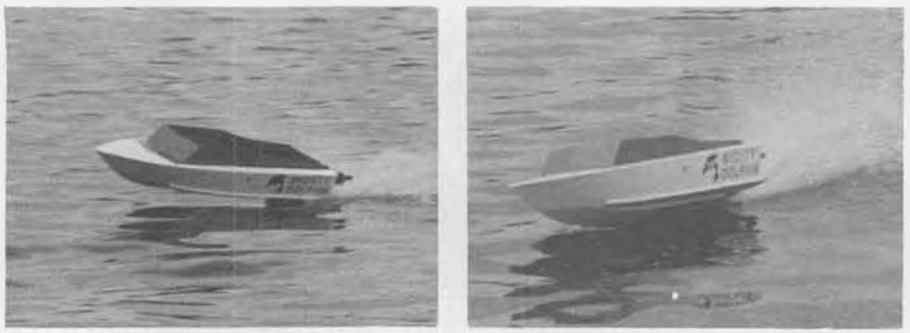
class and a larger version that is intended primarily for the .40 class, but could also be used in the .60 class. The "Streaker" series utilizes fiberglass construction. I just mention this because some of you may be more interested in that type of boat than something like the "Mighty Dolphin." But this article is about the "Mighty Dolphin," so let's move along with it.

As is the case with the other two "Dolphins", the one I built features plywood frames and sheeting and spruce for all stringers and part of the keel. The die-cutting on the frames, keel, and top sheers was not as sharp as one might hope for in a built-up kit. I mentioned this to Steve and he told me that my kit was one of the first and the die-cutting wasn't as good as he had hoped. He is aware of the problem and is correcting it. This meant that I had to take a little extra time with the die-cut parts to dress them up before assembling the framework. The sheeting is not precut, so the builder will need to have access to some type of jigsaw or Dremel saw. I personally can't imagine being in the model boating hobby without my Dremel saw. Wish I had a dollar for every piece I've cut with that tool.

Continued on page 105



Jerry used a Kraft two-channel wheel-type R/C system in the Mighty Dolphin. Waterborne equipment is housed in a JC Products plastic waterproof radio box.



Two views of the Mighty Dolphin doing what it does best. Looks like very little of the boat is in the water at any one time. Jerry's 7-year-old son, Paul, did the driving for these photos.

Denise Dunlap, 5, takes her turn at the wheel. It's neat having your kids enjoy the hobby!

Joe Beshar with his Astro 020-powered Buzzard Bombshell. Photo taken by Bob Boucher at the 1977 SAM Champs at Las Vegas.

Mitch Poling with his "Request," flies well with Ace rudder-only rig. Photo taken in Anchorage, Alaska.

ELECTRIC POWER

By MITCH POLING

PHOTOS BY AUTHOR

• Joe Beshar wrote a neat article in the April issue of *Flying Models* titled, "020 Electric — A New Era in Flying Fun". Joe is absolutely right, the Astro 020 is more fun per minute than any other flying, at least in my more than slightly biased opinion! *Flying Models* magazine will have its second annual old timer fly-in on May 20, 1979. Due to magazine lead times, this will be very soon after this column comes out, but anyhow there will be an 020 Old Timer electric free flight event in the contest. This was quite a success last year, and though I cannot afford the long journey to Newton, I hope to send a proxy plane to compete. The rules are super-simple and quite fair, just use an Astro 020 motor, any four-cell battery pack with a female Deans plug for charging (mark the plus lead). use a design that flew before December 31, 1942, and that's it!

The charging procedure is the best part. A contest charger supplied by Astro Flight is used to first check the pack for no power, then a two-minute charge at three amperes is put in. If the pack is not at zero, the charger can discharge the pack until it is at zero, since the meter reads both charge and discharge current. This method ensures that all the contestants get the same motor run, about twenty seconds. This usually gives a two-minute flight, which is all you need in most fields, otherwise the model gets ideas about visiting faraway places!

Some may question the method of discharging a pack until it is at zero, especially since so much has been written (and still is!) about the dangers of deep discharge, reversed cells, and so on. My own experience in six years of electric flying is that General Electric cells, especially those used in electric flight, are quite tolerant of deep discharge, including cell reversal. This is especially true for the smaller packs (fewer cells) used in the Astro 020 and the 05. Larger packs, such as those in the 10, 15, and 25, may not be so tolerant, since there are more cells "ganging up" on the low cell. I have been flying the Astro 15 for almost two years and I have let the pack get quite low, so it may not be a problem even there. At any rate, in electric flying, the pack is usually charged up again right after landing, so none of the cells stay low or reversed for very long. So, perhaps we shouldn't worry much about deep discharge; my own feeling is that vibration does more harm to Ni-Cds than any other cause, and there isn't any vibration in electrics! But, back to the contest.

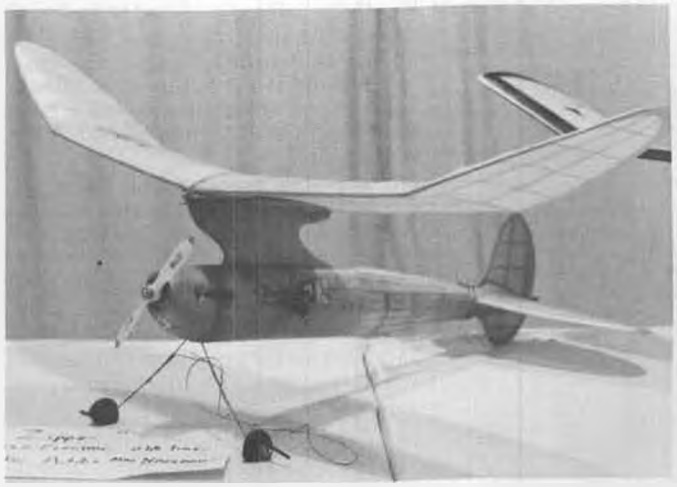
Joe says that the best combination is the Astro 020 motor, the 250 milliamp battery pack, a flying weight of seven ounces, and 200 to 230 square inches of wing area. The photos show Joe and his 020 Old Timers at the SAM champs in 1977. His Buzzard Bombshell is 211 square inches, 36 inch span, and the rudder-only version turned in a flight of ten minutes in competition against the full sized ones. That got second place. These little replicas are competitive!

I have been flying an Ehling Request, which at 29 inch span, has only 140 square inches, so I'll scale down the plans I got from John Pond (John Pond Plans, Box 3215, San Jose, CA 95156) of the original Request to 36 inches and get the 230 square inches Joe recommends.

The photos show my Request, which after three years and many hundreds of flights using Ace rudder-only, is still going strong. This little plane has been more fun than a dozen of my other ones all added up, and it is so small that I can easily take it along on trips. One photo was taken while I was in Alaska one summer; among the accomplishments of the little plane is a near-midnight flight in Anchorage (they have a non-stop day up there in the summer!), flights over the tundra and gold dredges at Nome (of gold rush fame), and just plain fun flying around home. It climbs fast, stays up there, and at times gets to be just a speck in the sky. Last, but not least, it is a genuine work of art. It was on display at our college art gallery for three weeks, surrounded by sculptures and paintings. It was, in fact, one of the most popular items!

Addie Naccarato had a very neat Astro 020 Zipper on static display at the IMS show in Pasadena. Addie's workmanship is excellent, the plane looks like it is flying just standing still. Addie uses a Tatone timer and switch to turn off the

Latest report is that Cox is coming out with an electric version of its popular Sportavia powered glider. Model is said to climb faster than the gas-powered version.



Addie Naccarato's Astro 020-powered Zipper was on display in the T&A Hobby Shop booth at the Pasadena IMS Show.

Another view of Beshar's Buzzard. Extreme temperatures (120° plus) caused overheating problems on some electrics at '77 SAM Champs.

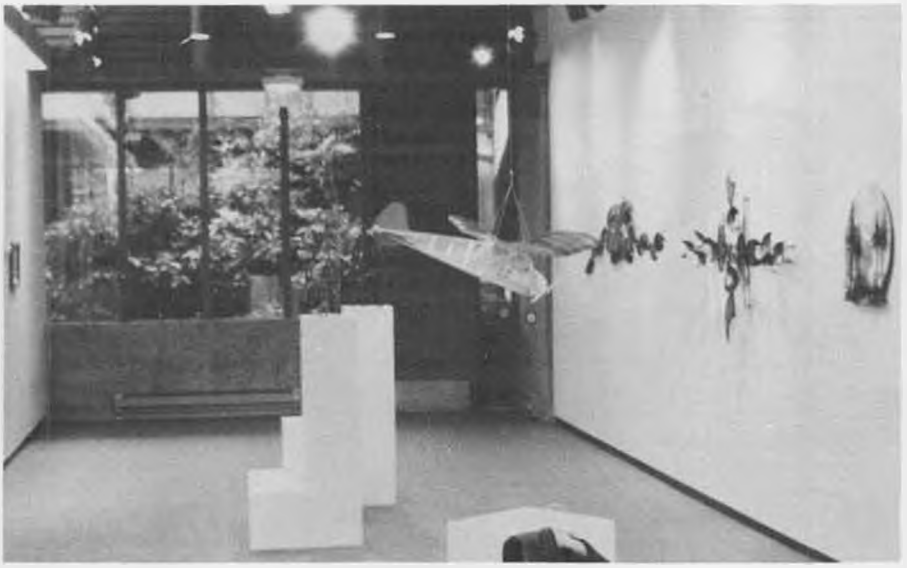
Bob Mark displays his House of Balsa Nomad II. Good flier with an Astro 020.

motor and a dethermalizer fuse to prevent fly-aways. The electric 020 replicas can and do fly away. One unwary contestant in the first all-electric contest at Sepulveda in 1975 gave the 250 milliamp pack a full charge and launched. The last we saw, he was chasing it into the Hollywood Hills! Hours later he brought it back. It had gone about ten miles!

Well, on to other subjects! Cox is going to market an electric version of its Sportavia. This should be an excellent flier. Several beginners have learned to fly at our field with the gas powered Sportavia. It is stable, easy to fly, looks good, and is easy to see in the air, a big plus for the beginner. The electric version uses a motor that is the same diameter as the Astro 020, but is about 30% longer. I have used a similar motor in my mini-seaplane in place of an Astro 020 when I needed extra power to climb out of a tight area in the Seattle Science Center, and also in my Sopwith Tabloid sport scale biplane. I used six cells which gave a good climb. Cox is using eight, which would give the power of a Baby Bee .049. Lee Renaud says it climbs even better than the gas version, charges from a car in twenty minutes, and weighs 28 ounces with two channels. The list price is $139.95, and it should be available by the time this column comes out. It looks good to me, perhaps later I can do a test report on it.

Bob Mark, of Hawley, Pennsylvania, sent a photo of his Nomad II (House of Balsa). It is a good flier with the Astro 020 on a pylon above the wing and a Kraft two-channel radio. Bob has tried several electric planes with the Astro 05, including the Ranger 42, the Navigator, and the Electra Fli. These all seemed underpowered to Bob, and he says he considers the Nomad II as his first real success. He is also building a Jr. Electra Fli which I designed and published in *Radio Control Sportsman*, and is going to try it on floats with twin 020's. Ambitious! Thanks, Bob, for the photos and information.

I have to admit that sometimes I'm stumped as to why some combinations work for some fliers and not for others. I know another flier who had just the reverse of Bob's experience, the Nomad didn't work for him, and the Electra Fli was just great for him with an 05. Each flier does things a little differently, and is looking for different types of flying. Don't give up on your first electric, try another combination, and you will have success in the end. Persistence is definitely the key to success. My first electric was a Schoolboy powered by a Mabuchi 360 motor and six 100 milliamp batteries, and it didn't fly. My second try was a Mattel Super Star, the first version with the clear plastic motor housing, and that didn't work as an R/C plane, though it was great as a free flight. The third try was the charm, the later model of the Super Star with the gold plastic motor housing with an Ace R/O radio, and I was off and flying. That was six years ago, and since then most of my planes have flown very well, with lots of fun along the way. In fact, with the wisdom of hindsight, my first attempts would have flown too if I had known then what I do now. That always seems to be the story, it's all part of learning! Till next time, fly high with every charge! •



Mitch Poling's Request was on display at the local college art museum, proved to be quite a hit, probably because it's so much different from what most people consider "art" to be.

Winners of last year's JAM meet (kneeling, l to r): Arnoldo Hernandez, Fred Koval, Dave Jaggie, Cliff Schaible, Jack Van Dusen. Standing, l to r: Beverly Hartman, Esio Grassi, Mike Lachowski, Fred Quedenfeld, Frank Collins, George Haley, Stu Murray, Jim Clark, Al Mallon, and Bob Burns. Photo by Pete Vano.

PLUG SPARKS

PHOTOS BY AUTHOR

By JOHN POND

UPCOMING EAST COAST R/C O.T. CONTESTS

DATE	SPONSOR	LOCATION
June 3	SPOT & Central Jersey R/C Club	Middlesex County Model Airport, Sidney Road, Piscataway, NJ
	Events: Class A, B, C, D, glow; Class ABCD comb. ignition, Antique, and Texaco.	
June 15	Jersey Antique Modelers	North Branch Park, Milltown Road, Bridgewater, NJ
	Events: Class A, B, CD glow, Class ABCD comb. ignition, Antique, Fuel Allotment.	
Aug. 12	Somerset Signal Senders	North Branch Park, Milltown Road, Bridgewater, NJ
	Events: Class A, B, CD, glow; Class ABCD comb. ignition, Antique, Fuel Allotment, and Static Scale.	

• Hi there, all you friendly Eastern readers! You are in for a real treat this time, as that indefatigable Contest Director, Jim Clark, has turned in a flock of reports on contests in the New Jersey area (the original hotbed of R/C Old Timer activity).

Jim also sent along several sheets of the rules used last year by the various SAM Chapters on the East Coast. By and large, they look very much like the new 1979 SAM O.T. R/C rules recently distributed to all SAM Chapters and to be published in SAM SPEAKS, **Model Builder**, and any other *good source* that will reach the model builder (is that a play on words?).

Of all the contests listed in the schedule of East Coast O.T. R/C meets shown on this page, the last one is the most interesting, as there will be a Static Scale event. This event will feature the Hank Baer Craftsmanship Cup, which is a real honest-to-goodness silver cup valued at $100.00. Those interested in this phase of O.T. modeling should write to Hank Baer, R.D. 5, Box 448, Barton Hollow Road, Flemington, NJ 08822.

In listing the results of the SPOT contest (Society for the Preservation of Old Timers), it is interesting to note they are using the SAM rule of five-minute flight limits for Classes A, B, and C Limited Engine Run events.

CLASS A
1) Joe Beshar (Playboy) 724
2) Stu Murray (Interceptor) 583

CLASS B
1) Joe Beshar (Fox) 876
2) Mike Lackowski (MG) 730
3) Bob Burns (Buzzard) 357

CLASS C
1) Esio Grassi (MG) 805
2) Dave Jaggie (Playboy) 708
3) Mike Lackowski (MG) 701

ANTIQUE
1) Hugo Mercoli (Dallaire) 1693
2) Bob Shupien (Dallaire) 1543
3) Don Hartman (Standby) 1006

TEXACO
1) Don Hartman (Standby) 1322
2) Frank Collins (Powerhouse) 1282
3) Arnoldo Hernandez (Lanzo) 744

Meeting of the minds at the Jersey Antique Modelers meet: Frank Collins, Don Hartman, C.D. Jim Clark, and Beverly Hartman.

Contest Director Jim Clark is real lucky to have a faithful helper (and wife) like Marianne. Nice collection of trophies. Vano photo.

4) Pete Vano (Powerhouse) 742
IGNITION
1) Arnoldo Hernandez (Lanzo) 361
2) Hank Baer (?).....160

An event which was held at the Jersey Antique Modelers (JAM) contest and which was quite popular on the West Coast for several years is the Fuel Allotment event. This is similar to the Texaco event, but the fuel has been cut to 1/8 oz./lb. Best part of this event is that any Old Timer model can enter. This is a big help to those fellows who keep encountering date restrictions. Anyway, let's get the results of the JAM contest. It will be interesting to see how many names repeat.

CLASS A
1) Joe Beshar (Playboy) 345
2) Fred Koval (Brigadier) 223
CLASS B
1) Joe Beshar (Fox) 894
2) Mike Lackowski (MG).....575
3) Stu Murray (Interceptor) 538
CLASS C
1) Esio Grassi (MG) 747
2) Stu Murray (Gas Bird) 740
3) Dave Jaggie (Playboy) 715
ANTIQUE
1) George Haley (MG).....1576
2) Stu Murray (Gas Bird) 1539
3) Esio Grassi (MG) 1157
FUEL ALLOTMENT
1) Cliff Schaible (Lanzo) 2274
2) Frank Collins (Powerhouse)....1534
3) Dave Jaggie (Playboy) 1449
IGNITION
1) Cliff Schaible (Playboy).....790
2) Arnoldo Hernandez (Buzzard) ..524
3) Jack Van Dusen (Dallaire) 471
4) Fred Quedenfeld (Powerhouse) .206

In the last event (Ignition), Cliff Schaible passed the first place trophy to allow the rest of the field to move up. Good man!

Las Vegas revisited! Tricia Webster, Miss SAM Champs 1977, and Jim and Marianne Clark with Jim's 4 different sizes of the M-G design. All are good fliers. Photo by Pete Vano.

"Where the heck did my model go?" Esio Grassi lost sight of his M-G on a landing approach at recent New Jersey contest. Like Jim Clark, Esio also has several sizes of this model. Vano photo.

Ed Cadwell (left) and Charlie Critch with Charlie's Anderson-powered Powerhouse at recent SAM 27 contest at Two Rock C.G. Station. Charlie blew it on a landing approach... see text.

In Jim Clark's reports of the New Jersey contests, an interesting event has developed in the split of the Class C Limited Engine Run event, which normally has the engine cubic inch displacement between .301 to .610. A new class called Class D (shades of 1945!!) has been reintroduced, which limits Class C

Fifteen feet of Dallaire Sportster! Builder Karl Tulp (left) and Ron Kiel share the load. Ron is also building a similar ship. Model has 4008 sq. in. of wing! Plans are available.

Latest threat from the Don Bekins stable of winners is this scaled-up Goldberg Gas Bird (forerunner of the Zipper). Model won Texaco at Two Rock SAM 27 contest.

Some of the SAM 30 boys caught in the act. These guys really go for the Lanzo Record Breaker. Warren Pickering, Jim Kyncy, and Hal Cullens (l to r) are the ones behind the SAM 30 sign.

to .450 and specifies Class D as .451 to .610. This should effectively separate the hot K&B Torpedo .40 engines from the equally hot .60 engines. (You can lug a bigger model up with a .60, thus increasing your chances of duration with a better gliding model.)

Getting around to talking about the big meet of the 1978 season, the Somerset Signal Senders (S.S.S.) really put one on with food and drink available (the girls really do right by the boys!), plus a good site to fly from.

The New Jersey boys love to fly, starting at 10 a.m. and quitting at 5 p.m. Generally speaking, most western contests are all through around 2:30 or 3 p.m. at the latest. In California, the western breezes can really get to you in the afternoon!

Before listing any results, the columnist would like to point out that the New Jersey boys have the right idea in handicapping the glow-powered airplanes to a wing loading of 10 oz. per sq. ft., as compared to the ignition-powered types which have a requirement of only 8 oz./sq. ft. Nothing like encouraging the original idea of Old Timers by using ignition engines!

S.S.S. MEET RESULTS:

CLASS A
1) George Haley (MG) 886
2) Mike Lackowski (MG) 831
3) Joe Beshar (Playboy) 810
4) Larry Fair (Playboy) 774
5) Bob Burns (Zipper) 565

CLASS B
1) George Haley (MG) 898
2) Joe Beshar (Fox) 867
3) Mike Lackowski (MG) 841
4) Bob Burns (Zipper) 707
5) Joe Cornielle (Playboy) 287

CLASS C
1) Bill Green (?) 815
2) Bob Bara (MG) 784
3) Eugene Vekony (Playboy) 765
4) Eugene Brown (Buzzard) 497

ANTIQUE
1) Bob Bara (MG) 1439
2) Fred Quedenfeld (PB-2) 820
3) Don Hartman (Standby) 626
4) Arnoldo Hernandez (Lanzo) 593
5) Danny Sheelds (King Bird) 284

FUEL ALLOTMENT
1) Fred Quedenfeld (PB-2) 1447
2) George Haley (MG) 1008
3) Jack Van Dusen (Dallaire) 832
4) Arnoldo Hernandez (Lanzo) 760

IGNITION
1) Woody Woodman (Playboy) 756
2) Cliff Schaible (Playboy) 450
3) Fred Quedenfeld (Lanzo) 435
4) Arnoldo Hernandez (Lanzo) 317

For those guys who eagle-eye the list of winners for a possible better flier, one will be immediately struck by the presence of the MG design in the winner's circle. This plan is not available from John Pond Old Time Plan Service or **Model Builder**. This is a design originating in 1936 that Mike Granieri (M-G) cooked up. A real pretty parasol design that flies as well as it looks. For further information, write to: Michael Granieri, 3 Dryden Road, Box 78, Pottersville, NJ 07979.

Because the original 9-1/2 foot wingspan design has been so successful in the New Jersey area, Mike Granieri has scaled the model to four sizes: .020, Class AB, Class C, and Antique/Texaco. All seem to fly equally well. At last report, the large plans sold for $10.00. The columnist is not sure of the costs of

We don't know how Dave Bruner can smile. That's the third time for his Rambler! Hill Country SAM 21 meet.

Karl Tulp and Gene Pond puzzle over the Quadra in Karl's monster Dallaire. Model flies in contests with a Merco .61.

Julius De Camillo (holding Tx), of England, came to the '78 SAM Champs with this unfinished OPS .40-powered Privateer. Lots of work and help from Don Hartman (right) got it a 6th place. Jack Van Dusen holds stopwatch.

David Baker, of England, did fine job on this full-size M-G, held by his wife, Hilda.

the smaller sizes, so it would behoove you to write Mike and get the dope.

ENGINE OF THE MONTH

This month's motor, the Kopper King 60, known also as the Condor 60, was a very compact .60 size engine. The most unusual feature of this engine was the combined control of gas, spark, and air with only one lever. One could choke the motor by closing the throttle arm and then opening the air intake, at the same time advancing the spark timing. Certainly did cut down on the amount of items to adjust to produce the best running condition.

According to Charlie Folk, who also wrote an article for the Engine Collectors Journal, the engine was actually designed by an English toolmaker, Roy Lloyd, in the late thirties. To start with, like most engines of that era, production was strictly a garage operation, being produced in Bob Gardner's basement in Pittsburgh, Pennsylvania. Of course, Lloyd and Gardner produced other engines such as the Condor Midget, but we are primarily concerned with the Kopper King 60.

As mentioned, the first engines were produced in the basement shop using only a South Bend lathe, a drill press, and several other pieces of small equipment. Surprisingly, Lloyd and Gardner employed two apprentice machinists. Each engine was hand-lapped and carefully fitted (they didn't have a honing machine) utilizing a special lapping compound. Each engine was bench run, disassembled, cleaned, then reassembled and boxed for shipment.

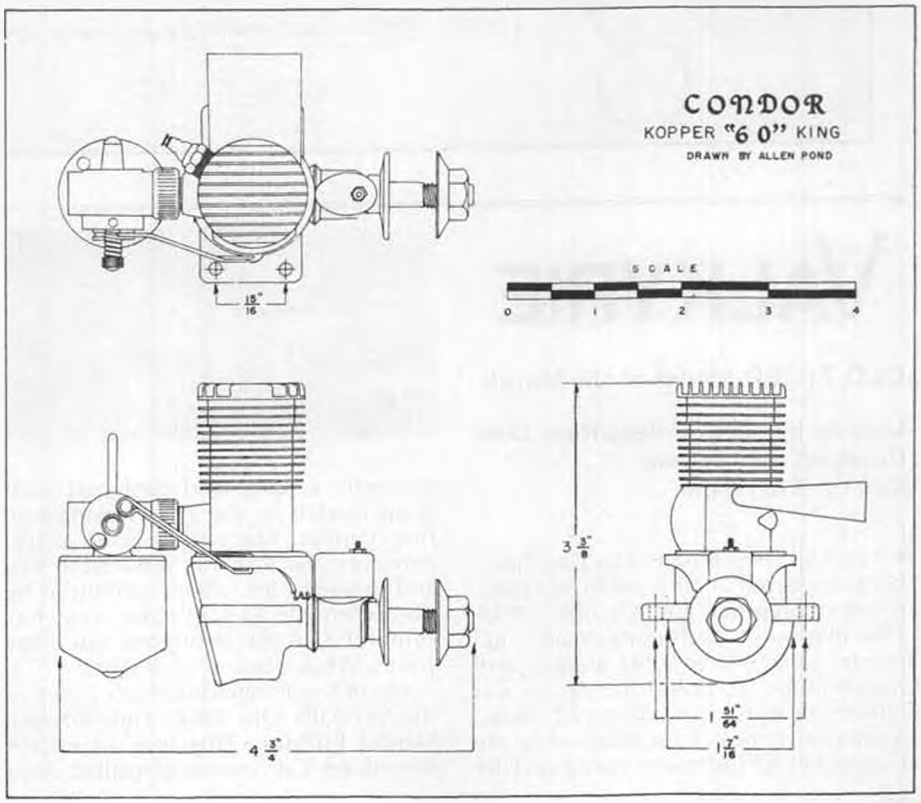
About this time, the Pittsburgh Brass Manufacturing Co. became interested in obtaining the manufacturing rights for this engine. The deal as completed gave 50% to Pittsburgh Brass for all rights and privileges to the patent rights. Before WW-II started, and during the time Lloyd and Gardner were associated with Pittsburgh Brass, most of their time was spent in perfecting the design for production purposes. Actually, only about 100 engines were produced before a lack of materials brought on by WW-II shut production down.

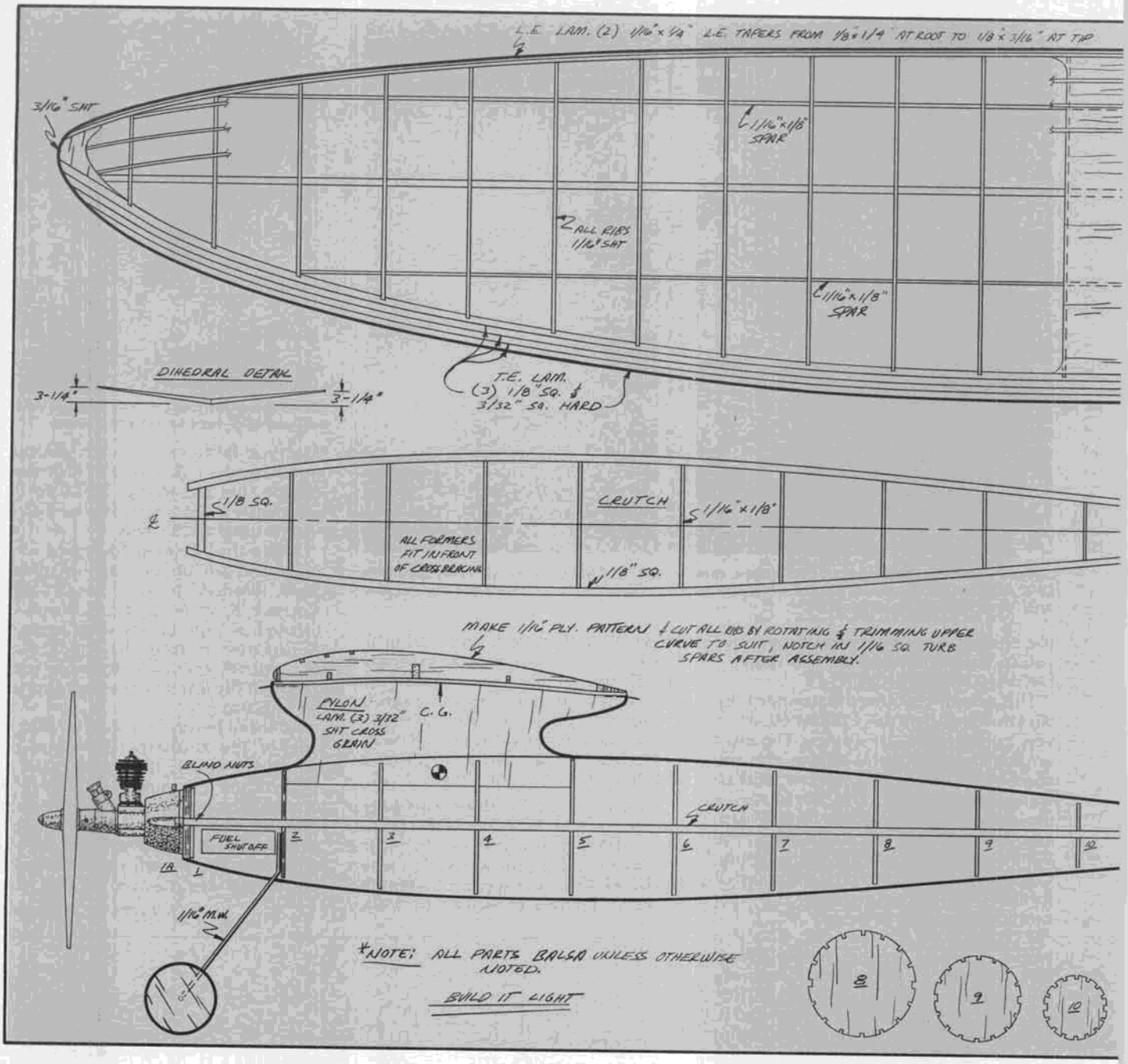
Around 1943, Gardner and Lloyd formed the Rob Roy Co. (ROBert Gardner and ROY Lloyd) to get in on the defense production work. So, when Pittsburgh Brass was approached in 1945 by Robert Edward Miller, of Miller Machine Products, Chicago, Illinois, to purchase all rights to the Condor 60 engine, he had to pay $2,000 to Pittsburgh and a like amount to the Rob Roy Co. to obtain full rights.

Miller then assembled engines in his plant and set up production of those parts needed (pistons, etc.). Condor Kopper King 60 engines were sold through a large hobby shop known as Aerocrafters in 1946. The actual amount of production is unknown, as the serialization of the engines does not appear to be uniform.

As noted before, the Kopper King was one of the smallest .60 engines produced; however, it did turn 13x6 and 14x6 propellers quite creditably. The unusually good finish on the piston and cylinder wall was in no small part responsible for this performance. For those who get slightly confused on the pre-WW-II and post-war models, there

Continued on page 108





VALKYRIE

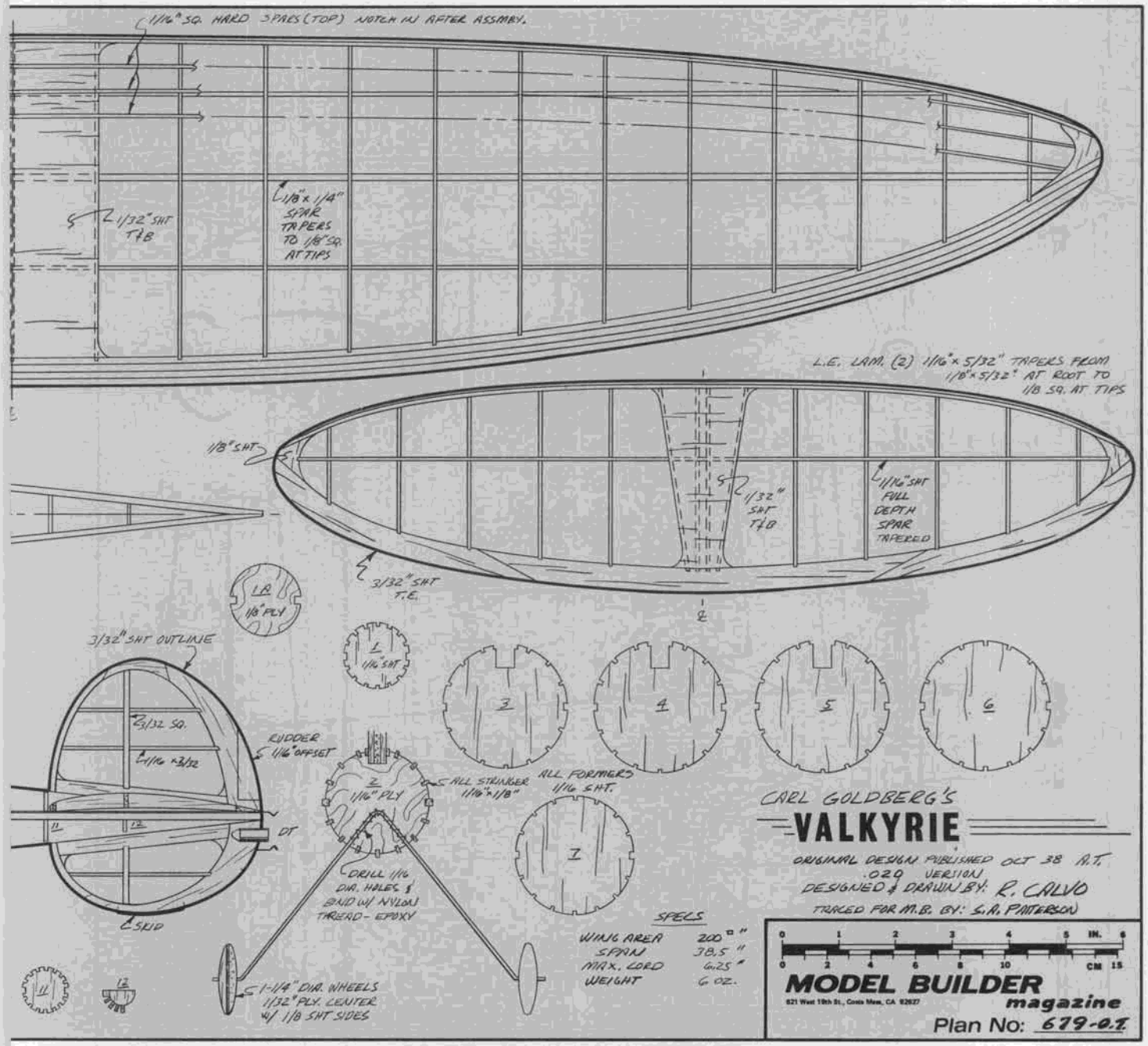
OLD TIMER Model of the Month

Designed by: Carl Goldberg/Rudy Calvo
Drawn by: Al Patterson
Text by: Rudy Calvo

• The Valkyrie, designed by Carl Goldberg, appeared in *Air Trails* in two parts, issues September and October, 1938. The theme: A high-performance gas model combining light weight and streamlining. No doubt the design was influenced by Carl's background related to indoor models. Carl, retained by the Comet Model Company, continued the competitive spirit and designed such great models as the Zipper, Sailplane, Interceptor, Mercury, and Clipper. However, the Valkyrie, reduced in size and modified for rubber, produced by the Scientific Model Company, has remained in my thoughts since my youth. What a beautiful design!

About 8 years ago I was made aware of the SCAMPS Old Timer club through **Model Builder**. This was an article describing Cal Aero information. Anyhow, Bob Oslan was kind enough to inform me of the Old Timer movement.

Jimmy Dean had the *Air Trails* issues, and that's how it all started. I have built the Valkyrie in an .020 replica version, the subject of this article, a half-size version (60-inch span) with an Arden .199, and a full-size version, R/C, O.S. .40 (shown in **Model Builder**, April 1979 issue, at the Pasadena IMS Show). If a little extra work doesn't offend you, here's a plane you can have a lot of fun with. My plane weighed in at 6 ozs. It's a little large for .020 application, but I felt the clean aerodynamics design, minimum parasite drag, and high-lift wing would overcome the higher performance of other designs, or at least be somewhat competitive. But enough of the historical background. Let's get on with the construction.



FULL SIZE PLANS AVAILABLE – SEE PAGE 116

FUSELAGE

The fuselage is built on a 1/8 sq. crutch with 1/8 x 1/16 spacers behind each bulkhead. This method speeds construction and is similar to the concept of Gene Wallock and others. The bulkheads are solid 1/16 sheet. You may elect to hollow the formers for weight consideration. The bulkheads are 1/16 of an inch less than the finished skin, with 1/16-inch notches to receive hard 1/16 x 1/8 longerons. The landing gear bulkhead is 1/16 plywood and the complete assembly is set in place on the crutch.

The firewall is 1/8 plywood with blind nuts and is set in place complete on the crutch. The pylon is laminated sheet as noted on the plan. Wing platform is 1/16 sheet. The fuel shutoff timer is set on the right side next to the firewall, just below the 1/8 sq. crutch.

WING

The wing ribs are made from a 1/16 plywood template, full size, as noted in the profile view. The method is to rotate the template to the chord length at each station. The rest should be like typical wing construction.

TAIL SURFACES

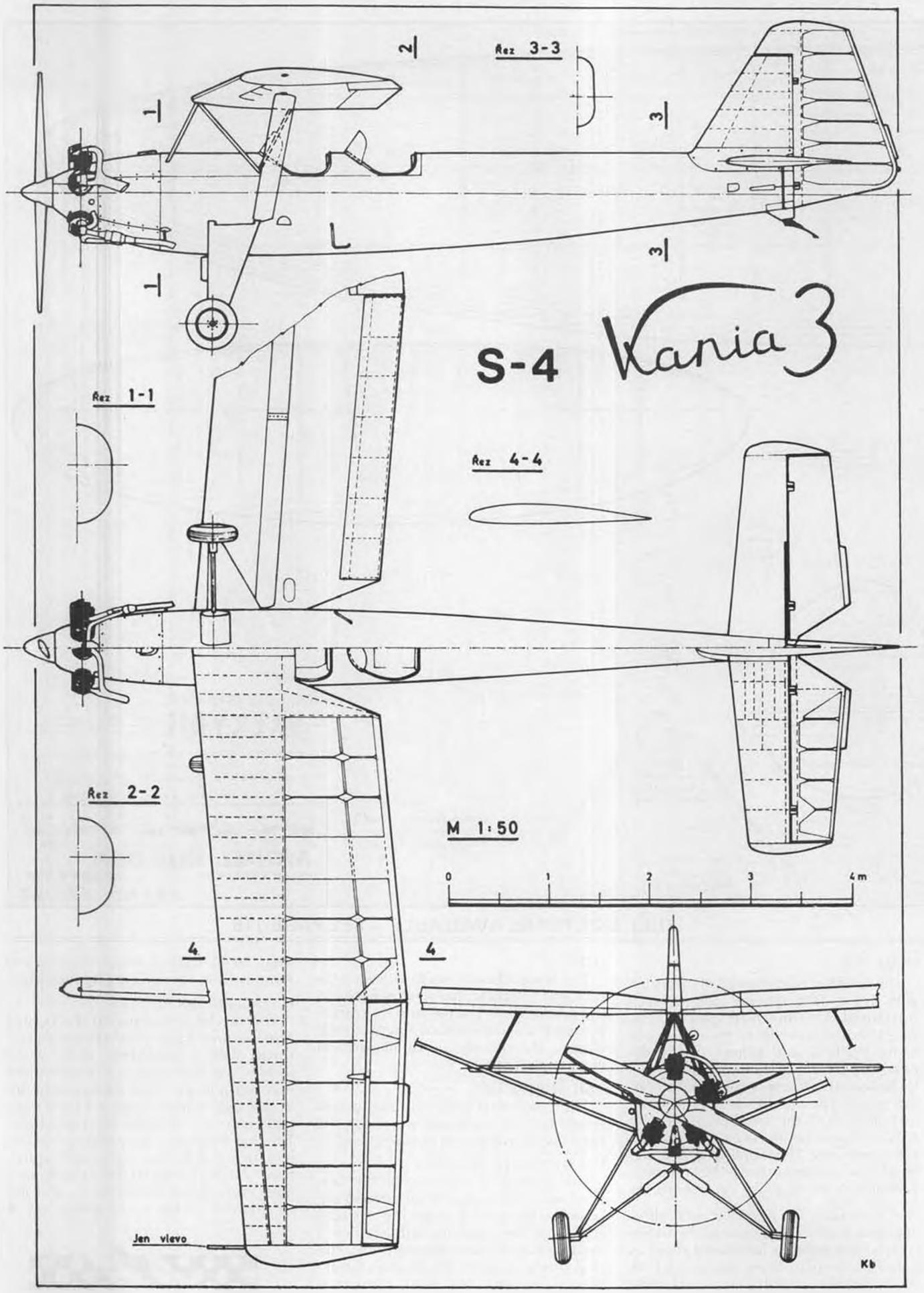
The horizontal stabilizer uses a full-depth spar to minimize warpage. The rest is of conventional construction.

FINISHING THE MODEL

The fuselage is lightweight silk, applied wet. The wing and tail surfaces are Japanese tissue. Pre-dope the surfaces and apply the covering with acetone. I used 5 coats of 50-50 nitrate dope. The final 2 light coats are 253-00 gloss Fullerplast (sprayed). This is an industrial coating manufactured by Fuller O'Brien. It requires 283-00 Fullerplast catalyst and then 50-50 mixing with Fuller 181-00 thinner (fast) for spraying application.

FLYING THE MODEL

The model flew right off the board! Mine required a little right thrust and up thrust with a sandpaper shim. Right rudder was also required. Your model may not require these adjustments. Tilt in the stab may be required for a right glide pattern. My plane flies right-right. The power pattern, considering the size, is a reasonably fast, tight right spiral, then watch the glide! This has been a most enjoyable experience . . . and still is! And that's what it's all about. •


S-4 Kania 3
Rez 1-1
Rez 2-2
Rez 3-3
Rez 4-4
M 1:50
0 1 2 3 4m
Jen vlevo
Kb

FREE FLIGHT AND CONTROL LINE

FREE FLIGHT SCALE editor, Fernando Ramos, built this Monocoupe from the Sig kit. Designed by Tom Stark, it took 1st Place in F/F Rubber Scale at the 1973 Nationals. Span is 24 inches.

Luke Roy, Bob Spahr, and John Newton, three very fast speed fliers with their asymmetrical FAI ships. All turned over 150 mph on many runs at Merced contest.

Mike Hoffelt adjusts his Fox the "proper" way. . . from behind the engine. Note ear protection and pressure bottle.

PHOTOS BY CHARLIE JOHNSON

Control line

By "DIRTY DAN" RUTHERFORD

SECOND CHANCE

If you would like to be one of the Combat fliers with a second chance at stomping the British in "their" event, FAI Combat, the time is approaching for Team Selection and all of the stuff that goes with it. Just received is the official announcement, straight from Paul Smith's typer.

"1980 FAI Combat Team Selection Program Approved. . . . By a vote of the F2D Team Selection Committee and the program participants, and by approval of AMA President Earl Witt, the 1980 Team Selection Program is now official.

"The entire program is available from AMA. The following are the major points. The location is Buder Park in St. Louis, Missouri. Pilots (and officials) meeting Friday, September 14, flying Saturday and Sunday, September 15 and 16. Rain date Monday, September 17, 1979.

"There is no prerequisite to enter (such as winning local contests). All U.S. citizens who are AMA members and have an FAI stamp are welcome. The advance entry fee is $50.00, payable to AMA headquarters (c/o Micheline Madison) by June 30, 1979. After that date, the late entry fee is $75.00, payable to the Contest Director at the pilot's meeting Friday, September 14.

"The team will be picked in a triple elimination ladder tournament. Pilots will advance one round per win. Those who have lost one or two matches will be considered equal with the undefeated contestants for matching purposes. Contestants will be eliminated from competition when they lose their third match. They will then be ranked according to the number of matches won.

"Pilots may enter as individuals or as teams of two or three for separation from their pit crews or friends. Teams larger than three will not be granted separation.

"Entry fees will be used to finance the Team Trials, pilot's travel expenses to the next C/L World Champs, and vehicle rentals at the W/C's. After the pilot's expenses have been covered, any excess funds will go the pit crews. As of this date, there has been no change in AMA's position on pit crews . . . still no funding. We hope that the Combat fliers and fans of our country will be generous again this year, that entries at the Team Trials will be high, and that the pilots can hold down their expenses to make more money available to the pit crews.

"My thanks go out to Micheline Madison of AMA for her help in handling the program paperwork, and to the committee members and program participants who helped put this program together.

"We desperately need almost 20 qualified people to help run the Team Trials. Interested people are asked to contact your local committee member or Paul Smith, 11112 Dill, Sterling Heights, MI 48077."

All that stuff just to pit a little 1/2A! Dale Long is everything a well-equipped pitman should be. Dale is wearing steel belted radials to make it around those corners when he chases the plane during pits.

It seems like just yesterday that I heard the British won the first FAI Combat event held at the World Championship level, and here shortly it will be time to decide who is on the next Combat Team. Time flies, and all of that. . . .

MORE ON COMBAT

Along with the above announcement, Paul sent along a letter addressed to the members of the Control Line Contest Board. Paul might be surprised to see it in this column, but I like what he says (having already said it before myself). Read it and see if you don't agree with him. If, by some chance, you don't agree . . . well, you're just all wet, to put it as politely as I can.

To: the CLCB

Subject: Proposal C1-80-3 . . . The banning of inboard mounted tanks in Slow Combat.

I urge you to vote NO to the above

Bruce Teffeau (left) and Darrell Albert with their Big Goodyears at Buckeye. Event won by Joe Klause, of Kustom Kraftsmanship.

Steve Hills with his Brasher-influenced design. Photo taken at Trick-or-Treat meet in October. Steve got tricked, Brasher got the treat!

proposal for the following reasons:

(1) In the last rules cycle we had the "5-inch nose rule". This rule effectively slowed down the event by making the models more nose heavy and forcing the addition of tail weight and wing area to compensate. The net results were bigger, heavier, slower, and more expensive models. A by-product was that most of the better airplanes in existence became obsolete. If this rule passes, many of the better models will again become illegal. Two rules changes in a row is too much in one event!

(2) In the history of all "Slow" events (slow combat and rat, profile carrier) attempts to slow-down the event by placing more and more limitations on the equipment have always been marginally effective. In the long run, the more dedicated competitors always find a way to make the new rule work to their advantage. The usual result is custom-made goodies that comply with the new rule, but are unavailable to the average modeler. If this rule passes, the top competitors will build some type of super-trick OUTBOARD tank, while the average guy (who is supposed to benefit from the change) will be stuck with doggy commercially available junk. Under the present rules, anybody can buy an R/C clunk tank, rubber-band it on inboard, and be competitive.

(3) The complaints about the event being "too fast" have been misinterpreted. I feel that the real complaint is that the competition is too fast, not the event in general. Any set of rules that seeks to equalize speeds by limiting equipment is doomed to failure. The more skillful modeler will always be able to get superior speed from "technically" similar equipment. If speed equalization is the goal, we should be considering a speed limit. This could be made to work much better than the ever-growing list of ineffective equipment rules.

(4) The speed boost available to a maneuvering model with an inboard tank is far over-estimated. Models generally set up to depend on the "G" force for added fuel pressure tend to go over-lean as soon as the fuel is partially depleted. The power gain is partially nullified by the increase in frontal area and the additional outboard wing weight required.

I hope that you will cooperate in helping to avoid the addition of another unnecessary and ineffective rule that would make many existing models illegal.

TO ADD A BIT OF BACKGROUND

Way back when, Slow Combat started to really pick up in popularity in this area, although it has never matched AMA (Fast) Combat in draw at the contests, always being a "second-class" Combat event (just one notch above FBI Combat). So I set about working on a model built to the rules; one that would fly well, be cheap to build (expendable), be easy to trim, did not require "tricky" equipment, etc. Like most designers who are primarily fliers, not aerodynamic whiz kids, I borrowed stuff from planes that I knew worked, threw in a couple of tricks of my own, and had my very own world-beater. In its final variation, it was called the "Cheater Slow", and *Model Aviation* published it.

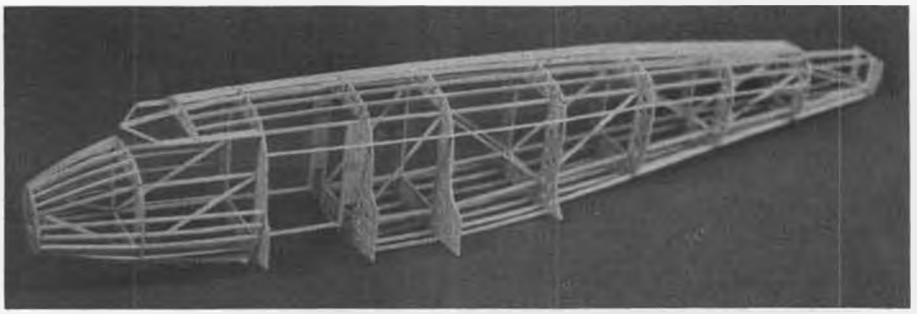
Rich Brasher doing his thing. Two-foot longer arms would help, but his competition is about to make a prop change anyway.

One of the more salient features of the design was a Pylon (Sullivan) 4-ounce clunk tank (commonly used in R/C models) that was mounted on the inboard side of the fuselage, rather than on the outboard side, which is the usual practice.

The tank was so mounted *only* because I wanted the engine a certain distance from the leading edge of the wing and a custom-built tank was all that would fit. I hate building hard tanks from scratch, especially for an event like Combat where equipment gets trashed regularly, and even more especially when the event in question is not one I take very seriously.

For any set of problems there is usually an easy solution . . . in this case the easy way out was to pick up on some relatively cheap, easy-to-assemble tanks and put them wherever they fit the best. As it happened, they laid up against the inboard side of the fuselage nicely, and strapping them on was a simple matter of bending up wire hooks that accepted rubber bands. Fuel line routing was easy, the tank was right next door.

Continued on page 84



This Lockheed Electra fuselage is a good example of the conventional "two identical sides" type of construction. Formers and stringers are added to give a rounded cross-section.

FREE FLIGHT SCALE

By FERNANDO RAMOS

PHOTOS BY AUTHOR

• This month, I want to discuss the many different ways to build fuselages. To me, this is the fun part of modeling. This is where the personality of the airplane lies. As far as I'm concerned, a wing is a wing. Whether it be straight, elliptical, or gull, it is still a wing. Not so with fuselages; this is where the challenge comes into play. There are so many different shapes that a fuselage can assume, affording the builder an opportunity to display his talents. The fuselage is my starting point, my stimulation to build the airplane. Therefore, I would like to cover different building techniques involving fuselage construction.

There are so many different ways to build up a fuselage, I thought I would take the opportunity and discuss a few. For many of you this may be "old hat," but for others new to the game, hopefully you will find it enlightening.

The old traditional two sides of the fuselage type of construction is the standard, which is also my favorite. The first item to remember is to find four longerons that match each other as closely as possible. If you don't, you can find the fuselage looking like a banana as the result of one hard and one soft longeron. Generally, what I do is pick out two similar pieces of material. I'll use one for both upper longerons, and use the other for the two lower ones. This minimizes the chances of unwanted curves.

Once one side has been constructed, the second one should be built up over the first one. The reason, of course, is to have two identical sides. For those of you who have never done it this way, it isn't much of a trick separating the two sides. But before getting into that, here are a few items to be aware of. Let's assume that a fuselage will be framed from 1/16 square material. Let's further assume that this is a cabin type aircraft with several window frames. These can be made from 1/32 sheet to help keep weight down. The obvious which is sometimes not quite so obvious is that the window frames have to be flush with the outside edges of the fuselage. With the 1/32-inch dimension being less than that of the longerons, you have to keep this in mind when gluing the parts into place. This isn't much of a big deal, but if you are aware of it before you start, it could save a few headaches later. Another area where I always use a lesser dimension than that of the longerons is at the tailpost. By using 1/32-inch thick material here, there is less to sand later prior to gluing the two sides together.

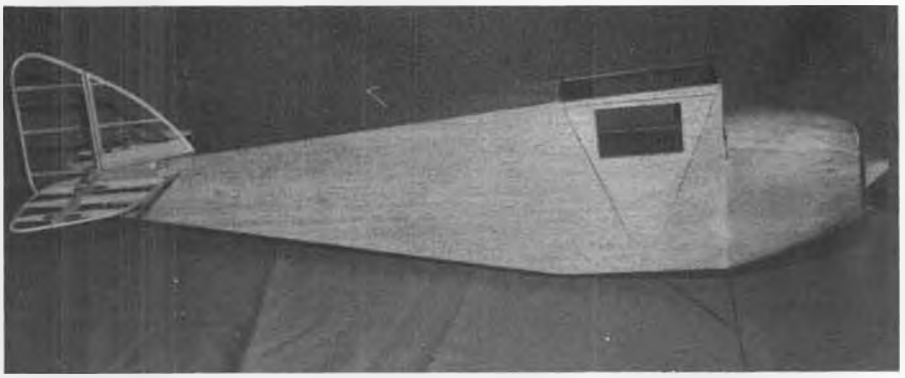
Before removing the sides from the workboard, locate where the motor peg should be. Drive a pin through both sides, then ream them out later with a rat-tailed file. Some may prefer to use a drill press. This at least keeps the motor peg in line.

Once the two sides have been removed from the workboard, before separating, take a sanding block with about 220 grit sandpaper and sand the two sides. This is done to remove any irregularities or excess glue. The top and bottom is given a similar treatment.

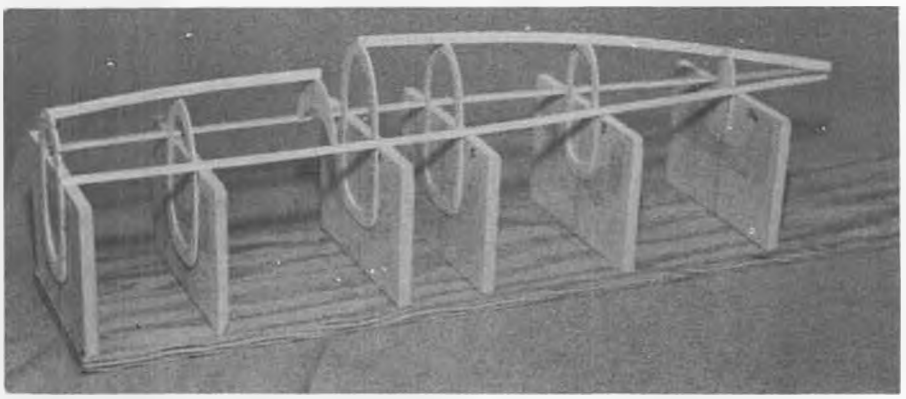
The two sides are then separated using a double-edge razor blade which has been broken in half so that it has a point. This blade is wedged in between the two sides to help part any joint that has been glued during framing. Then the inner sides are sanded with the block to help clean any of the glue joints.

Now the fun starts. With the tailposts tapered to the correct thickness, (this is determined by the size of the rudder post), the two sides are glued at the tailpost and left to dry. Rather than go to the nose of the model and start the framing, I'll start in the area of the cockpit or the widest part of the fuselage. The cross-members at this point are glued together and held just long enough for the glue to hold. The fuselage is then pinned down (see Fig. 1) with a right triangle beside it. This will assure that the fuselage will be perfectly square. All bays after that will follow suit.

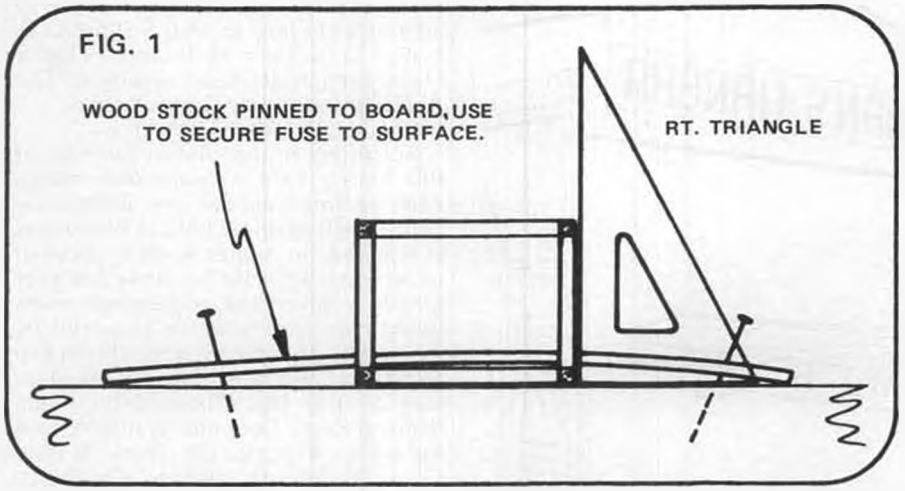
Sometimes I have found that the cross-members cut from the plan view (top view) do not fit properly, giving the fuselage an unusual taper. If this should happen, I merely measure from the fuselage, striving for a graceful curve. This may result in altering some of the bulkheads, but your model will look better for making the change. The last framing I do is the first bay, and this also is braced with the right triangle to assure squareness. Some modelers prefer to start at the front and work back. The final

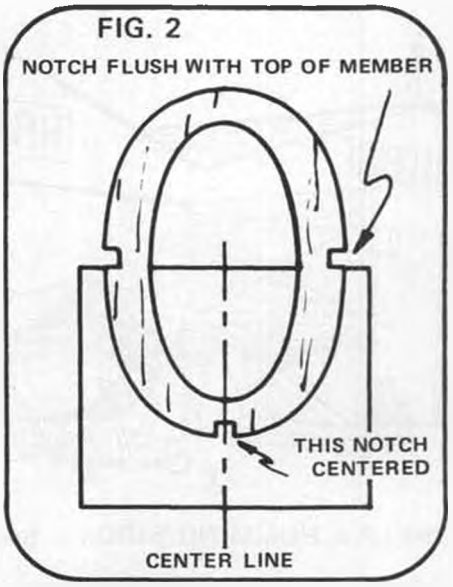


Fernando's ABC Robin uses light 1/32 sheet over a simple stick framework. This method is good for gas models, might be a little too heavy for rubber or CO_2.



The jig used to build Sterling or Guillow type fuselages. Formers are held to the vertical uprights by 3 small dots of rubber cement, makes for easy removal later.





results are the same.

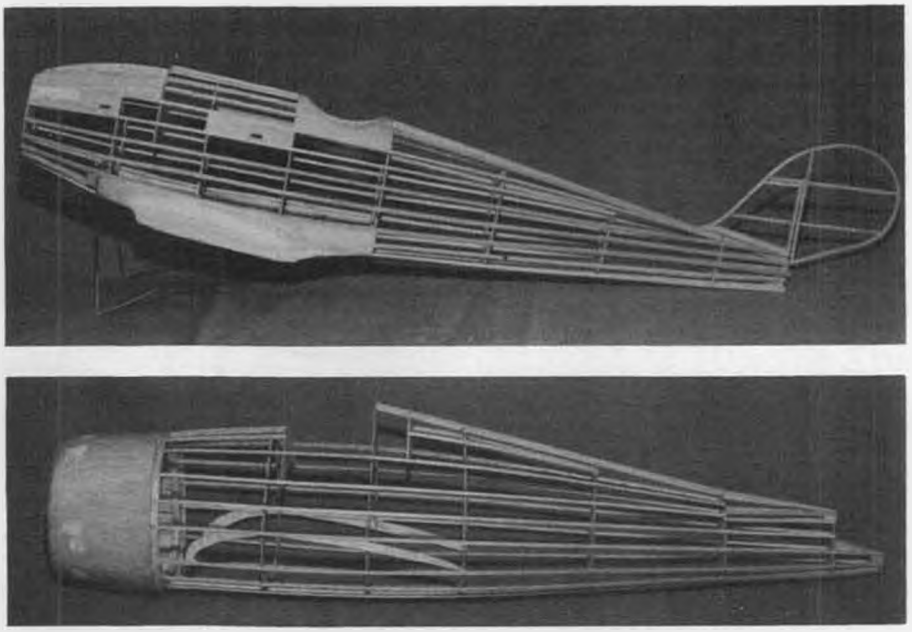
There are some fuselage designs that have a constant width for several bays. It seems that I always have difficulty cutting out several cross-members each the same length. The photograph shows a neat little gadget that can make cutting several pieces of all the same length a piece of cake. Not only that, they are square cuts! This handy tool is made by a model railroad company called North-West Short Line. If you are interested in such a tool, it can be found at any good model shop that carries model railroad supplies. As handy as many of you are, you could easily come up with a similar device. The only criteria is that you must have a sharp razor blade in it at all times. Otherwise, the cut is more of a crunch. This tool works particularly well on hardwoods.

My approach to fuselages which are all sheet and pretty much square in shape is a little bit different than the norm. These are usually gas models, since this type of construction is obviously heavier than open type construction. Take my old ABC Robin as an example; the full-size airplane was of all-wood construction with a built-up framework of wood. This in turn was covered with sheet plywood of probably 1/8 inch in thickness. This gives a very light but strong structure. On the model, I did pretty much the same thing. A framework of the fuselage was constructed, then sheeted with 1/32 balsa. The usual method here is to cut two identical sides from sheet balsa, then reinforce the interior as needed. This requires, in general, heavier sheeting. However, I find my model fairly light, yet strong!

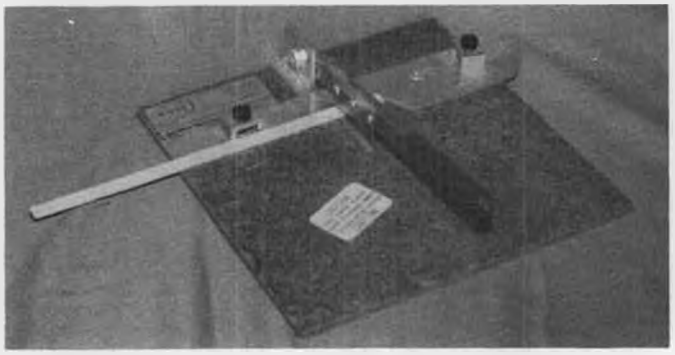
Someone might be concerned with the lightness of the 1/32 sheeting, and how this can look once the finish has been applied. To avoid any sagging between the bracing of the interior structure, the following procedure is followed. First, the sheeting should be applied with an aliphatic type glue, such as Titebond. This type of adhesive will not shrink once dried. The next step is to coat the interior with a thinned-out coat of Hobbypoxy clear. I do this before sheeting the bottom of the fuselage.

Why go through all of these steps? The clear epoxy penetrates into the wood and really puts a lock on it. That is, that it totally prevents the wood from distorting. The weight increase is insignificant, especially compared with the end re-

Continued on page 103

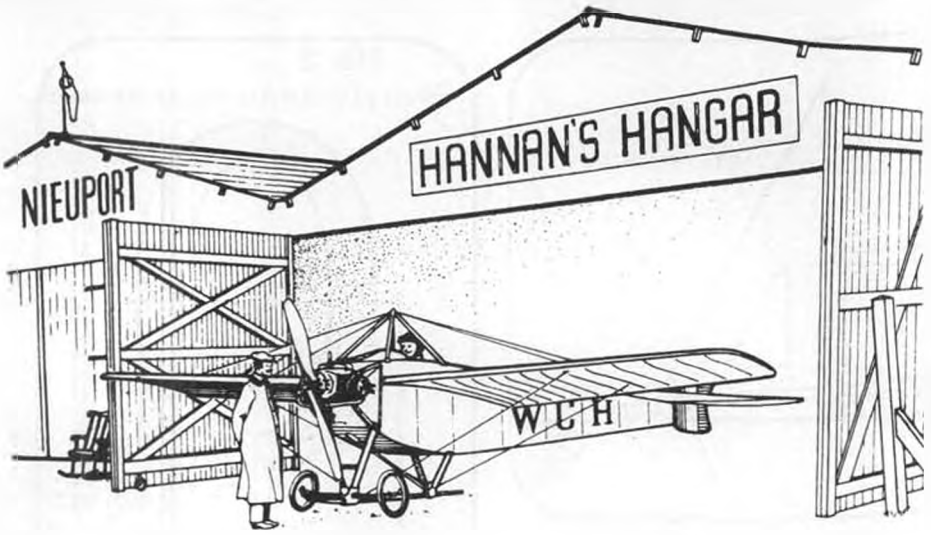


Two examples of the types of fuselages that can be built using the jig shown on the preceding page. Fuselage on the top is for a Phalz, bottom one is a Hellcat.



The wood-chopping device mentioned in the text. Uses ordinary razor blades, is great for making precise, square cuts.

Fernando's rubber-powered Henschel 126, built for Flightmasters WW-II Flying Aces contest. Model is finished with Floquil paints.



"HELP A HUMMING BIRD . . . teach it the words!"

• Our lead-in line this month was "borrowed" from *The West Coaster* newsletter. In fact, some of our most interesting material comes from limited circulation publications, and we are pleased to share them with our audience. For example, from *The Madison Plasticorner*, in an article by illustrator/writer/modeler Bill Feeny, we abstracted this delightful bit of whimsical comment about kit instructions: "The many details are not named, only numbered, which I think is a shame. I always believed that building a model plane should be an educational experience, but only the knowledgeable will know what parts are which (the pilot gripped part 37, looking through part 35 as flames poured out of part 93. He feathered part 29 and ordered "ABANDON PART 5603!!!"). See what I mean?" Subscriptions to this newsletter, aimed at builders of plastic models, cost $5.00 per year, from 6618 Dumont Rd., Madison, WI 53711.

And from the San Diego Scale Staffel newsletter, edited by Warren Shipp: "It was most gratifying to see the number of *families* that came (to the fun fly). A family that flies together has more balsa wood chips in their rugs than one that doesn't." Eh?

According to Dr. John Martin' "Hangar Pilot", from Florida, the Miami model association has a new slogan: "WE FLY INDOOR IN THE SUNSHINE". The reaction from modelers in colder climes can only be imagined.

BOMBING WITH PEANUTS

Every year, on December 7, the Antique Airplane Club of Greater New York, Inc. drops roses over the Statue of Liberty in tribute to those who lost their lives at Pearl Harbor. A new twist was added this year to help calculate the wind drift before dropping the roses. Styrofoam plastic peanuts! Some 12 aircraft including an SNJ, a Stinson, an L-19, a D.H. Tiger Moth and a Flaglor Fleet participated, according to *The Antiquer*, edited by Gene Thomas.

F/F SCALE INTERNATIONAL

According to the contest calendar of the March 1979 *Aeromodeller* magazine, an international free flight scale contest will again be held at Woodvale, in England, on August 4 and 5. Those of us who participated by proxy last year greatly enjoyed the experience, even though we were soundly trounced by the hosts! The prizes were distinctive and entry fee reasonable. For information on this year's bash, send International Reply Coupons, available from the post office, to: W. Thow, 6 Hale Court, Halebank, Widnes, Cheshire, England.

CONTINUING THE SPECIES

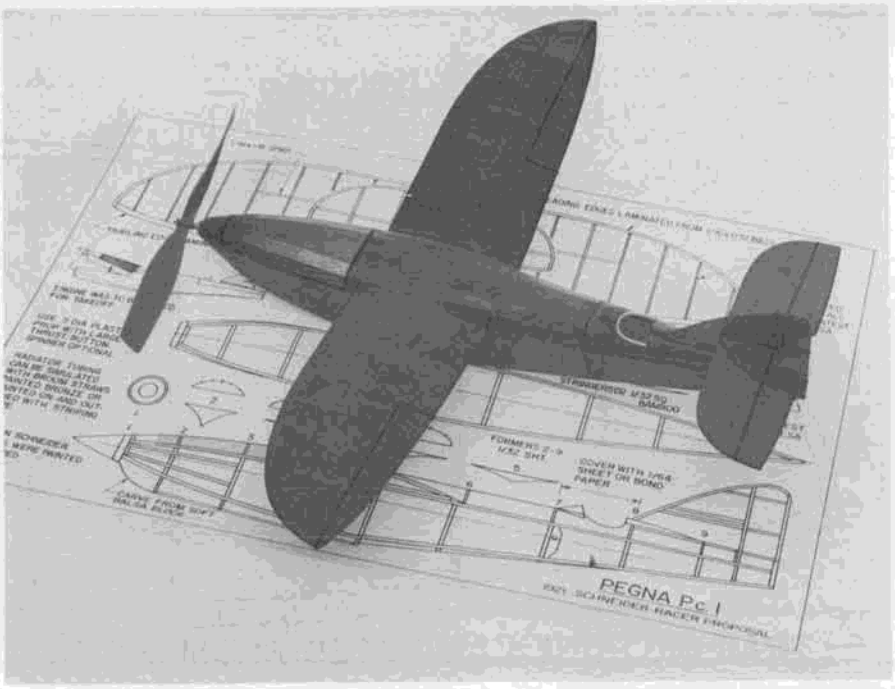
Doug Gillies, of Scotland, offers these profound thoughts regarding the diminishing participation in some model aircraft competitions. ". . .there must be one or more events at contests, or club meetings, or whatever, limited to fly-for-fun buffs who perhaps do not have the time or money or expertise to participate in the big time, *but from which group the experts of tomorrow will be recruited.* By dis-encouraging 'beginners' you get no supply for continuing or enlarging the sport. It is very

Continued on page 86

Magnificent 1-1/2" scale Lincoln Beachey biplane, by Dave Acker. All controls are functional. Dave was originally going to fly this beauty, had second thoughts. Can't say we blame him!

The late Bob Granville (left) of Gee Bee fame, and Henry Haffke with Henry's R/C model of the RI/R2 composite. Granville was flight caller for Haffke at several contests. Photo by Jay Duncan.

Georges Chaulet sent in this photo of his R/C hovercraft, which features two engines: one for lift, the other for propulsion.



PHOTOS BY AUTHOR

PEGNA P.C. 1

By JOHN WALKER . . . An unusual, yet good-flying model of a full-size Italian aircraft designed for the 1921 Schneider Cup Race.

• Shades of Bill Barnes and his SILVER LANCER . . . but what's this? The 1921 dateline precedes the famous BB1 by at least 15 years. Was it for real? Well . . . yes and no. The plane was designed by a very imaginative Italian, Giovanni Pegna, who owned the publication *L'Aeronautica*. The plane's sole reason for being was to win the 1921 Schneider Cup Race.

It seems that the bulky flying boats and pontoon-equipped aircraft were the usual fare for these races. Airports were small in those days and aircraft were not fitted with flaps and reversible props to slow them down and shorten the takeoff and landing run. These planes needed plenty of room.

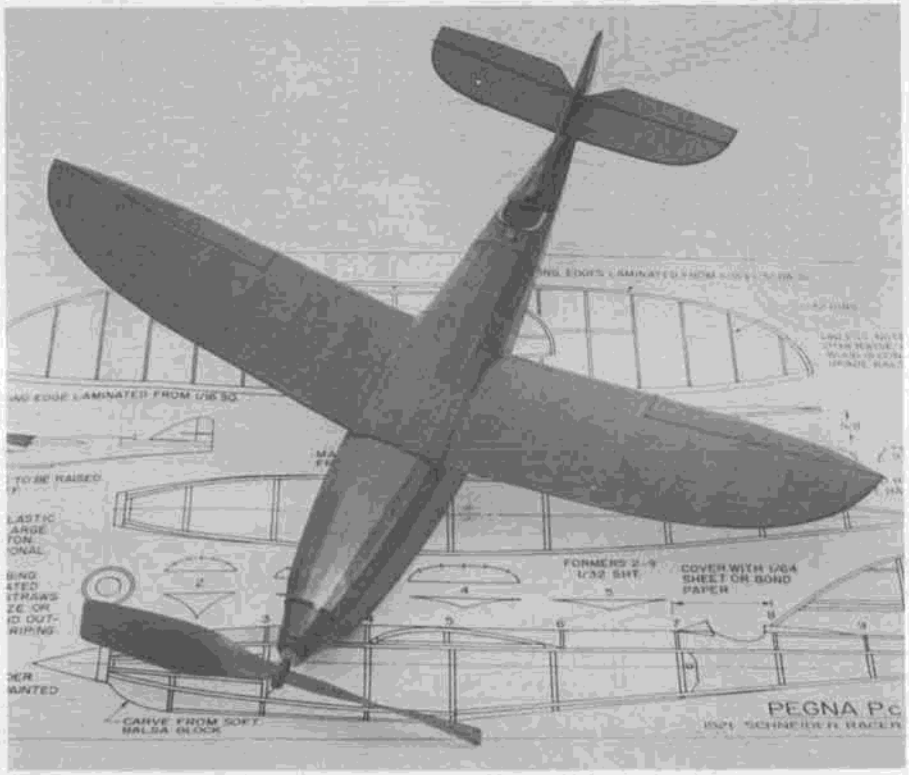
The conventional Schneider Cup racing planes had plenty of built-in headwind. If you ever visit the NATIONAL AIR AND SPACE MUSEUM, you'll see what I mean. Jimmy Doolittle's Curtiss R3C-2 that won the 1925 race is on display.

Well, anyway . . . Pegna, in his study of aero and hydrodynamics, knew that "sharp noses reduce drag." His idea was to reduce bulk and drag to a minimum, hence the P.c. 1. No floats or wires were to be used to cut speed.

The plane was to sit shoulder deep in the water. To take off and land, *the engine was raised to permit the propeller to clear the water.*

No, it never flew. Construction was started but a shortage of funds halted the project after quite a bit of time was spent in designing the hull and motor pivoting mechanism. If you want to read more about this plane and others like it, I recommend THE SPEED SEEKERS, by Thomas G. Foxworth. It is published by Doubleday & Company, Inc.

The proportions of this aircraft make the Pegna an ideal Peanut. I know that for contest work, the model must be patterned after a real plane that flew. However, how many of you fly in contests? This plane is interesting and enjoyable to fly when you want to soothe the tattered nerves after a day in the rat race.



This has to be one of the most interesting Peanuts to come along. Note that the engine was designed to be raised up for takeoffs. What an engineering nightmare that must have been!

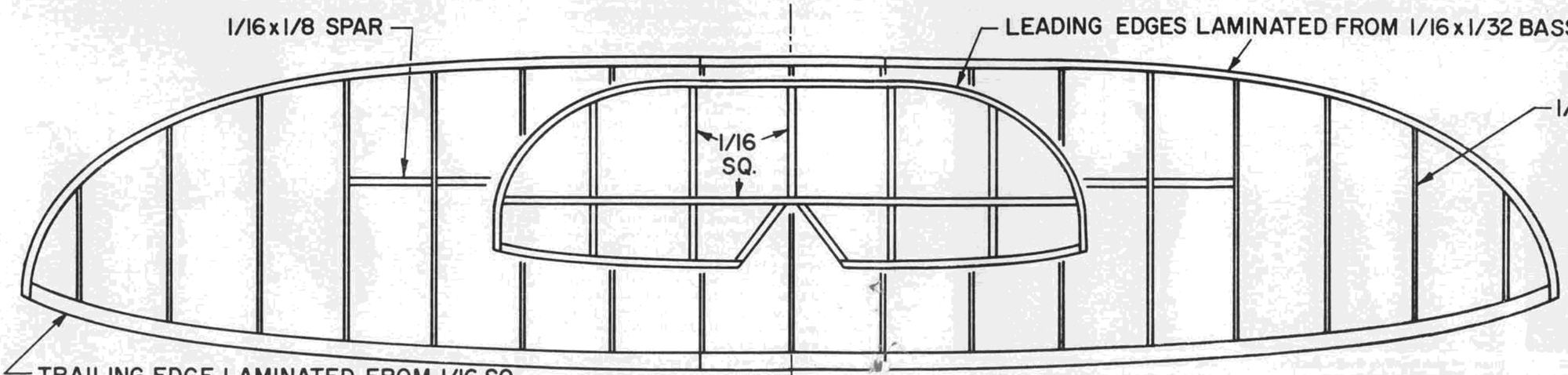
BUILDING THE MODEL

As with any model (or real plane, for that matter), the idea is to build it as light as possible while meeting flight and strength criteria. The plans indicate 1/16 sq. for the fuselage structure. You can use 1/20 sq. if it is available; it will help in building-in lightness. Cyanoacrylate adhesive was used to assemble the model.

The fuselage cannot be completed until the wing and rudder are added. The wing is unique in Peanut size because of the curve of the leading and trailing edge. They are built using the Mooney technique for laminating thin wood strips. It isn't as difficult as it looks. The multi-chord wing is readily taken care of by making a plywood pattern of the rib at the center section (shown on side view of fuselage) and slicing the required number of ribs. They are trimmed to length and cemented into place. Note that the spar is not full length; however, the wing will still be plenty strong.

Cover the model with red tissue and shrink the covering with denatured alcohol. Two thinned coats (50-50) of Sig Lite Cote dope will seal the tissue. Trim the exposed wood with matching red dope. Control outlines can be drawn with India ink or by using 1/32 trimming tape. The large radiator can be made using broom straws or dried grass and painting them bronze. The original model had a "painted on" radiator to cut down weight. However, if your

Continued on page 86



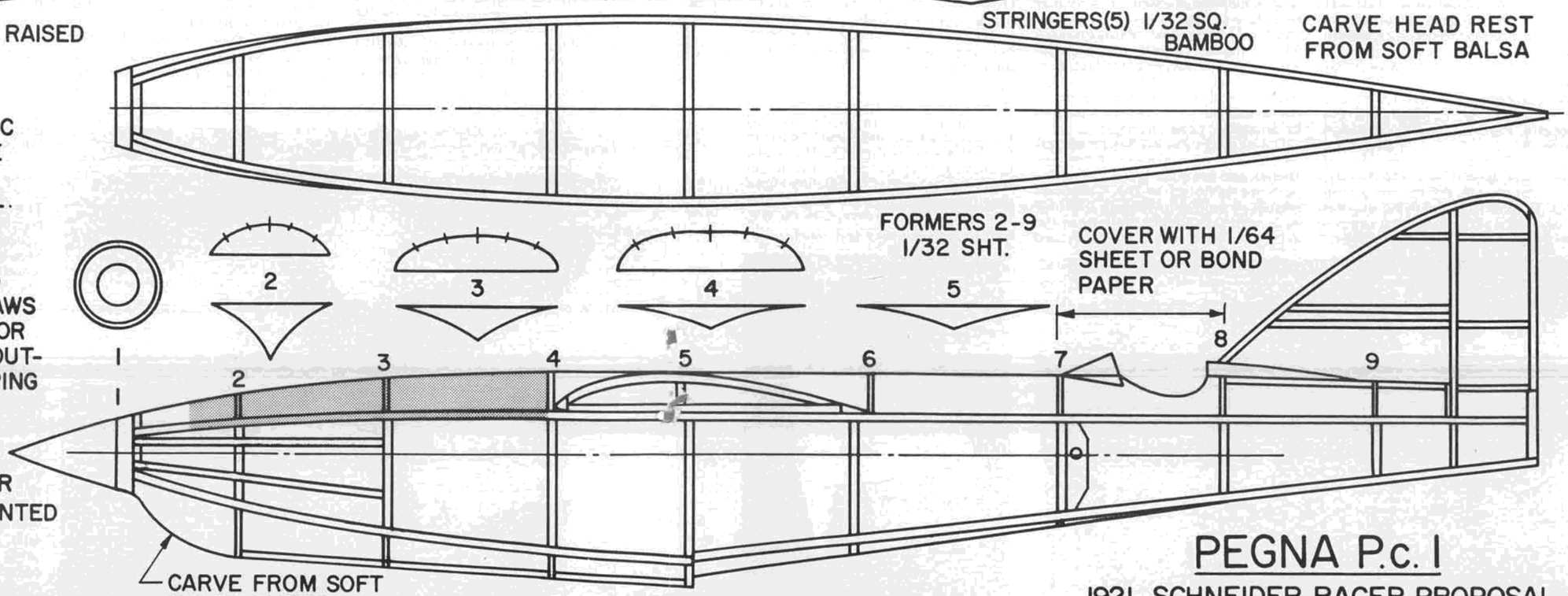
ENGINE WAS TO BE RAISED FOR TAKEOFF.

USE 5 DIA PLASTIC PROP WITH LARGE THRUST BUTTON. SPINNER OPTIONAL.

RADIATOR TUBING CAN BE SIMULATED WITH BROOM STRAWS PAINTED BRONZE OR PAINTED ON AND OUT-LINED WITH STRIPING TAPE.

ITALIAN SCHNEIDER ENTRIES WERE PAINTED A DEEP RED

JRW 2-79



PEGNA P.c. 1

1921 SCHNEIDER RACER PROPOSAL

Jim Walters shows what the well-dressed Nordic launcher wears at a Misery Meet!

Steve Helmick launches Guntis Sietin's A/2 at Misery Meet, before contest was called off.

Jim Thornberry demonstrating the foam cutter for making Nordic wings and stabs.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

FLASH: NEWS ABOUT 1979 FAI FREE FLIGHT WORLD CHAMPS!!

(Excerpted from article in October/November 1978 issue of *Free Flight News*, by Paul Masterman.)

After some deliberation, Taft was chosen... The program is as follows (though it may be subject to change in detail):

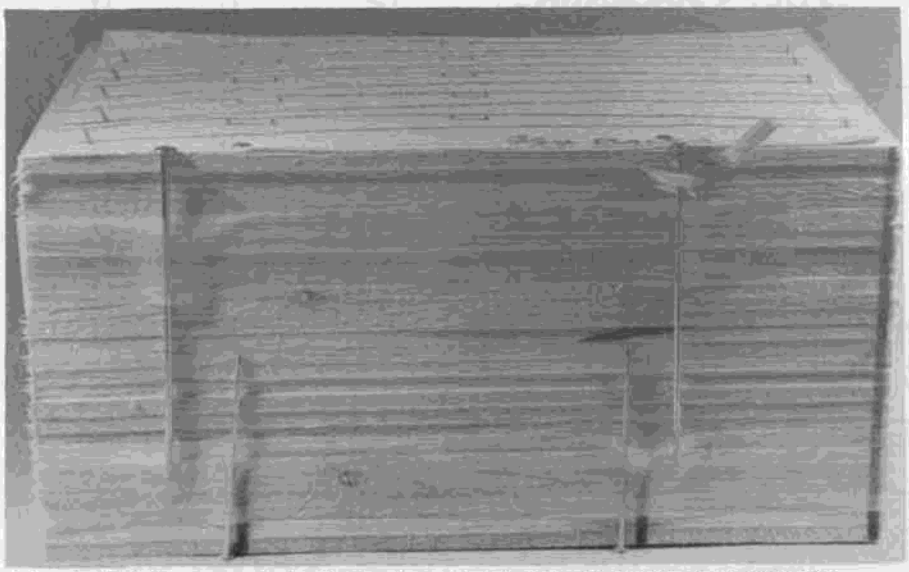
October 3 ..... Arrival Day
October 4 ..... Testing
October 5 ..... Processing and Opening Event
October 6, 7, 8 ..... Competition
October 9 ..... Departure

If you've ever wanted to see a World Champs but didn't have the money, here is your chance. The Bakersfield Inn (about 35 miles from the flying site) has put together a package deal for competitors, supporters, family members, spectators, or anyone else who cares to take advantage of it: for $200, you get 7 nights' lodging, 5 days of meals and an Awards Banquet, and 5 days' bus transportation to and from the field! If you wish to help out as a timer, this fee may be reduced to $100. Contact Bill Bogart, 795 Linda Vista Ave., Pasadena, CA 91103, for more information. The Bakersfield Inn was one of the first, if not *the* first motel in the USA. Today, it is a modern establishment, the accommodation being in 2-story blocks, separated by driveways, paths and trees....

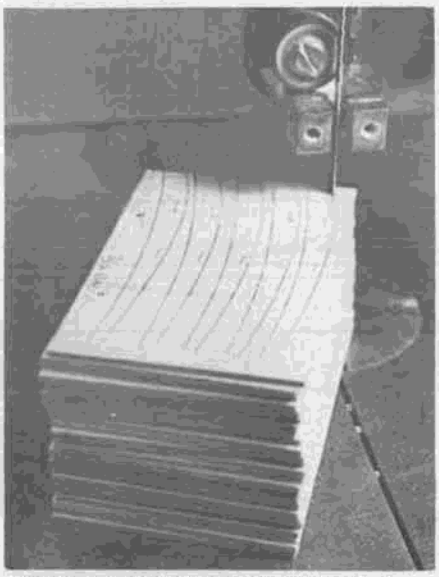
During a visit this last November, my wife and I spent a night at the Inn. Dinner and breakfast were among the best we sampled in the California region. A typical room had 2 double beds, with bath, shower, wash basin and WC, telephone, color television and balcony, in typical U.S. hotel/motel accommodation. There is a swimming pool as an additional relaxation, and providing the weather is seasonable (expect temperature to be in mid 90's in October!! —TH), the most delicate of constitutions will find it equable! We understand that the intention will be to house 4 people to a room, assuming this site is confirmed.

THE FAI FREE FLIGHT PROGRAM: WHERE IS IT? WHAT HAPPENED TO IT?

Usually, the year of a Free Flight World Champs is a busy and stimulating time for FAI fliers in the U.S. There are Qualifying Trials and Semi-Finals to get ready for, as well as speculating about the action at the big contest itself. This year SHOULD be no exception, but it is. Instead of excitement and anticipation,

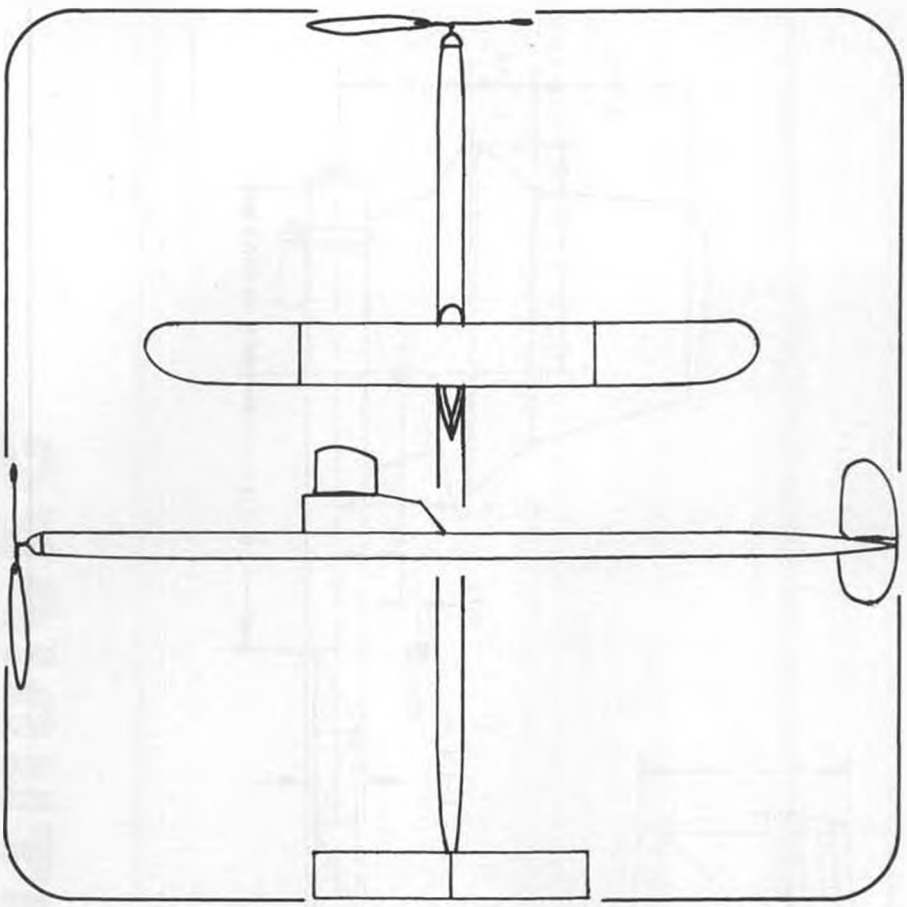


A bunch of rib blanks, ready for the bandsaw. Note how the blanks are pinned together from both the top and bottom. Long pins are called "bank" pins.



Cutting a stack of ribs on a bandsaw. See text for details.

Keith Martin shows the molds he uses for making fiberglass props. Details in last issue.



JUNE MYSTERY MODEL

there is indecision, unsureness and the beginnings of apathy.

This column is being written in late February. USUALLY, by this time, fliers who want to participate in the Team Selection Program at least know the particulars of the beginning portions of the program. Yet this year, the whereabouts of Judge Crater are as well-known as details of the Team Selection Program. Our District FAI committee person phoned Bob Stalick (who doesn't have any connection with the program anymore), hoping to find out what was going on. Our lines of communication have gone haywire!

And what about the World Champs themselves? The ultimate event of Free Flight is being held right here in the USA, and the same sense of secrecy and cover-up prevails. It might as well be the Snider Swamp Invitational, from the amount of publicity coming forth from the organizers and AMA HQ! I first learned via the grapevine in December that the U.S. would be the host. As of now, nearly 3 months later, the only news of contest details that I've seen came from *Free Flight News*, an English publication, that came over the ocean by *surface* mail. Who are those guys, and what are they doing down there?

Hosting the World Champs in the U.S. is a unique opportunity to stir the interest of the free flight community and increase participation in the FAI events, just as hosting the 1984 Olympics in Los Angeles will aid amateur athletics. Why are we wasting such a golden opportunity and being so close-mouthed about it?

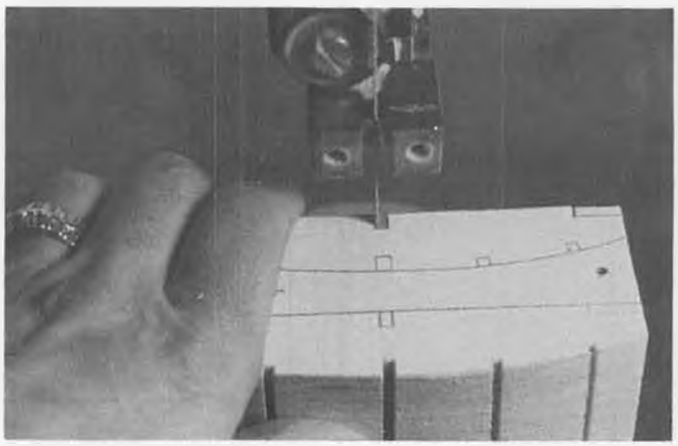
Could it be that increased participation and interest is NOT one of the goals of the organizers? Such a dog-in-the-manger attitude is not in the best interests of such a highly-specialized and sparsely-populated segment of our hobby.

For the amount of the recent AMA dues increase, we should expect something a lot more effective than the current lackluster public relations effort now coming from Washington and Los Angeles.

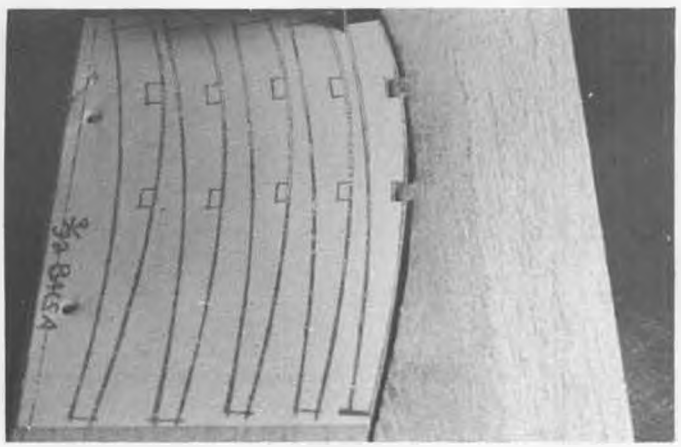
TROJAN HORSES, by Harry Murphy (from the CIA "Informer")

If you've just finished building this year's contest fleet and are getting ready to take them out to the flying field, read and heed these tips from Harry on taking them out there in style:

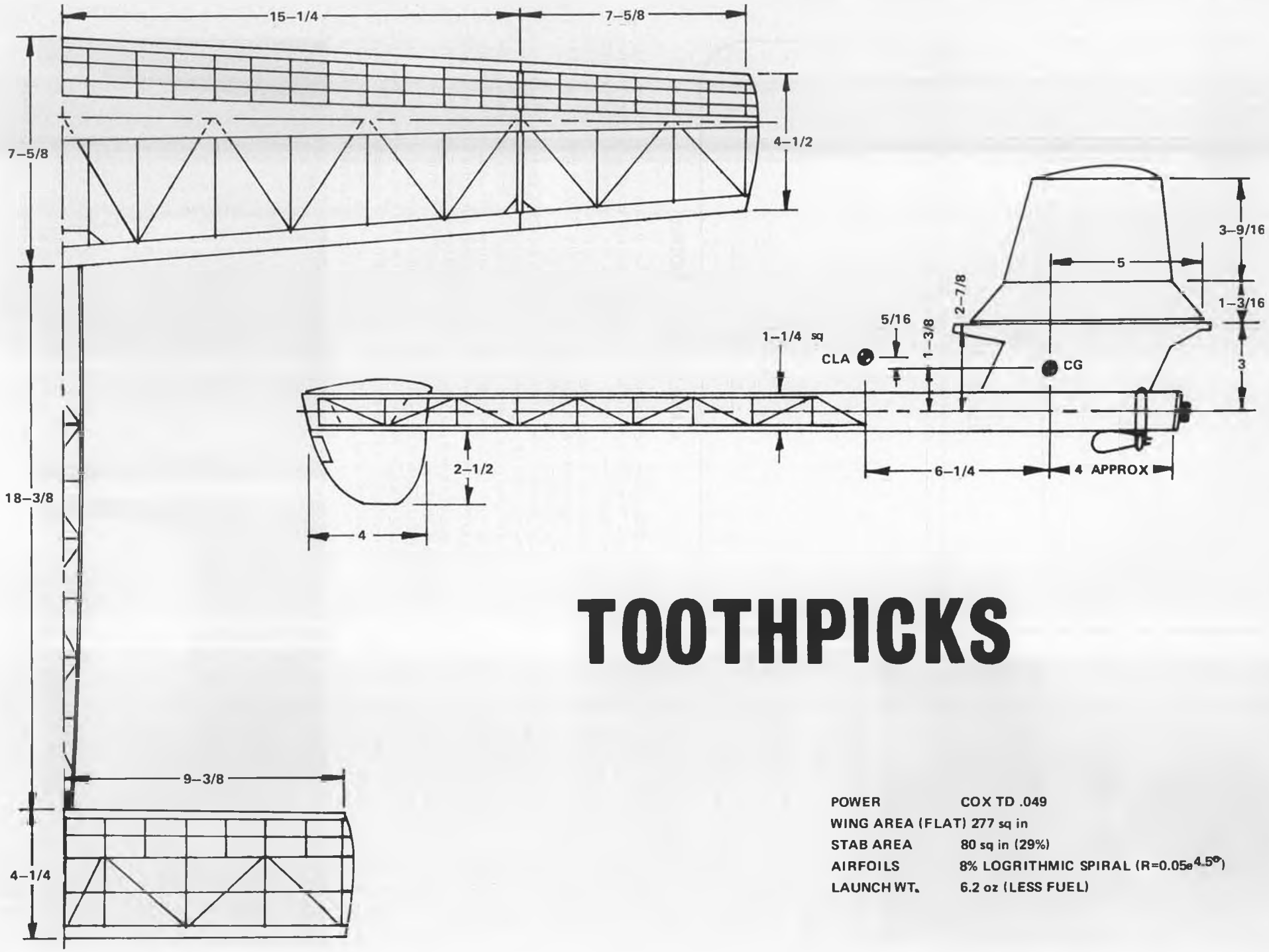
. . .Some years ago, I came to the conclusion that I punched more holes in my models while unloading and loading my car trunk or shuffling the parts around at model meets than I did DT'ing



Spar notches are cut out on the saw. Cut the front and back of notch, then nibble out the wood in between.



After the top surface and all notches are cut, a special holding block keeps the stack together while cutting the bottom.



TOOTHPICKS

POWER	COX TD .049
WING AREA (FLAT)	277 sq in
STAB AREA	80 sq in (29%)
AIRFOILS	8% LOGRITHMIC SPIRAL ($R=0.05e^{4.5\theta}$)
LAUNCH WT.	6.2 oz (LESS FUEL)

Two photos of Merv Buckmaster and his "Eldia 2 DC" original design A/2 Nordic. Elliptical tip dihedral is quite rare on F/F designs, but is sometimes seen on R/C sailplanes.

into a wheat-stubble field. Then I bought an old El Camino so that I could conveniently haul a motorbike to contests and the situation really became sticky when I tried to carry loose models in the truck bed. An add-on shell was a starter, but not enough.

As most one-day AMA F/F contests meant that I could expect to manage about 4 events per Sunday, I set about to construct appropriate boxes to house the required models, for safe transit. This eventually resulted in my building 3 containers for the purpose.

The first was constructed to house 4 identical 1/2A size models, 2 with .049's and 2 with .051's. This took care of 1/2A and A with a spare model for each event. The resultant box measured 12-1/2 in. wide, 42 in. long and 7 in. deep. The various model parts were prevented from banging around on each other by cementing in appropriately-shaped styrofoam positioning blocks as required. The stabs were maintained on their warp boards in grooved ways, which provided easy removal. All parts were also protected from the box itself with small pieces of 1/4-in. thick soft sponge in appropriate locations. I even found enough space under the upside-down fuselages to include a pair of cigar boxes for carrying spare engines, parts and miscellaneous stuff.

The second box was created to house 3 larger models, for FAI, large A or small B models, depending on the events to be flown. The protective styrofoam part positioners and protective sponge were again utilized. This box measured 12-1/2 in. x 56 in. x 10 in.

The third box was constructed indentically to the first, except that it contained no positioners, but did incorporate 1/4-inch sponge padding across the entire floor of the enclosure. I used this box for transporting my more delicate non-gas creations.

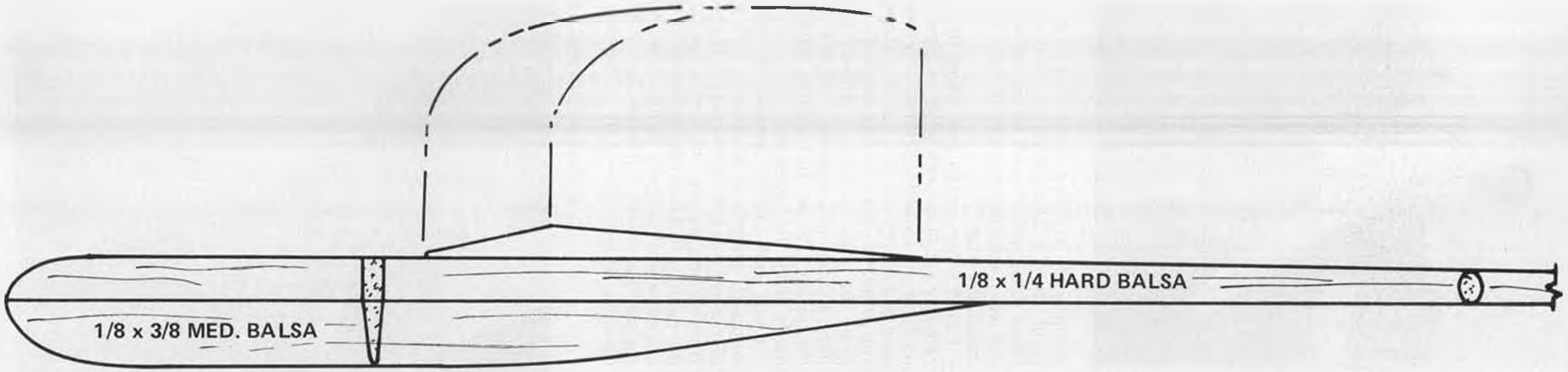
My boxes were quite lightweight. They were constructed from those thin top and bottom sheets that panel centers and lumber yards receive with bundled pre-finished wall paneling (the stuff is officially called "dunnage"). I got about 9 or 10 sheets of various thicknesses for the grand total of $4 from my local yard. Most is generally 3-ply Philippine mahogany which has a rather grainy surface texture. However, a little sanding takes off the splinters. I finished them with Hobbypoxy or Petit boat paint, then finally settled on Concrete Floor Paint, which worked just as well and was the easiest to apply and dried in much less time.

I used 1/2 in. square pine frame strips cemented in place with Elmer's Carpenter Glue and tacked together firmly with wire brads. The hinges, suitcase clasps and protective brass corners were direct from the local K-Mart. I utilized the thinnest paneling (approx. 1/8 in.) for the smaller boxes and a little thicker material for the larger box.

I was immediately amazed at how compact everything became and then discovered a few other advantages. Heretofore, as my "model armada" increased, I had been patiently building enclosed wall cabinets in my shop and garage to protect my models from dust, damage, or whatever. This was a time-

Continued on page 74

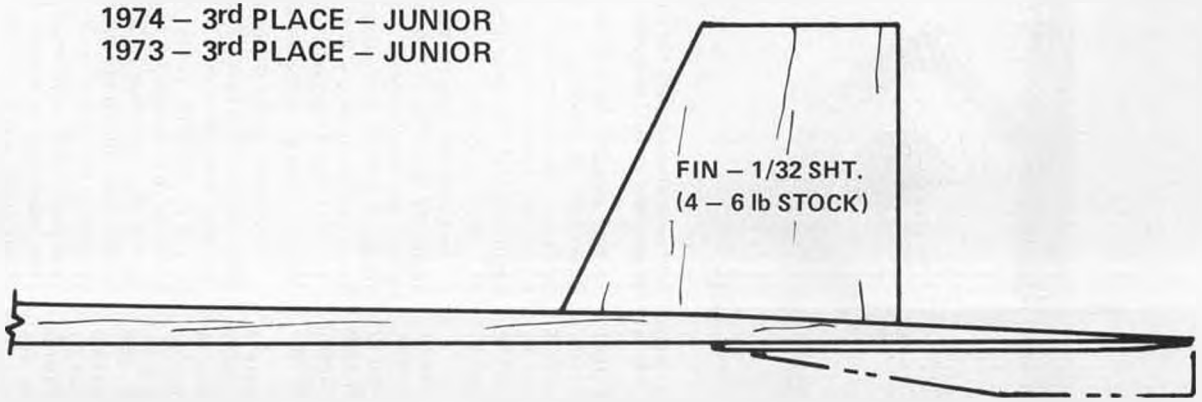
Detail closeups of the Eldia 2 DC. Merv is the editor of *Airborne*, Australia's model magazine, and is also a top Nordic flier.



NATIONALS COMPETITION RECORD :

1976 – 1st PLACE – SENIOR
1975 – 2nd PLACE – JUNIOR
1974 – 3rd PLACE – JUNIOR
1973 – 3rd PLACE – JUNIOR

THE Sea Gull



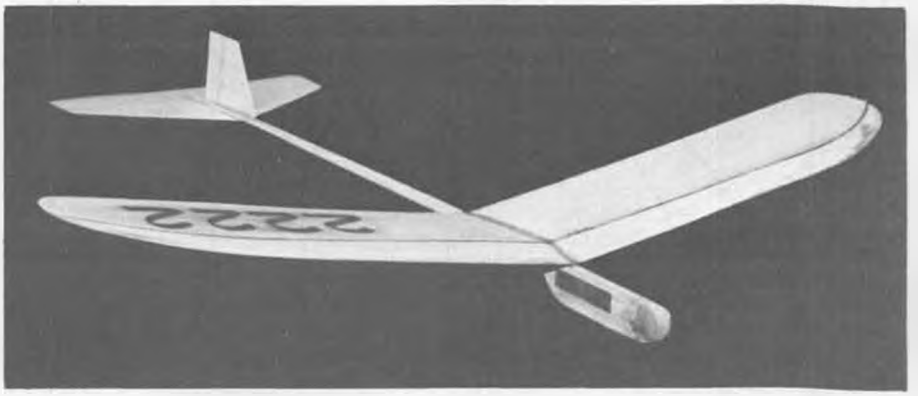
TYPICAL STAB & FIN CROSS–SECTION (NO SCALE)

INDOOR H L G FOR 50' TO 65' SITES

1976 NATIONALS WINNER

BUILT & FLOWN BY : BRUCE & BARRY PAILET

SPAN 18" TOTAL WEIGHT = 10 TO 12 GRAMS



PHOTOS BY AUTHOR

SEAGULL

By JEAN PAILET . . . This '76 Nats-winning indoor glider would be a good choice for the Cat. II site at this year's Nats. Give it a try!

• Like good wines, good Hand-Launched Gliders seem to get better with age. At least, that has been the case with the SeaGull. It is now entering its 10th year of competition and its performance has continued to improve a little each year as the design has evolved through the past decade. The high point in its career (at least for the time being) came at the 1976 National Championships, when Barry Pailet won the Senior Indoor Hand-Launched Glider event with his latest version of the SeaGull (which is the one depicted in these plans). This design also placed 2nd in Junior IHLG at the 1975 NATS, and 3rd in Junior at the 1973 and 1974 Nationals.

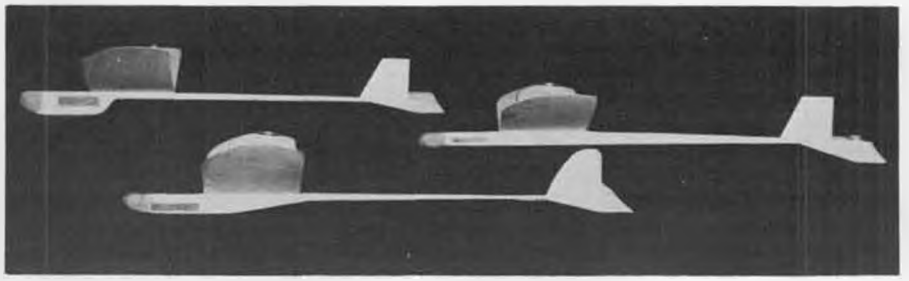
Since many of the indoor sites where we fly . . . Cantiague Park on Long Island, the Dumont Gym at MIT near Boston, Princeton University's Jadwyn Gym, as well as the 1974, '75, and '76 Nationals . . . have ceiling heights of nominally 50 to 65 feet (within the AMA's Category II limits), we designed the original SeaGull with that height criteria in mind. Now that we hear that the indoor site for the 1979 NATS in Nebraska will also be at about the 55-foot ceiling height mark, it looks like the SeaGull may well extend its Nationals competition activity for at least another year.

Two other major criteria guided the design philosophy: Keep it simple so that a Junior could build it quickly and easily (sons Bruce and Barry were both young Juniors when the design first took shape), and keep it light for top performance. The key factor in achieving these two goals is the wing, with its simple triangular airfoil and single dihedral joint.

Aside from the weight of the materials themselves, the amount of glue used in the construction process is probably the prime weight factor in Indoor model design. Therefore, we reasoned, let's keep the number of joints to a minimum by using simple dihedral rather than multi-jointed polyhedral in the wing. The straightforward triangular airfoil keeps the actual volume of wood in the wing to an absolute minimum (for a given thickness and chord there is no effective airfoil which is lighter) and enables young hands to produce an accurate wing quickly. While it may be argued that a more conventionally contoured airfoil is aerodynamically more efficient, we feel that the weight savings of the triangular foil make it at least as effective in achieving maximum possible duration . . . and that, after all, is the ultimate goal in designing a glider for competition.

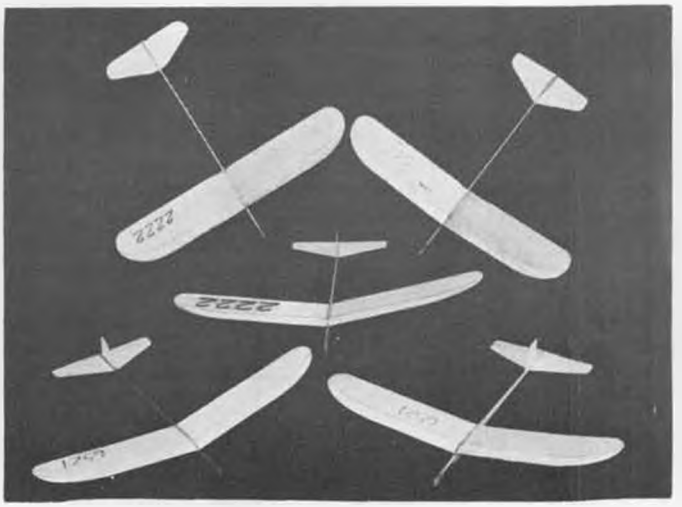
The accompanying plans are intended to give all the information necessary to construct the SeaGull. Therefore, we'll keep these written instructions to a minimum. We've built these gliders using spruce instead of hard balsa for the 1/8 by 1/4 main fuselage piece, so you can try that if you prefer, but we found no significant strength advantage and, of course, there is a slight weight penalty. Otherwise, stick with the wood types/weights indicated and work towards a weight of 10 to 12 grams for the specified ceiling heights. The one place we do compromise a bit on being weight-conscious is in using epoxy glue for the wing dihedral and wing-to-fuselage attachment joints. This is the single most strength-critical area on the model and, used judiciously, the epoxy will give a

Continued on page 99

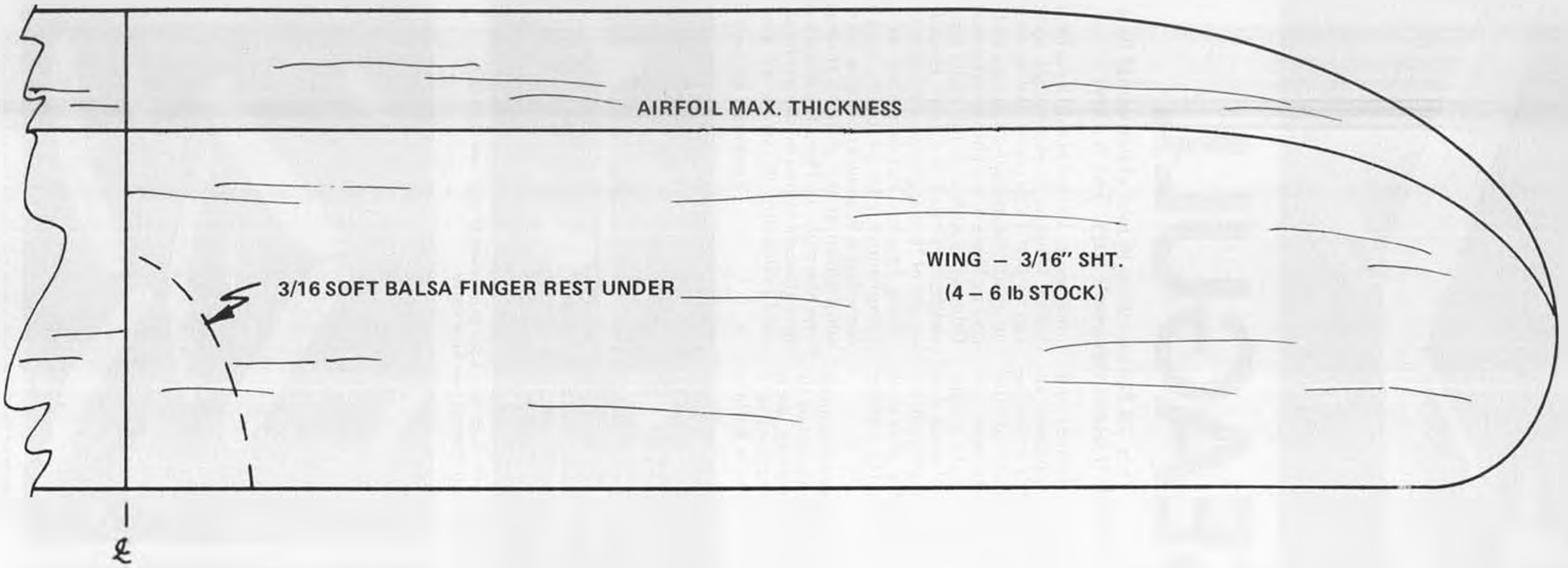


Three variations on fuselage profile shape have been experimented with over the years, but no significant performance differences have been noted.

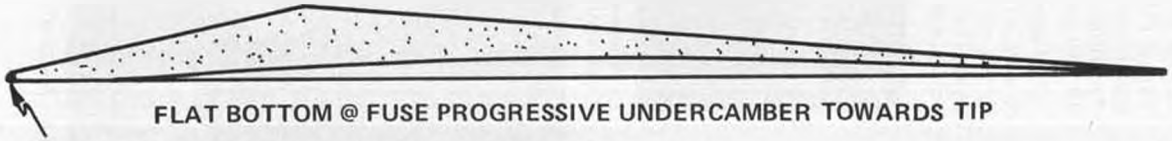
Barry Pailet (now 18 and in college) with two of his SeaGulls. His '76 Nats winning glider is in his right hand.

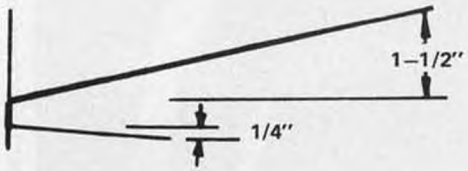


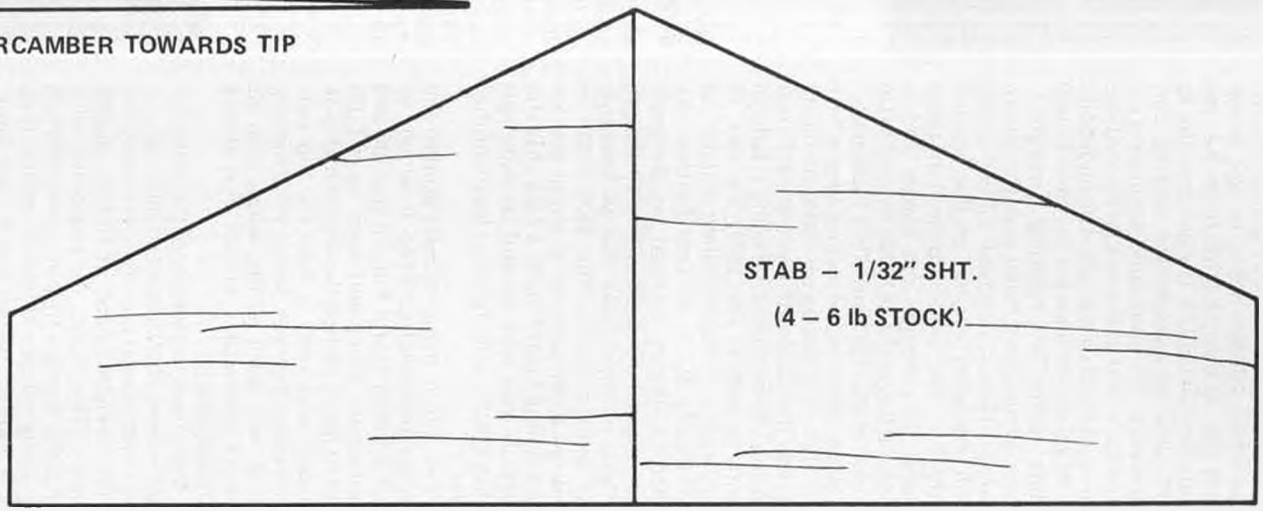
A gaggle of SeaGulls (how's that for a mixed metaphor?) with the Nats winning model at the lower right.



WING SECTION (2 x SCALE)







Bill Stroman's 1912 Albatros biplane had the dubious honor of winning (?) last place in scale. This, with a flight of over 10 minutes!

Bob Chambers did a beautiful job on this 9-foot Dallaire Sportster, powered by a Brown Jr., as were most of the big ships present.

VAMPS REPORT

By BILL STROMAN . . . A report on the Scale and Old Timer events at the annual bash put on by the Vegas Antique Model Plane Society. The club's flying site is one of the best in the world.

PHOTOS BY AUTHOR

• If you have never flown at this meet, you sure are missing a great thing! The site is located at Eldorado Dry Lake, a flat smooth surface 9 miles by 5 miles in size. With a site like this, some of the contestants showed up in full-sized aircraft!! For the icing on the cake, the people you fly with are the greatest bunch of modelers in the world. The array of events makes one feel like a kid in a candy store, you can only fly so many events in two days, and it's hard to pick which one you want to fly the most.

The flying site is located only 30 miles or so from Las Vegas, so many of the modeler's wives make the trip and stay in town to shop and gamble.

As you may know, I'm not an old timer modeler, but a free flight scale nut. However, this form of modeling really turns me on! The whole event is free flight, and, in most cases, the models must R.O.G., so I feel quite at home.

Most of the photos are of scale models (sorry, guess I'm partial), but you will notice that all the models feature very fine craftsmanship. As I mentioned scale, let's look into that event first. The rules state that the model shall be of a full-sized aircraft built before 1943. There is no static scale judging, but the model must look like the real plane. The minimum flight is one minute, the longest flight wins. As you can see from the results, the Corbins won hands down. It was found that the size of the model was a great factor in the timing of the event, as the timer must stay where the model is launched. In fact, Bud McNorgan's Corbin, with a four-foot span, actually flew for forty minutes, but the timer lost sight of it in 19 minutes. My 1912 Albatros biplane had a 30 inch span, and Jim Dean was hard put to see it after ten minutes. As I had to walk about two miles to retrieve it, I'm surprised he could see it that far! We all agreed to build bigger models next year (Wonder what my seven foot span Staaken R VI would do with four Cox 020's in it?).

Jim Adams guides his Earl Stahl Fokker D-VIII. Model has been around awhile, flies great.

The engine and tank installation in Jerry Sanford's 9-1/2 foot Fiske-Hanley. That's a V8 juice can tank! Placed 3rd in Texaco.

Larry Schwartz flew this Cox .020-powered P-26 in scale, flew well.

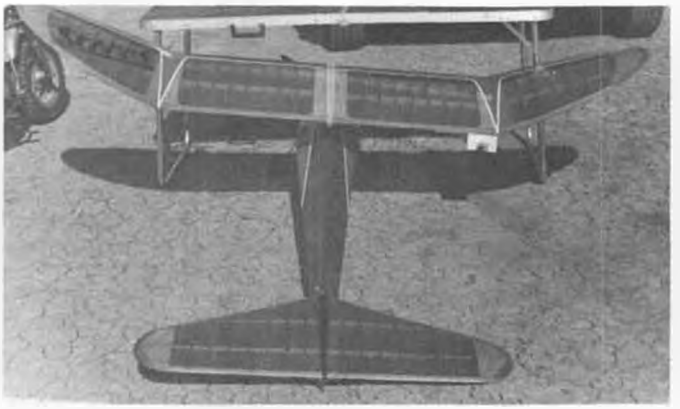
Bud McNorgan's pretty Buccaneer, powered by Brown Jr. Bud had better luck with his Dallaire, taking 2nd in Texaco.

Don Weitz placed 2nd in Class C Cabin with this Ohlsson 60-powered Clipper. Look at all the downthrust!

Brad Levine, President of the SCIFS O.T. club, brought this Aeronca C-3 to enter in scale, but had trouble getting it trimmed.

Bob Chambers with yet another Earl Stahl Fokker D-VIII. This is a popular model for O.T. scale events.

Cliff Silva's 7-foot Bunch-powered Corbin flew (and stayed in sight) for better than 27 minutes, long enough to win scale.



Bud McNorgan's Anderson Pylon is beautifully finished in orange silk with black and white trim, flies with a Forster .99.

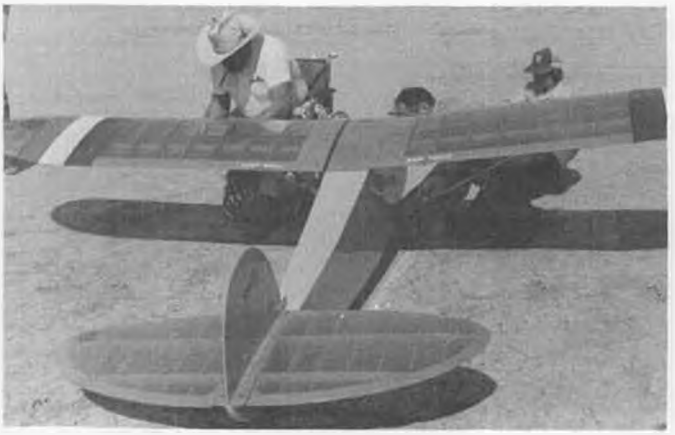
Cliff Silva's big Corbin won the event by a wide margin, with a 27 minute flight. I found that he had a good margin if that flight didn't make it; seems he only used two oz. of his six oz. tank! Many of the other models in the scale event made some great flights; Bob Chambers' Fokker D VIII, and Bob Haight's Bellanca Skyrocket, for instance . . . but not long enough to win. How did I do with ten minutes?? Last place. Back to the drawing board!

The "Rock" event was flown again this year, and Jerry Sandford won it with a time of 35 minutes and 39 seconds. This is the event in which each entrant puts $5 in the built-in drawer in the trophy, and is allowed one flight, anything goes. The longest flight wins the trophy until the next contest . . . and the winner keeps the money in the drawer! As these flights are long, and the cost of replacing a model and motor are very real, it's not a bad idea to have a cash prize.

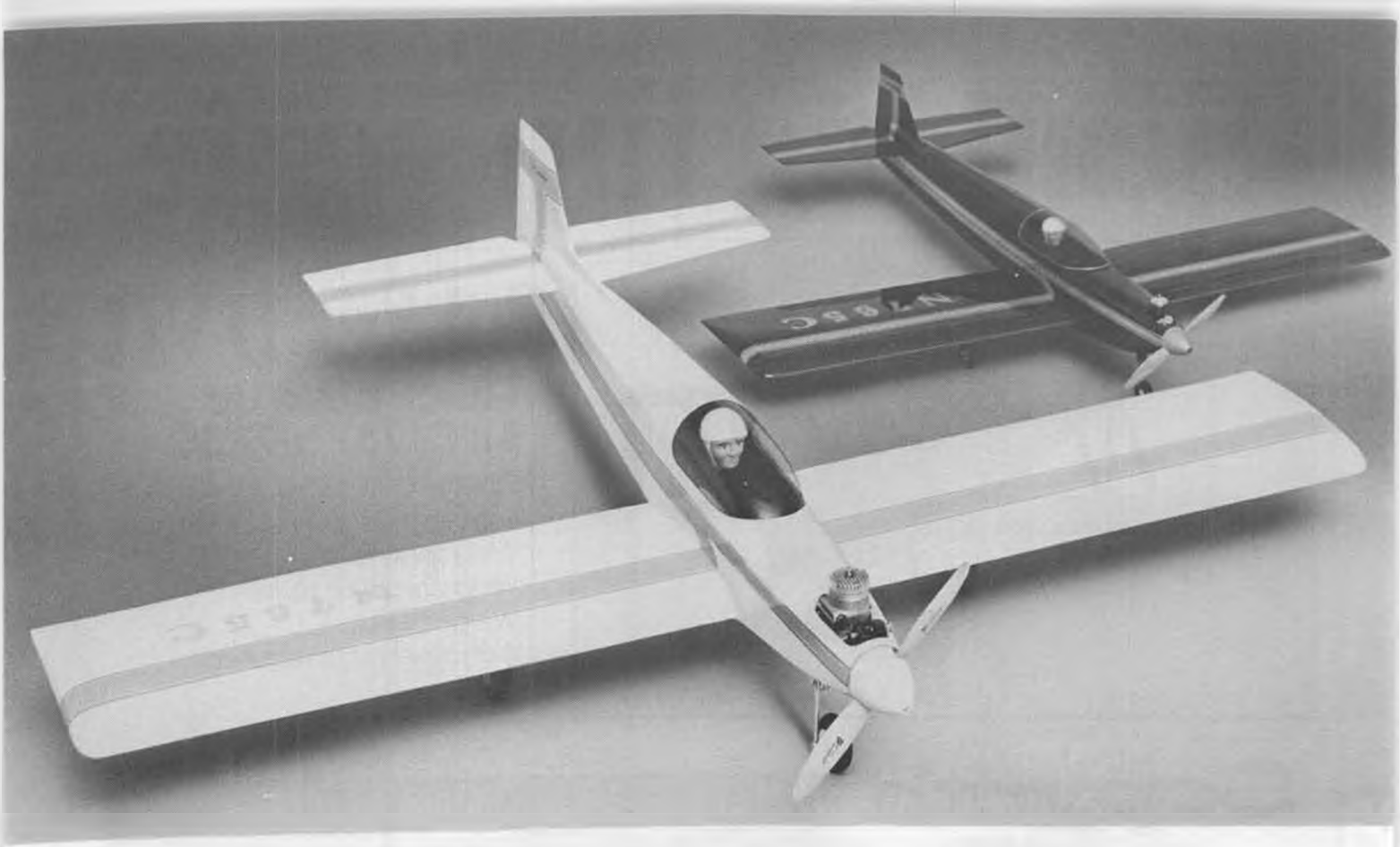
On Saturday morning, Sal Taibi was the first person to put up an official flight *(So what's new? This guy wakes up roosters! wcn)*. It seems he's always first at each contest I see him in. It's an education to watch both him and his models at any contest. He's so sure of what the model will do that he's calm, and carries on small talk with you as he prepares for the flight. The engines always start right up and the models fly the same pattern every time. I wonder if people realize how much preparation and testing (prior to the contest) it must take to be this good?

Heard some good comments during the two days I was there, and thought I might share some with you. As Brad Levine was trying to start a stubborn engine, he remarked, "If they would hold these contests at my house, my engines would sure run better." Or as Cliff Silva was telling me just prior to a

Continued on page 74



So you think your 1/4-scale model is big, huh? You ain't seen nothin' yet! How about this twice-size (14 foot) Powerhouse, built by Bill Cohen and Bob Longstreet (shown in photo on left). Model has 4325 sq. in. of wing area and flies well with a Quadra. Plans are available.



Cox Warlock .05 and .40. New high performance designs from Airtronics.

The world's best balsa kits now offer an even wider selection, featuring two new designs.

Cox/Airtronics introduces the Warlock .05 and .40. It's a maximum performance aircraft in two popular sizes. Clean design and realistic appearance in a *fully* aerobatic aircraft offer the sport flier a new challenge. Plus, you get the engineering and design features that have made Airtronics kits world famous.

Warlock .05—for serious ½A fliers.

Designed around the Cox Tee Dee .051 engine, this compact plane flies the pattern like the larger ships. It's set up for aileron and elevator control, with our catalog #3615 throttle/muffler as a third channel option. With a 32.5-inch wingspan and area of 219 square inches, you get the bonus of a competitive entry in the ½A pylon race circuit.

The Warlock .05 is the ideal move-up from our popular ½A RTF designs, or from our Q-Tee and S-Tee kits. Use Cox/Sanwa's 8020, 8022, or 8031 radio systems. Complete installation details are included on the plans.

Warlock .40—realism and precision.

Designed for popular .40-size front rotor engines, this new aircraft is fully acrobatic with any four channel radio system. With a span of 52 inches and 481 square inch area, this ship is sized-right to move out. And the realistic appearance sets it apart from the rest of the pack.

You can use our Cox/Sanwa 8044 or 8054 radio systems—optional retract installation is shown. For a real treat in precision maneuvers and tracking, install one of our Medalist sytems with ball bearing servos.

New kits, proven quality and features.

Both Warlock designs include all the features that have made Airtronics kits world renown. Including premium grade materials, with all balsa stock individually hand-selected. Precision-machined parts to ensure accurate alignment and make building a pleasure. And complete hardware for extra convenience. All this in addition to flight performance unequalled in the industry.

Add it up. Airtronics kits are truly superior in quality and performance, as proven by their outstanding record in competition including National and World Championships. Take a look at our full line of power and sailplane kits for the discriminating R/C modeler. We guarantee your satisfaction.

Our new Warlocks are the latest additions to a great line. For fun-flies, Sunday flying, or novice competition, check out these new winners from Cox/Airtronics.

COX **#1 in Power Modeling.**

COX HOBBIES INC., a subsidiary of Leisure Dynamics, Inc.
1505 East Warner Ave., Santa Ana, CA 92702

Check the yellow pages for your nearest hobby store.

Semi-big fun scale

Fokker D VII

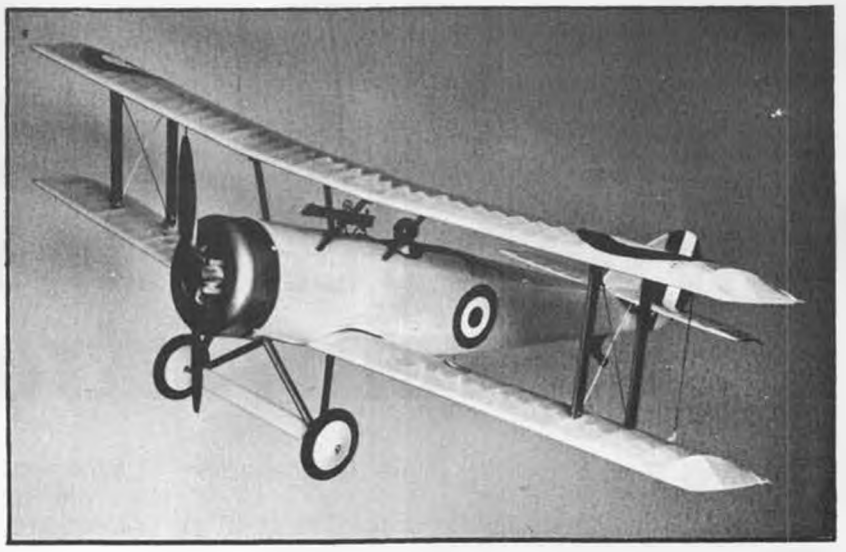
Quick build up
Kit OL781 $97.50

FOKKER DVII:
Engines .60 - .80
Wing span 72"
Wing area 1488 sq. in.
Weight 10 lbs.
4 channel radio required

Sopwith Pup

Quick build up
Kit OL792 $119.50

SOPWITH PUP:
Engines .60 - .80
Wing span 67½"
Wing area 1586 sq. in.
Weight 10 lbs.
4 channel radio required



KIT FEATURES:
- 2 full sized rolled plans
- step by step construction manual with photographs
- quality die stamped balsa parts
- machine cut hardwood parts
- machine cut and pre-sanded plywood parts
- preformed balsa blocks
- preformed leading and trailing edges
- preformed landing gear and cabanes
- heavy duty one piece ABS cowl

Accessories included:
- 5" scale wheels
- Scale machine guns
- Scale pilot
- Self adhesive decals

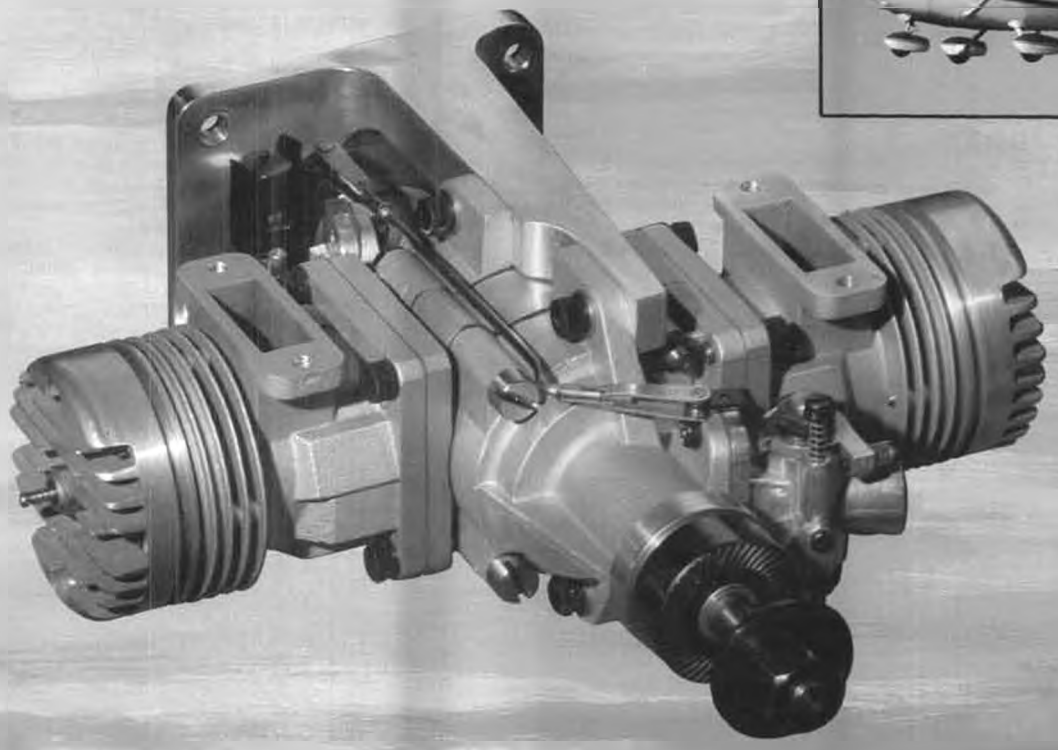
Hardware package includes: aluminum motor mounts, pinned hinges, snap links, control horns, nylon bolts, landing gear strap, socket head bolts and blind nuts, plus all necessary fittings.

See your dealer or order direct postpaid
Prototypes flew great with a K&B .61 and 14-4 prop.
Dealer and distributor inquiries invited

ORLINE

Orline Inc. • P.O. Box 12725 • Salem, Oregon 97309 • Telephone 503/792-3627
Manufacturing Plant: 11235 Portland Road NE Brooks, Oregon 97305

THE ULTIMATE IN RC FLYING
FOX 20CC OPPOSED TWIN



The Fox Twin is the finest two cylinder model airplane motor ever produced. Every design consideration and manufacturing care has been taken to make the Fox Twin a really practical power plant.

The two cylinder opposed simultaneous firing configuration was selected because equal and opposite piston motions cancel each other out vibration wise and produces a smoother running configuration than the alternate firing in line motor. In addition, the opposed cylinder configuration cools better and fits most scale models better.

The cylinder configuration is of the most modern and advanced schneurle porting, featuring Fox exclusive angle side flow bypasses. The cylinder is glass hard and the pistons are made of the hardest piston alloy available. The crankshaft is of hardened steel, and extremely massive compared to any other motor you have seen. The massive crankshaft construction was necessary because the terrific power of earlier experimental cranks twisted in two for conventionally proportioned shafts. The dual carburetion makes possible adjusting each cylinder for maximum power, a failing of most earlier twins, where a single carburetor would result in one cylinder running rich and the other lean. Although the Fox Twin can turn a 17, 18 or 19 inch propeller faster than most chain saw engines of equal displacement, its true potential is achieved by letting it rev up. The result is the ability to fly your airplane in a realistic manner, using a scale type propeller, but if you are performance minded, then put on a smaller propeller and really move out. We recommend a 15-6 for average models.

Each Fox Twin is factory run at full power, assuring you that when you buy this and put it in your model, you can fly. The carburetor has been adjusted and synchronized for atmospheric conditions at the factory. Unless you are at a rather high altitude, no further adjustments should be necessary.

TWIN Fox Twin $250.00

SPECIFICATIONS:

Bore ..... .907
Stroke ..... .937
H.P. (at 14,000 RPM) ..... 3 plus
Weight ..... 2# 8oz.

Standard accessories: Firewall type motor mount, carburetor interlink, fuel line "Y" fitting.

FOX
MANUFACTURING CO.
5305 TOWSON AVE. FORT SMITH, ARK. 72901
PHONE 501-646-1656

For More Information - Call: 1-501-646-1656.

VAMPS . . . . . *Continued from page 70*

flight. "When I was first flying, I noticed that all the other modelers would stop and watch me fly. At first I was really flattered, then I found out that I always launched in dead air."

Bill Cohen and his great wife, Pam, brought a twice-sized, Quadra powered Powerhouse to the contest. This was radio controlled, and due to its size, was the high spot of the contest. It was originally planned to fly it from Los Angeles to the contest site, but the weather from San Bernardino to the California border was windy (although the weather at the contest site was good both days), so the flight was cancelled. Bill did fly the great bird on Sunday for us, and it flew very smoothly and only at half-power, yet. If the fellows who build 1/4-scale think they are building big, think what twice-size would be? Let's see . . . a Piper Cub or Aeronca C3 would have a 72 foot span, power would be say, using the cube rule, about 2500 hp . . . might get an Allison from somewhere, hmmmm. By the way, Sal Taibi tells me that plans are available for the twice-size Powerhouse, if you're interested.

All in all, it was a great contest, and I think I have finally figured out my .020 Playboy, as I made all three official flights for the first time and hope to be more competitive next time. As I said before, the people are great up there, always ready to help you out with a problem. Many thanks to Bob Haight for running the contest, and to the whole Vamps club for making it a weekend to remember!

RESULTS

30 SECOND ANTIQUE
1) Bill Holt (Powerhouse) 11:22
2) Don Weitz (Clipper) 11:19
3) Bob Oslan (Clipper) 9:03

AB CABIN
1) Nicki Fechner (So Long) 8:31
2) Larry Scharz (Dodger) 8:13
3) Bill Holt (Brigadier) 7:23

C CABIN
1) Mark Fechner (Buzzard) 13:03
2) Don Weitz (Clipper) 11:41
3) Fred Caballero (Long Cabin) . . . 7:34

A-B PYLON
1) Rudy Calvo (Interceptor) 13:54
2) Don Weitz (Zipper) 13:15
3) Jerry Sandford (Zipper) 11:57

C PYLON
1) Mark Fechner (Playboy) 14:57
2) Leon Nadolski (Sailplane) 13:56
3) Don Weitz (Playboy) 13:50

TEXACO
1) Cliff Silva (Roll) 17:25
2) Bud Morgan (Dallaire) 15:07
3) Jerry Sandford (37 Texaco) 9:37

SCALE
1) Cliff Silva (8'-Corbin)
2) Bud McNorgan (4'-Corbin)
3) Sal Taibi (4'-Corbin)

020 REPLICA
1) Abe Gallas (Strato Streak) . . . . . 21:00 (8 Maxes)
2) Bob Oslan (Strato Streak) . . . . . 14:35 (4 Maxes)
3) Sal Taibi (Playboy) 8:57

THE ROCK
1) Jerry Sandford 35:39
2) Lee Rose 24:45
3) Fred Caballero 24:15

AMA 1/2A-A
1) Carter Watts (Pilford Pearl) . . . 13:04
2) Wes Weathers (Starduster) 12:06
3) Keith Whitley (Time Machine) 11:53

AMA B-C-D
1) Sal Taibi (Starduster 900) 34:27
2) Carter Watts (Pilford Pearl) . . . 24:12
3) Lee Rose (Sundancer) 10:54

HIGH TIME
Don Weitz
Bill Holt
Mark Fechner

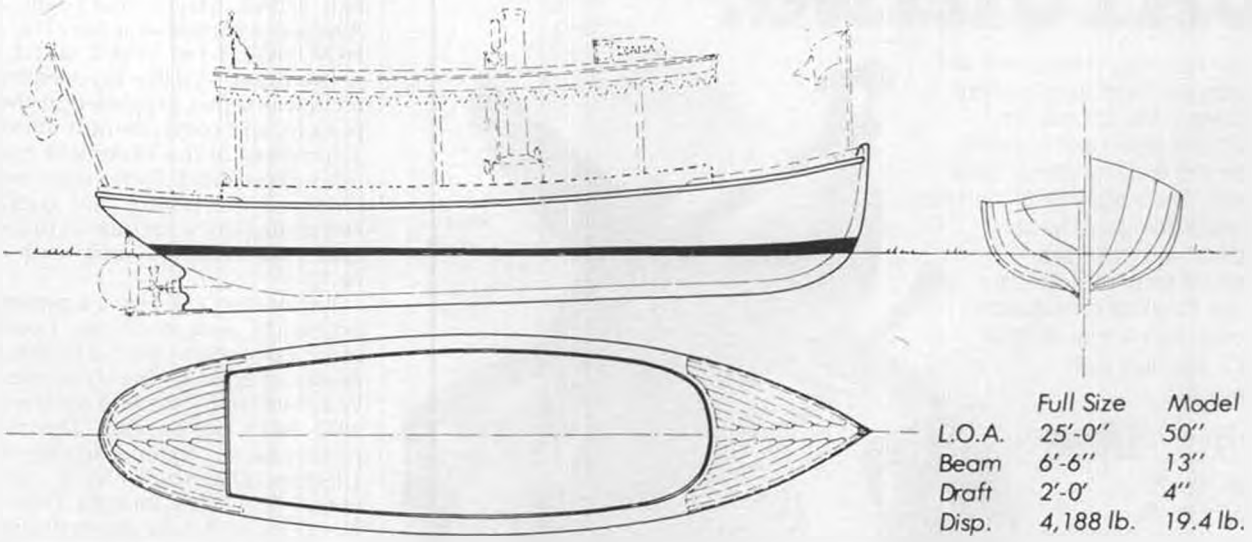
●

F/F . . . . . *Continued from page 65*

consuming and expensive operation. With the boxes, I now found that all I needed was some relatively inexpensive 18-inch deep steel shelving on which to place the boxes. No further protection was necessary and they were actually better incarcerated than in the cabinets. The cabinets served their purpose, but were similar to the car trunk . . . I continually seemed to be shuffling various model parts around in efforts to squeeze in another new model or locate items that I had forgotten the storage location of.

Whether packing for a contest or just making a quick trip to the test site before the evening sun went down, the boxed

Weston Farmer's **DIANA**



	Full Size	Model
L.O.A.	25'-0"	50"
Beam	6'-6"	13"
Draft	2'-0'	4"
Disp.	4,188 lb.	19.4 lb.

Now this famous Gay Nineties steam launch, featured in the May, 1976 Live Steam, is here in exquisite large miniature.

Diana, unlike a tugboat model, shows off her boiler, engine, and auxiliaries from every angle, and her nimble, dry hull rides over, not through, a river chop.

The hand-laid construction is the finest possible; both the hull and the deck are of stiffened fiberglass-epoxy laminate, with the colors molded in; the presented surfaces are of highest polish and ripple-free fairness. The hull topsides show plank seams, the stem rabbet line, and the upper and lower margins of the boottop all sharply incised. The deck even shows narrow planks bent into a nibbed kingplank. A copper shaft alley is molded into place at the proper angle, ready for a stuffing box.

To provide the intra-club variety that everyone prefers, the hulls are offered in White, Eggshell, Deep Country Red, Dark Green, Platinum Gray, and Black. Decks are Boston Buff.

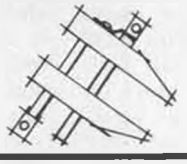
Because these boats are made to order, by hand, shipment must be on a reservation basis. Please follow these instructions to order:

1. Write us a reservation letter requesting your **Diana** hull and deck, specifying your hull color. If your hull is to be White or Eggshell, **send no money;** if it is to be any of the other colors, you must advance $20.00 as a deposit.
2. When we have your reservation, we will assign you a hull number, send you a deposit receipt for any advance, and advise you of the approximate shipping date.
3. About two weeks before that date, we will notify you that your hull is in work, and ask for your remittance of $135.00 plus $11.75 for packing and shipping. With your remittance here, your boat will be shipped the day it is finished.

Each hull will receive a serial number, and a file record will be maintained of all owners' names and addresses. After the first twenty hulls are shipped, we will publish free and mail to all owners a **Model Diana Association Roster**, arranged by states so that builders can get together over their work and, later, for regattas. Each time the number of owners grows by ten percent, we will forward an updated roster, until there are two hundred hulls out. (At that point, someone else can take over!)

Further, since all builders will start even, with bare hulls and decks, we intend to offer a yearly award, with publicity in our corner of **Model Builder**, in each of three categories: Scale Detail, Mechanical Sophistication, and Unclassifiable Ingenuity.

We have all the copper to build boilers with, fiberglass steam line lagging, metal darkening liquids, small brass wire, and the elegant Conger train crew lantern. Send a dollar for our stock list; it will be credited against the amount of your first order.



the Steamfitter

Specialties To The Live Steam Trade

R.D. 3, Box 326 M
Chestertown, Maryland 21620

models reduced this chore to a fraction of the packing time required for unprotected model parts. I soon quit worrying altogether as to what might be going on in the car trunk or in the truck-bed walls while bouncing over rough roads or slamming on the brakes to avoid some unpredictable driver. I don't go to model meets and "leave the stab at home" anymore, either!

Before you pick up hammer and saw, I should offer the following hints: Plan your project well! Make a box to fit your models; don't throw a box together, then expect your models to fit inside. Do not make your box too heavy! Should you cement the parts together, as well as utilizing a few well-placed wire brads or small nails, you will be amazed at the strength of your container. You can probably use much thinner and lighter weight sheet stock than you may realize. Quarter-inch plywood is entirely too heavy! *Never build a box for a single model if you can figure out a way to add a few more with just a slight increase in dimensions. Finally, you must consider your available cargo space for optimum shapes and maximum dimensions as well, or you may never be able to leave your garage with your "Trojan Horse".*

THIS MONTH'S THREE VIEW: "TOOTHPICKS"

The latest issue of the CIA Informer (c/o Harry Murphy, 3824 Oakwood Blvd., Anderson, IN 46011) was a real winner. In addition to Harry's article on model boxes, there was a 3-view of Gil Morris' 1/2A winner at the Lake Charles Nats of 1978. Here's Gil's description of the model:

"TOOTHPICKS" is the descendant of an experimental 580 sq. in. Class C original design. This model's wing and stab were reinforced with 2 mil music wire on the skin, which was silkspan with a mylar overlay. The fuselage incorporated the same truss-type construction indicated here in the 1/2A version; the idea being that a low moment of inertia was desirable for transition and glide; a relatively low center of lateral area to resist spin. This test model utilized a Fox single bypass .36 which kept the flying weight at a minimum. Like its daddy, TOOTHPICKS is quite consistent and surprisingly durable for its lightweight construction.

The specs are as follows: Wing: 1/16 sheet ribs, 1/32 sheet false ribs, T-spar with 1/16 sheet top, 1/8 washin right panel, 1/8 washout left panel, 1/16 washout both tips. Covering is 1/2 mil mylar, paint overspray (sandpaper-like finish) on front 1/3 of wing and stab for turbulation. Fuselage . . . 1/8 x 3/16 longerons, 1/16 sheet on forward part with the top cross-grained for pylon strength, which is built-up with 1/32 sheet covering, 1/8 ply firewall Titebonded to a 2-inch solid balsa block on the front. A Competition Models Tank-mount with the tank portion machined off is utilized to hang on a souped-up TD .049. Balance point is 65%.

The engine is mounted with 5 degrees downthrust and 1.5 degrees left thrust. Prop is 6-3 Cox gray. Add 1/16 right rudder and fly corkscrew right under power. Tilt stab for loose left glide. For best results, fly the model in thermals."

All in all, not just your average "looka-like 1/2A". Maybe that's why Model Aviation *will publish it later this year.*

NORTHWEST FAI SYMPOSIUM, Part 2

This month, I'd like to cover the more technical topics presented at the Symposium, and conclude next month with a summary of the Wakefield presentations (Wakefield fliers, take heart . . . there will be photos and sketches of Norm Beattie's torque-actuated VIT system for Wakes . . . well worth waiting for!).

Jim Walters and I gave a presentation on Nordic wing structures. I presented some calculations on the torsional stiffnesses of typical wing structures, using W.F. McCombs' method outlined in the 1977 NFFS Symposium. The torsional rigidity factor, K, for a double-covered *Ultimate Dragmaster* wing came out about 7. A 1/20 sheeted D-Box gave K = 15 to 20. A fully sheeted wing (1/20 sheet) gave K = 17 to 22, but the stiffness/weight ratio for this structure wasn't as good as for a D-Box to 40% of the airfoil. One interesting fact was that the tissue adds a significant portion of the total value of K. Also, C-grain sheeting has about twice the torsional stiffness of A-grain. I also made some preliminary calculations for a composite fully-sheeted/D-Box wing as part of a paper for this year's Symposium.

Jim reviewed the factors determining torsional stiffness. Best results are obtained when you enclose the maximum cross-sectional area per amount of structure. So, the torsion box should be at the thickest portion of the airfoil. With thin, undercambered airfoils, the thickest portion is forward, hence the D-Box (on full-size aircraft, the torsion box is more near the center of the wing, because of the type airfoils used). It is important to close off the rear of the D-Box with webs . . . a tube loses 99% of its torsional stiffness if there is a lengthwise slot. Jim prefers to carry bending loads in the main spar and spruce LE. His latest model features a carbon-fiber (graphite) reinforced ply/spruce spar for that reason.

Jim Thornberry presented some results of tests conducted to determine the height gain obtained during a Nordic zoom launch. Results were not too encouraging to those who believed in the Russian 50-foot zoom myth. Finding the most feasible, precise method of measuring height gain with a Nordic is not easy. At 164 feet, a 10 ft. difference in altitude is only 6% of the total. The *net* altitude gain should be measured; a 30 ft. zoom may look impressive, but if it requires pulling in 15 ft. of line to do it, you've gained only 15 feet and probably lost some consistency.

Jim tried the method used by model rocket fliers, triangulating from 2 optical tracking scopes on a measured base line.

BUD NOSEN MODELS

INCORPORATED

BOX 105, TWO HARBORS, MINNESOTA 55616

All kits feature all wood construction, fast assembly, huge rolled plans, assembly instructions, machine and die cut parts, all necessary hardware and much, much more. Designed for .60 engines on up. Write for our illustrated catalog—50¢.

9' PIPER J-3 CUB

Standoff Scale Formed ABS cowl Kit - **$119.95**

3 or 4 Channels Flys like a trainer Kit - **$99.95**

9' CHAMPION CITABRIA

9' AERONCA "CHAMP"

1/4 size Standoff scale 3 or 4 Channels Kit - **$99.95**

3 or 4 Channels No foam or plastic Kit - **$79.95**

102" BUD NOSEN TRAINER

8' CURTISS JN-4D JENNY

Standoff scale 4 Channels required Kit- **$129.95**

1/3 size Standoff scale 4 Channels required Kit - **$129.95**

8' 1933 GERE SPORT

9' "MR. MULLIGAN"

1/4 size Standoff scale 3 or 4 Channels Kit - **$139.95**

1/4 size Standoff scale Molded cowls Kit - **$169.95**

10' CESSNA 310 TWIN

OVERSEAS DISTRIBUTORS

AUSTRALIA
EK Logictrol Australia
44 Macquarie Road
Earlwood 2206
Sydney, Australia

SWITZERLAND
Blue Max
Modellflug-Technik AG
Alte Landstrasse 122
CH-8800 Thalwil Switzerland

SOUTH AFRICA
Radio Control World
202/4 Oceana House
Lower Burg St.
Capetown 8001 So. Africa

CANADA
John Klassen Hobby Central
400 Cuyler Street
Thunder Bay, Ontario

The altitudes calculated by each tracker must compare within 10% for a good tracking to be declared and the trackings averaged. The experienced model rocketeers said that Nordics were more difficult to track than rockets. This method only measures the apex of the zoom . . . some of the highest measured zooms were those where the model recovered poorly thereafter, with net loss of altitude. Using this method, Jim gained an average of 23.5 ft. on the 2 good zooms that were measured.

He also tried to avoid the complications of having so many people man the trackers by timing the descent of the glider after a quick (5-10 sec.) DT. Once DT'd, the glider falls at an essentially constant rate. The extra time to descend after a zoom represents the net zoom altitude gain. Using this method, Jim obtained an average 13 ft. net gain. His conclusion was that not even close to a 50 ft. zoom seems feasible.

APPLYING MASS PRODUCTION TECHNIQUES TO YOUR OWN WORKSHOP

I spoke on this topic at the NW FAI Symposium, then came home to take some photos illustrating the techniques RM Enterprises uses in its kits. We use a bandsaw (Sears Craftsman) for our production cutting, but those of you who have a Dremel jigsaw can adapt the same ideas. A Dremel is limited only by the depth of stack allowed . . . 27 ribs 1/16 inch thick or 18 ribs of 3/32 sheet are about the most that it will cut.

The first step is to make an accurate tracing of the part to be cut out, on drafting vellum (Dietzgen Clearprint). Make your parts layout on a 3 inch wide rectangle — length will be to suit your chord. Your rib blanks are best made of 3 inch stock, since the stack will not wobble as much.

Attach your tracing to the top rib blank with a removable spray cement. We have used 3M Labeling Adhesive, which is hard to locate, and are now using 3M Spra-Mount, which works a little better. In a pinch, you could use rubber cement, but that's a little harder to remove when you're done. The Spra-Mount (not to be confused with Spra-Ment) peels off easily, if you let it dry for about 30 seconds before pressing down the pattern. If pieces of paper stick, you can remove them with dope or lacquer thinner.

Get your rib blanks together (lightest blanks at the tips), and hold together with long pins, driven in from both top and bottom. Any good stationery store will order long "bank pins" for you. A half-pound is very reasonable and lasts a long time. For the size stacks the Dremel takes, you can use regular sewing pins. If your stack is shallow, pin from the bottom only.

Now run your stacks through the saw. Cut in only one direction (usually from LE to TE) to minimize taper. Cut a little oversize, so some of the line is still showing. This will allow a little sanding with a large flat block to smooth out irregularities and get rid of the fuzzies.

Cut the top camber, then cut off at LE and TE. Spar notches are done on the saw, too. Just run the blade into the notches drawn on pattern, and "nibble" out the wood in the notches.

We use a holding block cut to shape of the top camber, with a "spar" to engage the notches in the stack while cutting the bottom camber. A swipe of the sanding block applied to the bottom, and you've got a set of ribs in far less time than it takes to tell. Using this method, it's just as easy to cut out two sets of ribs for a given design as it would be to do one set with a razor blade and plywood template. The stack-cut ribs will be more uniform, too.

MYSTERY MODEL OF MONTH

While researching applicable designs for the Nostalgia event, I kept running across Wakefields. Not the puny, 40 gram models we fly today, but models that were so potent that you couldn't fly a Wakefield in the Unlimited Rubber event at the Nats! Those were the days when Wakefield contests lasted for only 3 rounds, flown at sunrise and sunset, to avoid thermals. Models were light and fully packed with up to 6 oz. of rubber in a 3 oz. airframe.

This month's mystery model was designed to fly under these conditions. It set some lasting design trends, with its long fuselage, aft CG (2 inches behind TE of wing!). This one should be easy . . . who's going to be first to identify it correctly and win a sub to **Model Builder**? (Mail it to the **MB** office, not to me!)

MYSTERY MODEL WINNERS

The first correct answer to December 1978's Mystery Model came from Irv Stein, North Miami Beach, Florida. It was Michael Gaster's "Gastove", winner of the 1955 FAI World Championships for England.

January's M/M claims the rare distinction of remaining a mystery . . . up to now. It was the "Stiletto II", by Bob Stalick, F/F editor for **Model Builder** *up until the end of the last year. Fame is so fleeting. . .*

Vic Cunnyngham, Jr., Covina, California, who has created a few famous designs of his own, beat everyone to the punch, even with the postal zone handicap, and correctly pegged the February M/M as Hal Cover's "Blue Flame", published in October 1957 Flying Models.

Tom Hutchinson's reference to the March Mystery Model designer's "fading from sight since the model was published" brought several notes of disagreement from readers. Phil Kraft may have vanished from free flight, but he certainly hasn't left the modeling scene! Of course, the model is his "Upstart", which was published in the October '57 issue of M.A.N. *Another Floridian, Bob Schuettler, from Lake Worth, was the first to answer correctly. Surprisingly, other guesses included Stan Hill's "Amazon" and Toshi*

Continued on page 84

"New"

PIPER TRI-PACER

(44" Span)

LOOK FOR MONEY SAVING OFFER WHEN YOU BUY THE NEW STERLING 44" TRI-PACER.

Kit FS37

Another Great R/C Kit

Scale 1½" = 1'
Wing Span-44"
For .049-.10 Engines

$29.95

A Beautiful New 44" Tri-Pacer developed for 2 to 4 channel R/C, expertly designed featuring accurately die-cut Balsa, precisely vacuum-formed parts, Hardware and detailed Plans and Instructions.

Sterling MODELS INC.

PHILA PA 19134 U.S.A.

☐ Catalog of entire line of airplane control line model kits R C scale and Trainer kits, boat model kits, accessories etc 50¢ enclosed
☐ "Secrets of Model Airplane Building" including design construction covering, finishing, flying, adjusting control systems etc 25¢ enclosed
☐ "Secrets of Control Line and Carrier Flying" including preflight soloing, stunting, Carrier rules and regulations Carrier flying hints and control line installation instructions 25¢ enclosed
No checks Only U S money orders or currency accepted

STERLING MODELS • 3620 G ST. PHILA. PA. 19134
If no dealer available direct orders accepted — with 10% additional charge for handling and shipping (60¢ minimum in U S $1 25 minimum outside U S)

Name _____

Address _____ City _____ State _____ Zip _____

WELCOME TO TOWER

WHO IS TOWER HOBBIES ? Tower Hobbies is the largest, finest, fastest, friendliest, and the most progressive Radio Control Mail Order Company in the United States. Tower Hobbies is not a little hobby shop that sells mail order as a sideline, but rather we are a highly specialized and efficient volume merchandiser. Tower's quantity purchasing and efficient order processing add up to fantastic savings and excellent service for our more than 50,000 active customers. Very simply, Tower Hobbies is the only RC supply company you'll ever need!

REPUTATION - Tower Hobbies has been courteously and honestly supplying modelers since 1971. Tower is a reliable company that you can depend upon for excellent quality, low prices, and outstanding service. Don't take a chance dealing with those little "here today - gone tomorrow" companies when you can deal with the best at no extra cost. Tower Hobbies is NUMBER ONE because we know that you are the most important part of our business. And that is something we never have nor ever will forget!

DISCOUNT PRICES - Tower Hobbies is the most competitive company in the hobby. Your hobby supplies cost you less from Tower because our volume purchasing and sales allow us to work closer than anyone else in the business. We would rather sell 10 radios at $10.00 profit each than to sell one radio at $100.00 profit - and that means super savings for you! Tower sells only brand new, brand name merchandise and we sell it at super discounts. Can you think of any reason why you should pay more for exactly the same product elsewhere?

FAST SERVICE - Tower Hobbies is the home of fast service! As soon as we receive your mail order or take your order over the phone we begin to process it immediately. We check your file (or make a new one for new customers), check over your order, computer process it, check it again, pick it, pack it, and then ship it RIGHT AWAY! You receive exactly what you ordered in a carefully wrapped package that is courteously delivered by United Parcel Service (or Parcel Post if requested) within 1 to 5 days depending upon where you live. You never have to leave home - no heavy traffic, stuffy crowds, or discourteous salespeople when you deal with Tower Hobbies!

TOLL FREE PHONES - Tower Hobbies was the first to offer Toll Free" 800 " phone service to its customers. With the Toll Free lines you can call Tower at no charge to yourself to place orders, check on availabilities, and check current prices. Your telephone is a straight connection to the largest and finest R/C inventory in the United States - it's fast, easy, and free of charge.

COMPUTER POWER - Tower was the first and as far as we know still the only mail order company in the hobby to keep track of inventory, remember backorders, and process all orders with a computer. This enables us to keep errors to an absolute minimum which means that you don't have the headache of receiving wrong merchandise, being billed incorrectly, or having your backorders forgotten or misplaced. Tower processes your order quickly and correctly this time, next time, and everytime!

EXTENSIVE INVENTORY - Tower Hobbies has the largest and most complete inventory of radio controlled model airplane supplies and related accessories in the United States. Tower carries over 145 manufacturers lines including:Airborne, Ace, Aerotrend, A.F.I., Air-Forms, Airtronics, A-Justo-Jig, Ambroid, Andrews, American RC Helicopters, Associated, Austin Craft, B&D, Badger, Banner, Bolink, Bridi, Cass, C.B. Associates, Corefilm, Coverite, Cox, Craft-Air, Custom Retracts, D&R, Daca, D.A. Enterprises, Devcon, Dodgson, Dremel, Du-Bro, Dumas, Econokote, Edson, Enya, Eveready, Exhib'air, Fliteglas, Fox, Fusite, Futaba, Gas Model Products, Gee Bee, Goldberg, G.M.C. Models, Grish, Hallco, HB, Hobbypoxy, Hot Stuff, House of Balsa, Hobby Products, Jemco, Jensen, Jet Hangar Hobbies, K&B, K&S, Kavan, Kraft, L&L, Lanier, Latrax, Leisure, L.R. Taylor, Mark's Models, M.E.N., Microflame, Michigan Hobby Hangar, Mile High Models, Midwest, Milman, Miller, Model Dynamics, Monokote, M.R.C., Steve Muck's, Bud Nosen, Octura, Ohio Superstar, OPS, Orline, O.S. Max, Pactra Aerogloss, Panavise, Pacer, Peerless, Perry, Pica, Powr-Mite, Prather, Proctor, Power Pacer, Quadra, R&S, R/C Buyers Guide, RCM, Rocket City, Rev-Up, Robart, Rhom, Rossi, Royal, RTC Models, S&O, Sanwa, Schluter Helicopters, Scozzi, Sealector, Semco, Sig, Simmons, Skyglas, Slimline, Solarfilm, Soarcraft, Sonic Systems, Southwestern, Span Aero Products, Spickler, Su-Pr-Line, Southern RC, Sta-Brite, Stafford, Sterling, Supertigre, Sonic Tronics, Sullivan, Sureflite, Tarno Aero Engines, Tatone, Titebond, Top Flite, Tower Hobbies, Trexler, Universal, V.K., Vortac, Webra, Williams Bros., Wing Mfg., Wilhold, World Engines, Wescraft, X-Acto, and Zinger!

The front office file area is a busy place! Over 50,000 active customer files fill up 100 file cabinets. Can we make a file for you?

The warehouse final checking and packing area processes over 500 packages each day. You'll enjoy receiving packages from Tower!

Good afternoon - Tower Hobbies! Part of our phone staff answering our Toll Free lines. We want to take your orders, answer questions etc.

Our computer operators enter your order on the terminals. The computer quickly and accurately generates an errorless invoice just for you.

Now where did those rear valve ABC schneurles with Perry pumpers go? Tower has the largest and finest RC inventory selection available.

TOWER HOBBIES

P.O. BOX 778, CHAMPAIGN, IL. 61820 PHONE: (217) 384 - 1010

ILLINOIS TOLL FREE: 800 - 252 - 3336

CONTINENTAL UNITED STATES TOLL FREE: 800 - 637 - 7686

TOWER HOBBIES

P.O. BOX 778 CHAMPAIGN, ILLINOIS 61820

217 - 384 - 1010

CALL TOLL FREE: 800-637-7686

ILLINOIS TOLL FREE: 800-252-3336

THESE SPECIALS ARE GOOD UNTIL THE 15th OF THE MONTH OF THIS ISSUE, ONLY.
ALL SPECIAL PRICES ARE SUBJECT TO CHANGE IF RETAIL PRICES CHANGE DURING SALE PERIOD.

TOP FLITE SEALING IRON — 30% OFF

This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.

RETAIL $19.95 — NOW ONLY $13.98 — MBM313

DREMEL MODEL 381 MOTO–TOOL WITH FULL ACCESSORIES — 41% OFF

The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.

RETAIL $72.95 — NOW ONLY $42.98 — MBM153

MILLER No.2017 SPRAY SET — 40% OFF

Complete set includes a precision built genuine piston type air compressor, 12 ft. air hose, 16G siphon type spray gun & 14G air brush both with open & fine spray nozzles.

RETAIL $77.95 — NOW ONLY $46.78 — MBM228

QUADRA 2 CU. IN. ENGINE — 29% OFF

Develops 2 horsepower! An engine suitable for large models with its scale-like sound and realistic performance. Comes with muffler, mount, and Tillitson pump/carb.

RETAIL $139.95 — NOW ONLY $99.98 — MBM260

DEVCON 5 MINUTE EPOXY IN ECONOMY 9 OZ. SIZE — 36% OFF

Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL $6.25 — NOW ONLY $3.98 — MBM151

DREMEL 572 MOTO SHOP — 36% OFF

This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft. Limit of 1.

RETAIL $94.95 — NOW ONLY $60.98 — MBM154

GOLDBERG FALCON 56 — 40% OFF

This all time best seller is now redesigned with ailerons. 56" span. Uses a .15 - .35 engine, all balsa construction. An excellent trainer.

RETAIL $47.95 — NOW ONLY $28.78 — MBM020

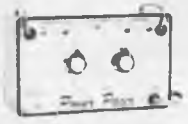
K&B .40 RC ENGINE No. 8011 — 40% OFF

THE MOST POPULAR RC ENGINE EVER MADE!!

Features a unique design for high power; and a Perry carburetor for excellent throttle response and easy adjustment - from a slow smooth idle to a roaring top speed.

RETAIL $72.50 — NOW ONLY $43.48 — MBM200

POWER PACER BATTERY TESTER — 22% OFF



A new ni-cad battery tester, cycler, and charger. Works great!

RETAIL $59.95 — NOW ONLY $46.98

MBM259 — 9.6 volt

MBM024 — 6 volt

GOLDBERG SKYLARK 56 MK II — 40% OFF

Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa construction. New improved design!

RETAIL $49.95 — NOW ONLY $29.98 — MBM181

SULLIVAN ELECTRIC STARTERS

Hi - torque, hi - rpm 12 v. starters. These heavy duty, long life starters develop more torque and rpm's than any other starters!

RETAIL $38.95 — NOW ONLY $23.98 — MBM305

Dlx. model has V-groove in drive cone for starter belt. Starts copters, airplanes, boats, and cars.

RETAIL $41.95 — NOW ONLY $27.28 — MBM306

BOLINK ELECTRIC CAR

This 2 ch. 1/12 scale electric car comes already assembled with .05 motor, nicads, & charger. Goes over 25 miles per hour!

RETAIL $99.95 — NOW ONLY $79.98 — MBM118

Bolink kit for above car - must be assembled.

RETAIL $79.95 — NOW ONLY $59.98 — MBM117

CRAFT-AIR FIELD BOX — 33% OFF

It's ready to use, not a kit, made of lightweight indestructible polyethelene. 22" long & holds everything. A SUPER BUY!

RETAIL $29.95 — NOW ONLY $19.98 — MBM148

CRAFT-AIR HI - START HEAVY DUTY — 35% OFF

Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.

RETAIL $42.95 — NOW ONLY $27.98 — MBM141

AIRTRONICS OLYMPIC II — 30% OFF

This 99.9" span trainer is capable of contest competition. All balsa with pre-cut parts. An excellent quality sailplane.

RETAIL $49.95 — NOW ONLY $34.98 — MBM106

S & O BATTERY TESTER — 33% OFF

Tests 8 cell transmitter and 4 cell receiver nicad packs under load. Extremely accurate scales. Detects bad cells and/or abnormal current drain.

RETAIL $29.95 — NOW ONLY $19.98 — MBM272

TOWER

P.O. BOX 778
CHAMPAIGN, ILLINOIS 61820

THESE SPECIALS ARE GOOD UNTIL THE 15th OF THE MONTH OF THIS ISSUE, ONLY.
ALL SPECIAL PRICES ARE SUBJECT TO CHANGE IF RETAIL PRICES CHANGE DURING SALE PERIOD.

HOW TO ORDER HOW TO ORDER HOW TO ORDER HOW TO ORDER HOW TO ORDER

BY MAIL ORDER

If you have a Tower order form, please use it. If not, then just use any piece of paper or stationery. Write down all of the items that you want along with their special stock numbers and prices. Total them up (Illinois residents add 5% sales tax) and add $2.00 for postage, handling, and full insurance, to obtain the grand total. Obtain a money order, certified check, bank check, or write a personal check for the grand total amount (personal checks may be delayed to allow for clearance). Foreign orders add $10.00 (excess will be refunded with order). Date of postmark determines special pericd eligibility. Send your order along with full payment to: TOWER HOBBIES, P.O. BOX 778, CHAMPAIGN, ILLINOIS 61820.

BY TOLL FREE PHONES

When you place your order over the phone we will ship it to you C.O.D., and you pay for it when it's delivered to your door. When you phone in your order, please have the stock numbers written down ready to give to the order taker.

Continental United States: **800 - 637 - 7686**

Illinois Residents Only: **800 - 252 - 3336**

The "800" WATS lines are open weekdays from 9:00 A.M. to 5:00 P.M., Monday through Thursday evenings 5:00 P.M. to 9:00 P.M., and 10:00 A. M. to 5:00 P.M. on Saturdays. Closed Friday evenings and Sunday.

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
MBM101	Ace 'Ace High' Glider	$19.95	$12.38
MBM105	Airtronics Aquila	74.95	52.48
MBM106	Airtronics Olympic II	49.95	34.98
MBM107	A-Justo-Jig Wing & Fuse Jig	59.95	39.98
MBM108	Andrews Arc-1 S-Ray	34.95	19.98
MBM109	Andrews Arc-2 H-Ray	39.95	23.98
MBM339	Andrews Aeromaster Too	74.95	51.98
	American RC Helicopters	Call For Low Prices	
MBM111	Associated RC100 Car Kit	125.00	87.48
MBM112	Associated RC200 Car Kit	195.00	119.98
MBM113	Associated 6-Cell Car Kit w/o Body	102.00	69.98
MBM114	Badger 200-1 Air Brush Kit	32.95	21.38
MBM115	Badger 200-3 Deluxe Kit	42.95	27.88
MBM116	Badger 180-1 Compressor	85.00	59.48
MBM117	Bolink 6-Cell Car Kit	79.95	59.98
MBM118	Bolink 6-Cell Electric Car	99.95	79.98
MBM119	Bridl Soar Birdy Glider	19.95	13.58
MBM121	Bridl Sun Fli 4-20	29.95	20.38
MBM123	Bridl RCM Trainer 40	54.95	37.38
MBM125	Bridl Dirty Birdy 40 - wood	59.95	40.78
MBM126	Bridl RCM Trainer 60	62.95	42.78
MBM127	Bridl Super Kaos 60	69.95	47.58
MBM130	Bridl UFO - fiberglass	129.95	93.58
MBM131	Bridl ¼ Scale Rearwin Speedster	129.95	89.98
MBM340	Bridl Deception	89.95	61.18
MBM132	Coverite Balsarite 8 oz	3.20	1.98
MBM133	Coverite Glaskote ½pt	2.95	1.98
MBM134	Cox Tee Dee .049 Engine	24.95	15.48
MBM135	Cox Tee Dee .09 Engine	26.95	17.48
MBM137	Cox RTF Cub w/engine & radio	99.95	69.98
MBM138	Cox RTF Cessna Centurion	64.95	45.48
MBM139	Cox RTF Sportavia Trainer	84.95	59.48
MBM141	Craft-Air H.D. Hi-Start	42.95	27.98
MBM142	Craft-Air Drifter II	19.95	13.98
MBM144	Craft-Air Sailaire	139.95	83.98
MBM145	Craft-Air Viking MK I Sailplane	79.95	49.98
MBM146	Craft-Air Butterfly II	49.95	32.48
MBM148	Craft-Air Field Box	29.95	19.98
MBM149	DAE Series IV Power Panel	34.95	22.48
MBM151	Devcon 5 min. Epoxy-9 oz	6.25	3.98
MBM152	Dremel 210 Drill Press	23.95	15.98
MBM153	Dremel 381 Moto Tool Kit	72.95	42.98
MBM154	Dremel 572 Deluxe Moto-Shop	94.95	60.98
MBM155	Dremel 580 Table Saw	99.95	60.98
MBM156	Dubro Lg. Nylon Hinges (15)	2.49	1.78
MBM157	Dubro Flex Cable - 20"	1.49	.98
MBM158	Dubro Kwik Fill Fuel Pump	10.98	6.98
MBM159	Dubro No. 203 Kwik-Switch Mount	1.75	1.28
MBM160	Dubro Kwik-Hinge Slotter	1.95	1.38
MBM161	Dubro Muff-L-Air II	8.95	6.28
MBM162	Dumas Big Swamp Buggy	35.00	22.38
MBM163	Dumas Atlas Van Lines U-1	50.00	32.48
MBM164	Dumas Competition DV60 - glass	100.00	63.98
MBM165	Dumas Hot Shot 24" Tunnelhull	32.00	20.78
MBM166	Dumas Hot Shot 21 - glass	70.00	45.48
MBM167	Edson Adjustable Motor Mount	6.95	5.58
	Enya Engines	Call For Low Prices	
MBM168	Fox .15 RC Schneurle	37.95	22.78
MBM169	Fox .19 RC Engine	36.95	20.98
MBM170	Fox .25 RC Engine	36.95	20.98
MBM171	Fox .36 RC Engine	39.95	22.78
MBM172	Fox .40 RC Schneurle	45.95	27.58
MBM174	Fox .45 RC Schneurle BB	$64.95	$38.98
MBM176	Fox .60 RC Hawk Engine	84.95	50.98
MBM181	Goldberg Skylark 56 MK II	49.95	29.98
MBM182	Goldberg Skylane 62	64.95	38.98
MBM183	Goldberg Senior Falcon	64.95	38.98
MBM184	Goldberg Handi-Tote	16.95	11.88
MBM185	HB .12 RC w/Muffler	39.87	27.88
MBM186	HB .15 RC w/Muffler	43.23	29.98
MBM187	HB .25 RC w/Muffler	56.00	40.88
MBM188	HB .40 RC	69.44	48.58
MBM189	HB .50 RC	76.27	53.38
MBM190	HB .40 RC PDP	84.34	59.98
MBM191	HB .61 RC PDP	119.26	83.48
MBM192	Hobbypoxy Formula 2 Epoxy-8 oz	4.00	2.58
MBM193	Hot Stuff Adhesive .5 oz	3.95	2.38
MBM194	House of Balsa P-51D (.29 to .40)	64.95	44.98
MBM195	Jemco P-51 Mustang	64.95	45.48
MBM196	Jemco AT-6 Texan	64.95	43.88
MBM197	Jemco F4U-1A Corsair	79.95	55.98
MBM198	Jensen Das Ugly Stick	69.50	44.98
MBM200	K&B .40 RC Engine	72.50	43.48
MBM201	K&B .40 RC Pressurized	105.00	62.98
MBM203	K&B .61 RC w/Muffler	96.95	57.88
MBM204	K&B .61 RC w/Muff. and Pump	125.00	74.98
MBM205	K&B .21 Outboard Marine	99.50	59.98
MBM206	K&B .21 RC Inboard Marine	69.50	41.68
MBM207	K&B .40 RC Sport Marine	82.50	49.48
MBM208	L&L On-Board Ignition System	19.95	13.98
MBM209	Lanier Transit	46.50	29.78
MBM210	Lanier Caprice	73.50	45.58
MBM211	Lanier Jester II	73.50	45.58
MBM212	Latrax Corvette w/Nicads and Radio	152.00	114.98
MBM213	Leisure 1/8 Scale Dune Buggy	199.95	149.98
MBM214	Mark's Models Wanderer 72"	19.95	12.98
MBM215	Mark's Models Bushwacker w/Acces	52.95	31.78
MBM217	MEN Trainer .15-.25	31.95	21.38
MBM218	Microflame 4400 Dlx. Welding Kit	39.95	25.98
MBM220	Midwest RK-40 Axiflo Fan Kit	49.95	34.28
MBM221	Midwest Little Stik	33.95	20.38
MBM222	Midwest Cardinal ARF	32.95	21.38
MBM223	Midwest Super Chipmunk	33.95	21.98
MBM224	Midwest Sweet Stik	42.95	24.78
MBM225	Midwest Strikemaster	69.95	41.98
MBM226	Midwest Attacker	42.95	27.98
MBM227	Midwest Pitts Special	96.00	63.58
MBM228	Miller No. 2017 Spray Set	77.95	44.38
	Monokote Reg. and Trans. Colors	Call For Low Prices	
	Monokote Metallic Colors	Call For Low Prices	
MBM229	MRC RTF Hawk Trainer w/Enya 15	98.00	73.48
MBM233	MRC Porsche 934 Turbo	74.98	45.48
MBM235	MRC FMC Combat Vehicle	84.98	59.98
	Nosen		28% Off Retail
MBM238	Ohio Superstar Softglas - Qt	8.95	6.98
MBM239	OPS .40 RC Marine w/Tuned Pipe	148.00	113.58
MBM240	OPS .65 RC Marine w/Tuned Pipe	219.00	159.98
MBM241	OPS .60 RC Big Red w/Pipe	168.00	124.98
MBM242	Orline Fokker D VII	97.50	68.28
MBM245	O.S. Max .60 FSR RC w/Muffler	129.95	88.98
MBM246	O.S. Max .60 FSR RC Press. w/Muffler	159.95	111.98
MBM247	O.S. Max .60 4 Cycle RC Engine	225.00	149.98
MBM248	Pacer X-30 Adhesive .36 oz	3.50	1.98
MBM249	Pacer Zap Giant .36 oz	3.50	1.98

HOBBIES

PHONE
(217) 384-1010

ILLINOIS TOLL FREE: 800-252-3336
CONTINENTAL UNITED STATES TOLL FREE: 800-637-7686

THESE SPECIALS ARE GOOD UNTIL THE 15th OF THE MONTH OF THIS ISSUE, ONLY.
ALL SPECIAL PRICES ARE SUBJECT TO CHANGE IF RETAIL PRICES CHANGE DURING SALE PERIOD.

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
MBM250	Peerless Pop Buggy	$140.00	$99.98
MBM251	Pica Cessna 182	89.95	59.98
MBM252	Pica Spitfire	79.95	53.58
MBM253	Pica T-288	79.95	53.58
MBM254	Pica Focke Wulf 190	79.95	53.58
MBM255	Pica Waco	79.95	53.58
MBM256	Pica Duelist 2/40	89.95	58.48
MBM259	Power Pacer 9.6 v. Model 300	59.95	46.98
MBM260	Quadra 2 Cu. In. Aircraft Engine	139.95	99.98
MBM262	Robart Incidence Meter	15.95	10.98
MBM263	Robart Super Pumper Mark II	17.95	10.78
MBM264	Robart Auto Mix	9.95	7.48
MBM265	Rhom 2 Gear-Mains	87.00	60.98
MBM266	Rhom 3 Gear-Firewall	125.00	82.98
MBM267	Rhom 3 Gear-Flat Mount	125.00	82.98
MBM268	Royal Photocell Tachometer	39.95	33.98
MBM272	S&O Battery Tester	29.95	19.98
MBM273	Schluter Heli-Boy	Call For Low Price	
MBM274	Sealector Custom Model Iron	25.75	17.28
MBM275	Sig Piper J-3 Cub	44.95	32.38
MBM276	Sig Kadet Trainer	39.95	28.78
MBM277	Sig Kougar	47.50	34.18
MBM278	Sig Smith Miniplane	54.95	39.58
MBM279	Sig Kavalier	44.95	32.38
MBM280	Sig Kiwi	42.50	30.58
MBM281	Sig Skybolt	69.95	50.38
MBM282	Skyglas Phoenix 5	55.00	36.98
MBM283	Skyglas Vertigo II	70.00	45.48
MBM284	Skyglas Phoenix 6	70.00	45.48
MBM285	Slimline Std. Muffler for K&B .35 -.40	9.95	6.98
	Solarfilm Reg. Colors	Call For Low Prices	
MBM288	Southern RC Compensator - glass	89.95	58.48
MBM290	Stafford B-24D Liberator	189.95	129.98
MBM291	Stafford Twin Comanche - balsa	139.95	97.98
MBM292	Stafford Comanche - balsa wing	69.95	45.58
MBM293	Sterling Puddle Jumper	17.95	12.58
MBM294	Sterling Puddle Jumper MK II	41.95	25.98
MBM295	Sterling Fledgling	41.95	26.48
MBM296	Sterling ½A Corsair	31.95	19.48
MBM300	Supertigre .40 RC w/Muffler	72.95	46.88
MBM301	Supertigre .46 RC w/Muffler	74.95	46.88
MBM302	Supertigre X-.45 RC RE Schneurle	84.95	59.98
MBM303	Supertigre X-.60 RC SE Schneurle	125.00	87.48
MBM304	Sonictronics No. 1250 12 v. Fuel Pump	14.95	11.98
MBM305	Sullivan Electric Starter	36.95	23.98
MBM306	Sullivan Deluxe Starter	39.95	27.28
MBM307	Sureflite Skylane 182	39.95	25.98
MBM308	Sureflite All Foam J-3 Cub	39.95	25.98
MBM309	Sureflite ½A J-3 - foam	29.95	19.48
MBM310	Sureflite Spitfire - foam	39.95	25.98
MBM311	Top Flite 10x6 (12) Super Maple	16.20	10.58
MBM312	Top Flite 11x7 (12) Super Maple	18.60	11.98
MBM313	Top Flite Sealing Iron	19.95	13.98
MBM314	Top Flite Heat Gun	29.95	19.98
MBM315	Top Flite Freshman Trainer	47.95	29.18
MBM316	Top Flite Contender	56.95	34.18
MBM317	Top Flite P-51D Mustang	74.95	44.98
MBM318	Top Flite P-40 Warhawk	74.95	44.98
MBM319	Top Flite P-47D Thunderbolt	95.95	57.58
MBM320	Top Flite F4U-1A Corsair	99.95	59.98
MBM321	Tower RC Long Plugs - 6 plugs	7.50	3.88
MBM322	Tower 12 v. Starter Battery - wet	23.95	11.98
MBM323	Tower 12 v. Battery Charger	13.95	6.98
MBM324	Tower 12 v. Gel/Cell Battery	26.95	18.98
MBM325	Tower Rubber Bands ¼Lb. No. 64	1.25	.68
MBM326	Tower Precision No. 11 Blades	.80	.38
MBM327	Tower Display Prop w/Clock	54.95	34.98
MBM329	VK Cherokee	69.95	48.98
MBM330	VK Fokker Triplane	69.95	48.98
	Webra	Call For Low Prices	
MBM331	Wing Mfg. The Love Machine	49.95	27.98
MBM333	X-Acto No. 5083 Deluxe Knife Chest	7.99	5.58
MBM334	X-Acto No. 5087 Knife & Tool Chest	29.95	20.98
MBM335	X-Acto No. 5089 Dlx. Knife & Tool Set	64.50	41.98
MBM336	Zinger Props 9x6 6 each	7.80	5.08
MBM337	Zinger Props 10x6 6 each	8.40	5.48
MBM338	Zinger Props 11x7 6 each	9.60	6.28

Remember, these are only a few of the several thousand different items that Tower Hobbies stocks. If you need an item that doesn't appear in this issue, give us a call to see if we have it. The chances are good that we do. By all means compare our prices before you buy elsewhere; you'll be dollars ahead.

Radio Sale!

MODEL	RETAIL	NOW ONLY	STOCK NUMBER
TOWER HOBBIES	TOWER HOBBIES	TOWER HOBBIES	TOWER HOBBIES
6 Channel w/KPS-14II's	$350.00	$199.98	MBM339
6 Channel w/KPS-15II's	370.00	209.98	MBM340
3 Channel w/KPS-14II's	210.00	119.98	MBM342
KRAFT	KRAFT	KRAFT	KRAFT	KRAFT	KRAFT
KP-2AW (Wheel) w/14IIA's	129.95	88.98	MBM344
KP-2AW (Wheel) w/15IIA's	135.95	92.98	MBM345
KP-2A (2 Stick) w/14IIA's	129.95	88.98	MBM346
KP-2A (2 Stick) w/15IIA's	135.95	92.98	MBM347
KP-2AS (1 Stick) w/14IIA's	129.95	88.98	MBM348
KP-2AS (1 Stick) w/15IIA's	135.95	92.98	MBM349
KP-4A w/KPS-14IIA's	299.95	187.98	MBM350
KP-4A w/KPS-15IIA's	311.95	196.58	MBM351
KP-6A w/KPS-14IIA's	329.95	204.98	MBM352
KP-6A w/KPS15II's	341.95	211.98	MBM353
KP-5C w/14II's or 15II's	375.43	267.98	MBM354
KP-5CS w/14II's or 15II's	375.43	267.98	MBM355
KP-7C w/14II's or 15II's	515.43	367.98	MBM356
KP-7CS w/14II's or 15II's	515.43	367.98	MBM357
KPS-14II Servo	44.95	34.88	MBM358
KPS-15II Servo	44.95	34.88	MBM359
KPS-18 Servo (Super Mini)	54.95	43.98	MBM360
KPS-14IIA Servo	39.95	27.98	MBM361
KPS-15IIA Servo	39.95	27.98	MBM362
FUTABA	FUTABA	FUTABA	FUTABA	FUTABA
FP-2GS	109.95	69.98	MBM363
FP-2F w/S-7's or S-20's	149.95	98.98	MBM364
FP-2F w/S-18's or S-22's	129.95	86.98	MBM365
FP-2E w/S-7's	149.95	98.98	MBM366
FP-2E w/S-22's	129.95	86.98	MBM367
FP-3S w/S-18's	144.95	94.98	MBM368
FP-3S w/S-20's	169.95	109.98	MBM369
FP-3FN w/S-18's or S-22's	219.95	139.98	MBM383
FP-4FN w/S-18's	289.95	179.98	MBM370
FP-4FN w/S-16's or S-20's	319.95	199.98	MBM371
FP-5FN w/S-18's	319.95	204.98	MBM372
FP-5FN w/S-16's or S-20's	359.95	222.98	MBM373
FP-6FN w/S-18's	339.95	209.98	MBM374
FP-6FN w/S-16's or S-20's	369.95	234.98	MBM375
FP-7GN w/S-15's	579.95	369.98	MBM376
S-18 Servo	29.95	22.48	MBM377
S-16 Servo	39.95	29.98	MBM378
S-7 Servo	39.95	29.98	MBM379
MRC	Call For Low, Low Prices!!		
SANWA	SANWA	SANWA	SANWA	SANWA
No. 8020 2 Channel	99.95	69.98	MBM380
No. 8044 4 Channel w/4 Minis	279.95	177.98	MBM381
No. 8054 5 Channel w/4 Minis	299.95	189.98	MBM382

F/F . . . . . *Continued from page 78*

Matsuda's "Zero".

PHOTOS, ANYONE?

If you'd like to see pictures of anyone else in this column besides the usual bunch of Northwest Free Flighters, you'll have to do something about it. Just mail in some usable black-and-white photos (4 x 5 or larger) and I'll be glad to find space for them. (Portraits of *Ultimate Dragmasters Mavericks* and *Zingos* will catch my attention more quickly.)•

C/L . . . . . *Continued from page 55*

Best of all, the tanks worked. They ran pretty consistently for a suction feed system, the 4-ounce capacity would keep you airborne for the full 5 minutes of a match, and it was easy to see how much fuel was in the tank or even if there was loose junk in the tank.

By the way, I'm not sure if this method of mounting this type of tank was really the first time it had been done, but it was an original idea for me (one of few) and I had never seen it done before.

Anyway, a lot of Slow Combat fliers saw the logic in the idea and started using it, no doubt making life a little easier for them. But a few Combat "experts" (hello Howard Rush and others) saw it and said, "Aha, you're using centrifugal force to get fuel pressure, consequently more speed out of your engine. We caught you and will propose rules to void your advantage. Never mind the fact that we rarely fly the event, have never actually tried your tank set up, and cannot seem to grasp the idea that "slow" is only a relative thing."

Most people missed the whole point of the Cheater Slow. In fact, that is exactly why it was called that. The name was a put-down aimed at those claiming I had a cheater design offering some mystical blend of superior horsepower and turning ability.

The truth was that I had a model that was simply easier to build from one end to the other, including the downfall of many Slow Combat fliers, the troublesome tank.

The result was rules proposals about tank location and so on. The one that did eventually pass, and that "did in" the Cheater Slow design, was a rule concerning a minimum 5-inch distance between the engine and the leading edge of the wing. With the engine this far forward, the C.S. (yes, even the initials are a put-down) is nose-heavy.

Now to the funny part of the whole situation. Using the present Slow Combat rules, including the 5-inch rule, it is possible to build a model that will out-fly the now illegal Cheater Slow. I won't go into a construction article here, but the updated Cheater would have a long tail to get the balance right again. Only one fuselage, instead of two, out of each expensive piece of 1/2 by 3 by 36 balsa. The total fuselage assembly would be heavier, wing area has to go up some. How nice; 48 inch leading edge, trailing edge, and spar stock instead of the 36 inch stuff. More ribs, more covering material. Harder to pack in a car. Not as expendable as before. However, it will be very competitive.

What it will *not* be should be obvious. It will *not* be easier or cheaper to build than your average AMA Combat model. It will *not* be slower than models built to earlier rules. It will *not* be a successful model in the hands of the novice, where generally the original Cheater was.

Can't all of us take a look around at the many events that have been loaded down with restrictive rules and see what has happened to them? Who would argue that Slow Rat is now quite sophisticated? How about FAI Team Race, FAI Free Flight events and others?

Another factor to consider is that if Slow Combat is to be an important part of the Combat Scene, and I recognize the fact that in many areas Slow Combat is *the* Combat event, then it will have to be governed by a stable set of rules.

While R/C flying continues to gain in popularity, C/L (evidently) continues to decline slowly but measurably. Is it a coincidence that in each rules cycle C/L has more rules proposals than R/C, and consequently more new rules every time a rulebook is printed?

I personally regard it as more than just coincidence . . . it is an indication that something is wrong. Not just in relation to Slow Combat rules, but to the C/L community's whole approach to C/L flying and the effective promotion of same.

Think about it . . . you are invited to disagree, but better have a damn good argument going for you. •

R/C Pylon . . . *Continued from page 33*

this point then make sure everyone realizes you'll wait the full 90-second period. Also, while it's generally agreed that it's OK to wait a second or two for traffic to clear out of the way, the engines must be running when the flag is dropped, or that particular plane not running is out of the race. Should the condition exist where the engines are all running but a contestant misses the flag or forgot to turn his radio on and then does so, it is generally conceded that as long as he takes off before the other

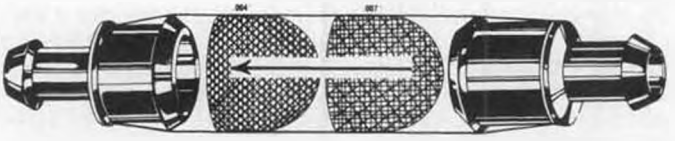
Sullivan PRODUCTS, INC.

535 DAVISVILLE ROAD • WILLOW GROVE, PA. 19090 • USA (215) 659-3900

WHAT'S BETTER THAN A HEAD START?

A ***sure*** start ... and that's just what you get with the Superstar of starters. The genuine, original Sullivan Starter — the one everyone else gave up trying to copy. It has higher torque and RPM's, heavy duty long life motor, "instant-on" strip switch, safety hand guard, and a full two-year guarantee. More than 150,000 modelers start every fun day with it.

THE ULTIMATE . . . A TRUE FILTER SYSTEM



IT DOES SO MUCH MORE . . . YET ACTUALLY COSTS LESS

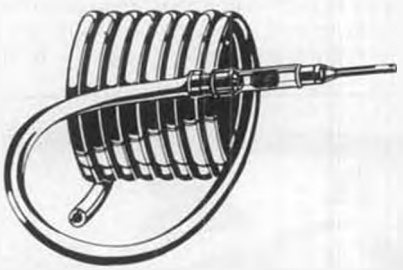
Between tank and engine, insist on
Crap Trap CT-1 ... it's only **$1.15**
Actually less than an ordinary single filter.

Between fuel container and tank, insist on
Crap Trap CT-P ... it's only **$1.25**
Includes the larger fittings you need for this use.

No single filter can equal the double filtration performance of the Sullivan Crap Trap. That's because we use two separate filters — one finer than the other. Larger particles are trapped out of the way in the corners of the front filter and smaller particles fall into a similar trap at the rear filter. And the see-thru Teflon barrel enables you to know for sure if the filters are clean after you back flush. Never trust your valuable model to an enclosed single filter again.

. . . AND NOW THERE'S A FUELER WITH A TRUE FILTER SYSTEM, TOO

NEW!

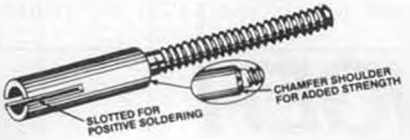


Get the double filtration performance of the Sullivan Crap Trap when you fuel up, too. Two different sized filters keep those particles out of your tank. Fueler comes complete with 4 feet of Sulli-Cone tubing — not 3 feet of lesser quality tubing. And tubing WON'T COLLAPSE when defueling.

Only $2.50

NEW!

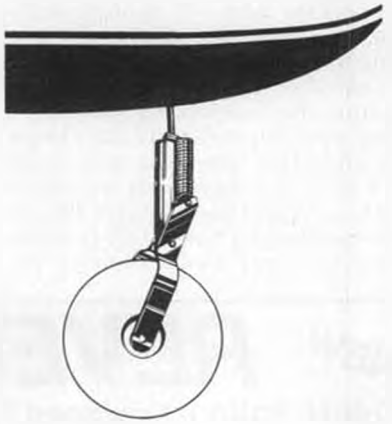
THE ONLY THREADED COUPLER WITH THE SLOT THAT HITS THE SPOT



Just a simple slot, but it takes all the guesswork out of soldering your wire into the coupler. The slot lets you see and be sure that the solder has flowed around the wire in the Sullivan 2/56 Threaded Brass Coupler. Leave it to Matty Sullivan to do those little things that mean so much — that's the Sullivan touch. Insist on the one with the slot — and the chamfer shoulder, too.

BC 6/7 — 4 for $1.00

SMOOOTH LANDINGS



Strong, lightweight, "REALISTIC" landing gears eliminate erratic vibration and feature short fulcrum for ground hugging ability. Caster action. Adjustable pressure. Easy to customize. Sizes to fit wheels from 1¾" to 3".

SINGLE GEAR fits nose or main gear **$3.50 to $4.00**

SET OF 3 for nose and wings **$9.95 to $10.95**

planes round No. 1 pylon, he will be allowed to race. Except for F1 races, most contests use racehorse starts; that is, when the starting flag drops everyone goes at the same time. Should your field not be large enough to safely use this method, you can use the F1 procedure where planes take off approximately one second apart. Generally, the time spacing is such that as soon as the starter can raise the flag and drop it again constitutes the one second interval.

Make sure all pilots and callers know where the black flag areas around the course are . . . no flying over the pits or spectators . . . and *use* the black flag for violations! The first time a flier commits an infraction, give him a warning, the 2nd time flag him out of the race. If there should be a third offense, disqualify him from the race entirely. Safety comes first. The only persons who should be able to call for the Black Flag are the Starter and C.D., or a judge assigned by the C.D. to watch for overflying the pit or spectator area.

Disputes should all be settled at the starting line between the Starter and Fliers. Bearing in mind that the contestants are entitled to a fair shake, any judgement calls should be weighed in favor of the contestants, i.e., should a plane be so close to a pylon that it could either be called as a cut or let go, it is best not to call the cut; the C.D. must back his workers unless it is a clear procedural error or his workers admit to an error.

Except for an F1 contest, your hosting club will be providing fuel and should also have a club member assigned to defueling and refueling the aircraft. Once the planes are refueled, they should not be allowed to leave the ready area. Impress upon the contestants that they are expected to be in the ready area and to promptly move out to the flight line as soon as all planes from the previous heat have landed.

Point totals and times should be posted on a scoreboard immediately after a heat. Point awards are: 1st place, 4 pts.; 2nd place, 3 pts.; 3rd place, 2 pts.; and one point for 4th place . . . in 4-plane races. In three-plane heats use 3,2,1 point awards. Naturally, at the end of the race (generally five rounds is considered minimum) the contestant with the highest point total is the winner. In case of ties, if there isn't a frequency conflict, the tie should be flown off. If this isn't possible, the flier with the lowest heat time in that point group would be declared the winner.

Now, send us those race reports and pictures!! •

Peanut . . . . . *Continued from page 59*

model is tail heavy, you might want to build up the radiator rather than add clay to the nose.

A loop of 1/8-inch well-lubed rubber will provide sufficient power for a light model. Flight is graceful and rather slow. To get scale speed, you will have to add more power and suffer the consequences.

If you want to ROG the model, make two "whiskers" of .010-inch music wire and cement them to the hull at the leading edge of the wing. Make them long enough so the prop will clear the ground.

Test glide over the proverbial long grass. When properly trimmed for glide, put about 100 turns in the motor and hand launch. Trim power flight down and/or side thrust until the model flies like you want it to fly. The model is docile and can be easily trimmed. •

Hannan . . . . . *Continued from page 54*

evident in the United Kingdom that unless one is top level expert and 24-hour day/7-day week committed, then one is outwith pail. This I truly believe is the reason for the decline in model aviation . . . I have seen this happen in other pastimes and hobbies too frequently — where an atmosphere is created which will surface only the cream; then the 'whey' underneath evaporates and only the cream is left. What seems to exist at present is a small group of dedicates who move around in circus from venue to venue (contest sites, w.c.h.) giving the impression that there are more of them than actually exist."

Note that Doug's observations are not confined simply to "Juniors", but to beginners of all ages. Perhaps it is prudent to remember that every expert was once a beginner, and usually was helped along to some degree. The growing acceptance of un-contests and fun-flys would seem to present a resounding confirmation of this line of thinking.

CONGRATULATIONS!

Georges Chaulet, who has been a subscriber to **Model Builder** on several occasions, is known for his experimental work with model rotorcraft (see example in one of our photos). But at home, in France, his real claim to fame is as a much-respected author of children's books. How respected? About 6 million copies worth! Georges, his daughter Helene, and his fictional teenage girl star "Fantomette" were recently saluted in the French magazine *PARENTS*. In the

interview it was mentioned that while Georges enjoys his writing, he always looked forward to his spare-time activities, such as "helicopteres".

GET THE SHAFT

Peck-Polymers is now offering a new line of rubber-driven model propeller shafts, featuring the German style diamond-shaped hooks. This design seems to keep rubber motors centered more effectively than the traditional round variety. The samples we received were of three types. One is specified for Peanuts and other small models. Another is suitable for larger designs; while a third is a full six inches long. The older style with round hooks will continue to be available for those who prefer them, as long as present stocks last.

Also new from Peck-Polymers are lightweight styrene plastic wheels. These are similar to those found in past Peck Peanut kits, but are molded in styrene rather than polypropylene. The advantage of styrene is that it is much easier to glue, in case you care to affix backs to the wheels.

THEM'S FIGHTIN' WORDS!

Florence Bakken sent us some tear sheets from the *San Francisco Examiner* Pictorial Living. In an article devoted to plastic control line models, complete with staged "flight" photos (the strings from which the craft were suspended showed and the "spinning props" were obviously faked). But it was the opening paragraph that really hurt: "The age of balsa wood, dope and rubber band power in model airplanes is as dead as Captain Midnight or the Jimmy Allen Flying Club." Ouch!

BY DIRECT CONTRAST

Alex Toth favored us with a copy of TWA's privately circulated newsletter *Contest*, which presents a brighter view of "old-fashioned" models. Entitled "The return of the rubber-powered plane", it was the work of Bob Whittier. We've taken the liberty of abstracting a few lines: "The planes fly slowly and quietly. And when the sunlight strikes the tissue paper that covers the balsa wood framework, it gives a delicate birdlike appearance. The rubber motors that power them are the ultimate in simplicity. . . . After assembly, a finished model must be adjusted knowledgeably. Many devotees are engineers and pilots whose knowledge of aerodynamics gets a real practical workout when testing a new and perhaps skittish or contrary rubber-powered creation."

The article winds up (you must pardon the expression) with "plugs" for the Flying Aces Club, Society of Antique Modelers, Flightmasters, and AMA. Incidentally, Bob Whittier is the fellow who gave the world the Phineas Pinkham anthology some years ago.

THE SPOKESMAN

Fulton Hungerford, prolific producer of spoked wheels, offers a 1979 catalog of his wares. Ranging in diameters from a 1/2 inch clear up through a whopping 5-1/2 inches, they are manufactured in styles and strengths to suit almost any application from static display models to Mammoth scalers. A set of the creations appear on the Beachey biplane shown in one of our photos this month.

Hungerford goes out on a limb in his catalog with this sentence: "If there is a size not listed that you want, just ask, it may be possible"! A stamped, addressed envelope will bring you his list: FH Wheels, 1770 Lilac Circle, Titusville, FL 32780

EXTRATERRESTRIAL INTELLIGENCE

From the *Aviation Technical News*, a NASA sponsored newsletter from Southeastern Oklahoma State University, edited by A.M. Moore: "NASA Reference Publication 1021 is a bibliography on the search for extraterrestrial intelligence which contains 1,488 references. This is a quote from the introduction of the publication: "Willey Ley and Wernher von Braun note in their book, *The Exploration of Mars*, that the Pierre Guzman Prize of 100,000 franks (sic) was offered by the French Academy of Sciences in 1900 to 'Whoever succeeded in establishing communications with another world OTHER THAN MARS.' " In 1900, communications with supposed intelligent beings on Mars was considered too easy to merit an award!"

ATTENTION COLLECTORS

Ira J. Keeler, 572 Deodara St., Vacaville, CA 95688, offers a number of unusual items for collectors. Included are books, model kits and propellers for scale models. In addition, he is compiling a list of known collectors as a means of improving communication among them.

Of particular interest were Ira's reprints of early model company catalogues, such as those of Ideal, Selley, Hawk, Madison, Jasco, Cleveland, George D. Wanner, and Megow. It is really a trip down nostalgia lane leafing through these old publications. How's about this entry: 1/16 square balsa strips: 25 for a nickel! Ah well. A stamped, addressed envelope will bring you a copy of Ira's complete list.

WHILE YOU'RE SENDING FOR THINGS

Looking for inexpensive prizes for club Peanut Scale contests? Try the Planters Peanut company! Among the many premiums they offer that would make suitable awards are: drinking cups, cocktail glasses, tote bags, me-

CHARGE IT

SHOP BY PHONE
Area 714 963-9881

Hobby Shack®

The greatest place to shop!

SHOP BY MAIL
18480 BANDILIER CIRCLE
FOUNTAIN VALLEY,
CALIF. 92708

BEECH STAGGERWING & THUNDER TIGER 15 R/C

RETAIL VALUE $75.90 IF PURCHASED SEPARATELY $54.98 **$39.99**

TRYSTAR 15 ARF & THUNDER TIGER 15 R/C

RETAIL VALUE $115.90 IF PURCHASED SEPARATELY $84.99 **$69.99**

SKYLANE 182 SURE FLITE ALL FOAM & THUNDER TIGER 20 R/C

RETAIL VALUE $75.90 IF PURCHASED SEPARATELY $54.98 **$39.99**

SPIRIT of 76 & COX TD 049 PLUS SPIRIT POWER POD

RETAIL VALUE $74.85 IF PURCHASED SEPARATELY $51.97 **$41.97**

QB CESSNA 20 KIT & THUNDER TIGER 20 R/C

RETAIL VALUE $82.90 IF PURCHASED SEPARATELY $61.98 **$49.99**

HOWARD PETE SURE FLITE ALL FOAM & SPEEDIE 10 FSR R/C

RETAIL VALUE $62.90 IF PURCHASED SEPARATELY $47.98 **$34.99**

Hobby Shack Aero Sport Two

TWO CHANNEL RADIO CONTROL SYSTEM

- TRIPLE TUNED FRONT END RECEIVER
- RF AMP CONTROLED BY AGC.
- NEW BA633 DECODER CHIP

Aero Sport Two System Includes: Two channel transmitter (for pencell batteries) with trims, Two channel receiver, Airborne battery pack (dry), 2 - NS-ICR servos, switch harness, frequency flag and full 180 day warranty.

$119.99 VALUE

79.99

Hobby Shack Cessna 180 Total Pack

Injection Molded All Foam

IDEAL FOR BEGINNERS

RADIO & ENGINE INSTALLED
COMPLETLY READY TO FLY
10 MINUTES OUT OF THE BOX

$169.98 VALUE

- AERO SPORT TWO RADIO FACTORY INSTALLED
- RUDDER & ELEVATOR FACTORY HINGED
- PUSHRODS INSTALLED
- VACUUM FORMED COWL
- ALL NYLON FIREWALL
- TESTOR .049 ENGINE & PROPELLER FACTORY INSTALLED

SPAN: 41 inches
AREA: 250 sq.in.
ENGINE: Testor .049
RADIO: 2 channel

129.99

NEW Hobby Shack 1979 MODELER'S CATALOG

- 96 PAGES IN FULL COLOR
- 192 BIG 8½ x 11 EXCITING PAGES TOTAL
- MANY BRAND NEW ITEMS
- EVERYTHING FOR THE MODELER

1979 CATALOG

☐ Enclosed please find $2.50 for my copy of your new Hobby Shack 1979 Modeler's Catalog!

Mail this coupon to:

HOBBY SHACK
18480 BANDILIER CIRCLE
FOUNTAIN VALLEY, CA 92708

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

POSTAGE & HANDLING CHARGES

$ 0.00 - $ 8.00 add $1.50
$ 8.01 - $15.00 add $2.00
$15.01 - $30.00 add $2.50
$30.01 - $40.00 add $2.75
Over $40.00 add $3.00

California residents add 6% state sales tax.

LOCAL Hobby Shack SHOPPING

FOUNTAIN VALLEY
Main warehouse store or mail order shopping
18480 BANDILIER CIRCLE
FOUNTAIN VALLEY, CA 92708
(714) 963-9881
S.D. FRWY – EUCLID OFF RAMP

LA HABRA
1401 SOUTH BEACH BLVD.
LA HABRA, CA 90631
(714) 994-5721
(213) 947-2574
CORNER BEACH BLVD & IMPERIAL HWY

ENCINO
5541 BALBOA BLVD.
ENCINO, CA 91316
(213) 995-1162
CORNER BALBOA & BURBANK BLVDS

RIVERSIDE
6135 VAN BUREN BLVD.
RIVERSIDE, CA 92503
(714) 785-6773
CORNER VAN BUREN & ARLINGTON

Charge it!

STORE HOURS:

Mon. thru Fri. . . 10 - 9
Saturday . . . . . 10 - 6
Sunday . . . . . 10 - 5

chanical pencils, banks, cast metal belt buckles, self-adhesive patches and beach towels . . . all bearing the likeness of *Mr. Peanut*. Or, how about a *Mr. Peanut* T-shirt? And the prices are surely right, ranging from 50 cents for two of the Peanut patches through $4.95 for the beach towel. The T-shirts, priced at only $1.50 each, must certainly have been manufactured long before inflation set in! Of course, one must add in the cost of a couple of peanut candy bars or peanut bags in order to obtain the two product labels also required to order. Still fantastic bargains on distinctive offerings. Send a stamped envelope for the complete premium listing, which is well illustrated: Mr. Peanut, P.O. Box 1267, Reidsville, NC 27320. Allow about 4 weeks, as things move a little slowly there, but they will come through for you.

When writing to any of the places we mention, it would be appreciated if you would mention **Model Builder**. We could use a few more advertisers!

WHY NOT?

Have you ever written to a Congressman? Perhaps you have not had sufficient reason or felt your voice would not be heard. Not so. Contrary to what you may think, such letters *ARE* read, and in many cases, answered. I had occasion to write such a letter concerning an aviation-related issue, and was pleasantly surprised to receive a prompt, personal answer from Congressman Clair W. Burgener, who as it turns out, is a pilot himself, and has more than the usual interest in aviation matters.

Sometimes people are timid about making their views known to government officials, but this should not be the case. If you have opinions, express them! If you disagree with the way they are handling their jobs, tell them so. Remember, we are paying their salaries and have every right to be heard. As the *Aircraft Owners and Pilot's Association* magazine's Robert E. Monroe puts it: "Start educating your Congressman now". Your freedoms are at stake.

SIGN-OFF

Rachel Castle was kind enough to give us this clipping from Family Circle's *Good News Gazette*, for March 13, 1979: "When aviation buffs, building a replica (sic) of one of the Wright brothers' early flying machines, fed information about the plane into the computer at Wright Patterson Air Force Base in Dayton, the computer came up with this verdict: *'It won't fly.'*" •

STOP! . . . . . . *Continued from page 27*

"the out-of-the-rut enthusiasts."

The final device for your consideration is the split rudder, shown in Figure 6. I've never tried this myself, because of the linkage complexity. It requires two pushrods, plus a rudder servo mounted on sliding rails (or some mechanical equivalent such as a V-tail mixer.) I saw it used, and very effectively, at an LSF tournament 'way back in 1972. The plane was an original T-tail design (in those days sailplanes didn't all look alike) and the pilot flew it well, but not well enough to win, so naturally the device never caught on. People who use them claim the rudder is still fully effective when it's open. •

Instructor . . . . *Continued from page 20*

.29-.35 engine.

"By this time, I had found some other fellows who fly R/C planes in the area (not easy when you live in the "boonies" of east Colorado). Discovered a local expert in the next town so I got him to fly the plane. It runs along, leaps into the air and banks sharply, crashing first to the right, second to the left. I watched him save another fellow's snappy little biplane when the aileron linkage came loose, so I know he can fly.

"I am discouraged by the welcome we newcomers get from these experts, though it was the same with ukie and free flight. The whole hobby is a big secret. I hope a lot of experts are embarrassed.

"Anyway I just want to take the plane out and teach myself. I know it will cost a few planes (Ukie did). So how about some help for the rank beginners (let the damn experts find their own answers).

"Bear in mind that the local hobby shop is 150 miles away, though John Kelly of Tom Thumb Hobbies, is one of the most congenial people I have met. I can't drive 150 miles to fly. If the Transit won't fly with .35, why did Lanier say it would?

"If it takes an expert to fly it, why is it billed as a trainer? How about a little more honesty among manufacturers.

"The Transit has a symmetrical airfoil; a trainer should be flat-bottomed. A trainer should be disposably priced, but $40 is not realistic when you're also raising four kids. It should be strong, easily built and warp resistant . . . diagonally placed ribs . . . enough! Two more sentences and someone will try to buy the thing.

"Anyway, how about slanting at least a portion of your column to rank beginners, and I would start at the building table (how to hook up control throws (minimum and maximum, what amounts work best) kit manufacturers seldom tell you. Don't forget your pilots and experts, but please include us.

"Well, it was a short letter, but at least you won't be lonely. Give me a call if I can help you, or go out and find someone to start in the hobby and follow him or her through all the trials. Lonnie J. Barlow."

Dear Lonnie:

Your reference to the aroma of this column notwithstanding, I think I can see your problem with instructors and experts. You're coming on a little strong for openers and turning them against you before they have a chance to help you. The Transit is an excellent trainer, and will fly well on a .35, but the man who installed the .60 had the right idea. The extra power of the .60 can come in handy to recover from some situations. I'd recommend that you reinstall the .60 and try that local expert again, but this time ask him politely to thoroughly

TOP FLITE is REALLY BIG in props

OVER A HUNDRED DIFFERENT PROPS TO CHOOSE FROM!

A size for every flying requirement!

PYLON RACING PROPS

Diam.	Pitch
7"	5N, 5W, 6N, 6W
8½"	6½, 6¾, 7, 7¼, 7½, 8, 8½, 9
9"	7, 7½, 8, 8½, 9
9½"	8, 8½, 9

SUPER-M POWER PROPS

Diam.	Pitch
5¼"	3, 4
6"	3, 4
7"	4, 4½, 5, 6
8"	4, 5, 6
9"	4, 6, 7, 8
10"	6, 7, 8
11"	4, 6, 7, 7½, 7¾, 8
12"	4, 5, 6, 8

Large	Diameter
16"	4, 6
18"	6, 8, 10
20"	6, 8, 10

SUPER-M TOP FLITE PROPS

Diam.	Pitch
6"	3, 4, 5
7"	3, 4, 6
8"	4, 5, 6, 8
9"	4, 5, 6, 7, 8
10"	4, 5, 6, 8
11"	4, 5, 6, 7, 7¾, 8, 8¼
12"	4, 5, 6, 8
13"	5, 6
14"	4, 6

NYLON PROPS

Diam.	Pitch
5¼"	3, 4
6"	3, 4
7"	4, 6
8"	4, 6
9"	4, 6, 7
10"	3½, 6
11"	4, 6, 7, 8
12"	6.

SPEED PROPS

Diam.	Pitch
6"	7, 7½, 8
7"	7½, 8, 9½, 10, 10½,
8"	7½, 8, 8½, 9
9"	7, 12½, 13, 13½
10"	8, 8½, 9

Each prop is precision carved, balanced and fuel-proof finished for superior performance.

TOP FLITE

Top Flite Models, Inc.
1901 N. Narragansett Avenue
Chicago, Illinois 60639

For a 12-page catalog describing our many other fine products send request plus 50 cents to Top Flite.

EMPIRE MODELS

MORE SUMMER SPECIALS?
YOU BET!

DUMAS HERITAGE 12 METER SAILBOAT
$195.00

ASTRO FLIGHT

KITS

ASW-17 Sailplane	62.75
Monterey Sailplane	31.75
Electra-Fly	17.75
Californian	51.75

ACCESSORIES

Std Hi-Start	26.25
HD Hi-Start	29.95
Astro-10 System	54.75
Astro-15 System	66.75
Astro-25 System	74.75

AIRTRONICS

Q-Tee	20.09
Square Soar	22.75
Gere Sport	36.55
Questor	31.95
Aquila St	63.95
Olympic II	45.75
Acro-star	82.49

BATTERIES

Nicads

1.25 V 2 Amp	1.98
1.25V 4 Amp	2.95
1.25 V AA 500 MAmp	1.75

Sealed Lead

12 Volt 1.9 Amp	14.95

BRIDI

T-10 Trainer	18.75
T-20 Trainer	29.95
RCM Trainer 40	37.49
RCM Trainer 60	44.95
RCM 15-500	29.95
RCM Sportster	29.95
Super Kaos 40	39.31
Super Kaos 60	52.49
Shrike Commander	138.95
Dirty Birdy 40	44.25
P-51 Mustang	97.49
T-6 Texan	97.49
Quickest 500	29.95
RCM Basic Trainer	29.95
Dirty Birdy	63.75
Soar Birdy	13.50

PICA

RC-2 T-28 B	69.95
RC-3 FW 190	69.95
RC-4 WACO F-3	69.95
RC-5 Duellist	72.95

DUMAS Sail Boats

Hobie Cat	8.45
Alcort Sun Fish	14.89
30 Star Class	36.75
45 Star Class	86.25
Bingo 50/800 Fiberglass	195.00
219 Lightning	15.75
NEW Dumas Huson	121.50
Etchells 50/800	163.95
East Coast 12 Meter Fiberglass	195.00
Probar Sail Unit	40.50

Dumas Hardware 25% Off Current List

DUMAS Scale

PT-109	29.85
Coast Guard Lifeboat	43.15
Tuna Clipper	35.25
Little Shelley Foss	32.00
Shelley Foss	58.85
Coast Guard 40' Utility	34.50
Dauntless	56.25

DUMAS Hydro & Deep Vee

AVL-1 Atlas Van Lines	8.65
AVL-40 Atlas Van Lines 40	41.65
Pay n Pak	29.85
Hot Shot Tunnel Hull	24.00
U-76 Hydro	39.35
DV-20CF Deep Vee 20 Competition Fiberglass	60.00
DV-40CF Deep Vee 40 Competition Fiberglass	71.25
DV-60CF Deep Vee 60 Competition Fiberglass	75.00
DV-10 Mahogany	8.65
Deep Vee 21	33.75
NEW Atlas Van Lines U-1	37.50
NEW Hot Shot 21 Glass Kit	52.50

MIDWEST CONTROL LINE PRICES SLASHED!

215 Magician 15	8.75	~~12.95~~
235 Magician 35	12.49	~~16.95~~
236 King Cobra 35	14.95	~~23.95~~
237 Mustang 35	14.95	~~23.95~~

E.D. TUNED PIPES

#1 (15-20)	17.25
#2 (29-40)	18.65
#3 Quiet (40-60)	21.75

FOX ENGINES

11600 15 Schn	19.56
21600 15 Schn R/C	26.56
21900 19 R/C	25.86
22500 25 R/C	21.60
13500 35 Stunt	19.56
13600 36	19.56
13700 36 BB Combat	34.96
23600 36 R/C	25.86
24500 45 R/C Schn	36.35
26099 60 BB Eagle R/C	48.95

Fox Tanks Wheels All in Stock
Mufflers 25% Off List

OLDBERG

Ranger 42 ARF	19.16
Falcon 56 II	34.95
Sr Falcon	44.75
Jr Falcon	9.55
***NEW* SKYLARK 56 II**	34.95
Jr Skylark	11.95
Skylane 62	44.75

HUGHEY BOATS

20 Rigger	84.95
40 Rigger	92.50
19 Hydro	66.75

INTERNATIONAL PIPES

501 (15)	14.95
503 (19-21)	16.50
507 (40)	17.25
509 (45)	18.25
511 (61-71)	19.25

K & B

6711 19	26.95
6712 19 R/C	33.75
8450 3.5 F Rotor	41.75
7860 35 Plain Bearing	21.95
7861 35 R/C	25.65
8600 5.8cc FF Racing	69.65
8380 3.5cc R/C	48.50
8382 3.5 cc Outboard	72.95
8011 40 R/C	42.25
8360 40 R/C Pump	60.49
9040 40 RSII Marine	72.95
6525 61 R/C	57.49
6535 61 R/C Pumper	74.25

LANIER

Comet II	43.95
Cessna	34.85
Pinto	34.85
Jester II	55.15

MARKS MODELS

Windward 72	25.80
Windfree 99	35.25
Bushwacker w/o access	35.25
Wanderer	15.69
Sunny	25.80

MIDWEST

106 Tri Squire	21.50
109 Lil Tri Squire	15.49
122 Das Lil Stik	22.25
125 Cessna Cardinal	21.95
126 Super Chipmunk	21.95
128 Sweet Stik	27.95
129 Cardinal Squire	57.49
130 Strike Master	49.75
131 Pitts Special	71.75
134 Attacker	27.95
Love Machine	32.95
AXIFLO40	35.95
AXIFLO049	29.50
Easy Flyer 60 Trainer	60.75
Heinkel He-162	53.95

SIG

Kadet	27.68
Kougar	35.60
Komander	30.50
Citabra	45.94
Chipmunk R/C	47.52
J-3 Cub	30.50
Clipped Wing Cub	30.50
Smith Mini Plane	39.60
Doubler II	19.80
Super Sport	15.84
Liberty Sport	50.50
Sig Minow	22.18
Cessna 150	55.44
Mustang Stunter U/C	22.18

STEVE MUCK

North Wind 40/60 Mono	44.95
Lil Lightning 21 O B	36.75
Bushwhacker 20 Hydro	82.50
Lil Northwind 20 Mono	42.75

SURE FLITE MODELS

J-3 Cub ARF	28.50
Spitfire ARF	28.50
7' Citabria	84.49
Baby Turkey	19.95

TOP FLIGHT MODELS

P-51 Mustang	46.35
P-40 Warhawk	46.35
P-39 Aircobra	46.35
P-47 Thunderbolt	63.95
SE 5A	46.35
School Master	11.60
Freshman Trainer	35.95

BATTERIES GALORE!
1.25 Volt NiCads

AA-500 MAmp 1.75 | **2 Amp** 1.98 | **4 Amp** 2.95

12 Volt Sealed Lead 1.9 Amp 14.95

WHITE SILK 36" WIDE $2.95 per yard

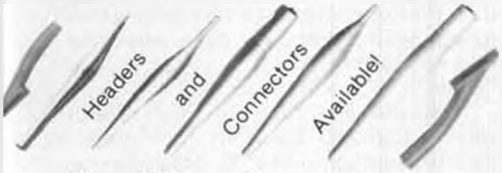
Want anything you don't see — call us!
CALL (602) 881-1257 FOR IMMEDIATE SHIPMENTS.
DEPT D P. O. BOX 42287/TUCSON, ARIZONA/85733

POSTAGE AND HANDLING and insurance orders up to $5.00 add .95, $5.01 to $10.00 add $1.50, $10.01 to $20.00 add $1.95, $20.01 to $30.00 add $2.50, $30.01 to $40.00 add $2.95, $40.01 to $50.00 add $3.50, $50.01 to $80.00 add $3.95, over $80.01 add $4.50. Send money order or certified check for fast service. APO's welcome. Export welcome. Prices subject to change, some quantities limited. Note some of the larger fiberglass kits are sent freight collect best way available. Reserve the right to clear checks.

(a) C.O.D. within 48 continental states only. Please add $3.00
(b) Outside 48 Continental States add **$15.00** for actual postage and handling, excess will be refunded. Arizona residents add 4% sales tax.
(c) BankAmericard/Visa and Mastercharge welcome.

JUNE IS R/C MARINE MONTH!

ED Tuned/Blown R/C Pipes



1	#2	#2Q	#3	#3Q
.25	18.65	18.95	18.50	21.75

NEW!

DUMAS LIL RASCAL

$18.75

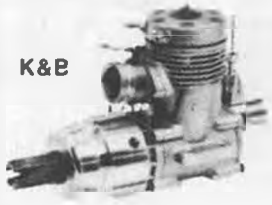
K&B MARINE PARTS

1032 .40 Outdrive Dbl Rudder **28.85**

MRC TURBO OUTDRIVE $47.95
MRC WATERPROOF RADIO BOX $15.96

Special of the Month

K&B



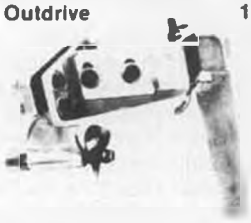
7.5 MARINE $89.95

NEW!

DUMAS SPEED CONTROL FOR 6 OR 12 VOLT MOTOR

$18.75

1041 .40 Variable Outdrive **16.50**



1009 Master Motor Mount **6.60**

NEW! **FULLER BOATS OUTRIGGER**

$69.95

OCTURA MODELS

5 Flywheel (Steel)	3.87
5 Flywheel (Aluminum)	3.87
0 Flywheel (Steel)	4.14
5 Flywheel (Steel)	4.68
5 Flywheel (Aluminum)	4.68
0 Flywheel (Steel)	5.36
ant .40 Eng. Mount	4.68
ant .60 Eng. Mount	5.63
60 V-Type Mount	7.02
ool Klamp Size 0-14	5.18

Competition Props
All Sizes Available

1010 Insert Adapter (.40)	4.95
1011 Insert Adapter (.60)	4.95
1023 Safety Shear Rudder (.40)	10.65
1024 Safety Shear Rudder (.60)	10.65
1034 .40 Outdrive W/Shear Rudder (Single)	25.50
1000 Double Skeg (.40)	3.30
1001 Double Skeg (.60)	3.30

Complete Line in Stock!

NEW!

DUMAS $69.95
USCG 44' LIFEBOAT

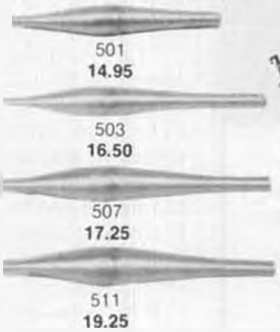
$52.50
Dumas
Hot Shot 21 Glass

AD RUNNER MARINE
T DRIVE UNIT
MPLETE

Hydro or Mono	$ 33.50
150 cable	1.00 per ft.
130 cable	.95 per ft.
186 cable for 40-61 engines	1.50 per ft.
FE tubing for 130 cable	1.00 per ft.
FE Tubing for 186 cable	1.10 per ft.

Many other available items. Call

INTERNATIONAL TUNED PIPES



501 **14.95**
503 **16.50**
507 **17.25**
511 **19.25**

NEW!

DUMAS SHORT STUFF FIBERGLASS **$16.85**

HUGHEY 21 OUTRIGGER

$97.75

J.G. BOAT PROPS

PROP	ENGINE SIZE MONO	HYDRO	PRICE
A-7	19	—	4.20
C-7	19	—	4.50
G-20	40	19	5.10
H-25	40	—	5.40
I-27X	60	40	5.80
I-30	60	40	5.80
J-30	60	40	6.05

WATCH FOR OUR 1979 R/C CATALOG! Want anything you don't see—call us!

EMPIRE MODELS

DEPT D P.O. BOX 42287/TUCSON, ARIZONA 85733

CALL (602) 881-1257 FOR IMMEDIATE SHIPMENTS

check the plane over before flying it (perhaps at one of your homes in the workshop) and then to teach you to fly. If you try to fly it without help, your odds are not good for success. Your description of an ideal trainer is not bad, but it probably couldn't be done for $40, and I personally feel that the flat-bottomed airfoil is a mistake, as it tends to be too speed sensitive. The manufacturers in this business do the best they can to provide good products at a reasonable price, and to blame them for the situation is ridiculous. Thanks, Dave Brown.

"Dear Dave:

"Although not a pattern flier, I have enjoyed your column in **Model Builder** *Magazine very much over the past few months. The question I would like to submit for comment in your column is this: I am presently flying both a Falcon 56 and a Midwest Tri-Squire on three channels; rudder-elevator-throttle. But here's the rub. When these ships are flying inverted, left rudder stick still makes them turn left. In short, when the plane is upside-down, left rudder stick actually makes the rudder move to the right (since the plane's inverted) but the plane still turns left.*

"I have discussed this with some quite knowledgeable modelers and they always dismissed the subject or told me I was crazy. But the proof is out at the field. I can steer both of these ships inverted using the same stick movement I would use if they were right side up.

"Please tell your editor that there are many guys like me who don't fly pattern ships yet enjoy your column immensely and I hope that it continues for a long time to come. Bob DeMond."

Dear Bob:

This stumped me for a while a few years back until I gave it a lot of thought. The dihedral still tries to roll the airplane in the same direction as the rudder is applied when inverted, and this rolling moment overcomes the yaw in the opposite direction. Typically, this type of airplane is difficult to fly inverted, as the dihedral tries to roll it back to upright. Hope this explains this and your friends cease to think you are crazy. *(Dear Bob: It sounds to us as if your "knowledgeable modelers" are cop-outs, and we're willing to bet they couldn't fly your aileronless models inverted as well as you do! Dave's theory seems to make sense, but right or wrong, it's exactly what happens! Rest assured, we'll keep this column going, but it sure helps Dave to get your letters . . . even ones like Lonnie's! wcn)*

"Dave,

"I would like to learn more about spins. I had a Q-Tee built stock except for the installation of a TD .049 and a one ounce tank. There was no washout in the wings. It would sometimes refuse to spin with full rudder and up elevator out of a power stall, so I started reaching over with my left hand and adding full rudder trim. Then it would spin every time. After a couple of turns, I could re-center the trim and it would continue to spin.

"This started me thinking. I tried a spin just as I've described, but after a couple of turns, I centered the trim and the rudder, holding only up elevator. It continued to spin, but the nose came up almost to horizontal, the rate of descent slowed by about 2/3, and the engine sounded as if it were suddenly muffled and throttled back slightly. Sometimes it would take two or three turns with the controls neutralized before it would stop spinning. It was a great stunt and I called it the falling leaf maneuver, but I think it may have been a flat spin.

"Then I build up a Dirty Birdy 40 with a Webra Speed 40 and tuned pipe. I would spin it with half-throttle, full left rudder and aileron, and full up elevator. After the spin was established I would neutralize the ailerons and it would behave exactly as the Q-Tee did, even to the change is exhaust sound.

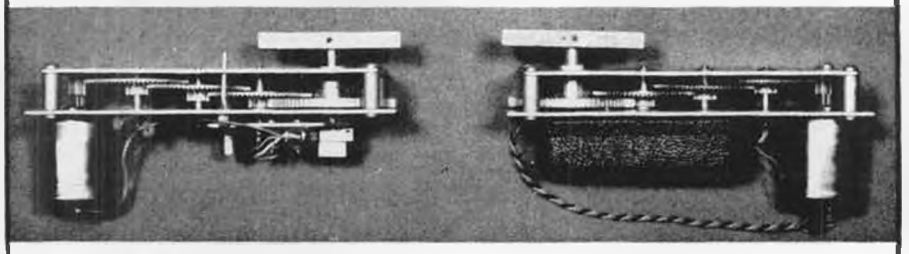
"One day I started from high altitude to impress a kibitzing full scale pilot, and I let it go through about six turns before I neutralized. Trouble! It just kept spinning and losing altitude. I hit opposite rudder and aileron, no help; full throttle, no help; idle, full, idle, down elevator and finally just sort of helplessly stirred the sticks around. I had written the ship off when it suddenly straightened out, nose down, about fifty feet off the deck. I pulled it up, throttled back and landed in the direction it was headed. I was done for the day.

"I am completely self-taught so I don't know to this day the explanation for these peculiar spins, the change in exhaust sound, the inability to terminate the spin, and so forth.

"By the way, I don't write letters often but I want you to have all the encouragement you need to continue your fine column. David Unruh."

Dear Dave,

What you are describing is a flat spin all right, but I must admit that I am surprised that the Q-Tee will enter (and exit) it quite this readily. The method you describe of doing it with the Dirty Birdy is the traditional way of entering one, but normally it takes opposite aileron to get it in. Once it is spinning flat, then down elevator and high throttle will usually hasten the spin rate while



decreasing the descent rate. "Now, for the problem! How do you get it out of a flat spin? Usually the trick is to get the airplane back into a normal spin by coming back to up elevator, low throttle, and bringing the ailerons back to the same direction as the rudder, and then recover as normal from the spin. This is theoretically the correct procedure, but it won't always work! I have many times resorted to wiggling everything like you mentioned in an attempt to get out of a flat spin and this will usually work if you have enough altitude. I remember seeing Jerry Harbert, from West Virginia, spin his Kwik Fli into Lake Benbook three times at the first National Fun Fly, in Fort Worth in 1970, and I must admit to suffering this same fate at least once myself at the same meet! During full scale spin tests on most airplanes, a special parachute is attached to the tail to break a spin if necessary, and even this had been known to fail in breaking a flat spin. In short, the flat spin is probably the most dangerous maneuver in aerobatics and results in the demise of many airplanes, although if they stay flat and don't hit anything but flat ground, they many times survive. Good Luck, Dave Brown.

Well, that is about it for this month, but I'll have to get back on the soapbox again and plead for letters, as after a giant surge in December, I've received very few since. Please send your questions, arguments and ideas to: Dave Brown, 8534 Huddleston, Cincinnati, OH 45236.

(Wonder if centrifugal force during the spin would push extra fuel into engine, causing richening of the mixture, which would result in slower running? wcn) •

Soaring . . . . . *Continued from page 24*

quarter scale model spans 3750 millimeters.

Windspiel also offers the Wanitschek spoilers and retractable landing gears, as well as the wing twisting gear, appropriately called "Twist." This device is suitable for all types of gliders up to a wingspan of 138 inches and fuselages wider than 2-1/2 inches. The gear is constructed to allow subsequent installation into a conventional glider. The additional weight is less than three ounces (less the servo required to drive this wing twisting mechanism). The special construction of the gear allows you to adapt the "Twist" to all widths of fuselage. You can, of course, choose whatever dihedral you like. The rotation angle of the wings should amount to about ±3°. Stunt gliders can have a rotation of up to ±5°. This "Twist" offers some interesting prospects for the experimenter.

On the San Diego scene, Rick Schrameck has come up with a sleek modification of the Ridge Runner. He calls this bird Shark I. I guess that implies that there is going to be a number of similar models, although I can't see how. The fiberglass fuselage ends in a T-tail. The plane weighs 4-1/2 pounds, or up to six pounds with ballast. The wing is of 7-1/2 foot span, 9% thick with Phillips entry and 10% sweepback made of foam covered with 1/16-inch plywood, then acrylic lacquer. It operates on ailerons and elevator and moves F-A-S-T. Here is a slope soarer's slope soarer.

A number of pilots have built the Sterling Towline Diamant and installed radio control. It's *very* scale and, with low dihedral, requires careful control. But it sure is pretty aloft.

Roland Anderson has been flying the Spirrus (Cumulus wings coupled to the Spirit of Freedom fuselage, designed by Harley Michaelis). Here is a good compromise between thermal, slope, and scale design. Simply stated, it looks good . . . especially when it flies in information with a seagull.

And if you enjoy reading about R/C soaring and related matters, may I call your attention to *How Birds Fly*, by R. Freedman (Holiday House Publishers, $6.95). This should be enjoyable for those who love nature . . . and instructive as well. Then there's *Design for Flying*, by D. Thurston (McGraw-Hill, $14.95). This book treats full-scale aircraft in some depths, and yet with immense clarity. It's relatively easy to translate his considerations into those of the modeler. Then there's *Basic Windcraft: Using the Wind for Sailing*, by Alan Watts (Dodd Mead & Co., $5.95). This book is written for the day sailor who really wants to understand meteor-

ology. All that he says also pertains to R/C soaring, especially if you fly near oceans of lakes. Lastly, may I call your attention to *Radio Control Flying for the Non-Modeler*, by Paul Kugler (Boynton & Associates, Clifton VA 22024, $5.95). This publication is complete with detailed instructions and photographs on how to build your first powered radio control glider. For the expert it's interesting reading on how to be a better instructor. For the novice operating alone, it's essential.

Please drop me a note if you have an item worth reporting to our readership. See you next month. •

1 to 1 . . . . . *Continued from page 21*

field in the 20+ mph class.

The time came for Charles to put the big bird into the air. With the Enya "roaring" at full throttle, the "Jenny" rolled into the wind and lifted off in what seemed to be inches. As the engine droned on, a circle to the left produced a hair-raising turn and the craft scuttled like a leaf downwind. Another turn into the wind and a maneuver called, "Straight Flight Out." The "Jenny" strained forward and seemed to move just a few feet in a long time before the maneuver was hailed complete.

The flight revealed the confidence of a man who knew his aircraft and a machine that would challenge the elements. When the flying and the day ended, it was evident that the experience had been memorable for the participants and the spectators as well.

This is what scale modeling is all about. It was a combination of experiences and feelings. Competition has nothing whatever to do with it, but it often provides the stage to achieve this experience.

Too often a modeler produces a strikingly accurate, perfectly executed model, but is unable to fulfill the total experience either for himself or others. I can't recall who won that day, but it isn't really important because a scale modeler often doesn't view competition in the same way. If you race, the goal has to be to go faster than the other fella and finish. If you fly pattern, you are competitive in that you fly a little bit better than the other fella. If you sailplane, you are in competition with man and the elements to see how long you can remain aloft.

The scale modeler produces a total experience, and it often is easier for him to achieve this without resorting to competition. It's a delicious feeling.

ANTENNA ANGLES

Where do you put the antenna on your scale models? I realize that for a competitive situation the rules state that you may add an antenna after the static judging, or more realistically stated, "Let it make a public appearance." Somehow the addition of that thick, usually kinked wire stretching unceremoniously tailward and anchored with a rubber band leaves much to be desired.

There are a few possible solutions which will help to make this necessary evil much less obtrusive. One possibility would be to leave the darn thing all wadded up in the fuselage and fly at arm's length only.

Three more practical solutions would include these ideas:

In most cases it is possible to string the antenna through the fuselage. Obviously it is wise to avoid servos as much as possible. When I utilize this method, I find it helpful to use plastic tubing such as the outer housing of a plastic pushrod system to achieve a routing. This way it's possible to push the antenna through the tube toward the tail and make certain that it is stretched out properly.

A second method I've found successful is to exit the bottom of the fuselage and allow the antenna to nestle neatly, virtually out of sight along the bottom. Under most circumstances, it is very difficult to see. I was concerned at first that while the model was taking off or landing that the proximity to the ground would prove detrimental. This has not proved to be the case, however.

A third method I've seen employed is to allow the antenna to substitute for the antenna shown on the full scale aircraft. Granted, the wire will have a slightly thick appearance, however, it still will tend to be less noticeable than a wire strung in an unnatural place. You may be able to use the scale mast to route the antenna from the fuselage.

Don't forget that strain relief inside the fuselage.

EVENTS TO COME

As many of us are still surrounded by snow, listening to the furnace run, and fondly holding the transmitter wondering what flying is *really* like, we view with envy the modelers in warmer climes such as Florida and California.

One might rationalize and say that the colder climate allows the modeler time to build and replenish his supply of aircraft. In like manner, he is able to "rest from the rigorous onslaught of flying." Actually, in either case, that's probably a crock of hogwash, since we less fortunate weather-wise would love to be flying.

In any case, the season is upon us and this year once again we see a further increase in the scale-only contest scene. As an editorial aside, it can be noted that a problem exists in a small degree in the scheduling of a scale-only contest. Should the event be limited to R/C only, the host club is faced with either relegating the event to an A-type contest, or including either AMA Scale or Static, since including Sport Scale only makes the official sanction less than AA standing. Some contests have used more than one class of Sport Scale, such as military/non-military, or expert/novice, but that doesn't change the sanction. Presently, 1/4 scale or 1/2A doesn't do the job either.

Hopefully, following the new rules cycle we are presently involved in, we will have resolved that dilemma for the scale-only contests.

Here are some that have been passed on to me as upcoming events for 1979:

May 19-20 ... Warbirds West-Morgan Hill. C.D. Don Loughridge, 20292 Glen Brae Dr., Saratoga, CA 95070.

May 26, 27, 28 ... WW-II Scramble. AMA Scale, Sport Scale, Team Scale. Pioneer R/C Field, Santa Clara, California. C.D. Gary Korpi, 3471 Woodyend Ct., San Jose, CA 95121.

May 26-27 ... BCRCA Meet, Florida. R/C Sport Scale.

June 24 ... 6th Annual Scale Championships. F/F Gas, Peanut and Rubber, CL Sport Scale, R/C Sport Scale in Military, Civilian, 1/2A, 1/4-Scale. Sea Bee Park, Abilene, Texas. C.D. Robert Oliveria, 1118 S. Pioneer, Abilene, TX 79605.

July 1 ... All Scale Fly-In, St. Louis, Missouri. F/F Peanut and Rubber, CL Sport Scale, R/C Novice and Expert Sport Scale, Static Display, EAA Chapter display and meeting in conjunction, Live Steam locomotives operating. C.D. Bob Underwood, 4109 Concord Oaks Dr., St. Louis, MO 63128.

Aug. 18-19 ... Milwaukee Flying Electrons, Milwaukee, Wisconsin. R/C Scale.

I know there are others, however, these are the only contacts I've received at this time.

SOME THOUGHTS ON RULES

The increased interest in scale has brought about much more concern in regard to the rules structure. During the recent poll of members of the scale organization, NASA, roughly 12% of the

membership returned the questionnaire listing their feelings on the present proposals. Judging from comments that I have heard and past experience on the R/C Contest Board, that is a significant number. Granted that the membership of the organization comprises some fraction of the overall scale community, there still is more communication occurring than ever before.

It's interesting to note the almost even split on some issues, while others pull large majorities *generally on the affirmative side.*

Looking at some individual rules, let's make a few generalizations. Everyone wants the R/C Judges' Guide. 'Nuf said? But in addition many want to make certain we have *both* a flying and static guide. Letters from a number of persons indicate this need in an effort to minimize the differences which exist from contest to contest.

The concept of having a pilot figure garnered almost 90% "yes" votes. Fellas like to see that cockpit filled with something. However, I received a letter from a modeler of long standing who objected violently to this rule. He stated that the rules do not *require* you to have a cowling on the model. You may be downgraded for having the engine hanging in the wind but you are not *required* to have it. So why be *required* to have a pilot figure? Interesting point and I can't honestly answer it. The letter went on to mention that most commercial figures were an abomination (point) and that they posed a problem of anchoring in an AMA Scale model while flying (point) and that further the letter writer modeled planes not people (point) He further pointed out that he modeled planes to get away from people in the first place. An altogether interesting letter. Many will not agree with his viewpoints (evidently almost 9 out of 10 don't) but it points up the vast latitude of feelings expressed by what may seem to be an innocent rules proposal.

Many persons appear to want to eliminate the AMA Scale classification of Class I and II. I suspect that becomes academic, since to my knowledge they are not flown anywhere. They were used one year at the Nats (Lake Charles, 1975) and have not been used since. There is a desire with over 3 out of every 4 wanting to *add* Novice/Expert classification to the Sport Scale rules.

About 70% of the votes went to NO on the 1/3 to 2/3 scoring ratio for Sport Scale. This was the highest negative vote on the list. A number of persons commented on this item and in general it went something like, "We don't want Sport Scale to turn into another pattern event." They fear that to award points on the basis of 1/3 static and 2/3 flying would encourage this to happen.

One vote surprised me since it is one of the most frequently heard complaints I have come across . . . 59% voted NO to keeping AMA scale out of Sport Scale. I can't help wonder whether this is because they feel it can't be done realistically or they genuinely don't want it to happen? As Mork would say, "Look of confusion-ponder-thought."

On rules SC-80-50 and 51, some 84% and 63% voted "yes". These rules require scale option demos on the ground (it doesn't preclude having them in the air as well) and limiting mechanical options to two.

As an editorial thought I personally feel that this might help the cause of scale. Take for instance a twin engine WW-II fighting aircraft (mine's about finished!). Let's say it has a "few" mechanical options. Mine has retracts, flaps, dive brakes, and bomb drop. In light of the rules which stipulate that multi-engines count for two options, in essence the aircraft in question has *six* electives. Therefore, it is possible that all it needs to do is to take off, do a fly-by, and land, assuming it did not use the bomb drop as an option. I don't think that is very healthy for the event. What do *you* think?

A closing thought on the questionnaire should include the fact that it appeared that 70% desired to see the 1/4 scale as a separate event rather than combined with present classifications. Several different lines of thinking were evident in the comments on this vote. Some felt that because many 1/4 scalers are "less competitive minded" that the level of competition in this as a separate event might tend to be more relaxed, less competitive as it were. It was also expressed that the inclusion of 1/4 scale in regular competition would further handicap smaller .40 size models which some persons feel are already handicapped competing against .60 size. A last consideration was an interesting one, in that 1/4 scale as a separate *official* event would allow clubs that already are offering it, to upgrade the status of their sanction for contests. These are all interesting thoughts worthy of consideration. One not mentioned in the comments, but heard at earlier times, was the advantage (or disadvantage) of having them judged in the same given size circle as smaller models.

Ah well, whatever rules comes out of the vote, we will live with them and compete with them for the next cycle. Those who want to compete will; those who cannot adjust to the changes either won't, or will and complain. Some time ago I felt that when they eliminated the bonus points for designing and building your own (a non-kit model) that the influx of new aircraft blood would cease and that kit versions would enjoy an overwhelming advantage. It hasn't and they haven't! I was wrong. So be it. If you enjoy the challenge of scale modeling and perhaps competition, then a little thing like rules won't bother you. You'll just do your thing and have fun. I'm going to build that Widget 10 yet!

One to one, Bob. ●

SeaGull . . . . . *Continued from page 67*

significant strength advantage with a minimal weight penalty. The trick is to start with close-fitting joints to minimize the amount of glue used.

We usually use a right-right flight pattern on our SeaGulls. That is, we launch almost vertically, but with a slight tilt to the right, and trim for a right-hand glide circle. Ideally, the model will flip-out perfectly flat at the apex of the launch. However, if you prefer the more conventional outdoor flight pattern of right-hand launch and left-hand glide, be our guest and give it a try; be forewarned, though, that our own attempts at that type flight pattern were less successful than the suggested right-right flight path. Balance the model at about the 50% wing chord and then trim the glide angle with elevator deflection. Based on the experience we've acquired with the SeaGull, we try to avoid using the rudder for turn-trim and instead work with a combination of stab-tilt and differential elevator twist to achieve the desired glide circle. Don't hesitate to experiment with a further aft CG and a bit more "down" elevator in order to reduce the amount of nose ballast required.

Like the mythical Jonathon Livingston Seagull, we've found that our SeaGulls continue to grow in ability as we strive for ever-higher levels of performance. We invite you to build one and join us in the battle against gravity. While we can't guarantee that you'll win the Nationals, we think we can assure you that you'll be in the thick of the competition. •

CAP 20L . . . . *Continued from page 15*

Add and shape 3/8-inch balsa leading edge and ply/balsa snap strip. Add the 1/4 x 1/2 balsa trailing edge.

Epoxy W-1 in position on the wing panels. The aileron servo lead slot is formed with a hot steel or aluminum tube melting the foam core.

Set up wing cores on anhedral board with beam and wing pins in position. Fit rear wing tubes into wing panels, using center section tube to align. Drill and tap for 4-40 machine screws through hardwood block, wing panel, and center section tubes.

The center section is next. Tack glue center section W-1 ribs to completed wing panel W-1 ribs. Cut the 1-3/4° dihedral angle on each side of the center section core. Make slot for rear aluminum joiner tube. Hot-wire cut behind full-depth spruce spar and fit this section of foam core neatly between wing panels. Glue full-depth 1/8 spruce to beam and core, checking for alignment. Add soft balsa fill and hardwood blocks above beam. Add foam leading edge ahead of beam and epoxy W-3 ply ribs in position.

Shape bottom of beam flush with foam core on center section and flush with 1/16 sheeting on wing panels. Cut slots for landing gear struts and drill a 7/32-inch hole in beam at the root.

Recess the 1/8 ply landing gear strap mounts into the beam.

Remove beam and center section from wing and, using foam gloves, sheet with 1/16 balsa. Add balsa and spruce trailing edge and balsa leading edge. Make tank recess and line with 1/16 balsa.

Epoxy W-1 in place with wing assembled to ensure snug fit between center section and wing panels. Burn aileron servo lead slot. Make cutouts for 1/8 ply servo trays and compartment for receiver in upper surface of center section. Kraft KPS-15II servos were used throughout in the prototype models.

AILERONS

The ailerons are built in upper and lower halves on a simple jig.

Cut a top view profile of the aileron from a flat piece of 3/4-inch ply. Using the template obtained from the wing false trailing edge, make a 1/8 ply pattern. Mark a hingeline on the approximate chordline on both sides of the pattern. Using small nails, tack the 1/8 ply pattern to the leading edge of the aileron profile, lining the hingeline up on the top edge of the 3/4 ply with aileron root and tip matching.

Lay a sheet of wax paper over the jig. Pin the 1/4-inch balsa leading edge snugly against the 1/8 ply. Pin the curved 3/16 balsa trailing edge piece to rear of profile jig. Glue the 1/4-inch balsa tip rib to leading and trailing edges. On top halves only, 1/16 ply horn mounts extend from under the 1/8 balsa inboard rib to underneath the 1/4-inch balsa aileron root rib. Add 1/8 balsa ribs between.

Using a razor plane and sanding block, remove material protruding above top of 1/8 ply leading edge pattern and feather into nothing at the trailing edge. While still in the jig, sheet with 1/16 balsa. You now have one-half of an aileron.

Because of the semi-symmetrical wing section, the 1/8 ply leading edge pattern will have to be moved after each half aileron is built, as no two are the same. This is accomplished by removing the nails holding the 1/8 ply leading edge pattern, inverting the 3/4-inch profile, and retacking the pattern on the leading edge of the profile, this time exposing the bottom half of the leading edge pattern. This will form the bottom half of the aileron.

To build ailerons for the other wing panel, repeat the above process using the opposite side of the 1/8 ply leading edge pattern.

Prior to joining aileron halves, file slots for hinges on top and bottom halves. Bevel the leading edge. Fit control horns in upper halves with small screws. Slot lower halves to facilitate control horns.

Ailerons are now joined and temporarily hinged. Add hollowed balsa wingtip blocks. The spruce trailing edge is added to the wing and ailerons in one piece. Before cutting ailerons free, block sand entire wing including aileron to achieve a smooth, faired surface.

FIN

The fin is of built-up balsa "egg crate" construction, using formers F-4 and F-5 as end templates for shaping with a razor plane and sanding block. Sheet the framework with 1/16 balsa. Add leading edge of 1/4-inch balsa and 1/2-inch balsa tailpost. Shape leading edge and fin portion of tailpost.

STAB AND ELEVATORS

Cut foam cores per templates and plan view. Butt join cores at center section. Remove foam to glue in stab trailing edge and elevator leading edge. Add 1/16 balsa tip plates on stab and elevators. Fit balsa stab joiners. Using the

foam gloves, sheet all surfaces with 1/16 balsa using one-piece full-span sheets. Add the 1/4-inch balsa trailing edge to elevators and add the 3/32 balsa root plates. Bevel the leading edge of elevators. Add block balsa tips and spruce trailing edges. Hinge surfaces and fit elevator drive assembly, relieving surfaces as required for free movement.

FUSELAGE

Install 1/2-inch ply firewall F-1 and all 1/8 ply cowl and canopy screw fastening plates with epoxy. Make up tailwheel assembly and install hardwood bearing block.

Fit cowl in position with tape and drill fastening holes. Remove cooling and access areas as shown on the plan view.

Mount Quadra engine inverted. It will be necessary to remove several head fins and the rear section of the crankshaft.

Fit canopy to fuselage. Drill fastening holes with a drill bit designed for use on plastics.

Remove outboard 1/4 inch of fiberglass wing fillets and clean out the inner flange with a file. The center section slips snugly through this opening and out the other side. Place wing panels on center section to align to fuselage from top and rear views. File fillets as required to obtain correct alignment. Tack glue center section to fuselage and remove wing panels. Turn fuselage on its side and glue center section to fuselage by letting epoxy pool into fillet inside fuselage. After curing, rotate fuselage and repeat on other side. It will be necessary to add microballoon filler to the exterior to return the wing fillet to its original shape.

The stab cutout is made in the fuselage and the elevator driver is placed in position with overlength cables attached. It will be necessary to slot the fuselage aft of the driver bearings to allow the stab to slip into its cutout. Replacing the wing panels, align the stab to wing and fuselage and check for correct incidence. Epoxy in place and fillet with microballoons.

File fin area flat on top and rear of fuselage. Epoxy fin in place using wing, stab, and fuselage centerline for alignment. Shape lower tailpost to match fuselage. Make a template of the tailpost trailing edge. Fillet base of fin with microballoons.

RUDDER

The rudder is constructed on the same type of jig as the ailerons. Because it is perfectly symmetrical, the jig only need be altered once. Use the tailpost template and side view of rudder for the jig.

After both halves are made, slot for hinges and 1/16 ply horn mounts. Bevel surfaces prior to joining. Join halves and add balsa tip and spruce trailing edge. Temporarily hinge rudder and block sand fin and rudder to achieve a smooth, faired surface. Remove rudder and glue horns in position.

EQUIPMENT INSTALLATION

Mount all servos on rubber grommets, and receiver and battery pack in foam rubber. Magneto shorting switch, airborne pack switch, and charging jack should also be mounted on grommets. Foam formers F-2 and F-3 are fitted and installed with silicon rubber. Fuel tank must be assembled with neoprene rubber tubing.

SPATS

Spats are added after the aircraft is assembled and all systems are installed. This is required to determine the position of the landing gear strut at rest. Epoxy the fiberglass spat to the strut. Add 1/4-inch balsa fairings on either side of the strut with silicon rubber. Fillet with microballoons.

FINISHING

All balsa surfaces are sealed with tissue and dope. Prime and spot-fill all balsa and fiberglass surfaces with an acrylic primer. Color coats are now applied using acrylic lacquer. This is a very lightweight method of finishing and is not affected by gasoline. •

Longster . . . . . *Continued from page 29*

of tailcone, gluing to rear of cabane bulkhead. Let the whole mess dry completely before removing from building surface.

4) Install 1/16 balsa triangular fairings either side of top tailcone longeron, immediately aft of rear cabane bulkhead. Add 1/16 dia. aluminum tube cabane anti-drag brace and 3/32 balsa gusset between aft end of cabane spreader and anti-drag brace.

5) Fabricate landing gear components and attach to fuselage.

6) Fabricate and fit 3/32 balsa center rib over cabane struts, cabane spreader and cabane anti-drag brace. DO NOT glue in position.

7) Fabricate wing panels, left and right, including tips and root ribs directly over plan. Tilt 1/16 balsa root ribs outboard using root rib dihedral template to establish proper angle. Assemble left and right wing panels to 3/32 balsa center rib fabricated in Step 6, with each tip rib elevated 1-3/8 inch above building surface. Sand, cover, and trim. Use tissue and apply two coats of 75% Sig Lite Coat dope or equivalent.

8) Fabricate tail surfaces from light 1/16 balsa. Round edges slightly and cover with tissue. Coat with the one light application of 75% Sig Lite Coat or equivalent. Cut hinges from very thin plastic sheet such as used for notebook filler sheet protective covers. Abrade plastic with fine sandpaper, cut hinges to size, insert in pre-cut slots in surfaces, and secure with Zap or Hot Stuff.

9) Fit motor and tanks. Prototype uses 10cc main and 1-3/4cc condenser tank.

10) Remove 100 ma battery from case and wrap battery with 1/4-inch Sig foam tape or equivalent. Mount battery in fuselage nose as far forward as possible.

11) Mount receiver in 1/4-inch Sig foam tape just aft of forward cabane bulkhead. Stack servos on side and mount immediately aft of receiver. Temporarily attach hinged rudder and stabilizer assemblies to fuselage. Fabricate pushrods, length as required, from 1/16-inch dia. aluminum tube and soft wire to fit tube I.D. Epoxy tube and wire components. Install pushrods in fuselage. Add 1/16 sq. balsa cross pieces to "A" frames as necessary to limit pushrod flex. Add 1/32 balsa in aft fuselage for pushrod exit support. Make final check of all control installation and operation.

12) Add card stock to fuselage nose sides, top and bottom forward of front cabane bulkhead. Cover with tissue and add trim. Use three coats of 75% Sig Lite Coat or equivalent.

13) Locate wing assembly on cabane mount and note that small notches will be required in bottom of 1/16 balsa root ribs to clear 1/16 dia. aluminum tube struts, forward and aft. Notch as required so that 3/32 balsa center rib seats to cabane spreader. Glue wing assembly to cabane and rudder and stabilizer assemblies to fuselage. Check squareness and centering with fuselage and between surfaces. Add landing wire pylon and gas tank detail to wing center section.

14) Add wing and tail flying and landing wires (use medium weight thread), sewing *through* surfaces. When positioned, hit point of penetration with a drop of Zap or Hot Stuff and the entry and exit point with a drop of acetate-base model airplane glue such as Ambroid or Testors. These wires are functional, do not omit. Take care that brace wires do not distort but rather secure proper surface alignment.

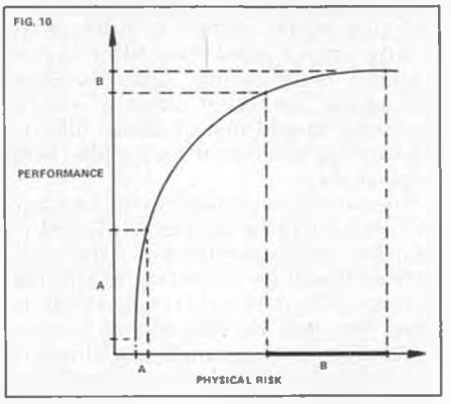
15) Check CG position. Ballast as required to locate per plans. The prototype weighed 6-3/4 oz.

17) DO NOT test glide. Make first launch an extended glide using approximately half power, outside, over tall grass (if available). Increase power on subsequent launches. •

Sailing . . . . . *Continued from page 35*

and has insufficient time to reach its peak. One really needs to pick the event and with a reasonable margin for emergencies, design for that "window".

Another consideration a designer must deal with is that of risk. One may trade performance for risk. In the case of physical risk, one accepts the probability that the boat may be damaged, in order to give it a competitive advantage. A paper deck would allow the boat to be lighter, more weight could go into the keel bulb increasing stability for a given displacement (everything is OK as long as the deck is not pierced!!). Figure 10 shows that early in the game a little physical risk can be accepted (A) and a fairly large potential in performance can result. Farther out on the curve, one must accept large physical risk (B) for a much diminished increase in performance. No designer likes to be famous



for breakdowns. It is correspondingly unnerving to sail a fragile boat that is a real winner, unless it is touched by another boat. It is often said that anything that breaks was under-designed and needs to be strengthened. What

never breaks, has been over-designed and is carrying extra weight needlessly.

Another kind of risk is technical risk (Figure 11). If we build a copy of boat A, the present winner, there is no risk, but there is also no gain. Somewhere down the line is a new design which will have an acceptable risk that is balanced against the potential gain in performance. Such a trade-off is not easy to quantitate. Decisions are usually made on the basis of the experience of the designer involved.

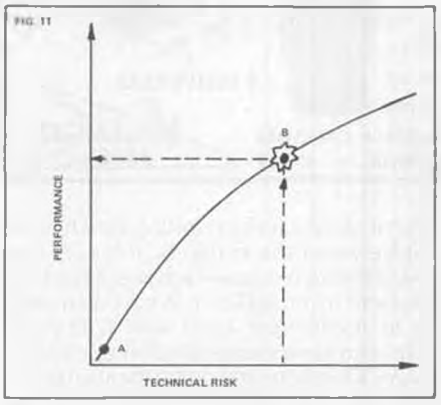
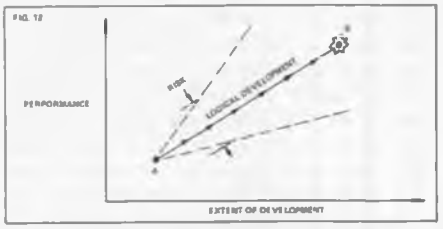


Figure 12 gives a picture of the process of innovation. From a functioning design A, logical development leads to subsequent designs of increased performance. Examples are the previously mentioned Goodwin WARRIOR series, Godby's WIND series, and Purdy's YANKEE line. These are evolutionary developments leading in a natural order. The farther one departs from the existing design, the wider the band of performance uncertainty. The more time that is spent on design the narrower the band.



Please remember to send in your AMYA dues of $10.00. AMYA has finally stopped playing musical secretaries, and the following address is good for at least the next year or so. My apologies for any delays that were caused by the addresses previously published. I'm sure nothing was lost, just slowed a bit. AMYA Secretary, 11913 Ferina St., Norwalk, CA 90650.

I will field questions for the SASE send to 7608 Gresham St., Springfield, VA 22151. •

F/F Scale . . . . *Continued from page 57*

sults. This technique works well even for rubber models.

You may wonder why the clear is applied to the inside instead of the outside of the structure. If you have ever tried sanding any of the resins, you know that it is quite a chore. The other way, you can treat the outside with dope followed by tissue and more dope until you are ready for the final paint. This will give you a finish that is probably much better than the prototype ever was!

The half-shell method of construction, a la Guillow and Sterling, has been around a long time. This is one method that I thoroughly refuse to use! I don't care how careful I am, I can never get the bulkheads to align when the two halves are glued together. However, I came up with a jig a few years ago that has really turned me on to this type of construc-

tion. The multi-contours of WW-II and Thompson Trophy aircraft fuselages are easily constructed using this jig. The photo shows the basic idea of the fixture. Pine or plywood can be used.

Fig. 2 shows how each bulkhead is mounted onto the jig. Three small dots of rubber cement are placed as shown on the bulkhead, which in turn is mounted onto the fixture as shown. Instead of the usual 1/16-inch thick bulkheads, they can be made from 1/32 sheet for additional lightness. Next, the two side keels are glued into place. I prefer to make these from a couple of laminations of 1/16 square stock. I like to undercut the overall size of the bulkheads by the thickness or the stringers used. However, I do leave a 1/16 square notch where the side, top and bottom keels fit.

By undercutting each bulkhead, the stringers lay on top of each former instead of in a notch. I have found that if you make the notches as shown on the drawings, the stringers do not always line up. This means that the notches have to be relieved in order to have alignment. So, I eliminate that hassle by simply undercutting each bulkhead.

Once the side keels are in place, the top profile keel is glued into place followed by all of the stringers above the side keels. At this point, you have half of a fuselage. Remove this assembly from the fixture by using a thin razor blade to "unstick" the framework. Fortunately, rubber cement doesn't adhere that well with just a single coat. Finish the lower half as you did the upper one. When completed, you will have a light, strong, good-looking structure that you can admire.

Here are a few additional comments regarding this type of construction. The first bulkhead should be made full-size, and should incorporate all of the notches for the stringers. One of the most tedious jobs related to this type of construction is the sheeting which has to fit between the stringers. It is very time consuming because each piece has to be cut and trimmed to fit. What I do instead is to sheet these areas with 1/32 sheet. This can be accomplished in a couple of ways. One is to sand down the stringers to 1/32 of an inch, then sheet over the top of them. Or, instead of undercutting the bulkheads a 1/16 of an inch, undercut them 1/32 only where the sheeting is required. Stringers can be used under the sheeting if desired by cutting notches so that they are flush to the surface. This may sound complicated, but it isn't, and believe me, it can save you a great deal of time. The Hellcat shown in the photo was done this way.

Incidentally, an easy way to make the bulkheads is to make a Xerox copy. Take a pair of proportional dividers set at 1/16 of an inch and go around the entire former, making a pair of holes. This is very similar to making a template for a rudder or stab. The bulkhead template is mounted onto a balsa sheet with rubber cement and cut out using the inner holes as a guide. This gives you the correct amount of undercut. The paper template can easily be removed once the former has been cut out from the

balsa sheet. This system is fast and fairly accurate.

Regardless of how careful you are in cutting out the templates, it seems that there is an occasional one or two where the stringers will not touch. Worry not. Just let the stringers follow their natural contour. On those formers where the stringers are not touching, just put a small balsa spacer or even some glue in the space.

One other advantage that I can see from the use of a jig is that the side keels are perfectly aligned and are exactly on or parallel to the thrust line of the model. This makes a very good reference point for making the stabilizer platform or for locating the wings. The exact location of cabanes on biplanes or parasols can easily be found as well, using these side keels.

If you are building a Guillow or a Sterling kit, you can still incorporate one of these methods. First, sand the backs of the die-cut sheeting to about one-half their original thickness. The parts will then fall out with very little persuasion. Glue each bulkhead half together, and when dry, they can be mounted onto the jig.

Whatever method you choose to do, above all, take your time, use glue sparingly, and try to anticipate problem areas. No matter how many models you have built in the past, you should study the drawings well enough so that any inaccuracies can be found and dealt with before it is too late. Pride will also make your efforts worthwhile. Good luck and happy flying.

Next month, I'll continue discussing other methods of fuselage construction.●

Power Boats . . *Continued from page 43*

All the material in the kit was good to top grade. The item that impressed me most in the kit was the building instructions booklet. I think Steve did one of the best jobs I've ever seen in providing the builder with a step-by-step, photo-laden construction and instruction booklet. If a photo is worth a thousand words, this booklet will be priceless for the person building his/her first model boat. Good on ya, Steve. I think this type of booklet will really be of benefit to new model boat builders.

If built according to the plans, the "Mighty Dolphin" will come out 36 inches long and 11 inches wide. But one of the problems with my building other peoples' wooden kits is that I like to make a few changes here and there. That's one reason I enjoy building from wood. You have some amount of flexibility that just isn't possible with a fiberglass hull. So what did Dunlap change? Well, the most noticeable change would be what I did, or maybe I should say what I didn't do, to the transom. The "Dolphin" boats feature a false transom. It looks neat, but I couldn't see any reason for it. So, when I arrived at that point in the building sequence, steps 15 to 19 for all of you who might be wondering, I stopped building and made a phone call to Dallas, Texas. As I recall, the conservation went something like this.

"Hi, Steve, this is Dunlap."

"Hi, Jerry, whatdaya need?" (I'm usually asking for some freebee whenever I call Steve.)

"Say, Steve, how important is that false transom to the performance of the Mighty Dolphin?"

"Not so awfully important. Why?"

"Well, I just thought I'd save myself a half-dozen steps and run a flat transom. Would that bother you?"

"No, I guess not." (Steve's really pretty easy to get along with.)

With that out of the way, we gabbed about model boating until I more than used up any profit I might make from writing this article. I keep telling my lovely wife Maren how all this building and writing is helping to pay for my hobby. But she helps write out the bills at the end of the month and I don't think I'm kidding her one bit with that line any longer.

The end result of this modification is that my boat is 34 inches long. The only other change I made probably wouldn't even be noticed if I didn't mention it. I elected to add a little crown to the deck of the hull rather than build a flat deck. This is just a personal thing with me. I like my boats to have a slight amount of deck crown, and it was easily accomplished. Other than those two modifications, the kit was built as it was intended.

As can be seen from the construction photos, the boat is built upside-down on a flat building surface. This is a fairly standard building procedure for wooden hulls and one that I use on my own designs. The building of the framework and application of sheeting posed no problems. There are no severe bends

on the hull, so sheeting the hull isn't any big hassle.

Steve provided me with his No. 65 hardware set to install in my boat. This is a complete stern drive set-up employing 3/16 cable running in a teflon tube. The only thing you need to add to this unit is a prop. And Steve will be glad to furnish one of those. The strut interested me since it used a blue material (teflon maybe?) for the bearing. I was a tad skeptical about this at first, but after running the unit for more than an hour, I can find no appreciable bearing wear.

Completing the hardware needed for the boat is a K&B Marine Specialties Multi Mount. Since I already had this mount on hand, I didn't ask Steve for one of his motor mounts. An Octura 5-inch wide mount could also be used. The directions provided with the hardware set were most sufficient, and I'm getting to where I can install these cable drive set-ups in hardly any time at all. This hardware set would also work well on other boats calling for a stern drive, and can be purchased separately from Steve Muck's R/C Model Boats, 6003 Daven Oaks, Dallas, TX 75248.

I used K&B Super Poxy paints to finish the boat. The instruction booklet gives excellent suggestions on how to properly finish the "Mighty Dolphin". I will quote what I feel is the most important idea Steve gives. "The quality of your finish will be directly proportional to the amount of time spent preparing the hull prior to application of the paint." *Amen* is all I can add to that statement. There are a number of fine products available to the model boat builder for finishing boats. When used as directed on a well prepared model, they all will give excellent results. I would suggest epoxy type products since they are quite durable and stand up well to the abuses that model boats are subjected to while being operated.

As was mentioned earlier in this review, the "Mighty Dolphin" was intended to be used as a sport running hull as well as for possible usage in deep vee type events. It has a rather shallow vee, approximately 18 degrees, and qualifies for both NAMBA and IMPBA deep vee events. When I began thinking about what engine to use in this boat, I thought more in the area of a hot sport type engine rather than a racing type engine. The HB .40 Marine caught my attention as the type of engine that might meet my needs. Bill Northrop, **MB** Editor, made the initial contact with Bavarian Precision Products Company, P.O. Box 6, 22 East Avenue, New Canaan, CT 06840, to see if they could provide such an engine. They were interested but were awaiting a shipment of new .40 Marine engines and hoped I wouldn't mind waiting a bit to receive one to use in the "Mighty Dolphin". It was well worth the wait because the HB .40 Marine is truly a beautifully built engine with good performance potential. The version I received features Perry Directional Porting, front intake, and has a tuned pipe. A Perry carb handles the throttle control. I believe this engine would be an excellent choice for the model boater looking for an easy starting, responsive, sport type engine. It isn't going to be able to keep pace with the hotter Schnuerle racing engines, because it isn't designed as an all-out racing engine. But after running it in my "Mighty Dolphin", I think it's an excellent engine for this type of sport hull. Being a ringed engine, it doesn't present some of the starting problems of engines without rings. It turns over very easy on the electric starter. The one I received fired up the first time I applied the starter to the starting belt. I mean it fired immediately! It really has proven to be a well mannered engine. For a sport type engine with better than average performance, it is worth serious consideration.

Completing our equipment review is the new Kraft 2-channel radio from Kraft Systems, 450 W. California Ave., P.O. Box 1268, Vista, CA 92083. Once again, WCN was instrumental in arranging for me to obtain another item to complete this article. The fine folks at Kraft thought it was a great idea to have the new 2-channel system used in a review and sent one to me without delay. Only problem was that it was a single-stick; great for flying a glider, not so great for model boating usage. So, we returned that unit and waited for the wheel version. In due time, the wheel version made its appearance and it also was

worth the wait. I elected to go with the larger 15-size servos and also had Ni-Cds installed in both the transmitter and receiver. I recommend that anyone seriously considering entering this hobby spend the initial extra bucks to get rechargeable batteries for their radio systems. Typical of any of the Kraft radios I have used, this 2-channel came well packaged and with plenty of informative material about the hobby of radio control and proper usage of radio control equipment. The Kraft stick-on decals and jacket patch are neat, too.

I'm not an expert on evaluating the whys and whatevers of radio systems. If a radio works, I'm happy. The Kraft 2-channel wheel worked beautifully from the time I charged it up. The transmitter is small compared to others I've used, but it feels good when operating the boat. Many of my friends ask my opinion of using a wheel transmitter compared to using sticks. I only began running wheel transmitters in 1977 and now I rather like them. I do believe that a beginner might do better by starting off with a wheel because it seems more natural. I know my seven-year-old son, Paul, doesn't even want to drive boats using stick transmitters. And five-year-old Denise can take that transmitter and really drive up a storm. Looks good and works well; you can't ask for any more than that in any radio system.

Although a radio box is provided in the kit, I used a clear plastic box produced by two of my boating friends up this way. The J.C. Products Radio Box will accept any of the popular radio systems being used today. The box features a lipped lid that fits tightly on the top of the box. It does not include seals, and I used K&B Seals for the pushrods, and a DuBro Kwik Switch for the on/off switch. I've used this box in other boats with other radio systems and have been well satisfied. It is available through J.C. Products, 6229 S. Fife, Tacoma, WA 98490. The price is $15.00 and that includes shipping.

It took some waiting but the day finally came when everything was in place and it was time for testing. The day we took the boat out for its initial running was absolutely a great day for doing anything out-of-doors. It was the warmest March 11 on record in our area. We were running boats in our T-shirts. As was mentioned earlier, the HB .40 Marine fired up so quickly I was startled. With the engine running, radio working, and ideal conditions, we launched the "Mighty Dolphin" for its first run. It soon became apparent that I was experiencing some problems with the rudder, because the boat wasn't turning very sharp. When a boat doesn't turn as it should, that's usually a sign that something's wrong with the rudder (trust me to give you all the "trick" information on boat handling). In attempting to get the boat back to the beach, I missed catching it and ran it aground. Actually I ran "arocks". This little miscue was to prove the undoing of the cable drive and a rather short maiden voyage.

Returning home, I discovered a poorly installed rudder servo in the radio box had worked loose. Repairs were made to the radio box and another cable inserted into the drive system. The weather the next day wasn't nearly as nice as the day before, but we got our act together and put some time on our new boat. Son Paul really took a liking to this combination and gave it a real workout. This was the first time he has ever run a boat full speed, and was he excited! It was equally exciting for me watching him enjoying himself like he was. With Paul driving the boat, I grabbed my camera and told him to drive the boat by for some running shots. He did a super job of positioning the boat for the pictures. He tells me he wants to race the boat this coming season. It will be interesting to see how he does. We won't be the fastest, but we should be pretty consistent.

Before heading for home, Denise tried her hand at running the "Mighty Dolphin". She's still at the stage of twisting the wheel to see what the boat does. But in a couple of more years I might be setting something up for her to use. One thing is for certain, the "Mighty Dolphin" will be mighty busy this coming racing season.

I most certainly wish to express my sincere thanks to Steve Muck for the boat and hardware. I'm sure Steve is still waiting for the day when I build something he sends me the way the instruc-

tions are written. My thanks also to Kraft Systems. My boy says the radio works great. I have to ask him for permission to use it. And thanks to Bavarian Precision Products Company for providing that fine-running HB .40. •

Plug Sparks . . . *Continued from page 49*

was little difference except the shaft size was reduced from 9/32 to 1/4 inch (to take advantage of standardized parts), and the connecting rod was changed from bronze to steel.

For the technically minded, the Condor Kopper King 60 featured a bore of .960 and stroke of .937, giving a displacement of .60 cu. in. The weight was advertised at 7-3/4 ounces (pretty light for a .60). A standard Champion V-2 plug was mounted horizontally at about ten o'clock looking down from the top with the prop shaft on the right.

The Condor .60 featured a neat way of inverting the motor. All that was necessary was to loosen the split nut on the carburetor, detach the spring wire connecting link, reverse position of the carburetor, tighten the split nut, and reattach the spring wire on the lower brass boss of the carburetor throttle body and to the opposite side of the timer segment ring. This method was quite reminiscent of the system used by the Hetherington Meteor. Recommended fuel mixture was four parts of high test or ethyl gasoline (not regular or low-lead!) to one part of S.A.E. 70 oil.

In conclusion, the Condor .60 was just another good engine that failed to survive, simply because the market was already flooded with good and proven .60 size motors having good capital backing.

THIRTY YEARS AGO, I WAS. . .

Originally, this columnist had figured to use Harry Murphy's writeup on the C.I.A. as a lead article, but this spot seems to be the best place. Let's hear what Murf has to say:

"The end of World War II saw Indiana emerge as a veritable hotbed of free flight activity. By 1949, there were so many contests that an Association of Indiana Clubs had to be formed to prevent conflict of contests between nearby cities. However, within five years, I think it could be said that nary an active free flight club remained within the state boundaries. The reasons for this sudden decline were varied and did not affect Indiana alone, but other areas as well. Locally, our club, the Anderson Johnnies, was basically hit by the "KKK." That is, Korea, Kollege, and migrations to Kalifornia. (Personally, I had a taste of all three; two years in Uncle Sam's Canoe Club, four years at ole P.U., and then spent some time in Californy analyzing Aeronautical Engineering as a vocation, but finally decided that airplanes were not here to stay and returned to the auto industry for security reasons.)

"In the next twenty years that followed, we diehards spottingly took in a few meets in neighboring states and usually most of the yearly NATS, whereby we continually renewed old acquaintances with remnants of other previous Hoosier Model Clubs, also long ago defunct. This situation continued rather consistently until Oshkosh in 1973.

"One evening, about a half-dozen Hoosiers were 'bulling it around' in one of the dorms and the idea for attempting to start a new free flight club in Indiana evolved. The tone of the discussion was that individually, none of us had really contributed much to model aviation in many years and rather than continue to complain about the lack of contests in our area, maybe we could help ourselves, as well as model aviation in general, if we collectively exerted a combined effort to make a few things happen in this regard. We decided to give it the old college try, so we sent out the call and held our first organizational meeting within two weeks after the NATS. About a dozen fellers attended and we kicked it off by establishing our club purpose as to 'Organize and Promote Free Flight Model Aircraft Activity in the Central Indiana Area.' (To this tune we have been beating our drum ever since!)

"Our immediate goal was a free flight contest that impending October, so we 'shotgunned' the election of officers, club sanction, meet sanctioning, etc., and made it through our first meet with money left in the bank. We were on our way. We followed with an indoor meet in the spring, which established our current tradition of one spring indoor meet and one fall outdoor meet per year, but with the determination of striving to make each the best in our seven-state area.

"Thus, it is a bit ironic that the only currently active free flight club in Indiana in nearly twenty years was actually conceived in Wisconsin, 600 miles from home base."

Columnist's note: Harry Samuel Murphy is one of the most prolific writers this writer has encountered. His news-

NATIONAL SOCIETY OF RADIO CONTROL AEROBATICS

NEW MEMBERSHIP AND RENEWAL FORM Please PRINT

Name _____ AMA No. _____

Address _____

City _____ State _____ Zip _____

Competition Classification: A ☐ B ☐ C/DN ☐ C/DE ☐

NEW ☐ RENEWAL ☐ NSRCA No. _____

Dues are $10.00 for one year.
Send check or Money Order to:

NSRCA, c/o Sally Brown, 8534 Huddleston Drive, Cincinnati, Ohio 45236

letter, the C.I.A. *Informer*, is always at least four sheets of information. "Murf" is one of those guys who isn't afraid to stick out his chin when he thinks something is wrong. We may not always agree with Murf, but he does get things done! A few more guys like him and we wouldn't have that wail, "Whatever happened to free flight?"
CALIFORNIA SAM O.T.
R/C ASSOCIATION

Okay, you Easterners, eat your hearts out! The first meet of the California SAM O.T. R/C Association got underway on March 4. Originally slated for February 25, the meet was postponed because of very bad weather forecasts. Wouldn't you know it! The 25th turned out to be a beautiful day with a handful of disappointed modelers on hand.

The following Sunday, the meet was held on the baseball diamond at the Two Rock Coast Guard Station west of Petaluma under cloudy skies and very wet ground conditions. Although it did cut down the entries somewhat, the SAM 27 boys couldn't complain one bit, as this meet turned out to be one of their largest to date. C.D. Bill Hooks was greatly pleased, as was the motivating force, Secretary Ed Wood.

Among the numerous giants that made their appearance was Karl Tulp's 15-foot Dallaire. This huge model flew excellently with a Quadra for power. Karl informs the writer that he has flown it with a Merco .60 and gets a thirteen-minute motor run under the new 1979 rules. However, fellows, take heart, as the model can only be flown on fairly calm days. Trying to penetrate a 15-mph wind with all that drag is a real problem! With the Quadra engine, this makes a nice combination. Karl is now seriously considering the pushing of a "King-Size Texaco" event.

In the same line of thought, fellow club member Ron Kiel also has a 15-foot Dallaire just about ready to cover. A few more like this and people will be coming out expecting to see an air circus and taking rides!

Don Bekins won the Texaco event on sheer guts. Most everyone in the early morning would not fly because of the cloud ceiling between 1000 and 2000 feet. Although he came perilously close to losing his Gas Bird several times, he did find the best thermal of the day to pick up the win in Texaco.

The columnist, on the other hand, has now found another way to lose a contest. It seems that Charlie Critch, in making an approach with his Powerhouse, zigged when he should have zagged. Net result was that he fell among the homes, shearing his wing in half on a standpipe. It was during the columnist's Texaco flight that the complaint came in, and the writer was asked to move his model away from the vicinity of the homes at 2000 feet altitude and in the best darn thermal you would ever want to catch! Needless to say, when the Dallaire was moved to another location, it promptly came down! Wait until next year!

To offset any sadness, the writer was greatly pleased to see Jim Carrll (a brand-new newcomer) win the .020 Replica event with his Cal Aero Playboy. It is always great to see the newcomer rewarded for his perseverance. Anyway, let's look at the results:

TEXACO
1) Don Bekins (Gas Bird) 31:31
2) Karl Tulp (Dallaire) 29:32
3) John Pond (Dallaire) 19:54
4) Speed Hughes (Boehle) 18:34
5) Jim Kyncy (Lanzo) 17:40

ANTIQUE
1) Speed Hughes (Miss Philly IV) 28:51
2) Nick Nicholau (PB-2) 20:47
3) Dave Bruner (Scram) 13:18
4) Loren Schmidt (Buccaneer) 5:22

LIMITED ENGINE RUN (CLASS ABC)
1) Ed Solenberger (Playboy) 20:49
2) Jim Kyncy (Lanzo) 16:20
3) Don Bekins (Playboy) 7:00

.020 REPLICA
1) Jim Carrll (Playboy) 10:34
2) Al Davison (Playboy) 7:17
3) Don Bekins (Playboy) 5:00

HAGGART-BOWDEN MEET

Here is a type of F/F contest that never seems to get off the ground for popularity. With all the dissidents crying that the hot dogs are dominating the limited engine run contests (Classes A, B, C, 30 Second Antique, etc.), one would think this type of meet would enjoy a good turnout.

The idea of a Bowden contest was reintroduced in England by the late John Haggart (a real live wire!) with the blessings of the Colonel. The Southern California Antique Model Plane Society (SCAMPS) quickly picked up on this idea and originally had a postal contest with the boys in England. After Haggart's unfortunate demise, the SCAMPS found themselves running this contest alone. Hence, the name of the contest in commemoration: the Haggart-Bowden Meet.

The main purpose of this contest is to come as close with your model to three minutes as you can, taking a three-flight total of the divergence from the ideal of zero seconds. No dethermalizers are allowed, and if one is used, you are charged with the maximum divergence; i.e., three minutes.

Well, the first time the contest was held at Lake Elsinore, it appeared to draw pretty good. Evidently the novelty has worn out, as it is no longer featured as a major contest, having been relegated to the status of a club contest held at Lake Elsinore. Really a shame it hasn't attracted more popularity.

This year's contest was won by Daniel Heinrich with a three-flight deviation of 1:13. And get this! Dan is the 11-year-old son of SCAMPS member Al Heinrich! The rest of the SCAMPS are going to have to look to their laurels.

Jimmy Dean, newsletter editor of the SCAMPS *Hot Leads*, provides the following results:

1) Daniel Heinrich (Trenton Terror) 1:13
2) Bill Cohen (So Long) 1:50
3) Wade Wiley (Guff) 2:17

It was interesting to note that hot performance is not required in this contest, as proven by Wade Wiley using a Genie engine in his Guff. There's hope for a few of us old goats yet!

AMPS BOWL

Tricky little name for a contest, isn't it? Cooked up by the AMPS (SAM 32), otherwise known as the Antique Model Plane Society of Northern California, this meet features an event that is generally different every year. Last year, contestants were restricted to one design, the Comet Phantom Flash R.O.G. That made the boys step!

The 1979 version (AMPS Bowl IV) will feature a two-minute precision contest where you can use either a gas or rubber model (no gliders!). There will be no engine run limit. The main idea is to approach two minutes in each of the three official flights. Anything over 40 seconds will be considered an official flight.

We expect to get a report from Jim Persson, AMPS Prexy, about how this meet turns out. Maybe we can turn it around and use the Haggart-Bowden rules and start up some real inter-club competition!!

THE WRAP-UP

It remained for Jimmy Dean, *Hot Leads* newsletter editor, to remind this columnist that 40 years ago, his friend, Ted Dykzeul, had a Hurleman-powered free flight (what else in those days?) Howard Hughes Racer. As Ted commented in *Model Airplane News*, February 1939, "On the first flight, the model was tail heavy. It went up into a steep climb, stalled, came down in a power dive and hit. The propeller and a wing panel were slightly damaged. The second flight was made during a large gas model contest (many spectators on hand in those days). The plane made a nearly perfect powered flight, banking to the left. After the motor cut out, it started in a steep right bank and when it neared the ground, the flaps came completely down and the model leveled off. A wheel caught as it landed in the rough ground and caused it to nose over. The damage was slight. The wing flaps proved their worth, as they cut the landing speed by fifty percent."

The model was small, having only a 48-inch wingspan and weighing three pounds (!!). Flaps were worked by a camera timer, taking ten seconds to fully activate. Now, how about that? When was the last time you saw something like that at a contest? Somewhere along the line in the pursuit of that elusive "maximum flight," we seem to have lost sight of the fun to be derived from meets requiring scale-like performance with some gadgetry thrown in. Somewhere in the great silent majority, there must be

literally hundreds of modelers interested in this type of exhibition, contest, call it what you like.

Food for thought, men. . . •

Counter . . . . . *Continued from page 9*

open holes in the exhaust stack. The new Tatone muffler is designed to fit over the exhaust stack and cover these holes; no plugs or adapters are required. The muffler is made of cast aluminum and is polished to a bright finish, and the mounting strap and screws are included. Retail price is $12.95. This same muffler is also available on request to fit the .29 through .40 sizes of Super Tigre, O.S. Max, and Enya engines, at $1.00 extra.

The other new goodie from Tatone is a newly-designed engine mount for the K&B .40 and .29 to .40 sizes of S.T., O.S., and Enya engines. These mounts can be purchased in either long or short beam versions and, like the mufflers described above, are cast from aluminum and are brightly polished. Best of all, these mounts are drilled and tapped for the engines listed above. Short beam mounts go for $6.00, and the long ones are $7.00. Be sure to specify the brand and size of your engine, and if ordering direct from Tatone, add $1.00 for postage and handling.

From Tatone Products Corp., 1209 Geneva Ave., San Francisco, CA 94112.

* * *

MPS Products is releasing an electronic device similar to the "Sono Beacon" described here last month. It's called the "Plane Alert," and can be used to make sure your fequency is clear before turning on your transmitter, performing an audible range check, finding lost models, and reminding you to turn off your receiver after a flight (assuming you remember to turn off your transmitter, that is!), as the device will sound off only when the transmitter signal is cut off.

The Plane Alert plugs into an unused channel on your receiver or can be used in tandem with a servo by using a Y-cord. *No connectors are supplied with the Plane Alert*, so you'll have to dig those up yourself. The instructions do tell how to wire the connectors to the unit, however, so you shouldn't run into any problems.

The Plane Alert weighs less than an ounce, draws less than 15 ma. when operating, and less than 3 ma. when silent. Servo tape is supplied for mounting it to your model, and the unit is covered by a full 1-year warranty.

The Plane Alert is available for both positive and negative-pulse systems (be sure to specify which one you want when ordering), and sells for $19.95 each, plus $1.00 for postage and handling. From MPS Products, 279 Jefferson Ave., Buffalo, NY 14204.

* * *

Something new and unusual (to say the least!) in the way of ready-built 1/2A C/L airplanes has been announced by The Testor Corporation: the Galax IX Spacefighter. This wild-looking machine is the newest addition to Testor's fleet of engine-powered space models and measures almost two feet long. The airplane is molded from polypropylene, which is claimed to be unbreakable and solvent resistant. The engine is the reliable Testors .049, and is unique in that it is mounted in the *middle* of the airplane, and is a pusher to boot. No broken props on this model!

Of special interest is that in addition to the written instructions, an exclusive 5-minute instructional recording is included that gives the straight dope on how to start and adjust the engine. Sounds like a good idea, especially for beginning beginners.

No word on the price, but you can find out from your dealer or The Testor Corporation, 620 Buckbee St., Rockford, IL 61107.

* * *

The Smithsonian Institution Press is at it again. Last month we told you about the excellent P-51 and Aeronca C-2 books that the Smithsonian is publishing; now there's a third, titled *The Wright Brothers: Heirs of Prometheus*, edited by Richard P. Hallion. Rather than us trying to tell what the book is about, here's what the Smithsonian has to say about it:

7 th Annual Mint Julep Meet

MAY 19--20

SANCTIONED AA BY AMA

Rough River Dam State Resort Park

Falls of Rough, Kentucky 70 Miles Southwest of Louisville

Hosted by:

Kentucky Department of Parks

Kentucky-Indiana-Ohio R/C Association

Sponsored by:

RC Modeler World Engines
Model Airplane News
Du-Bro Products Model Builder

Judging to be with the help of USPJA

ENTRY FEE

$10.00 IF LETTER OF INTENT IS FILED

$12.00 IF LETTER OF INTENT IS NOT FILED

(ALL FEES PAYABLE AT FIELD)

Airstrip closed to full sized traffic 7:30 am 'till Dark Saturday and Sunday, Land at Hardinsburg Airport . . . call the Park on 122.8 or by phone upon landing and transportation will be provided.

Beautiful array of silver thru 5th place. Merchandise awards to be drawn for throughout the contest among contestants and workers.

Choose accomodations from lodge rooms, cottages, or camping areas. For those who fly, 2500-ft paved airstrip is in the park.

For further information concerning reservations, write Rough River Dam State Resort Park, Falls of Rough, Kentucky 40119 - or phone (502) 257-2311.

In addition to the park facilities there are several privately operated motels in the vicinity.

Letter Of Intent

(PLEASE MAIL BY MAY 7, 1979)

7 th Annual "MINT JULEP MEET"

For Information Contact:

Dave Brown CD
8534 Huddleston
Cincinnati, Ohio 45236 (513) 791-0744

Radio Frequencies:

Pattern Class _____ MHz

AMA No. _____

A fantastic banquet will be held Saturday night for contestants and family at a reasonable cost.

Do you plan to attend the Banquet?

How many people ? _____ Adult
_____ Children

Name _____

Address _____

City _____

State _____ Zip _____

EVENTS (please check)

☐ Novice ☐ Expert

☐ Pre-Novice ☐ Advanced ☐ Master

Prepared to commemorate the 75th anniversary of the Wrights' first flights at Kitty Hawk, this book presents a unique contribution to our understanding of those two American aviation pioneers. The book combines a series of essays by a uniquely qualified group of aviation historians with accounts by the participants themselves, a comprehensive photographic essay, technical information on the Wright aircraft and engine, a detailed chronology, and a guide to bibliographic sources on the Wrights. Edited by Richard P. Hallion, Curator of Science and Technology at the National Air and Space Museum, this book will prove useful to the aviation enthusiast, scholar, student, or lay person desiring to learn more about the two men who changed forever the fabric of our society.

To which we can only say, *Yeah!* The book retails for $4.95 in paperback, or $15.00 for the clothbound version (both prices include book rate postage). From the Smithsonian Institution Press, P.O. Box 1641, Washington, DC 20013.

* * *

If your model boats have been sinking a lot lately, there's a new product from Fibreglass Evercoat that'll solve your problem. It's called "Spray Foam," and is a one-part foam that is just perfect for model boat flotation. No mixing or preparation is necessary, making this material safer than conventional similar foams. Spray Foam will stick to wood, metal, and fiberglass, and will insulate and soundproof hulls, walls, and bulkheads. The material is waterproof, so it can be used for sealing and caulking, too.

Spray Foam is available in 18 and 36 oz. containers. The 18 oz. can sells for $11.95 and yields more than 1/2 cu. ft.; the 36 oz. can is $21.95 and will put out more than 1 cu. ft. For more info on this nifty one-part foam, write to Fibreglass Evercoat Co., 6600 Cornell Rd., Cincinnati, OH 45242. •

R/C World . . . *Continued from page 11*

reward, and enjoyed a good laugh over our story about the people who reprimanded us for our "bad taste".

What was your "first R/C"? If you've been an R/C modeler for more than a few years, particularly B.M.P. (Before Multi-Proportional) and have a photo of that first bird, write and tell us about it. ONE OR TWO?

The latest issue of *K-Factor*, 16-page newsletter for the N.S.R.C.A. (National Society of Radio Controlled Aerobatics), which you can receive if you join by sending 10 bucks to Mrs. Sally Brown, Sec./Treas., 8534 Huddleston Dr., Cincinnati, OH 45236 . . . has an interesting question posed by District 4 Rep and Vice President Tony Frackowiak. Would two .40's geared to drive a single prop be considered the same as twin engines, which are now allowed in pattern competition?

In our opinion, the answer is NO. Whether the connection is internal or external, if you join two engines to-

gether with one power output, you end up with one engine. The new Fox Twin 1.2 and the HB 1.2 are examples; one opposed, the other in-line. Prettner's "engine", which he used in his T.O.C.-winning Dalotel, is made up of two Webra 60's joined by gears to turn a single prop.

Now excuse us while we jump in our eight-engined Corvette and drive home!

SINGLE STICK OF ANOTHER KIND

Charles Ricci, Pompano Beach, Florida, has succeeded in completing the cycle of model aircraft design. The lowly but well-known "stick" model of years ago, the backbone of free flying model aircraft, is back in R/C form!

Starting with a 37-inch long stick of 1/2 x 3/4 inch hardwood, Ricci added two 6-inch sticks up front to serve as engine bearers and tank mount, and then built on a balsa box which serves as a combined radio enclosure and wing mount.

Most any spare wing will do, ranging in area from 300 to 450 sq. inches. Ricci has used a Pilot Trystar wing, an Ace Warbird foam wing, and a Southwestern Topcat balsa wing. Tail surfaces are 1/8 sheet balsa.

Power is a Cox .09 running wide open without throttle. A 2-ounce tank gives a flight of decent length.

The radio box/wing saddle is built up of 1/8 sheet balsa, with 1/16 ply reinforcing laminations for the 1/4 inch wing hold-down dowels. Taper the top to give about 3/16-inch positive incidence. Back of the radio box is left open so the rudder and elevator pushrods have a direct shot to the control horns.

Ricci calls his stick model the "Knock-About". We were about to suggest "Let It All Hang Out", and then remembered that we published such a design, the name condensed to LIAHO (get it?), way back in July of 1973. This was kind of a novel trike-geared, quickly-built design for the Cox .049, and because **MB** was relatively limited in circulation back then, we've run a photo of it this month. Plan is No. 7731, price $2.50. Subsequent European kit was a dead copy of this layout, but with enclosed fuselage.

"TANKS A LOT, SULLIVAN!"

The following was quoted by Al Skidmore from the September 1976 *MARCS SPARKS* newsletter.

"In the first heat of our recent 1/2A pylon racing contest, my racer ran out of fuel at the end of the eighth lap. This peeved me somewhat, as I was way out ahead and only had cut three pylons so far. Several of the wiser sages in the club surmised that I would burn less fuel if I didn't go so fast. Owen Kampen got right to the point and indicated I should move the CG to 20%. Dick Buscher hit the nail on the head when he reminded me of a little gem of knowledge I had forgotten: 'You've got a round tank and you must remember that square ounces are bigger than round ounces.' Frank Baker wasn't much help as he wouldn't lend me his slant SS-2 tank because he was planning on having his 178-piece airplane back together for the third heat.

"I finished the remaining heats by going to a lower nitro fuel, cramming as much into my little round one-ounce tank as possible, and waiting till I heard the other engines come to life before getting serious about starting my own — a dangerous procedure with a 90-second time limit. No matter, that's not my main message to you. My main message is that round ounces do appear to be smaller than rectangular or square ones.

"Back in the shop, I measured the fuel capacity of my R-1 fuel tank. With the rubber stopper, brass tubing, nylon insert, etc., all in place, I could squeeze only 9/10's ounce of fuel into that tank. All I could think of was 'Tanks a lot, Sullivan!' Curiously I tried the same thing on what is known affectionately in 1/2A circles as SS-2, the slant 1-oz. tank, and found it to have a capacity of 1-3/8 ounces. The SS-2 has sufficient capacity for our pylon races and 1/2A aerobatic pattern; the round does not. Unless you're willing to glide the last part of each event, that is.

"Well, I do have a couple of other ideas you might find handy when you come across that latest corollary of Murphy's Law, 'The tank space in a 1/2A plane is never big enough.' The first is that Sullivan's tanks are somewhat amenable to changing their shape. You can shorten that bulbous end with heat. Just back the end of the tank into your Monokote iron, set at Solarfilm tem-

CLASSIFIED ADS

Non-commercial (personal items): Rate is 25 cents per word, with a minimum of $3.00. Commercial: Rate is 40 cents per word, with a minimum of $5.00. No mail-order discount house ads knowingly accepted. No advertising agency discounts allowed.
All ads are payable with order, and may be for any consecutive insertion period specified. Name and address free, phone number counts as two words. Send ad and payment to MODEL BUILDER Magazine, Classified Ads, 621 West 19th St., Costa Mesa, CA 92627.

STARTER CORDSET, glowplug to battery, 30" tangleproof, insulated clips — $1.89. Razor blades, single edge industrial quality — 100/$3.75; 200/$6.75, 300/$9.75. COBBIE'S GIFTS, Box 2, Deal, New Jersey 07723.

FF/UC SCALE PLANS. Peanuts, Walnuts, Hazelnuts, Rubber, CO_2, Gas. Modernistic Models P.O. Box 6974, Albuquerque, NM 87197.

PEANUT/GRAPENUT Catalog. Send stamp. Fokker E-1, Gee-Bee R-1, Geep, SBD Dauntless, Davis DA-2, Fike E $1.00 ea. Aero Era, 11333 N. Lake Shore Dr., Mequon, WI 53092.

OLD TIMER HANDLAUNCH GLIDER PLANS — Pre-1943, 15 different. Send $1.00 for listing and two sample plans. Bob Larsh, 45 South Whitcomb Ave., Indianapolis, IN 46241.

WANTED: Old-Time spark-ignition model airplane motors, magazines and gas powered race cars of the 1930's and 1940's. Russell Stokes, Rt. 1, Box 73J, Keller, TX 76248.

"HOW TO BUILD and fly 18 cutout replica paper aircraft. Easy, no glue required. Volumes I, II, III, $3.50 each postpaid. Free sample aircraft 35¢ postage handling. Little Brown Jug, P.O. Box 180, Getzville, NY 14068."

WANTED: Old model airplane engines and miniature gas powered race cars and all related items from 1935-55. Arthur G. Suhr, W218 N5866 Maclynn Ct., Menomonee Falls, WI 53051.

MODEL YACHTSMEN: Proportional conversion of any sail control unit . . . "R.C." spinnaker control . . . "R.C." genoa . . . Plans $2 each, all $5. Rainbow, Box 796-MB, Westbury, NY 11590.

HOBBY HORN, hobby specialties: Old Timer Kits, Big Red Rubber Bands, Y & O Props, Peanuts, Electrics, Accessories, Plans Scaling, and more. Bob Sliff. Write for free listing. Hobby Horn, Post Office Box 3004, Seal Beach, CA 90740, (714) 894-6223.

MOVING? SEND NOTIFICATION FIRST!

OLD ADDRESS (Please Print)

Attach old label here — Attach old label here

NAME

ADDRESS

CITY — STATE — ZIP

Attach old label here — Attach old label here

NEW ADDRESS (Please Print)

NAME

ADDRESS

CITY — STATE — ZIP

Change of address notices must be received one month before date of issue that new address takes effect. For prompt service, old label MUST be attached. Post office will not forward copies unless you pay extra postage. Duplicate issues cannot be sent.

MODEL BUILDER, 621 West Nineteenth St., Costa Mesa, Ca. 92627

perature, and wait for the softening and compressing to proceed. When satisfied, remove the tank from the hot surface and hold against a cold one until it holds its shape. It's easy . . . I only ruined one tank learning how. My latest achievement was turning a round 2 into a round 1-1/2.

"The second idea for shortening the tank is to make a 90° angle bend for the brass tubing by other than bending. The bent tubing seems to kink, get stuck in the springs used for bending, and still takes up too much room. File, sand, or grind a 45° on two pieces of brass tubing. Clean out the filings, etc. Now use silver solder and the liquid flux supplied with it (see the peg in your local hardware store). Place a drop or two of flux on a very small piece of paper towel. Press the 45° surfaces on to this blotter and wet the 45° surfaces with flux . . . but not the inside of the tubing. Clean and tin the iron and remove almost all of the solder from the iron. Now when you press one of the 45° surfaces to the iron it will come away with a thin coat of silver solder on it. Do so for both surfaces. Next hold the two 45° surfaces against each other . . . steady there . . . and heat one of the pieces of tubing quite near the 45° surface. When the two surfaces get hot enough the two will grab each other. Cool and flush away the flux. You now have a right angle for the exit from the tank which may save you another 1/2-inch space in front of the tank."

SIDEWAYS KNIFE-EDGE!

If you have plenty of power in your favorite bird, try this maneuver which

ADVERTISER INDEX

FULL SIZE PLANS SERVICE

Including reprint of construction article (if any)

No. 6791 CAP 20L-200 $10.00
Fully aerobatic large-scale low winger for 2 cu. in. or red.-drive engines. Jeff Tracy.

No. 6792 LONGSTER $3.00
F/F or R/C 1-inch scale (30" span) cutey for CO_2, .010, or rubber power. Le Gray.

No. 679-O.T. VALKYRIE .020 $3.00
Build this .020 Replica of Carl Goldberg's famous soaring gas model. Rudy Calvo.

No. 5791 DFH - 20 $7.50
Latest FAI pattern ship by top Swedish flier. Has built-in pipe. Bengt Lundstrom.

No. 5792 DORNIER Cs 20 $2.00
Contest-winning CO_2 scale free flight. It takes off water every time. Walt Mooney.

No. 579-O.T. TAYLORCRAFT $10.00
Quarter-scale in 1941! Famous 9-foot design kitted by Miniature Aircraft Corp.

No. 4791 HOLLY HAWK $3.50
Scale-like shoulder wing sport model for 3-channel R/C, .19 eng. Mike Hollison.

No. 4792 PETREL $5.00
Rugged, competitive R/C sailplane with 100" or 2-meter wing options. Jim Ealy.

No. 4793 PELICAN $2.50
Far out, but well-tested F/F pusher canard flying boat, .049-.09. Jim Fullarton.

No. 479-O.T. TLUSH MITE $2.50
From May 1938 Air Trails, a 4' span gas model for Atom (I) engines. Frank Tlush.

No. 3791 DUSTER $6.00
A 7/8 size "Big John" biplane for .61 engines and 4-channel R/C. Bill Northrop.

No.3792 MYSTERY $3.50
Compact 64" span aerobatic R/C slope soarer for 2-channel radio. Al Patterson.

No. 379-O.T. PRIVATEER $5.00
Very clean cabin design from Sept. '38 M.A.N., 87" span. By Thracy Petrides.

No. 2791 GROSS VOGEL II $7.00
Large (1700 sq. in.) plank-type R/C flying wing, .19 to .60 eng. Charles Clemans.

No. 2792 CLIFFHANGER $2.50
R/C slope soarer quickly built from Ace foam wings, 54" span. By Larry Renger.

No. 2793 STORMHAWK $2.00
Sleek, 26" low wing sport rubber ship, reminiscent of late '30's. John Morrill.

No. 2794 HALF-A SCALE RACERS $2.00
Two-for-one plan with 'Little Mike' and 'Shoestring' ukies. Jim & David O'Reilly.

No. 279-O.T. S/S PUSHER/CANARD $2.00
Single stick, 32" pusher/canard rubber ship from '33 M.A.N. By Harry Edsall.

No. 1791 DFH-21 $4.00
Smaller FAI pattern ship for .15 power by top Swedish flier. Bengt Lundstrom.

No. 1792 MAC'S "ROBOT" $5.00
Famous R/C Aircraft Series, No. 3. First published in 1951 AM. Fran McElwee.

No. 1793 LITTLE BIT $2.00
Super-mini 24" stunter will fly on up to 35' lines with Cox .010. Randy Heydon.

No. 1794 AVIATIK D-1 $3.00
Rubber powered scale model of WW-1 biplane fighter, span 26". Bill Noonan.

No. 12781 GRUMMAN AG-CAT $11.50
Mammoth 2-1/2" R/C scale biplane, for 2" engines. Span 7.5'. Floyd Fitzgerald.

No. 12782 COUPE DE PLASTIQUE $2.50
A proven contest winner with tube fuselage and plastic prop! Harry Steinmetz.

No. 1278-O.T. THE "TRIANGLE" $2.50
Rare Antique designed by Ehling. Used O&R 23, 1/2A with R/C. B. Shulman.

No. 11781 TRAVEL AIR D4D $7.50
Accurate 2-inch R/C scale model of famous Golden Era biplane. By Bill Seidler.

No. 11782 PAZMANY PL-4A $4.00
Jumbo rubber scale model of VW powered homebuilt, 56" span. Leon Bennett.

No. 10781 GUSSETS $5.00
Sporty, mid-wing, aerobatic "could-be" R/C scale, for .29 - .35's. Brad Shepherd.

No. 10782 AFTERNOON DELITE $3.00
Compact 54" span, highly maneuverable V-tail R/C slope soarer. Randy Wrisley.

No. 10783 ATAVIST $3.00
Quickly built, highly competitive, half-A free flight, 252 sq. in. Bill Langenberg.

No. 1078-O.T. TLUSH'S INSPRER $4.50
Modern construction featured in this '37 cabin ship, 78" span. By Francis Tlush.

No. 9781 GREAT LAKES TRAINER $4.00
Sport scale biplane for 3-4 channels and .19 engines, 40" span. By Bill Northrop.

No. 9782 "LIVE WIRE" TRAINER $4.00
Famous R/C Aircraft Series, No. 2. First kit ever for R/C modeling. Hal deBolt.

No. 9783 R/C STEAM LAUNCH $5.50
Natural finish mahogany planked 40" OA "African Queen" type. Kilburn Adams.

No. 9784 COBRA/KINGFISHER C/L $1.50
Whip and 1/2A powered 2-for-1 project. great for young beginner. Dave Kingman.

No. 8781 R/C VELIE MONOCOUPE $8.00
Light-weight 1/4-scale for belt reduction electric power, 90" span. Bob Boucher.

No. 8782 VEST POCKET SE5A $2.50
For pulse rudder R/C, this 22" span bug uses Cox .020 Pee Wee. By Fred Angel.

No. 8783 "PHOENIX" C/L STUNT $3.00
Sharp looking profile C/L stunt ship for .29 to .36 engines. By Mike Parenteau.

No. 878-O.T. .020 RECORD HOUND $2.50
Classic Henry Struck design. Could dominate .020 Replica class. Dave Sweeney.

No. 7781 "LIL QUICKIE" $5.00
R/C Form I model of George Owl's best. All wood construction. By Hal deBolt.

No. 7782 '30's SPORTSTER $3.00
Small R/C parasol for .020 and mini-multi or pulse rudder. Span 29". Tom Houle.

No. 7783 GREAT SPECKLED BIRD $2.50
Unlimited rubber ship which won Mulvihill trophy at '77 Nats. George Perryman.

No. 7784 "SICKLE" $2.00
FAI Combat ship with interesting mass production innovations. By Steve Fauble.

No. 778-O.T. CURTISS ROBIN $5.00
A 1937 Sport Scale ship! From Comet kit, 72" span. Designed by Joe Konefes.

No. 6781 LOCKHEED P-38L $10.00
R/C Sport Scale, balsa and ply const., a trophy winner, big, 8' span. Art Johnson.

No. 6782 PASKEY $4.00
Low-wing, trike, sport/pattern for advanced flier, 42" span, .19. Randy Randolph.

No. 6783 R/C SAILING KETCH $10.00
Complete plans (4 sheets) for building an elect. aux. powered ketch. Walt Musciano.

No. 6784 BUSY B $1.50
Very thorough instructions go with plans for this competitive EZ-B. Ron Roberti.

No. 678-O.T. MISS DELAWARE $4.00
Steve Kowalik's 1937 Junior Motors Consistency winner. Easy to build, 7' span.

No. 5781 UPTON'S BABY ACE $10.00
Exact R/C quarter-scale model of popular homebuilt parasol, 78" span. Bob Upton.

No. 5782 MERLIN $3.00
Single or mini-multi R/C aerobatic slope soarer. Ace foam wing. By Kevin Flynn.

STICK 'EM PATTERNS

Complete sets of pressure sensitive patterns provide "printed wood"... on your stock . . for selected MODEL BUILDER plans. Press all patterns for ribs, bulkheads, tips, etc., on proper thickness sheet balsa or plywood, and cut 'em out! No tracing, no transferring, no plans tearing, no inaccuracies. Just like making up your own kit with printed wood. "Stick 'em Pattern" numbers correspond to plan numbers. Order with plans and they'll be mailed together . . 3rd Class. Add 65¢ per set to mail patterns 1st Class.

CALIFORNIA RESIDENTS ADD 6% TAX.

No. 12711SP CURTISS-WRIGHT Jr.	$3.95
No. 11731SP BIG JOHN the FIRST	$5.95
No. 574-O.T.SP T-D COUPE	$2.95
No. 674-O.T.SP RED ZEPHYR	$3.95
No. 6741SP TRIXTER BEAM	$2.95
No. 774-O.T.SP OUT 'O SIGHT	$2.45
No. 7741SP CURTISS A/12 SHRIKE	$3.95
No. 874-O.T.SP POWERHOUSE	$3.95
No. 91074-O.T.SP BUHL PUP	$4.95
No. 1174-O.T. SP LANZO STICK	$1.95
No. 11743 SP "C-QUELL"	$3.95
No. 575-O.T. SP MERCURY	$3.95
No. 775-O.T. SP BOMBSHELL	$3.25
No. 277-O.T. SP BERLINER JOYCE	$5.25
No. 3771 SP WACO UPF-7	$5.50
No. 4771 SP "MISS ARPIEM"	$3.25
No. 577-O.T. SP GLADIATOR	$4.75

Price includes 3rd Class postage and reprint of building instructions (if any). Add 65¢ PER PLAN for 1st Class postage. Add $1.00 PER PLAN for overseas orders (except APO and FPO). Complete plans list 35¢.

CALIFORNIA RESIDENTS ADD 6% TAX.

MODEL BUILDER PLANS SERVICE
621 WEST NINETEENTH ST.
COSTA MESA, CALIFORNIA 92627

Joe Butler, Benbrook, Texas, has been doing with his Fox 78 powered Duster (March '79 **MB**). While in a stalled, nose high condition, with full rudder and moderate power, Joe's Duster will actually fly sideways with the nose straight up! Joe also adds that he installed full-length strip ailerons on the lower wing only, and found this to be quite adequate. •

Workbench . . *Continued from page 6*

90012, phone (213) 974-4111 and U.S. Congressman George Danielson at 8873 E. Valley Blvd., Rosemead, CA 91770, phone (213) 287-1134 or 722-7731, and tell them about the problem.

"The jurisdiction of this land falls to the Congressman while the residents adjacent to the area are represented locally by Supervisor Peter Shabarum."

AFTER THE CURTAIN

We've quoted Ken Sykora (King Sugar) on previous occasions. He writes and edits the *Flightplug* newsletter for the SCIF club (Southern California Ignition Flyers). In the most recent issue, he has come closer to describing the actual meaning and feeling of flying true model aircraft than anyone we can ever recall. The word picture will not fade. The title of his editorial is "After the Curtain". If it grabs you, you're a genuine modeler.

"We've seen it happen in the theater. The final curtain comes down, the applause ends, and the house lights go up. Most of the crowd files out, but here and there scattered members of the audience remain seated . . . savoring the evening's entertainment; not quite ready to end the experience and return to the routine world that awaits outside this momentary respite.

"The analogy may be a bit strained, but we observed much the same phenomenon on a recent late afternoon at the Taft Field. Competition was over for the day. Many of the fliers were well ensconced in campers, tents, or motel rooms, applying cold beers and suntan lotion against the internal and external rigors of a hot day of contesting.

"But the flying site was not deserted. The evening was delightfully mild, with a buoyant shelf of slowly cooling air and no drift at all. And a dozen models still floated around as their owners put up 'just one more' flight after another. It was just too perfect a moment in time for a flier to waste.

"Which leads to another interesting analogy. Ever since we can remember, other branches of modeling have been holding wakes for Free Flight. The loss of flying sites, lack of kits and and other supplies, the impact of controlled model options, and no formal youth programs are just some of the reasons that have been joined in this popular tirade.

"But, it seems to us, that dear old F/F is a very healthy corpse, because like weeds in the lawn, it just keeps coming back year after year . . . in spite of all the negative notes from so many quarters.

"And just maybe the reason F/F refuses to lie down quietly and become a dusty piece of modeling history was illustrated in that evening scene we witnessed at the field. For isn't the thrill of all types of pleasure flying based on that sense of freedom that comes from floating above the earth, with no ties?

"Perhaps, in our imitative way with our free flight models, this is the thing that makes us different breeds of cats from those who retain some type of ground control over their models . . . they never really leave the ground . . . and, in this context, controlled boats, cars, or trains (truly surface oriented machines) have always seemed to us much more rational subjects than aeroplanes for restrained and confined operations.

"Could be that's as close as we'll ever get to the core of the drive that makes the F/Fer tick. That intangible joy of free, random flight for its own sake that surpasses all other alternatives; and if not inherently felt, can never, really, be explained.

"And maybe that's not it at all. Individual reasons for individual actions can be unusual and varied. But of one thing we're sure. Whatever the cause, it has the power to keep some of us in the theater long after the 'play' has ended." •

NEW! Byro Drive T.M.

Patent Pending

Double the Thrust of Your .60 Size Engine.

The Boost Quarter Scalers Needed, But Could Never Find!

FACTORY DIRECT

$89.95

Complete as shown
(including prop & spinner)

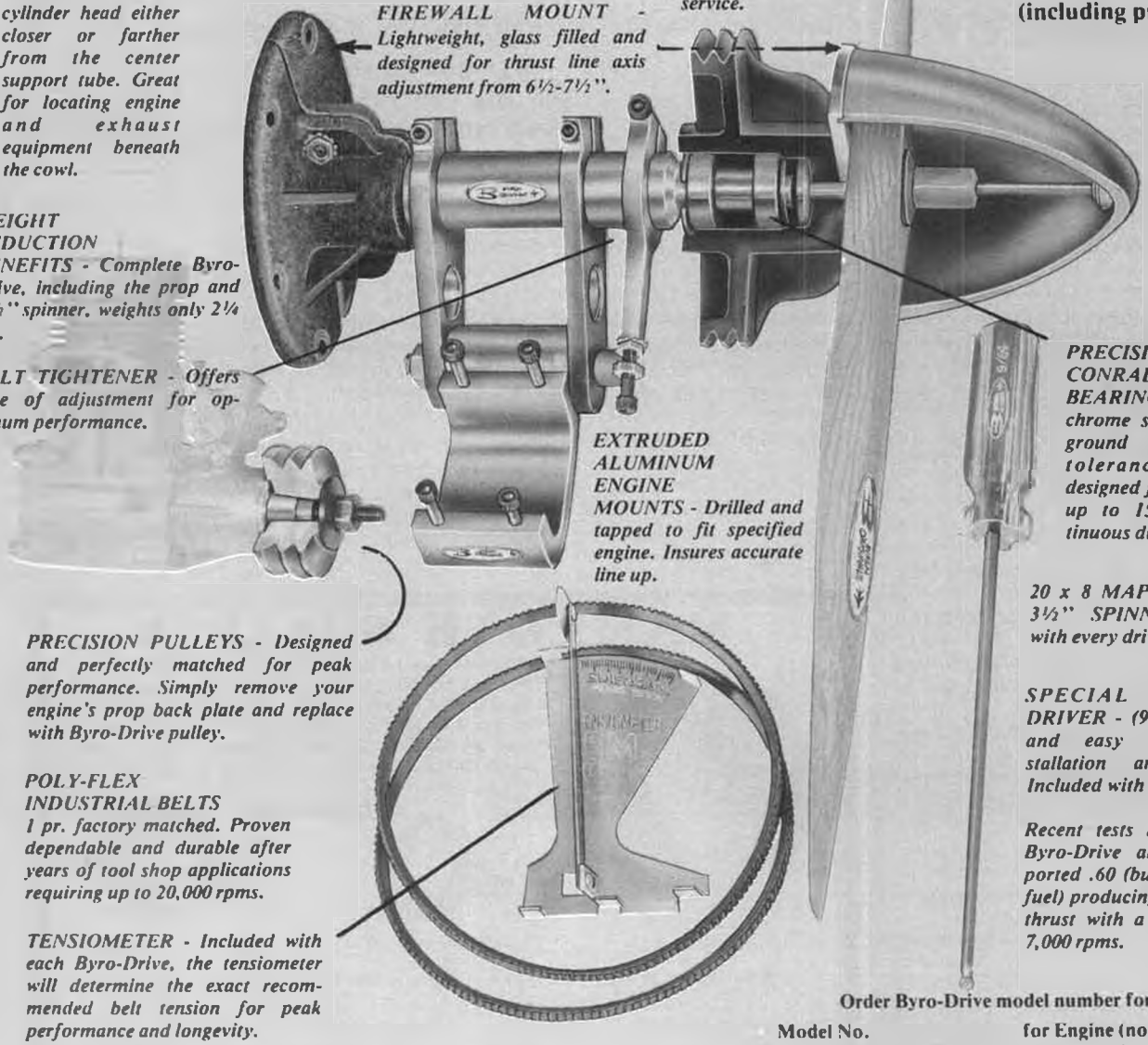
UNIQUE ENGINE MOUNTING - Allows a full 360 degrees adjustment around center support tube, plus positioning capabilities to locate the cylinder head either closer or farther from the center support tube. Great for locating engine and exhaust equipment beneath the cowl.

DURABLE 4½" NYLON FIREWALL MOUNT - Lightweight, glass filled and designed for thrust line axis adjustment from 6½-7½".

BALANCED 4" DRIVEN PULLEY - Injection formed, glass-filled and machined for dependable, vibration-free service.

WEIGHT REDUCTION BENEFITS - Complete Byro-Drive, including the prop and 3½" spinner, weights only 2¼ lbs.

BELT TIGHTENER - Offers ease of adjustment for optimum performance.



EXTRUDED ALUMINUM ENGINE MOUNTS - Drilled and tapped to fit specified engine. Insures accurate line up.

PRECISION CONRAD 1 1/8" BEARINGS - High carbon, chrome steel ball bearings ground to +.0000-.0002 tolerance. Originally designed for smooth service up to 15,000 rpms. continuous duty.

20 x 8 MAPLE PROP AND 3½" SPINNER - Included with every drive.

SPECIAL BALL END DRIVER - (9/64) assures fast and easy Byro-Drive installation and adjustment. Included with each drive.

Recent tests have shown the Byro-Drive and a Schnuerle ported .60 (burning 15% nitro fuel) producing up to 20 lbs. of thrust with a 20 x 8 prop at 7,000 rpms.

PRECISION PULLEYS - Designed and perfectly matched for peak performance. Simply remove your engine's prop back plate and replace with Byro-Drive pulley.

POLY-FLEX INDUSTRIAL BELTS 1 pr. factory matched. Proven dependable and durable after years of tool shop applications requiring up to 20,000 rpms.

TENSIOMETER - Included with each Byro-Drive, the tensiometer will determine the exact recommended belt tension for peak performance and longevity.

Order Byro-Drive model number for matching engine.

Model No.	for Engine (not included)
MFR-10	.60 & .65 O.S. Max, front & rear valve
RR-11	.61 & .65 Rossi, rear valve
RF-12	.61 & .65 Rossi, front valve
WFR-14	.61 Speed Webra, front & rear valve
TFR-13	X.60 Supertigre, front valve, rear exhaust
KF-15	.61 Kraft
HPFR-16	Silver Star or Gold Cup, front & rear valve
OPSR-17	OPS .60 Speed, rear valve

Thanks to **Byro-Drive** and its ingenious method of prop reduction, you can stop searching for that elusive method of powering your giant aircraft. And above are **13 good reasons** why. Forget about oversized and overweight gasoline and chainsaw engines with their abundance of vibration. Instead, place your trust with proven names like O.S. Max, Webra, Rossi and others* for superior engine performance and dependability. Then look to **Byro-Drive** from **Byron Originals** for the finest in high performance prop reduction. You'll like what **combining two winners** can do.

*Byro-Drive models for other well-known engines available soon.

BYRON ORIGINALS

VISA

master charge THE INTERBANK CARD

Send me_____Byro-Drive(s) Model No.(s)_____at $89.95 ea., plus $2.50 handling. (Iowa residents add 3% Sales Tax.)

Name _____

Address _____

City _____ State _____ Zip

☐ Visa # _____ Expires _____

☐ Master Charge # _____ Expires _____

☐ I have enclosed Chk. or Money Order for $ _____

☐ Ship C.O.D. (85c additional per pkg.)

Prices and specifications subject to change without notice.

Send to Byron Originals, P.O. Box 279, Ida Grove, Iowa 51445

big Pitts

BYRON ORIGINALS

A Product of Midwest Industries, Inc. Ida Grove, Iowa 51445

Complete ARF Kit.

Includes all items needed to complete model as shown, including decals, color scheme templates and documentation for contest work. Prop and Spinner included with optional Byro-Drive prop reducer.

Exact 1/3 Scale Pitts S-1A

Wing Span: 68" Wing Area: 1400 sq. in. Length: 62"

Weight: ready-to-fly, less fuel.
***Under 15 lbs. with Econokote finish.**
***Under 17 lbs. with Epoxy/Fiberglass finish.**
(Optional glass kit available for $36.00).

Use the handy coupon below to place your order or call me for more information. 712-364-3165

Jimmy

Spectacular Flight Performance!

Thanks to its special pressure molded, foam airframe and the optional Byro-Drive, the Pitts S-1A from Byron Originals has overcome both the excessive weight and inadequate power problems of other quarter scale aircraft. See full page Byro-Drive ad about how you can increase the thrust of your .60 size engine by 100%.

FACTORY DIRECT PRICE

$188.00

Plus $8.00 shipping charges to any address in U.S. Items shipped by United Parcel Service.

NOTE: Although the Pitts will readily accept the various gasoline and chain saw engines presently on the market, their excessive weight, size and vibration render them less desirable.

Byron Originals
P.O. Box 279
Ida Grove, Iowa 51445

Send me_____Pitts S-1A kit(s) at $188.00 ea. plus $8.00 shipping.
Send me_____Fiberglass Covering Kit at $36.00 ea. plus $2.50 shipping.
(Iowa residents add 3% sales tax.)

Name _____

Address _____

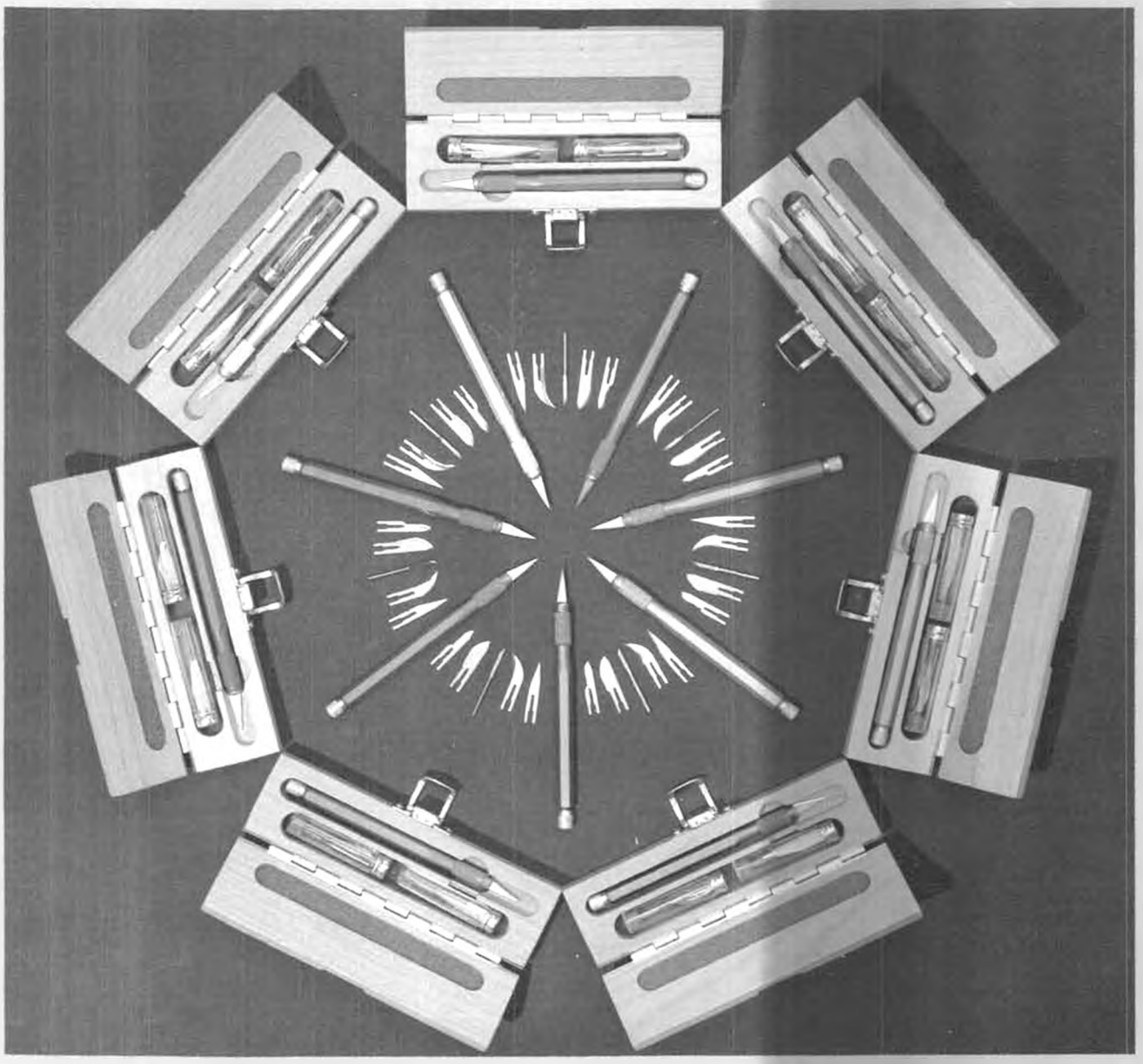
City _____ State _____ Zip _____

☐ I have enclosed Check or Money Order for $_____
☐ Please charge to Master Charge or Visa Account.

Master Charge # _____ Expires _____ Visa # _____ Expires _____
☐ Ship C.O.D. ($.85 additional charge per pkg.)
(Prices subject to change without notice).
Send to: Byron Originals, P.O. Box 279, Ida Grove, Iowa 51445.

master charge THE INTERBANK CARD VISA

IN THE BEST CIRCLES, IT'S **über skiver**



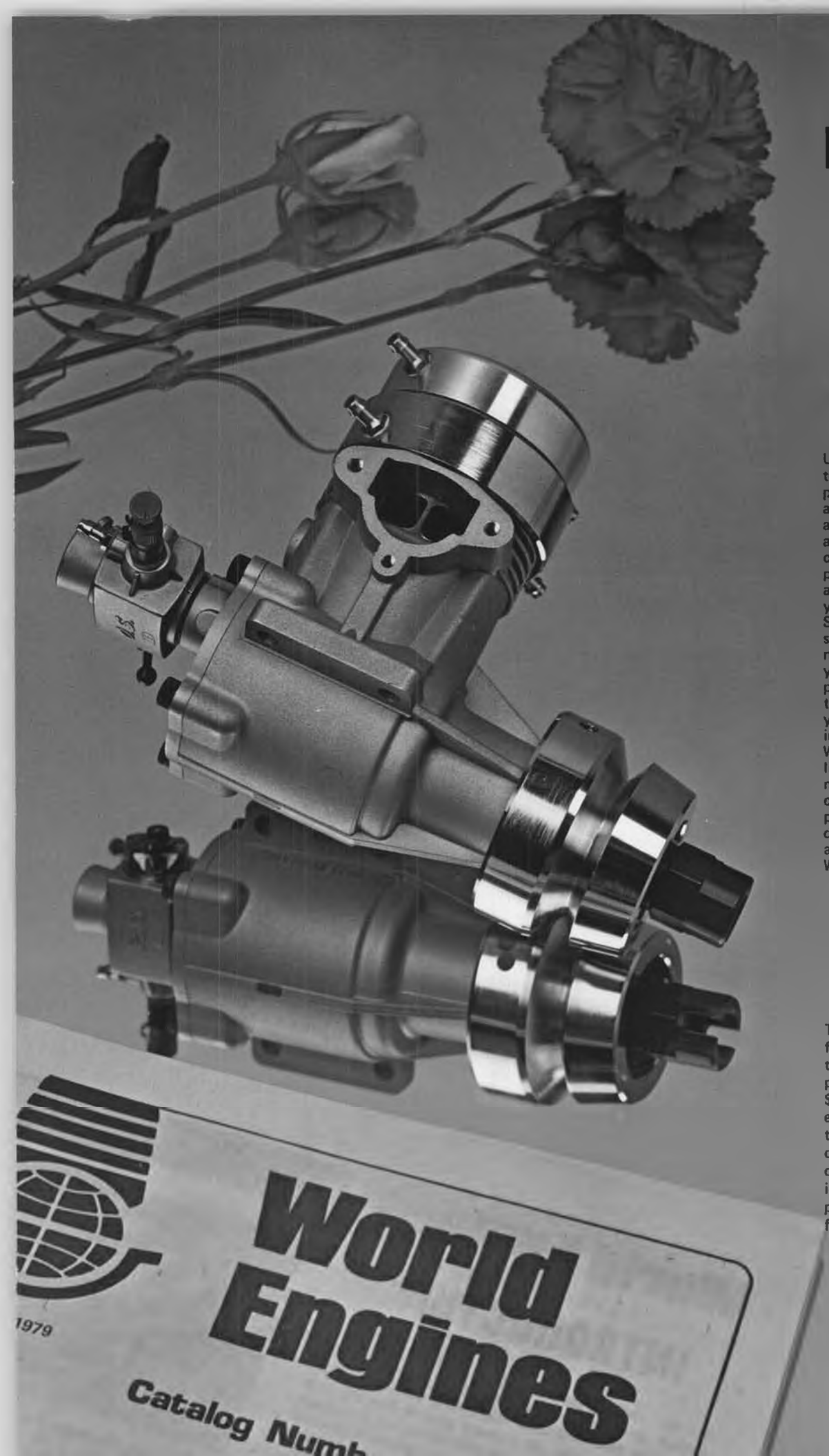
A PRECISION INSTRUMENT FOR THE DISCRIMINATING MODELER

- *Safe, Rear Draw-Bar Clutch*
- *Precision, Instrument-Quality Materials*
- *Strong-Holding Advanced Collet Design*
- *Non-Rolling Hex Cross-Section*
- *Deeply Knurled, Non-Slip Grip*
- *Long-Life, Stainless, Surgical Steel Blades*

Available in seven satin anodized handle colors: silver, blue, red, green, gold, copper, violet. Complete set in fitted hardwood case; includes uber Skiver, together with two vials containing four No. 11, and one each of Nos. 10, 12, 15, and 20 . . . . . $14.95
Individual handles (specify color) $5.95
Vial of 6 blades (No. 10, 11, or 15) $2.10
(No. 12 or 20) $3.30

See your dealer, or order direct.
Dealer inquiries are invited.
All direct orders sent postpaid in U.S.
California residents add 6% sales tax.

MODEL BUILDER PRODUCTS
621 West Nineteenth St., Costa Mesa, California 92627



WORLD ENGINES

8960 ROSSASH AVE.
CINCINNATI, OHIO 45236
(513)793-5900

Under the OS 90 marine pictured on the left, is a new 72 page World Engines catalog and pricer. These are available for $1.00. It lists the OS and Supertigre engines in current production and the parts for each engine. This is a handy document to have if you are operating an OS or Supertigre engine. You can show this catalog and part number to your dealer when you are asking him to order a part from us. Or, if you order the part directly from us, you can nail it down by giving us our catalog number. We have also included things like crankshaft/thread sizes, mounting dimensions, list of carburetors and carburetor parts, and a list of all the domestic items that are available to our dealers from World Engines.

O.S.

OS 90 RSR MARINE

This engine will be available from World Engines sometime in August. The retail price will be approximately $299.95. The engine is equipped with the 7E throttle with flywheel and a water cooled head. Also, a water cooled cylinder jacket. Rear induction. A forward facing pipe elbow will be available for tuned pipe users.

MRC'S new ready-to-fly breaks the price barrier...

with quality, performance and power at under $100

Until now if you wanted to buy a ready-to-fly airplane that wasn't an .049 powered toy you had to spend big bucks, or settle for kid stuff control, low end power and minimum performance features. MRC's Trainer Hawk puts an end to that. Now for under $100 take home, a big brightly colored rugged foam aircraft with full 48" wingspan, 32" fuselage, complete with an MRC-Enya 15IV TV already installed. You'll fly loops, figure 8's, Cuban 8's . . . trim it properly and you'll even fly hands off. You've complete throttle control at your fingertips. The Trainer Hawk is indeed a new plateau in beginner ready-to-fly.

We've designed it with high dihedral, anti-stall wing tips for maximum stability and excellent wind penetration. There's even a steerable nose wheel that lets you taxi with complete control. Best of all you can go from buy-to-fly in about an hour because so many of the time consuming installations have already been completed at the factory.

Included in the package are muffler, propeller, glow plug, spinner, dowels, decals, wheels. See the spirited ready-to-fly, full size Trainer Hawk at your dealer. It's ready to go. (Also available, Electra-Fli ready-to-fly electric trainer complete with MRC-Mabuchi electric power system installed.)

- **Bulkhead factory installed**
- **Fuel tank and tubing factory installed**
- **Engine mount with Enya 15IV TV factory installed**
- **Steerable nose wheel factory installed**
- **Pre-bent control rods for elevator, rudder and throttle factory installed**
- **Hinges and control horns factory installed**

Two channels control nosewheel steering, rudder and elevator. Third channel can be used for control of throttle valve.

Model Rectifier Corp.
2500 Woodbridge Ave., Edison, N.J. 08817