MODEL BUILDER

ICD 08545

FEBRUARY 1983

$2.50

volume 13, number 133

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Authentic 1/7 Scale
A-4 Skyhawk!

BYRON ORIGINALS T.M.

A product of Midwest Industries, Inc. Ida Grove, Iowa, 51445 Ph. 712-364-3165

Powered by the Patented Byrojet Ducted Fan!

NEW!

SPECIFICATIONS:

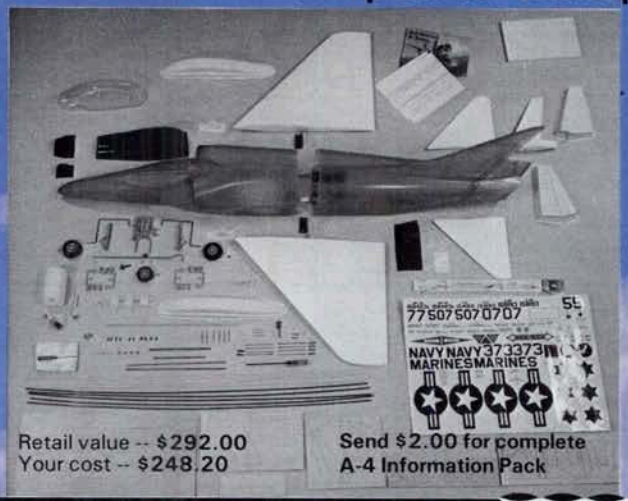
Wing Span	45"
Wing Area	762 sq. in
Wing Loading	30 oz. per sq. ft.
Length	68"
Ready-to-fly weight	9½ lbs.
(with retracts	10½ lbs.)
Channels	4 (5 w/retracts)
Power	Schnuerle ported .60s & Byro-Jet

(No high nitro fuels required)

Kit includes extensive decal set to finish off both models as shown.

Exclusive plug-in wings and aileron linkages for quick and easy transport.

True Value in a "Complete Kit Concept"!



Retail value -- $292.00
Your cost -- $248.20

Send $2.00 for complete A-4 Information Pack

Available NOW!

Byron Originals proudly announces the release of our latest ducted fan adventure—the world famous A-4 Skyhawk. Like all Byron Originals kits, this super scale jet fighter is designed, manufactured and packaged with our "complete kit concept" in mind. While other manufacturers are content to offer you only semi-kits, Byron Originals does a whole lot more. Every item needed to complete the model, except fan unit, engine, radio, paint and glue, is included. In addition to the latest state-of-the-art construction methods and materials, this A-4 package offers you an impressive list of scale appointments. They include a highly detailed fiberglass fuselage, canopy, avionics cover and rudder, plus scale strut assemblies, landing gear pods, cockpit interior, extensive decal set and optional drop tanks. **Exclusive** plug-in wings and aileron linkages for quick and easy transport are just a few of the many unique A-4 standard features. Retracts can also be easily incorporated for added scale realism.

Flight characteristics are just as impressive. Powered by our proven Byro-Jet fan and tuned pipe system, the A-4 is a true scale performer. The patented Byro-Jet promises plenty of power reserves for both hard surface and grass field take-offs, including the usual aerobatic manuevers. All things considered, the A-4 Skyhawk from Byron Originals is a masterpiece of modern modeling technology.

Byro-Jet Tuned Pipe System

Byro-Jet's exclusive quick start capabilities makes engine starting fast, easy and safe. No complicated belt start procedures and no hatches to remove and re-assemble. Simply attach the starter extension to your Sullivan starter, insert the assembly through the tail pipe until contact is made with the rotor...and hit the starter.

In addition to increasing power output, this unique Byro-Jet Pipe System provides the necessary noise suppression and the means to completely conceal tuned pipe within fuselage. Available for both side and rear exhaust .60 engines.

A-4 kits are now in stock and ready for immediate delivery!

Send me:

NOTE: In order to receive proper Pipe System and Byro-Jet, determine engine to be used and check accordingly.

____A-4 Skyhawk kit(s) at $248.20 ea. plus $8.50 shipping & handling.
____Optional drop tank kit(s) at $25.46 ea. (includes shipping & handling)
____Byro-Jet ducted fan(s) at $53.08 ea. plus $2.00 shipping & handling.
____Complete tuned pipe system(s) at $57.22 ea. plus $1.75 shipping & handling.
____ Starter extension(s) at $14.03 ea. (includes shipping & handling).

____Webra .61 speed #1030 r. ex.-f. val.
____Webra .61 speed #1030 s. ex.-f. val.
____O.S. Max .61 VF r. ex.-f. val.
____O.S. Max .61 FSR s. ex.-f. val.
____O.S. Max .60 FSR s. ex.-f. val.
____O.S. Max .65 RSR s. ex.-r. val.
____Rossi .65 ABC r. ex.-r. val.
____Rossi .61 ABC r. ex.-r. val.
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____Webra .61 speed #1024 s. ex.-r. val.
____H.P. .61 gold cup s. ex.-r. val.
____YS FR .60 f. val.,-r. ex.
____Undrilled engine mount
____O.P.S. .60 & .65 RCA r. ex.-f.&r. val.
____O.P.S. .60 RCA s. ex.-f. val.

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_____I have enclosed check or money order for $_____

_____Please charge to MC# _____ Exp._____

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Iowa Residents Add 3% Sales Tax. Prices Subject to Change Without Notice.

Send to: BYRON ORIGINALS, P.O. Box 279, Ida Grove, Iowa 51445, Ph. 712-364-3165 Telex 439012 IDAG

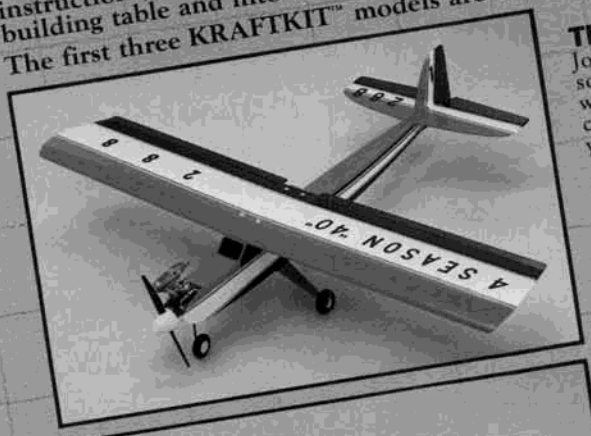
Introducing KRAFTKIT

Designed by Joe Bridi

Ask the experts at your local R/C flying site about Joe Bridi aircraft designs. They will probably tell you how they learned to fly R/C on a Bridi designed trainer, or how they won a pattern or scale contest with a Bridi design.

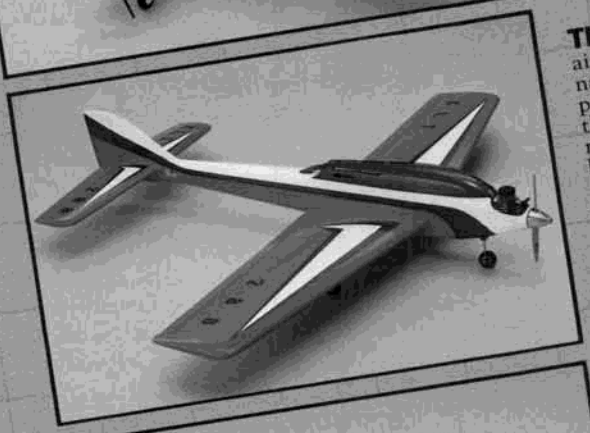
KRAFTKIT™ continues this tradition with an all new line of R/C kits designed by Joe Bridi. Each quality kit contains precision, machine cut and sanded balsa, plywood, and hardwood parts. You will also find high quality Kraft hardware packages, including Kraft motor mounts. Detailed, illustrated instructions, and full size plans allow the beginner and the expert alike, to get the model from the building table and into the air quickly.

The first three KRAFTKIT™ models are on your dealers shelves right now, and more are coming soon.



THE FOUR SEASONS 40—This new sport model characterizes Joe Bridi's approach to R/C fun flying. Its design allows the modeler with some experience to get through construction and a flight training program with very little difficulty. The FOUR SEASONS 40 is also an aircraft you can grow into; Its symmetrical airfoil makes this a real performer when you become a more experienced pilot.

Wing Span	58 inches
Length	49 inches
Wing Area	615 square inches
Recommended Engines	.25 thru .45 cubic inch
Suggested Retail Price $64.95	Part No. 004-046



THE XLT—Joe Bridi is an expert pattern flyer and this XLT pattern aircraft is the culmination of his experience at competitions on the national level. The XLT is designed for tuned pipe, rear exhaust, high performance engines and the kit comes with a molded "tunnel" to enclose the pipe. This aircraft is great for the installation of Kraft electrical retracts. For a pattern aircraft that is engineered for precision flying, buy the XLT.

Wing Span	65 inches
Length	65 inches
Wing Area	845 square inches
Recommended Engine	.60 cubic inch
Suggested Retail Price $119.95	Part No. 004-047

THE WIND SURFER—Joe Bridi designed this new 2 meter sailplane to be light and strong. Constructed of machine cut balsa, and hardwood, the WIND SURFER can take the stress of towing, high starts and aerobatics. Its large forward compartment makes radio installation simple. A clear canopy provides a touch of realism missing from many other sailplane designs. A simple "plug-in" wing and stabilizer allows easy transportation to the nearest thermal.

Wing Span	78½ inches
Length	42½ inches
Wing Area	544 square inches
Airfoil	Flat Bottom Highlift
Suggested Retail Price $46.95	Part No. 004-048

Ask for these KRAFTKIT™ designs at your favorite R/C hobby dealer.

Kraft Systems Company, Division of Carlisle Corp., 450 W. California Ave. Vista, Ca 92083,
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1983

volume 13, number 133

621 West Nineteenth St., Box10335, Costa Mesa, CA 92627-0132 Phone: (714) 645-8830

CONTENTS

FEATURES

CONSTRUCTION

Cover: Our cover artist, Bob Benjamin, has captured the Republic P-43 "Lancer" in a classic pose, as it climbs through some broken clouds. The P-43 was the first fighter off the line after the Seversky company became Republic Aviation. It saw action in the Far East in early WW-II, and was the only AAF fighter with high altitude capability at the time of the attack on Pearl Harbor. Col. Art Johnson flew P-43's and P-43A's in 1942, and now brings you his large, contest winning R/C scale model of this polished aluminum beauty. The construction article begins on page 14.

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COUNTER-REVOLUTIONARIES GIVE NEW DIRECTIONS TO 2L AND 4L SYSTEMS.

Just flick a switch on the back panel of our new FP-2L or FP-4L transmitter and you can reverse the action of any servo in the system.

Our popular and economical L-Series now has the added convenience of servo reverse switching to make linkage set-ups a snap.

Always the value leader in RC, Futaba's 2 channel 2L ($114.95) and all-NiCad 4L ($209.95) systems also feature our new S28 precision servos.

A HOT NEW ROAD PACK MAKES THIS 2F SYSTEM TOUGH TO BEAT.

A pair of rapid-transit S32 servos (0.16 sec./33.4 oz/in.) and our micro R4H receiver make this 2F system ($139.95) perfect for the RC car driver in a hurry.

Designed for serious racers, this high-speed, lightweight Futaba combo can give your car the winning edge.

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SIG CUBS WIN AT 1982 NATS

JULIE ABEL TAKES 1ST PLACE IN JR C/L SPORT SCALE

LINCOLN, NE - (Left) Hazel Sig congratulates young Julie Abel on winning 1st place in Junior C/L Sport Scale with a model of Hazel's own full-size Clipped Wing Cub. Julie's Clipped wing is beautifully detailed right down to the scale rib stitching and pinking tape. The Fox .36RX engine in her model even exhausts through the scale exhaust pipe. Converting any of the Sig R/C Scale kits, like the Cub, to C/L flying is simple. Write for free advice from our engineering staff.

MIKE GRETZ WINS 1ST PLACE IN R/C GIANT SCALE

(Below, left) Mike Gretz won 1st Place in R/C Giant Scale flying our new 1/4 scale Piper J-3 Cub. The full-size Cub's legendary flying qualities are totally inherent in the model, enabling Mike to post the best flight score of all the R/C Scale entries. A Fox .78 engine powers the 15 lb. model. The same accurate scale outlines, dummy engine detail, leaf-spring tailwheel, and other details that made Mike's J-3 Cub a Nats winner are all included in the Sig kit.

DAVE FALKENHAGEN PLACES 4TH IN OP. C/L SPORT SCALE

(Below, right) Another Sig Clipped Wing Cub, this one built and flown by Dave Falkenhagen, took 4th Place in Open C/L Sport Scale. Dave's model is powered with an O.S. .40 and flies extremely well. He placed 3rd at the '78 Nats with the same model, and before that it was flown as an R/C. The Cub has always been a favorite for C/L or R/C Scale flying.

FLY A CUB FOR FUN OR COMPETITION . . . . .

Build The 1/6-Scale Size . . . . or . . . . The 1/4-Scale Size

PIPER J-3 CUB

RC-3

$59.95

Wingspan: 71"
Engines: .19 -.40

PIPER J-3 CUB

RC-48
$169.95

Wingspan: 105"
Engines: .60 - 1.5 Glow or Gas

CLIPPED WING CUB

RC-26

$59.95

Wingspan: 56"
Engines: .19 - .40

SIG

CLIPPED WING CUB

RC-47
$164.95

Wingspan: 86"
Engine: .60 - 1.5 Glow or Gas

VISA MasterCard

See your dealer first! To order direct add $1.00 postage for orders under $10.00. Over $10.00 postpaid. No C.O.D. Latest Catalog - $2.00 ppd.

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Hobby Workshop
The Bazzar Mall
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RICHMOND HILL
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ROCHESTER
Dan's Crafts & Things
24 Bergen Street
SYRACUSE
Wall's Hobby & Craft
4300 W Genesee St
UTICA
American Hobby & Sports
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CHARLOTTE
Science Hobbies Inc
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Coke's Fix it & Hobby Shop
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PH 919 627 0166
GREENSBORO
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2144 Lawndale Drive
Lawndale Shopping Center
HENDERSONVILLE
The Hobby House
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PH 692 6683
HIGH POINT
Barnie's Craft & Hobbies Inc
2291 English Road
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King R/C
Old Hwy 52
PH 983 3969
NORTH DAKOTA
GRAND FORKS
McGillins Hobbies Unlimited
1228 9th Ave S
PH 701 772 5311
WILLISTON
C & C's R/C
R R 1 Box 87C
OHIO
ASHLAND
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42 E Main Suite 204
PH 419 325 1691
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Buckeye Hobby Shop
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Country R/C
12450 Amity Road
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CLEVELAND
National Hobby Inc
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PH 513 548 1035
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LANCASTER
Slater's Inc
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LIMA
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BATH
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Lancaster Shopping Center
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Ott's Hobbies
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NORTH KINGSTOWN
Hobby Hut
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SOUTH CAROLINA
GREENVILLE
The Great Escape
Pleasantburg Shopping Center
1426 Laurens Road
PH 803 235 8320 or 242 4229
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Ed's Hobby Shop
Hwy 501 Next to Fanjoy
Sign Company
SUMMERVILLE
FWP Hobby Shop
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KNOXVILLE
Tennessee Model Hobbies
Rt 62 Oak Ridge Hwy Solway
PH 615 482 2900
NASHVILLE
The Toy Mart
113 Graylynn Drive
PH 615 883 1648
TEXAS
ABILENE
The Hobby Center
3421 S 1st
ARLINGTON
The Hobby Hub
903 A Pioneer Parkway West
AUSTIN
J & J Hobbies
610 Kennelson Dr
CORPUS CHRISTI
Leisure Time Hobbies
1326 Airline
DENTON
Yellowbird Hobbies
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EL PASO
Hal's Hobby Shop
No 57 Sunrise Center
PH 915 755 1914
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400 C Seminary Dr E
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PH 817 281 0921
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SULPHUR SPRINGS
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J H Hobbies
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Bill's Hobby Town
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BEAVER DAM
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R/C Unlimited
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True Value Hardware
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L Mart Shopping Ctr
MILWAUKEE
Casanova's Hobby
1423 S Muskego Ave
PH 414 672 2700
CANADA
BAWLF ALBERTA
B & P Transport Ltd
Box 6
PH 323 3953
CALGARY ALBERTA
Hobby World Canada
Box 968 Stn M
CALGARY ALBERTA
P M S Hobby Craft
Calgary North Hill Centre
WINNIPEG MANITOBA
Celac Dweller Hobby Ltd
1477 Main St
PH 589 2037
WINNIPEG MANITOBA
Gooch's Hobbies
646 Portage Ave
ST JOHN'S NFLD
Capitol Hobby Centre Ltd
6 Freshwater Road
DUNDAS ONTARIO
Skycraft Hobbies Inc
139 York Road
SCARBOROUGH ONTARIO
Toronto R/C Hobby
1869 Lawrence Ave E
PH 416 755 1766
WILLOWDALE ONTARIO
Keith's Hobby Shop
5205 Yonge St
PH 222 4721
ARVIDA QUEBEC
LeModele Reduit Enr
118 Mathieu CP 341
PH 418 548 2136
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Le Centre Du Modeliste
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MONTREAL QUEBEC
Can Air Hobbies
5850 Gouin Blvd Ouest
PH 514 332 3565
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Le Mur du Son
1050 157 Rue
PH 418 228 1374
SASKATOON SASKATCH
Collins Aero Craft
238 First Ave North
PH 652 4725
YORKTON SASKATCH
Radio Control Hobbies
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BRISBANE QUEENSLAND
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The Hobby Warehouse
30 Kingston Road
COLUMBIA, S AMERICA
Aeromodelos Britannia Ltda
Apartado (P O Box) 52530
Bogota 2, Columbia
PH 212 7309
ENGLAND
LONDON N7 6NP
Henry J Nichols & Son Ltd
308 Holloway Road
ISRAEL
REHOVOT
Tsuney Rehovot
70 Derech Yavne
NETHERLANDS ANTILLES
CURACAO
Curacao Modelboue N V
AVVC Building Room 13
Schouwburgweg 44
P O Box 3101
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Mike & Paul Pastecchi
Calle Juan Maragall 26
SWEDEN
S 871 02 HARNOSAND
Modell Produkter
Box 2050
VENEZUELA
CARACAS 1070 A
Hobby World C A (Dist)
Apartado Postal 70504
PH (02) 34 33 02
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DEALERS. Write For Details On How Your Name Can Appear In This Column

The Best Hobby Dealers Stock SIG - Order Our Latest Catalog For $2.00 - Complete Line Of Kits And Accessories

SIG MANUFACTURING CO. . . . . Montezuma, IA 50171

from Bill Northrop's workbench . . .

Carl and Beth Goldberg, at their home in Northridge, a suburb of Los Angeles, California, where they recently held a party to celebrate Carl's 70th birthday. More like an overlapping series of receptions, guests were arriving and departing throughout the afternoon of the party, wishing Carl many happy returns, and congratulating him on his long, successful, and continuing career in the field of model aircraft.

FEBRUARY ISSUE . . . HONEST!

If you were able to lift up and peek under that obnoxious little sticker on last month's cover, you found out about the biggest goof ever to happen in publishing *Model Builder* . . . wrong month on the cover! You'd almost have to be in the magazine publishing business to fully appreciate the horror that struck when I received a phone call at 5:30 in the morning just a few weeks ago. Through sleep-numbed ears and brain came these words from the printer, "Think you've got a real problem with this issue, and we just discovered it, with only a couple of thousand more to come out of the bindery . . . the date on the cover doesn't match the date on the inside." . . . Try that on your blood pressure!

To make a long and panic stricken few hours short, we came up with the solution you've seen. May it not happen again for at least *another* 132 issues!

About the only excuse that can be offered . . . at one two-week period each month, we are working like mad on one issue, the previous one is just being mailed, and material is already coming in on the next one. It can get confusing!

IT HAS HAPPENED TO ALL OF US

During a major trade show, we occasionally have someone come up to our booth, grab a magazine, thumb through it, and then drop the bombshell . . . "Is this a new magazine? I've never seen it before." Immediately you figure the guy was just released from the "funny farm" after a long stay, or that he is from East Podunk, way out in the hills, or a rural farm land. Usually, however, he's a long-time modeler from a large metropolitan area, where there are all kinds of hobby shops that carry the magazine.

Here's a prime example that did not happen to *Model Builder*. In the November '81 issue, we published a Peanut Scale Grumman Turbo Ag-Cat, designed by Hoby Clay. Recently, one of our readers sent a letter to Hoby, by way of our office, asking where he could get a January '82 issue of *Model Aviation*, which Hoby referred to in his Ag-Cat article as carrying photos and information about the plane, as supplied by Warren Shipp. The reader went on to say that, "I've looked, but no dealers around Philadelphia carry or have heard of Model Aviation magazine."

How could an obviously experienced modeler (he wanted to scale up the plans for a 52-inch rubber job first, then double that for an R/C, Quadra powered version later) not know about *Model Aviation* and the AMA, and live in a major metropolitan area!?

AMA, we're sending you the gentleman's name and address.

UNDER NEW MANAGEMENT

Although the name and address will remain the same, the product line will not change, six new items will be introduced in 1983, and the product designer or Chief Engineer position will be occupied by the person now filling that chair, Craft-Air, Inc. has now changed ownership.

To break the above one-sentence paragraph into smaller pieces: Tom and Marie Williams have sold their nine-year old business, Craft-Air, Inc., to Mr. Louis Nelli. Tom will stay on as Chief Engineer, but will immediately begin a phase-out at the management level. The existing Craft-Air products will continue to be available and six new items will be introduced throughout 1983. In addition, some ". . . will be sold with an excitingly new marketing concept."

Tom and Marie are semi-retiring to Lake Nacimiento, in Central California, about 200 miles from Los Angeles, expecting to move there next spring. Tom will commute to Chatsworth, on a weekly basis, in his homebuilt Long-Ez, which is now under construction.

We wish Tom and Marie great enjoyment in their new environment, and welcome Lou Nelli to the mad, mad, mad world of model manufacturing and marketing.

DOWN, BUT NOT OUT

As this is being written, famed pioneer model engine manufacturer Irwin Ohlsson, and his wife, Annie, are recouperating in the Desert Hospital, Palm Springs, California, after an unfortunate accident. They were walking across the busy four-lane highway leading out of Palm Springs to the south, returning to their hotel from a restaurant, when they were struck by a car.

At last word, Annie had both legs broken below the knee and numerous skin abrasions and bruises. Irwin received a broken hip, along with bruises and skin abrasions. Both were in intensive care for the first 48 hours in the hospital, Irwin having been knocked unconscious when struck.

By the time you read this, both should be at home. Their address is 27437 Eastvale Rd., Rolling Hills, CA 90274.

THINGS TO DO

Leisure Electronics is sponsoring the Second Annual Electric R/C Grand Championships, to take place on the 26th and 27th of February, 1983, from 8 a.m. to 5 p.m. each day. In addition to four competition events, there will be

Continued on page 108

OVER THE COUNTER

All material published in "Over the Counter" is quoted or paraphrased from press releases furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by R/CMB does not constitute an endorsement of that product, nor any assurance as to its safety or performance by R/CMB.

• American R/C Helicopters has diversified its wares to include the first 1/5th scale model of the famous *Atlas Van Lines* hydroplane racer. For those R/C power boaters who like to go fast with style, consider this: the hull, deck, cockpit, and engine cowling of the *Atlas Van Lines* come molded in fiberglass; the kit is complete with all running hardware, bearings throughout, a centrifugal clutch, full-size master plan, and a complete instruction manual. All you need is a pull-start, gasoline powered Quadra engine, and a two-channel radio, to get this hydro racer going in your nearest lake or marina.

Statistics for this Atlas Van Lines hydro are: length, 68 inches; beam, 34-1/2 inches; running weight, 22 pounds. For further information, contact American R/C Helicopters, 635-11 North Twin Oaks Valley Road, San Marcos, CA 92069, (714) 744-7533.

★ ★ ★

Kraft Systems has recently announced its newest servo, the KPS-25K. You'll want to use this servo wherever the possibility of exposure to water exists, whether in an R/C boat or seaplane. The KPS-25K servo features an O-ring sealed, bearing supported output shaft for water tight safety, a maintenance free carbon button wiper, a sealed potentiometer, 5-pole motor with carbon brushes, heat sinked end bell, and high impact case. The specifications for this servo are: torque, 40 oz.-in.; transit time, 0.5 sec.; size, 2.16 x 0.77 x 1.52 inches; and weight, 1.4 oz.; retail price, $29.95.

Kraft's new KPS-25K servo.

Now that you have all the facts, bop on over to your local hobby shop and take a look at this new servo. It might be just what you've been looking for. If you need more information, write or call Kraft Systems, 450 W, California Ave., P.O. Box 1268, Vista, CA 92083, (714) 724-7146.

★ ★ ★

T and D Fiberglass Specialties has just announced a newcomer to its line of model aircraft parts, boat hulls, and molds, it's an engine cowl for the New Ruler and you should see it! Tom Keeling has done a beautiful job of molding this fiberglass part. In addition, he has made it 3/8 of an inch longer than the New Ruler plans indicate, just in case your engine needs the extra room (if it doesn't, trim the cowl to original size).

If you would like to order one, send $17.95 (that includes the $2.00 shipping and handling charge) to T and D Fiberglass Specialties, 30925 Block, Garden City, MI 48135. If you send an SASE, T and D will send you a complete list of epoxy/glass cowls and wheelpants that they manufacture.

T&D Fiberglass Specialties' New Ruler cowl.

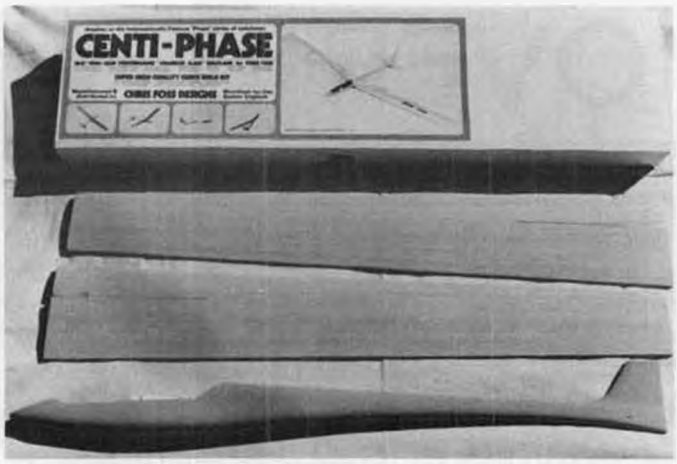
★ ★ ★

Hans Weiss, of Wilshire Model Center, a leading importer of European soaring hardware, has announced the arrival of Chris Foss Design's Centi-Phase and Phase 6 sailplanes.

The Centi-Phase is a 100-inch rudder, elevator, standard class sailplane designed for thermal, slope, and English cross country flying. Wing area is 775 sq. in., with a typical wing loading of 8 oz./sq. ft. The airfoil is a 10 percent flat-bottom section which gives a wide speed range. The kit comes with fiberglass fuselage with built-in nose longerons, clearly marked wing and tail

Ikon Northwest new Piper Super Cub. Designed for Quadra engine.

Train-Air .20 from Northeast Aerodynamics. Uses 4-channel controls.



New at Wilshire Model Center, Phase 6 and Centi-Phase sailplanes. Fast building, high quality kits from Chris Foss Designs, England.

mounting points, blue tinted canopy; wings are pre-sheeted foam core with joiner slots pre-cut; pre-cut sheet balsa tail surfaces; and full hardware.

The Phase 6 glider is an aerobatic slope soarer. It is the latest in a series of highly successful competition proven designs, and is geared toward the intermediate to advanced flier. Phase 6 comes in two versions: a sport version with a "semi-symmetrical" wing section for pylon racing and general aerobatics; and a fully-symmetrical wing section for the ultimate in precision aerobatics. Wing kits are available for those who would like the best of both worlds. The Phase 6 kit comes with foam wing panels that are pre-sheeted; plywood and balsa fuselage sides; sheet balsa tail surfaces; all hardware and instruction manual.

The Centi-Phase is $149.95 and the Phase 6 is $79.95, from Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, CA 90403. Write or call Hans Weiss at (213) 828-9362 for more information.

★ ★ ★

K and S Engineering, 6917 W. 59th Street, Chicago, IL 60638, has developed, and is currently marketing a great new tool for bending large diameter steel music wire (1/8, 5/32, 3/16, 7/32, and 1/4-inch) as well as square and rectangular shaped metal. Now you can make that landing gear at home for a fraction of the cost in time and money.

Look for the "Mighty Wire Bender" in your local hobby shop. Price is $19.95 for this handy tool.

★ ★ ★

Six new colors have been added to Coverite's Black Baron line of epoxy spray paints. This brings the total number of paint colors to twelve, ten of which match Coverite's Permagloss fabric covering.

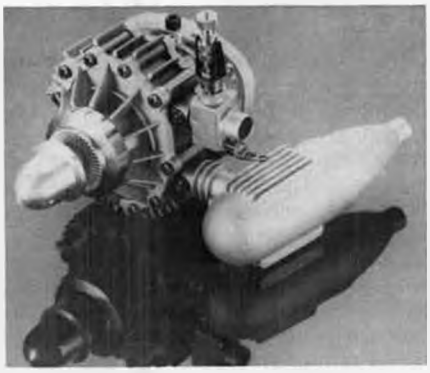
Black Baron epoxy paints are ideal for model airplanes as they are resistant to most fuels, and cure to a very tough, high gloss finish in only a few coats. They are more "forgiving" than conventional paints, so the average modeler will be able to achieve more professional results without expensive spray equipment or tedious clean-ups.

Black Baron colors that match Permagloss Coverite are; White, Black, Lemon Yellow, Cub Yellow, Light Blue, Dark Blue, Bright Red, Aluminum, Orange, and Cream. In addition, there are two vivid flag colors; Electric Blue and Fire Red.

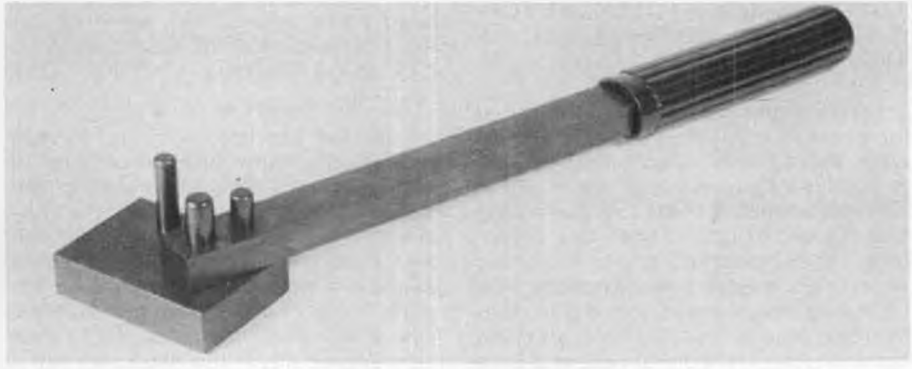
Black Baron paints are available in hobby shops throughout the world.

★ ★ ★

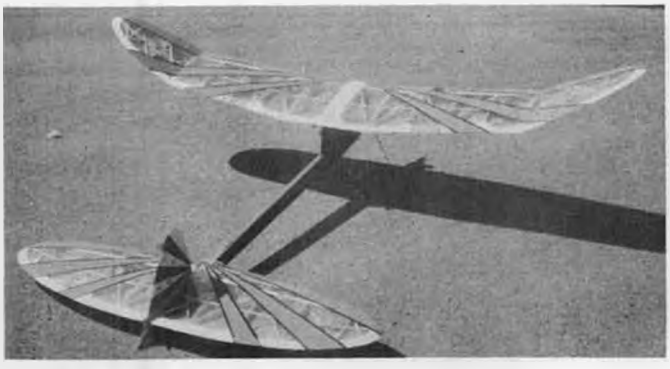
Du-Bro Products, Inc., 480 Bonner



New OS Wankel from World Engines.



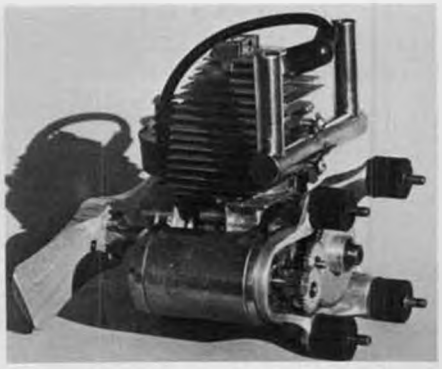
Wire Bender for 1/8 to 1/4-inch music wire now available from K&S Engineering.



The Satellite 1000 returns! Short kit available from F&F Hobbies.

New 1/5 scale Atlas Van Lines hydro from American R/C Helicopters.

CO_2 powered Porterfield from Hunt Models or Midwest Model Supply.



Mid Am Products Quadra Starter System.

Road, Wauconda, IL 60084, one of America's leading model products manufacturers, has come out with a whole slew of new goodies for all of us modeling types.

Urethane tubing, recommended for gas, oil, and diesel fuels, is now being offered in two sizes; medium and large. Unlike neoprene, urethane tubing will not harden or swell, and is virtually indestructable. Available in spool or package lengths.

Quarter-scale enthusiasts will be happy to know that Du-Bro now has good looking, functional turnbuckles for that working touch of class on the flying wires of their airplanes. Cost per pair is $6.95; catalog No. 300.

And to go along with the turnbuckles . . . Du-Bro's Kwik Twist tool neatly barrel-wraps music wire up to .032 diameter. Now you can make up guy wires in seconds with this brass and steel tool (cat. No. 301) for only $8.95 each.

Have you seen the new Du-Bro prop spinners? Well, they are now being manufactured out of a tough new material, a "super tough nylon," and feature a new double lock system for safety. Try 'em, you'll like 'em.

Finally, you can now get Du-Bro 4-40 rod ends separately. They come in two different types: solder rod ends (cat. No. 303), and threaded rod ends (cat. No. 302). Check them out at your local hobby shop.

★ ★ ★

Ikon N'wst is back in production again with its completely redesigned Super Cub along with all of the other fine kits, which have been improved. The new Super Cub, a nine-foot span, 14-pound replica of the full-size Piper Super Cub, is powered by a Quadra engine, and given a five mile per hour headwind, can take off in ten feet! Inspite of this amazing ability, flight performance is very scale-like, and landings are gentle and slow.

The kit features 3/8 balsa and spruce construction material; pre-cut ribs; pre-bent landing gear; pre-formed cowl, shock covers, instrument panel, and seats; and factory decals for interior and exterior detail. The plans are inked and accurate. There is even a proof-of-scale photo page that includes cockpit details.

For additional information, write to Ikon N'wst, P.O. Box 566, Auburn, WA 98002, and include a buck for their complete catalog.

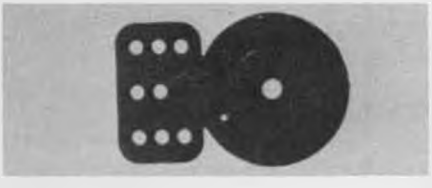
★ ★ ★

The Satellite 1000 is once again in production and available from F and F Hobbies, 7424 No. 51st Ave., Glendale, AZ 85301, (602) 934-0319. This famous free flight model was designed by Bob and Bill Hunter, now the "Hot Stuff" kingpins of cyanoacrylate adhesives. The Satellite 1000 is a "short kit" as was the original. A few of the parts are not made so that the builder/modeler can use his or her own methods of construction. The plans are copied directly from the originals drawn by the Hunters. Sal Taibi has selected the wood for the kit, and Gene Wallock has done all of the parts cutting . . . with experts like these, you *know* the kit is top quality.

Satellite 1000's can be purchased through F and F, or F.A.I. Model Supply, P.O. Box 3957, Torrance, CA 90510.

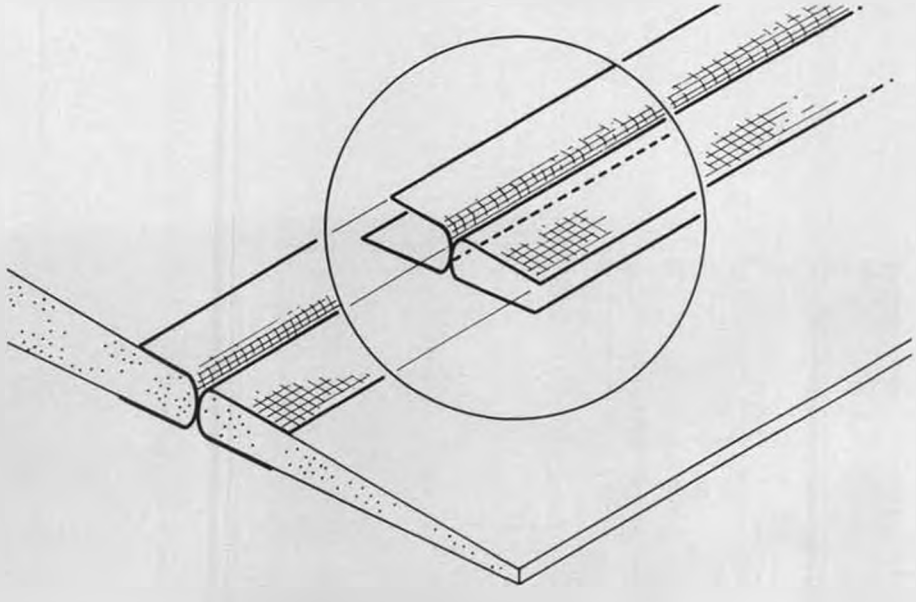
Continued on page 66

E&L Manufacturing 1/4-scale size Big "E".



Kimbrough Products servo saver arm.

Kimbrough Products differential gears.

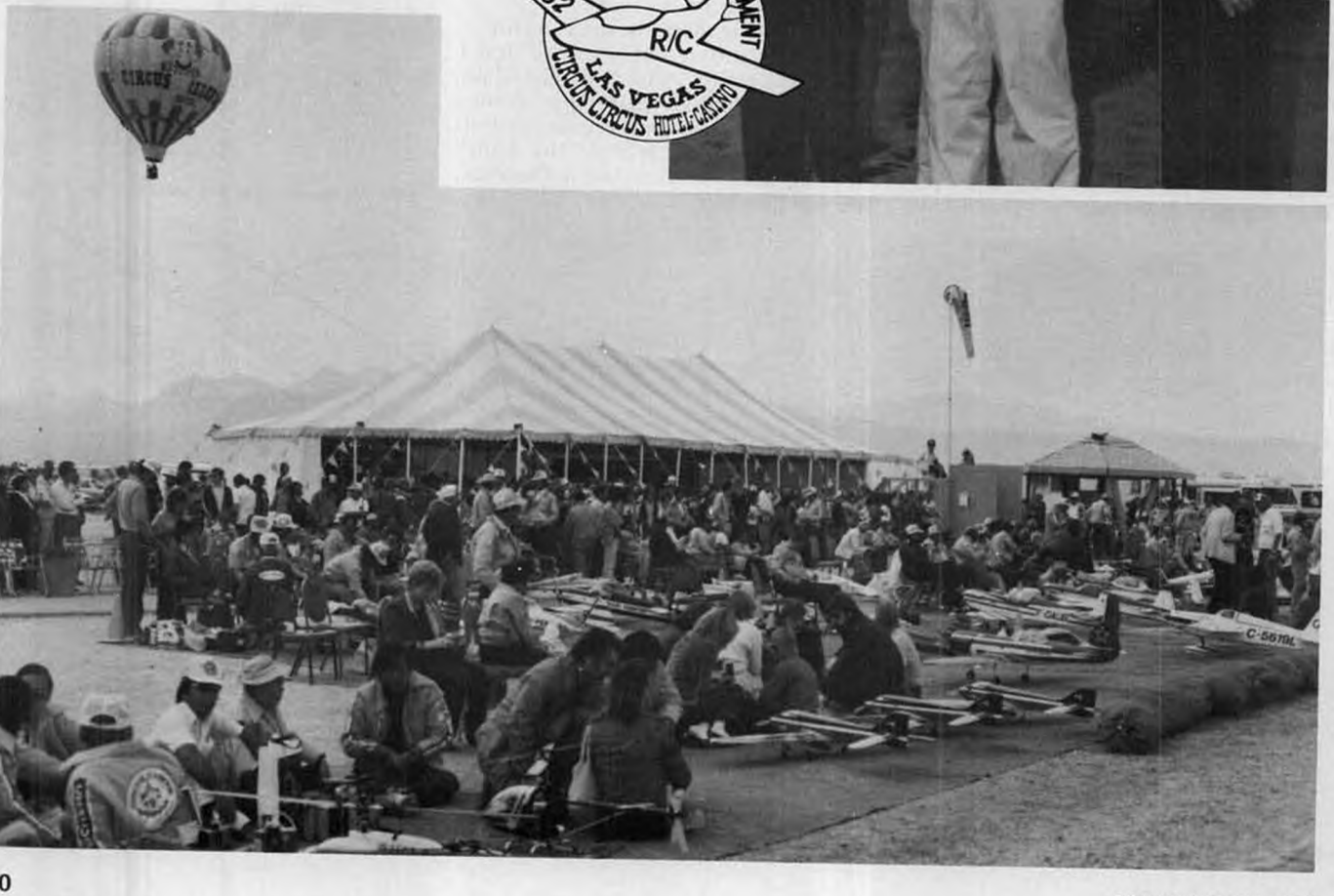


Iron-on gapless hinge material from Granite State R/C Products.

Las Vegas T.O.C.

by BILL NORTHROP

INTERNATIONAL TOURNAMENT OF CHAMPIONS
1982
R/C
LAS VEGAS
CIRCUS CIRCUS HOTEL-CASINO



Wolfgang Matt, with his Webra "Bully" powered Laser 200, was not too far behind Hanno throughout the contest. Second place, $12,000.

Dave Brown and his Chapman modified Tartan Twin powered Laser 200. Third place and $9,000 ain't bad!

Tony Frackowiak jumped right into the flyoffs and 4th place in his first T.O.C. Own make twin drive with O.S. 90s.

Ivan Kristensen, Canada, made it back in the top five for the fourth time. Webra Twin-Drive and Laser 200.

• As stated in our "Stop Press" announcement in last month's issue, Hanno Prettner, of Austria, has continued his uninterrupted string of wins of every Tournament of Champions competition since its inception eight years ago, by taking first place . . . and $25,000 . . . at the Seventh International T.O.C. (as it is best known), sponsored by the Cirus Circus Hotel/Casino of Las Vegas and Reno, Nevada.

The T.O.C. was co-founded in 1974 by Walt Schroder, then editor of *Model Airplane News*, and Bill Bennett, Chairman of the Board of the Circus Circus organization, and has become the leading and most world-renowned international competition for radio controlled aerobatics. Although not an official FAI world championship competition, it is still looked upon by nearly all modellers as the most innovative and advanced competition in its field . . . even aside from the unprecedented cash prizes, which have elevated radio controlled aerobatics to a top ranking professional sport.

Speaking of prize money, Hanno's continuing wins of the T.O.C. have netted him a total of $95,500. The total cash winnings of all competitors over the seven championships, including a scale contest in 1977, is $343,925! Everyone who qualifies and is invited to compete, wins a cash prize. This year's 11th through 20th place finishers each took home $2,500.

What, aside from the money (and that's not easy to put aside!), has made

Don Lowe, 6th, ready for any engine with his go-kart starter motor, Mallory spinner cup.

Mark Radcliff, 7th, Chapman/Tartan Twin and Laser 200. Uses JR single stick radio.

Steve Helms took 8th with his Contempo Magnum III powered Laser 200.

Gunter Hoppe, 9th, West Germany, had to resort to his backup Cap 21 after a freak accident on only his second round flight on Thursday. Webra "Bully" engine.

Don Weitz, 10th, and his Magnum III powered Don's Custom Models Super Chipmunk.

Ron Gilman and his Circus Pink decorated Super Chip, powered by modified Tartan Twin, placed 11th.

T.O.C. co-founder Bill Bennett with Dean Koger and his 12th place Laser 200 powered by Chapman/Tartan Twin.

the T.O.C. such a top attraction? First of all, the flying capabilities and notoriety of the contestants. The U.S. competitors are chosen from the top of the pack; national champions, FAI team members, and high-placing Masters Tournament fliers. The foreign competitors are all national champions of their respective countries, often many times over; and in the case of Hanno Prettner, of Austria, Wolfgang Matt, of Leichtenstein, and Yoshioka, of Japan, FAI World Champions.

For the past three tournaments, however, the pilots have had to share the top attraction with the competition itself. The first four T.O.C.'s were based on the FAI aerobatic rules in effect at the time. Thus, in 1974 through 1977, the pilots flew state-of-the-art precision aerobatic "pattern" aircraft, through maneuvers prescribed by FAI rules. These aircraft, and the maneuvers they are required to perform, could best be described as a special art form . . . undoubtedly artistic and beautiful within the bounds of the form, but not necessarily realistic or dramatic to the majority of viewers, whether or not they understand what is going on. The models themselves have evolved into functional tools of the sport, their design influenced by the demands put upon them to perform the maneuvers specified by the rules. And the manuevers themselves have become large, sweeping, space consuming combinations of loops and rolls that are more akin to the performance capabilities of jet-propelled aircraft than to the propeller driven types that the rules specify.

For the fifth T.O.C., in 1978, and credited in a large degree to the creative abilities of Jerry Nelson, the tournament

Flight Line Director Phil Rumbold, kept competition on strict time schedule

Werner Schweiker, West Germany, 13th, Webra "Bully", Cap 21, Varioprop radio.

Keep an eye on Steve Stricker, 14th, Baltimore, Magnum III, Don's Custom Sup. Chip.

Tony Bonetti's Magnum III powered Cap 21, JR radio, placed 15th. Note boxing glove.

Giichi Naruke and Yoichiro Akiba of Japan, 16th and 17th respectively, both service managers for Futaba. Akiba's Cap 20L powered by Tartan Twin.

Benito Bertolani, Italy, 18th with Yak 18 powered by latest Tartan Twin.

Japanese Kalt demo team put on spectacular show. Ships about six feet apart here.

Steve Wilson, 19th, Fountain Valley, CA, Super Chipmunk with Magnum III power.

Jeff Tracy, Australia, 20th, had engine cuts in early rounds. Cap 21, Webra Twin-Drive.

rules took a significant side-step into reality. For the first time in any prestigious R/C aerobatic competition, the models had to be scaled-down copies of known, full-size aerobatic aircraft, and many of the new maneuvers were patterned after those flown by the full-size counterparts, employing the symbol identification devised by aerobatic pilot Count Aresti.

In '78, the fliers were still pretty well influenced by their FAI background, so most of the aircraft were still about average "pattern ship" size . . . and they flew large and fast maneuvers . . . like their pattern ships . . . and unlike the real aircraft their models copied . . . except Hanno. Hanno appeared with his first Dalotel, the largest of his Dalotel series, and certainly much larger than any other aircraft at that tournament. Unfortunately, Hanno's flying capabilities seemed to overshadow the fact that his selection of a large, light, slow (scale speed) flying aircraft had given him even more advantage over his competitors.

In 1980, the maneuver schedule went completely full-scale Aresti style, including all turn-arounds. Pilots were now judged on every part of the flight, from the time the aircraft entered the "box" until it left. This literally forced the fliers to revise their thoughts on aircraft design, and resulted in larger, lighter loaded models, with engines that provided more torque, turning larger props at lower RPM's, instead of small props and high RPM's . . . Staying in that box meant no more cross-country turnarounds with speed-building Split-S's.

And what, if you think about it, could be more appropriate for today's environmental and space shrinking requirements? Quiet, slow-flying, tight turning, spectator (and critical public) pleasing aircraft that look and behave like real ones. . .

Well . . . back to this year's results . . . Following not as far behind Hanno Prettner, as in the past, two-time World Champ Wolfgang Matt, the handsome banking executive from the roaring mouse principality of Liechtenstein, placed second, and collected $12,000. Matt's 16 pound Laser 200, with Webra Bully engine, suffered an engine cut in the second Unknown Program flight of the finals, yet he was the only pilot to actually score higher than Hanno in any

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The judges (standing, l to r): Geoff Franklin, "Doc" Edwards (Chief Judge), LaMar Steen, Bob Upton, Bill Payne (Caller), Gerry Zimmerman, Phil Kraft (Contest Director).
(Kneeling, l to r): William C. "Buck" Weaver, Clint McHenry, Dave Lane, Gordon Price, Travis McGinnis, and Steve Nelson.

REPUBLIC P-43 "Lancer"

By Col. ART JOHNSON . . . Designer of our popular large-scale P-38 and P-40 models, comes up with still another. Predecessor to the famed P-47, the similarities are obvious. For Quadra or prop-drive power.

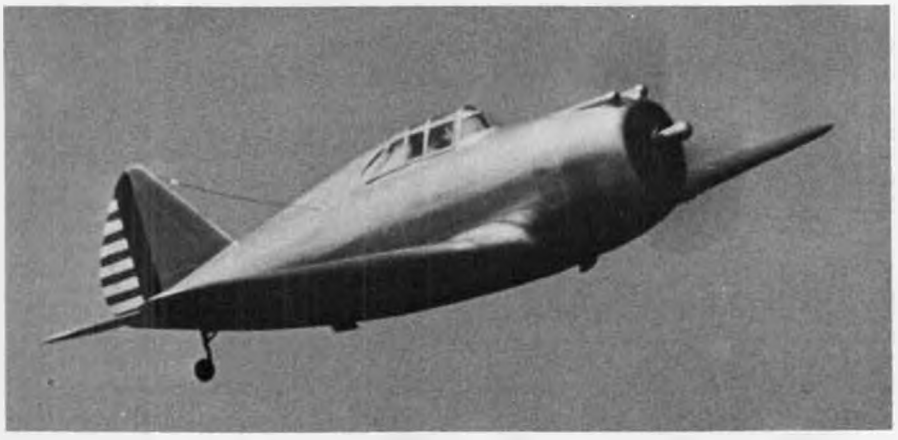
• "Farmingdale Tower . . . this is Republic Number One . . . landing instructions . . . over."

I am not sure that the pilot of the first P-43 used that call, but he might well have. The P-43 was the first Army Air Force fighter to come off the line after the Seversky company became Republic Aviation. Although it was the first of a long line of Republic fighter aircraft, it was destined to become the least known of any of the World War Two fighters. Two hundred and seventy eight P-43 and P-43A models were built by Republic before the fighter was replaced on the production line by the P-47 "Jug." If you were to run across the remains of one of these aircraft today, you would have one of those rarest of the rare finds. To my knowledge, not one P-43 survives. Not in a museum or even in a junk pile. Except, there is one reincarnation in miniature, and that is what this article is about.

So how come I decided to build a model of this most obscure WW-II fighter instead of another P-51 or Corsair? Well, I think you already know the answer to that one. Something different is always interesting, and how else can you get to talk to so many people while explaining that the bird you just brought to the field is not a P-35 or P-47? Contrary to popular belief, the P-43 did serve in combat in the Far East. The U.S. shipped 125 of the aircraft to the Chinese Air Force, and others were flown in that theatre by U.S. and RAAF pilots. Some day, an enterprising historian may dig out the facts on how it faired against the Japanese, but if any P-43 aces turn up, I suspect they will have names like Lee or Wong.

My personal involvement with the P-43 dates back to the summer of 1942, when I flew the P-43 and P-43A models at Foster Field, Texas, along with the P-36 and early P-40. This was where the Chinese pilots were checked out before returning to China to fly the P-43 against the Japanese. All the production P-43s came off the lines in 1941, and in early 1942 they were the newest planes on the base. I remember the P-43 as faster than the early P-40, but with a higher wing loading and requiring a bit more attention to approach speeds. At the time of Pearl Harbor, the P-43 was the only single engine fighter of the AAF that could climb to high altitude. It had the same G.E. turbo as the later P-47, but it was working with the Pratt & Whitney 1200 hp R-1830 engine . . . same engine as used on the Navy F3F Wildcat. It was high altitude capability that induced the AAF to convert many of the P-43 fighters to high altitude recon aircraft. At altitude, they were as fast as the early Spitfires.

So nostalgia played a part in the decision to model the P-43, but I think the real challenge came from an urge to build a WW-II fighter that would fly well using one of the popular gasoline engines for power. I had been told that these engines were really useful only for the large light aircraft types, but I must



Model at rest (top) and in flight (above) has lines half-way between the P-35 and P-47. First contest win at East Coast Scalemasters, Bowie, Maryland. It's still taking prizes.

admit that the few WW-II fighters I had seen built and flown with ignition engines were rather sorry performers. The reason for this poor performance seemed rather obvious, however, with builders falling victim to quarter-scale propaganda and trying to build all models to that size without having quarter-scale engines to match. A Piper Cub has a little more wingspan than a P-39. A nine-foot span model of the Piper Cub may fly well on a Quadra engine, but with the same engine, a nine-foot span P-39 would perform like a Cub, if it would fly at all. If you wonder why, just think of the P-39 performance with a 65 hp Continental in the (I started to say nose) back end (middle?). I doubt if the P-39 would taxi, much less fly.

Getting the model sized right for the available power seemed the initial key to success, and I had already decided to go with the standard Quadra engine. There are more powerful engines around, but on a horsepower-per-pound and on a dollar-per-horsepower basis, the Quadra is second to none. The engine is larger and a little heavier than the largest glow engines, and these were the factors that made the P-43 look like an ideal choice for an ignition engine fighter. The short somewhat chubby P-43 looks a lot like it's follow-on, the P-47, but it was in fact a rather small fighter with a big engine up front. The nose moment is a lot shorter than the P-40 or the P-47, so the heavier engine is needed for balance. Better engine weight than lead weight.

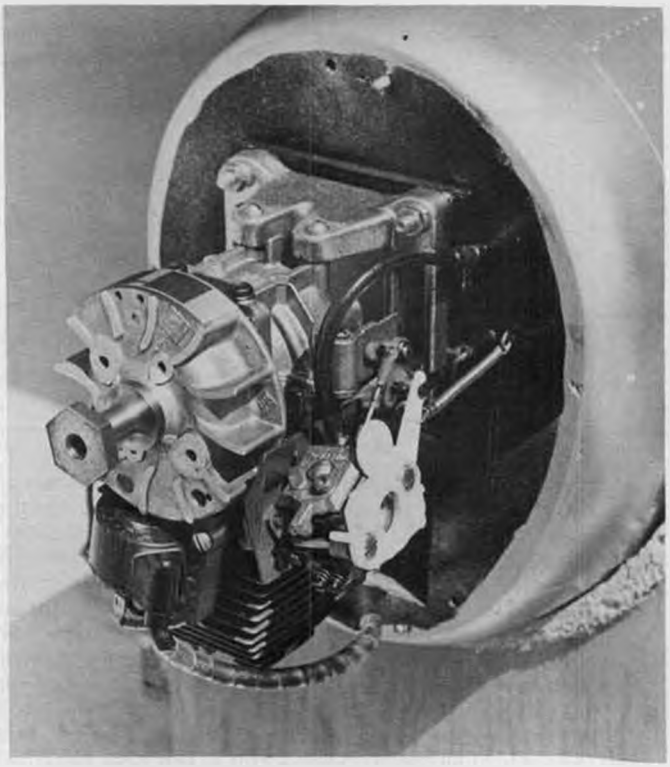
The original P-43 had less wingspan and area than the P-40, so for the P-43 model, I thought I better go to a bit larger scale to handle the extra weight of the engine. Wingspan is one inch more than on my 90 glow powered P-40 model, with the scale going to 1 to 5.3, or a little less than 1/5th scale. At this scale, the Quadra engine is almost lost within the big cowl of the P-43 model. With these decisions out of the way, all I had to do was draw up the plans and build the model.

Drop tanks are early 75-gallon types. Ship weighs just 20 pounds, with Quadra engine. Model and original both flew from grass fields.

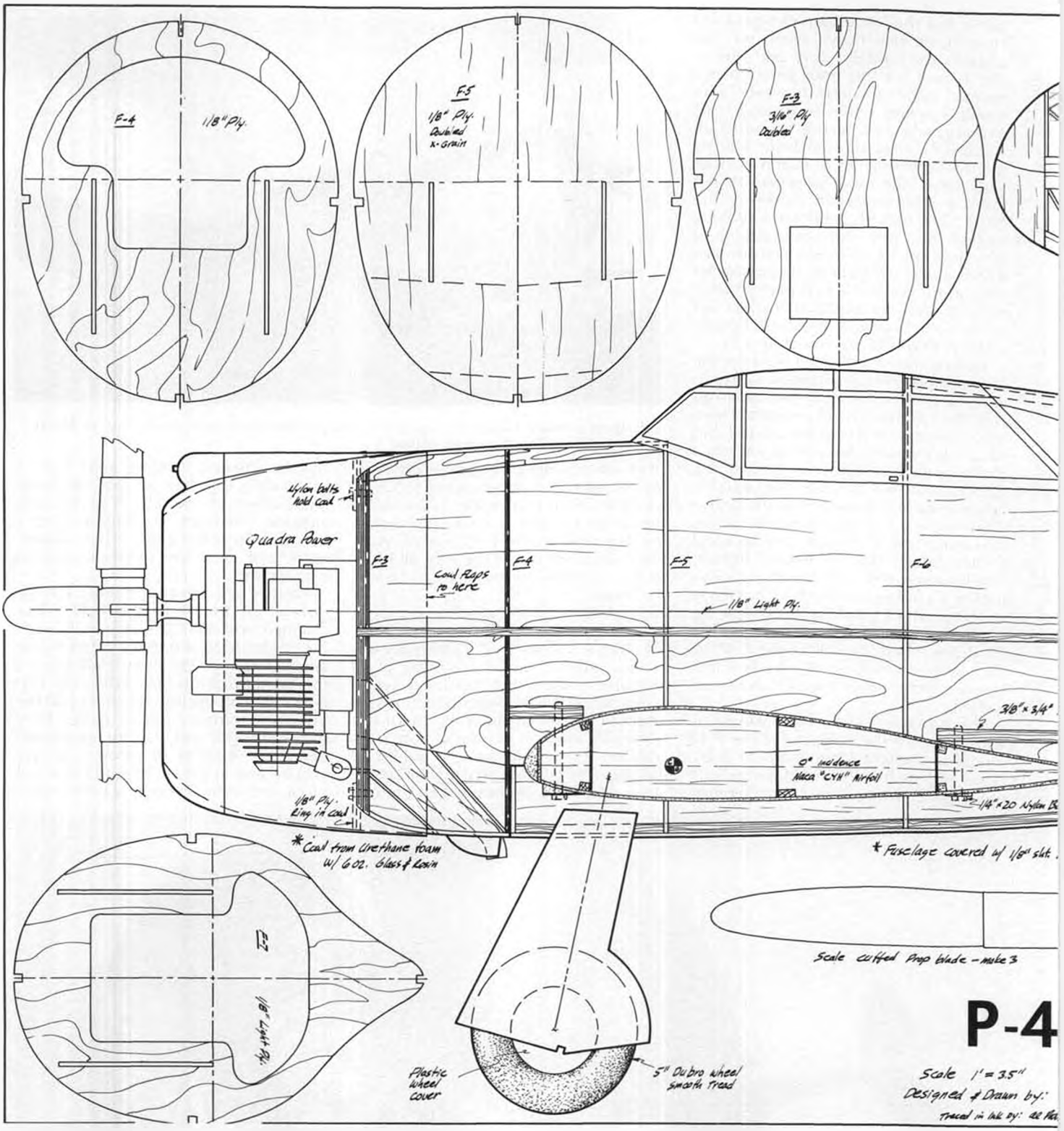
In going with the gasoline engine, I was not interested in just another "fun-fly Biggie." I wanted a competition quality model, and this meant good documentation and accurate scale. Considering the limited production and obscure history of the P-43, there is a surprising amount of information available on the aircraft. M.A.N. published William Nye's drawings of the P-43 many years ago. They are not bad on outline, but he shows a landing gear from a completely different aircraft. His fuselage outlines do not match any existing airplane. The book, *U.S. Fighters*, has a fair three-view, but a little off on proportions, and there are others in various publications.

Photos are another story. I have dozens of photos of the P-43, some originals from 1942. Unfortunately, each is a single photo of one aircraft from one angle. Republic Aviation itself proved the saviour on this one. When the first P-43 rolled off the line, Republic had the PR photographers out in force. They shined up the first P-43 demonstrator and took dozens of photos on the ground and in the air, both in color and black and white. Every magazine article

Classic elliptical wing shape of Republic prop fighters. Model flies very well with Quadra. Handles easily.



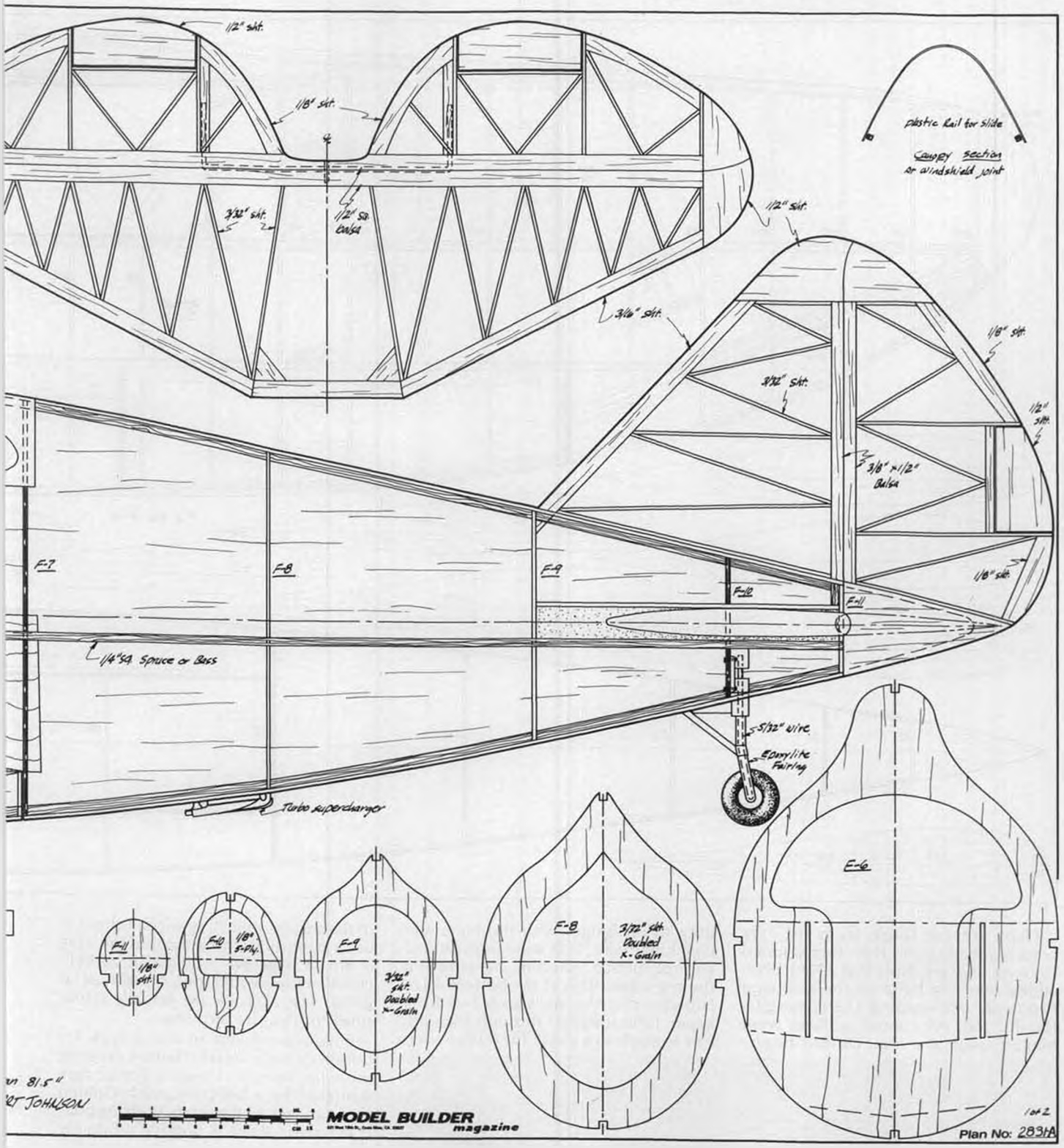
Quadra installation with Tatone mount is simple and neat. Choke is plastic, from Quadra. Spiral wrap protects plug and mag wires.



on the P-43 has used at least one of these photos, and Republic Number One was the obvious choice for duplication as a model. Not a gun equipped combat veteran, but a slick new sales model.

CONSTRUCTION: This was my first chain saw engined model, and I had read all of the articles on Giant Scale that told how you had to build these models using full scale construction techniques, etc., etc. This gave me a bit of a problem, as the P-43 was of all metal construction right down to and including the control surfaces. I am not too good at extruding aluminum spars and have no experience in riveting aluminum sheets onto elevators so I decided to take the advice for what it was worth and build the model the way I have always built them, strong but light. Construction is typical all balsa and ply, with hardwood spars where I thought they would do the most good. I am inclined to make the center section out to the landing gear attachment points perhaps stronger than necessary but only because I hate to see the gear sticking up through the wing after a hard landing. I would rather fix the gear than build a new wing.

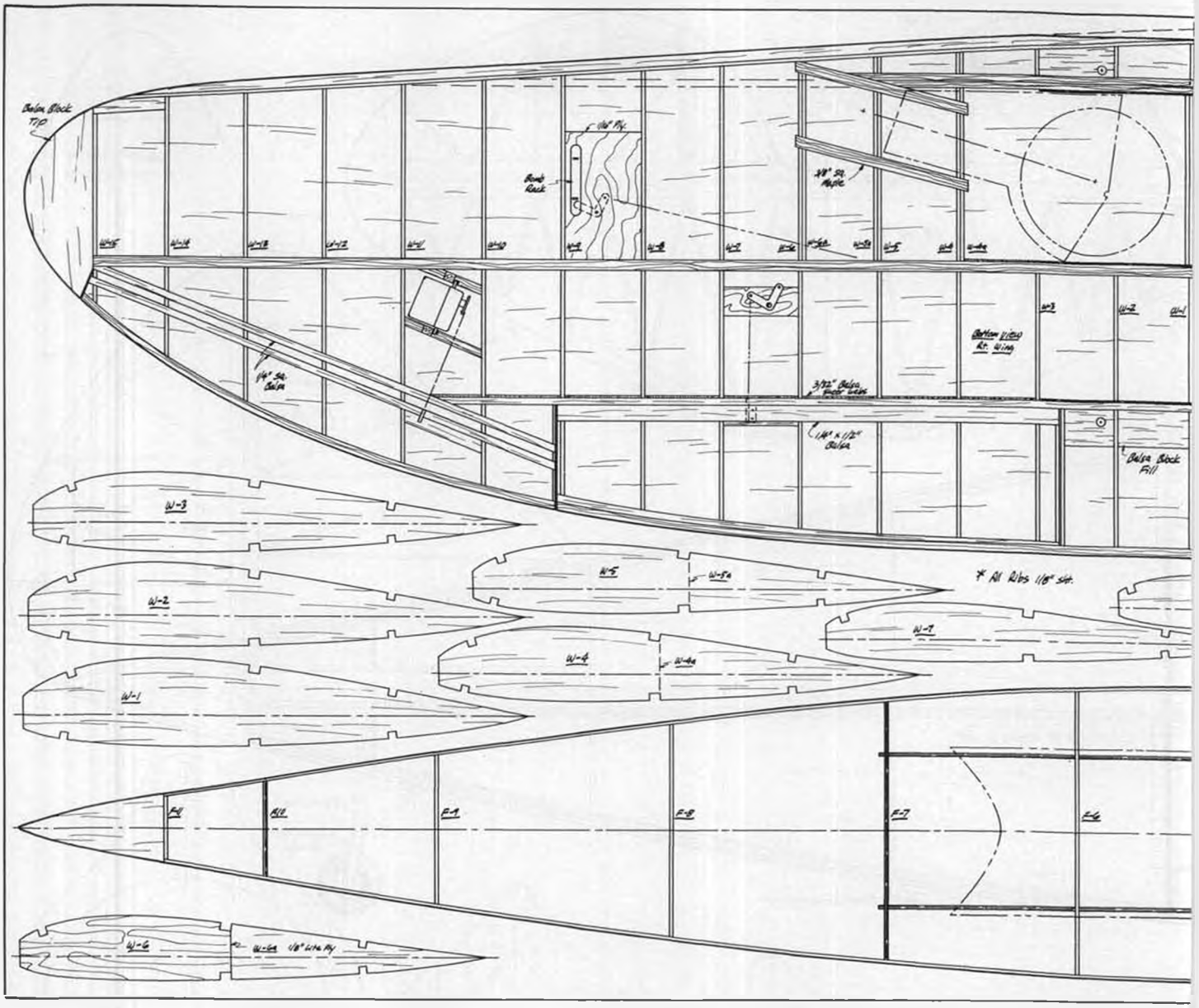
WING: I always build the wing first on a scratch project, because I have to have it done before I can make the fuselage fillets. The P-43 wing had the same NACA CYH airfoil as the P-35. This airfoil is flat over most of the bottom, curving up at the leading and trailing edges. It is a fairly high lift section so I decided to go with the scale airfoil on the model. It has worked out well, as the model came out a little heavier than I had anticipated (don't they all) and the high lift feature comes in handy. Trim changes with



FULL SIZE PLANS AVAILABLE – SEE PAGE 104

speed change are minor considering the flatter-than-usual bottom contour. Elliptical wings are more difficult to build with the correct washout than are straight wings. Take care to block the trailing edges so that both wings have the same 2 degrees washout at the tip. The ailerons and flaps are built into the wings and cut out after sheeting. This maintains the washout throughout the wing structure. Note that the rear spar notches are not shown on all the ribs. Working close to the tips, it is easier to notch these as you install the spars. You will find that as you install the bottom aileron spars, that the rib is cut all the way through. Build the top side up and sheet the top with 1/8 balsa before turning over. Finish the ailerons and flaps and install the linkage before sheeting the bottom center. The ply center section braces go all the way through the wing and are installed after the wing panels are joined and before the bottom center is sheeted.

The gear doors are cut out of the wing after the bottom fuselage fairing is attached to the wing and faired in. The gear doors actually go into this faired part of the fuselage, and this is the best way to get the curved sections to match. The center section is covered with fiberglass wing tape on both sides for added strength. Two oz. cloth and resin is extended over the bottom gear well section to beef up this area.

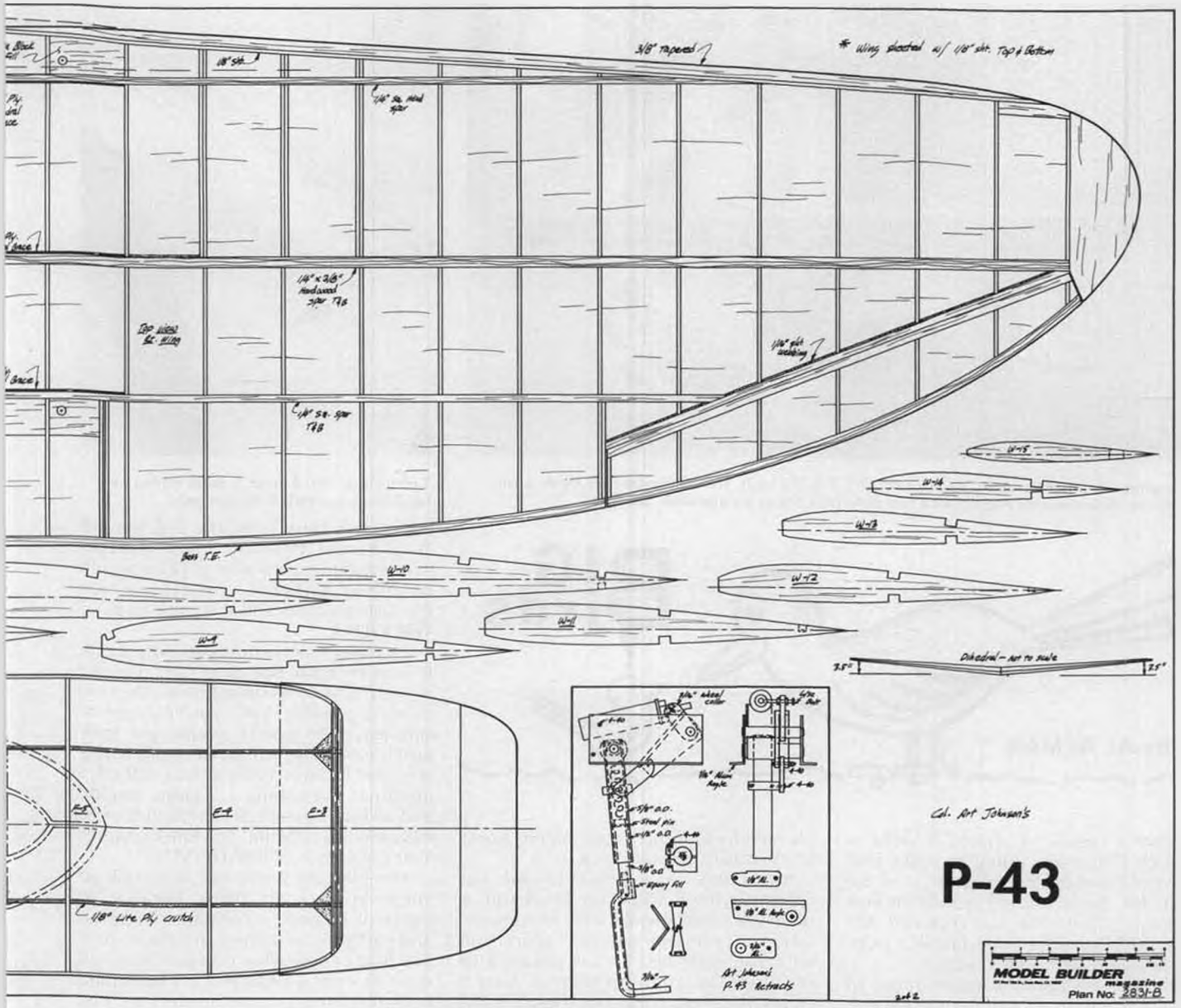


Flaps are cut loose from the ribs before covering and then repositioned to cover in place. Note that 1/64th ply is added over the balsa on the split type flap to prevent warping. Use epoxy glue for this job. All control surfaces were hinged using the new Du-Bro heavy-duty nylon hinges with the cotter pin type hinge wire. Four were used on each control surface. Ailerons are hinged at the top edge, flaps at the bottom edge. Not shown on the plans is a 1/2-inch dia. paper tube installed through the wing ribs to serve as a guide for replacement of the servo connecting wires. I chose to use a servo for each aileron, but the wing is not so large that a single servo bellcrank setup would not be almost as good. The ailerons are actually rather small for this size airplane.

Art makes a low pass for the camera. Cowled Quadra has a nice sound. Ship has clever reproduction of polished aluminum finish. Only color is insignia.

If you are going to use a rack for bombs or tanks, install it before sheeting the wing bottom. I used a Vortac rack operated by a bellcrank, with Golden Rod connecting the servo. With the bellcrank setup there is nothing inhibiting the spring action of the rack, so installation of the external stores is eased and there is nothing pulling on the rack to cause premature release. The bellcrank is not attached to the rack but presses against the release only when the servo is hard over.

FUSELAGE: The P-43 was actually one of the cleanest designs produced during WW-II. There is not a flat spot on the entire fuselage. With nothing but compound curves, I decided to strip plank the entire fuselage with 1/8 sheet balsa . . . time consuming, but with cyanoacrylates, a lot faster than it used to be.



FULL SIZE PLANS AVAILABLE — SEE PAGE 104

The firewall is laminated from two pieces of 3/16 ply. The 1/8 light-ply crutch lines the first four formers up with the firewall, while the 1/4 square hardwood longerons hold the remaining formers until strip planks fix them in place. I kept the formers in line while strip planking by placing the firewall on the workbench and building the fuselage in a vertical position. A plumb bob from tail lined up reference marks on the formers to establish a perfect alignment until enough strip planks were on to keep the fuselage rigid. A little unorthodox, but it works.

G.E. turbo-supercharger on P-43 gave it high altitude capability. Made of ply and balsa.

The ply crutch is braced to the firewall with triangular strips and the space between the firewall and the former F-4 is filled with blocks cut from 1/2-inch sheet balsa. This balsa also absorbs vibration from the firewall.

The duct that carries cooling air and the exhaust pipe from the engine is made from 3/32 balsa with exit openings on either side of the exhaust pipe fairing. The fuselage fairing attached to the wing is planked as part of the fuselage and separated later for installation. The balsa tail cone is hollowed and attached with silicon rubber after the

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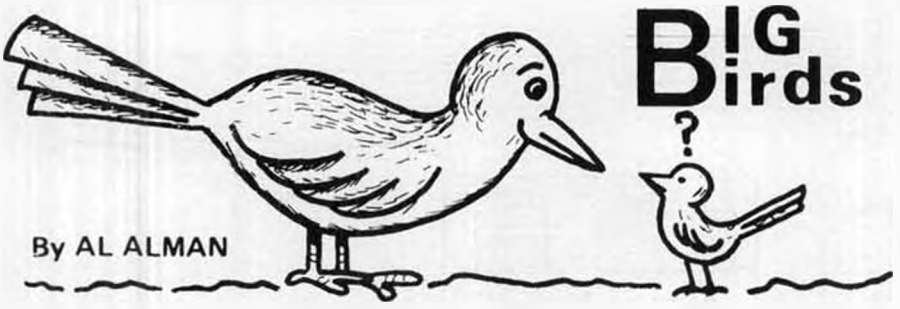
Dual-purpose cowl. Makes great tropical helmet in Florida's heat! T&D will make.

This gorgeous Toledo winner, a Fairchild 22-C-7-E (F) built, and displayed here by A. Lynn Lockrow, should excite more than a few scale fans. Plans are available, see text.

Tail surface "hard-point". Balsa drilled out for 1/4-inch dowel. 4-40 bolt hole.



• After a couple of aborts, it looks as though I'm finally going to make that move to Puyallup, Washington . . . so the next "BIG Birds" should include my new address. *(Flash! We just received Al's new address: 2713 Alderbrook Court, N., Puyallup, WA 98373. wcn)*

But, this on-again/off-again move of mine has gotten a lot of people miffed: Texans because I bad-mouthed their hot summers and June bugs; Washingtonians demanding to know *who* okayed this change that's allowing me to move in; and a smattering of other folks who are impatiently waiting for me to answer questions I haven't seen yet (and probably never will if our postal system works in its usually efficient way.)

Anyhoooo . . . as this'll be the last column written while on Texas soil, it deserves some special kind of identification . . . something to set it apart from all other epistles. So I'm pleased to include the accompanying sketch covertly lifted from the Texas A&M Aviation Department's Classified Basic Flight Intsruction Booklet aptly called . . . "Aggie Aerodynamics." For all non-Texans out there, you've got to appreciate the fact that "Aggies" are truly "steeped" in Texas tradition and folklore . . . or to put it another way: Aggie jokes have long been the mainstay of Texas humor. Hmmm . . . sort of makes you wonder exactly where Texas would be without its Aggies . . . not to mention the hot summers and the June bugs. . .

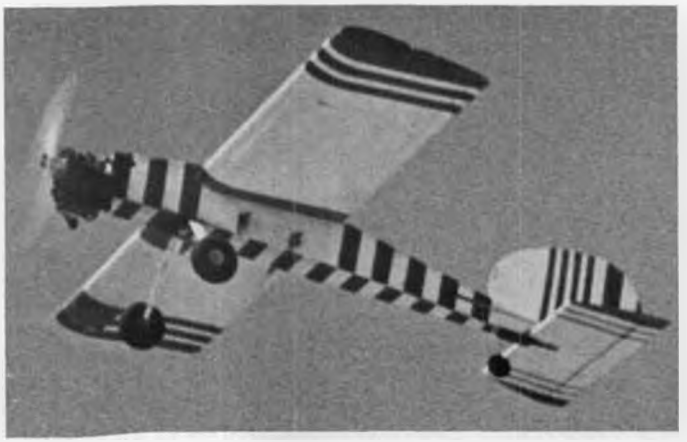
THE KILLER

It's always there, doing its dirty deed. If you're with the program, you've already slowed its devastating effects as much as possible; but if you're sloppy or careless, then you're gonna get your lunch eaten and will never really know why that BIG Bird totaled. And nothing's immune; everything . . . radio, engine and airframe are all delectible tidbits to its voracious appetite. The Killer's name? You guessed it. VIBRATION!!!!!!!

And like safety, you can never talk up vibration enough: partly because so many of us need a constant reminder, and partly because there are always new BIG Bird people who must be told about their #1 enemy. Please don't be fooled into thinking you're home free just because you may have an engine that doesn't appear to shake. Even the smoothest running engine is slowly eating away at your bird and everything in it . . . so it's absolutely vital that you do your homework. . .

1) Balance *all* your props, using the

Al Willaert's "Ugly Tree" on its back for pictures. This 3.1 Whirlwind engine is very short-stroked. One flip starting.



Al's "Ugly Tree" in flight. "Squat One" engine makes this 24-pound beast perform. Hands-off stability: Photog was the pilot!

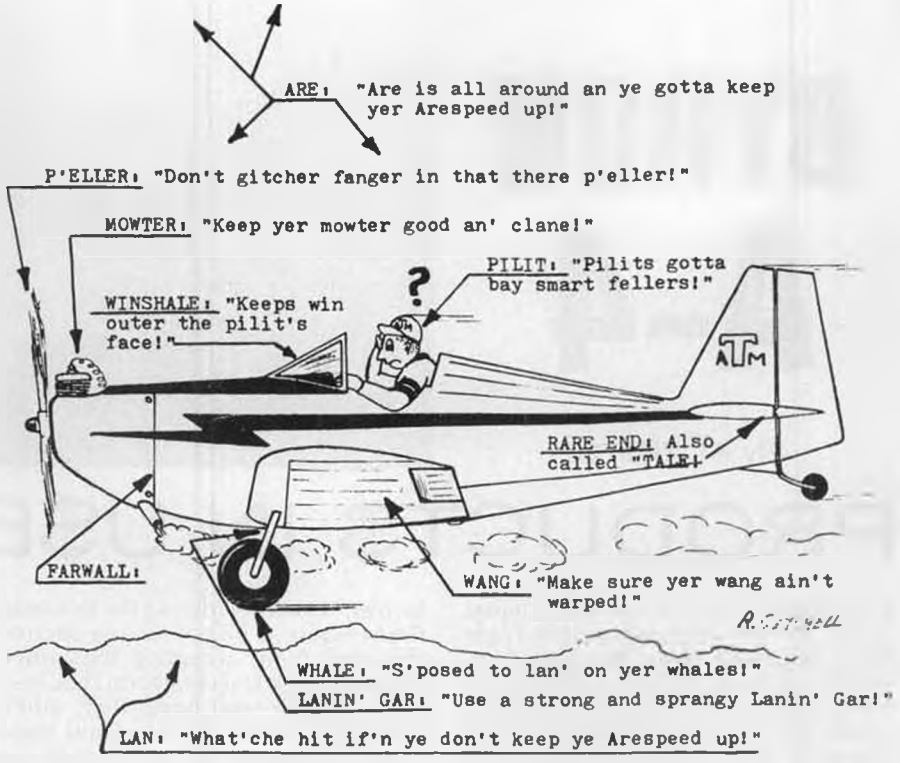
High Point Balancer or something equally as good; forget about those three and four dollar balancers . . . they're not able to do the job. I've already described how I do mine (BIG Birds, June '82) . . . however, in this case the end justifies the means, so balance them any way you want to . . . but DO BALANCE THEM. And then don't forget to check the prop you're flying with after each session (nicks and cracks are a NO-NO) . . . and recheck all those props for balance at least once a month; scrapes or a hard-to-see layer of dirt can easily throw any prop out of balance again.

2) Make sure that both prop tips are tracking in the same arc, and you can only do this by using a six-bolt hub. Most engines now come with this kind of hub, but a few, like the Quadra, still come with that stupid single bolt as standard equipment. Besides allowing you to track those prop tips, the 6-bolt hub is safer (the bolts should be safety wired), adds much to that scale look, and if it's made out of steel, really enhances the flywheel effect, making for easier starting and a lower and more dependable idle.

Here's how I track my tips: I hold, or secure, a long piece of heavy (3/16 inch or bigger) wire or 10 inch long hex-wrench to the top of the cowl/nose, adjusting the length so that the end of the wire barely grazes a prop tip. Then, making sure that the wire doesn't move, I rotate the prop 180 degrees, bringing the other tip around to meet the end of the wire rod. If the distance between both tips and the rod end are the same, no adjustment is needed. If, however, one of the tips is too far forward, carefully tighten the bolts on that end just a tad and then recheck the tracking. After a few times you'll be able to get the feel and come out pretty close when replacing props . . . or reinstalling the old one. *Don't ever loosen bolts to bring the rearward tip forward . . . 'cause you're bound to throw a prop!!!*

3) Doing whatever is necessary to bring the engine itself into balance, like getting one of Dario Brisighella's "over-balanced" wheels for your Quadra; it do make the difference!

4) Making sure that your airframe has got the "meat" and the strength to support a gas engine. Firewalls should be at least 1/2 inch thick (I laminate two 1/4 pieces of ply at 90 degrees to each other) with sufficient mass in that forward area. The entire fuselage should have gussets at every joint (1/16 ply) to provide maximum strength with minimum weight load. Load bearing members, such as inner fuselage framework and wing spars, should be made from good, straight-grained spruce.



5) By using braces/dampers in the tail section, you can build a light rear end that will stand up to the low frequency vibration of gas engines. However, too many braces are anchored poorly . . . usually directly to the softer wood of the horizontal and vertical stabs. By taking a look at the pic, you'll see how easy it is to "hard-point" braces and dampers; just drill out for, and epoxy in, a section of 3/16 or 1/4 inch dowel . . . and then drill the dowel out with a #33 bit, which is the right size for a 4-40 bolt (it's insanity to use anything smaller for installing braces).

6) Mount your engine solidly in its mount, and make sure that the mount is secured just as solidly to the firewall. I recommend that you stay away from soft (rubber grommets) mounting unless you're an engineer and/or have the time and the patience to thoroughly test different set-ups . . . because, more times than not, the end result is tragedy; either the vibration that normally gets to the airframe is severely amplified, or the engine is isolated too well and gets eaten up by its own vibes. It's like playing Russian Roulette with all the chambers loaded!

7) Pay close attention to your control system installation. Any slop or play means BIG trouble in the form of flutter, which can also be easily induced by hinge gap and/or unbalanced control surfaces. And don't forget about those pushrods or control rods: too much bowing or lack of guides to limit lateral movement can also make you planeless.

I use and recommend a push-pull control system (BIG Birds, May '82) for all control surfaces, because it gives more of a safety margin: the servos don't work as hard, which translates into more reliable and longer lasting servos . . . and a battery pack that'll yield more flying time 'cause the servos won't draw as much current. This kind of peace of

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Air Tech's "Eagle" can be grossly manhandled in the air, and still stay together. Will fly any maneuver you want.

The new Air Tech "Spinks Akromaster" flys as good as it looks . . . on a Quadra engine; flying weight is only 17 pounds.

BYRON A-4

By AL TUTTLE

PRODUCT$ IN U$E

• This product review has its beginnings at the January 1982 annual IMS Trade Show bash, held at the Pasadena Convention Center, Pasadena, California. Although this show has been around for several years, it was the first time that the wife and I had the opportunity to attend. The show runs for two days, each day jam packed with model exhibits, all sorts of action, i.e.: flight demos, how-to demos, etc., not to mention the manufacturers displaying their myriad wares. If you see this in time, and are going to be in the area, make it a point to attend. Allow enough time for the entire show, as you ain't going to see it all in one day!

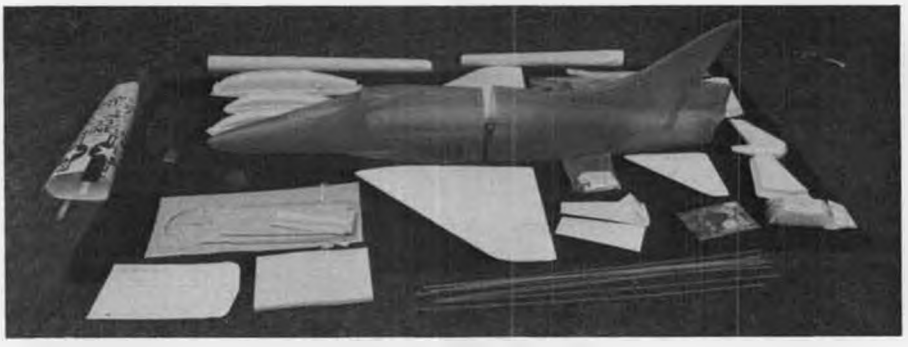
Byron Originals was there showing its line of ARF models, one of which was its newly-introduced 1/7-scale Douglas A-4 Skyhawk, affectionately known, after its designer, as "Heineman's Hot Rod." It sure did look nice sitting there on its pedestal, all dressed up in Navy Gray and Marine markings. And that's about all the thought I gave to the A-4, until one day during the show, Bill Northrop asked me if I was into ducted fans yet. I told him no, not that I wasn't interested in them, as I was, but just hadn't got around to trying one yet. Bill's comeback to this was: "How would you like to do a product review on the Byron A-4." After giving it considerable thought (approx. 3 milliseconds), I said: "Yes, I'd love to." However, during the five-hour flight home, I began having second thoughts about accepting Bill's offer. Having judged at several Nats, I had seen a few ducted fans. Some flew, others wallowed around the sky, and some were just plain accidents looking for a place to happen. I had also seen the Byron F-16, and it flew quite well. Gradually my anxiety turned to anticipation, and by the time we arrived home in Maui, I was ready to start building!

About two weeks later, three boxes arrived from Byron Originals. The airplane itself was packed (and I do mean packed) in a box 44x18-3/4x12-5/8 inches and weighed 25 lbs. The two smaller boxes, 34x10-1/4x4-3/4, each weighing 4 lbs., contained the fan and pipe unit, and the optional drop tanks.

The kit is very well packed, and arrived in mint condition. Shipping was via UPS Blue Label to Honolulu, and then transhipped to Maui via "Flybynight Airways & Screen Door Company." Delivery by the latter outfit is kinda spotty, as they wait until they get enough paying cargo to buy go-juice for the Gooney Bird. If they scrounge up a real big load, then they gas up the DC-4. Seriously, I'm not too sure about their fuel problems, but they do have a DC-3 and a DC-4 in which they fly freight throughout the islands.

I have been using these two carriers for the past several years and have yet to receive damaged goods. It is expensive, but well worth it in the long run.

UNPACKING

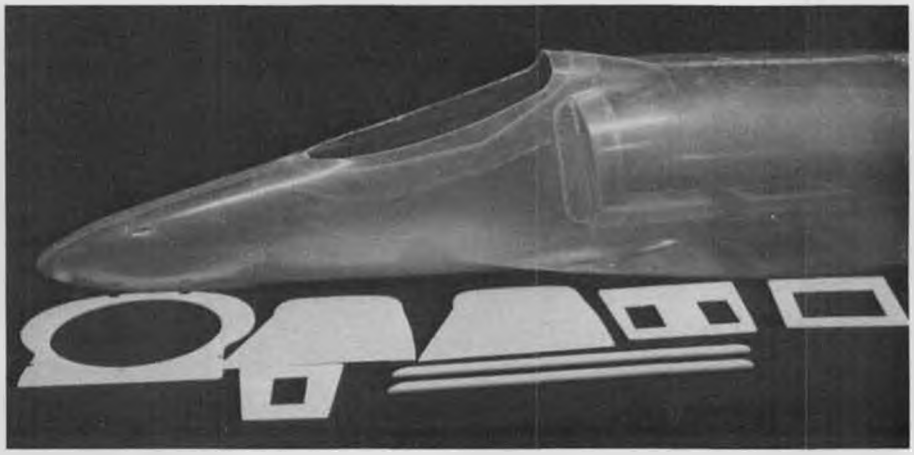


This is what you will find inside the Byron A-4 kit.

Rear view of the Skyhawk, ready for take-off run.

Beautifully finished and detailed A-4. Looks too pretty to fly!

Rudder and elevator servo tray showing props between tray and fuse bottom.



Front half of fuselage with formers and 3/8-inch dowels used for mounting retract servo in nose of aircraft. Fiberglass quality is excellent.

The first thing I looked for was the instruction manual. This was in a large white envelope and was lying on top of the kit. The envelope contained not only the instructions, but an engine/pipe data sheet, starter extension assembly sheet, engine/fan assembly and balancing sheet, starter extension assembly sheet, and two sticky-back labels. One of these is the aircraft kit serial number, and the other a warning label to be attached adjacent to the bottom fuselage air intake puka (hole) telling you to keep fingers, neckties, etc., away from this area.

All parts were easily identified using the material list on the back page of the owner's manual, which is also the instruction manual. As there are a lot of parts and pieces (approximately 152, counting the nuts and bolts), I identified each part during unpacking, and placed them in separate containers, i.e.: parts for fuse, empennage, wings, etc.

All parts are of the highest quality, and top name brand accessories are used. The fiberglass fuse was really outstanding, with minimal pin holes, and only one "crater," which was a 1/4 inch in diameter. The molded foam surfaces were accurately done and of excellent quality.

There are two sheets of black-line drawings. Both show the full-size assembly. The fuse assembly drawing depicts the left side view, and location of the fuse related components. The wing assembly drawing depicts the bottom view of the L.H. wing panel, and also shows the location of the wing related components. In addition, both drawings show detailed views of the various sub-assemblies, i.e.: cockpit, assembly, elevator linkage assembly, etc.

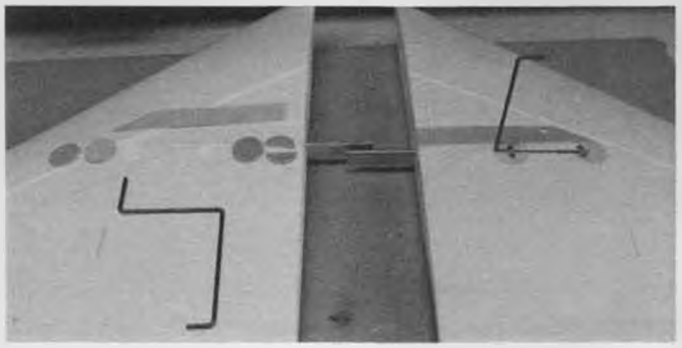
The decal set has complete decals for either a U.S. Marine Corps A-4M, or an Israeli HEYL HA'AVIR A-4N. A three-view paint scheme and decal placement guide is included for both types of aircraft.

Robart scale wheels and accessories, a 16-oz. Sullivan tank with a large clunk, foam rubber for mounting the receiver and tank, hinges, and all kinds of

Foam fin post clamped inside fin while epoxy cures. Note bellcrank's shadow.

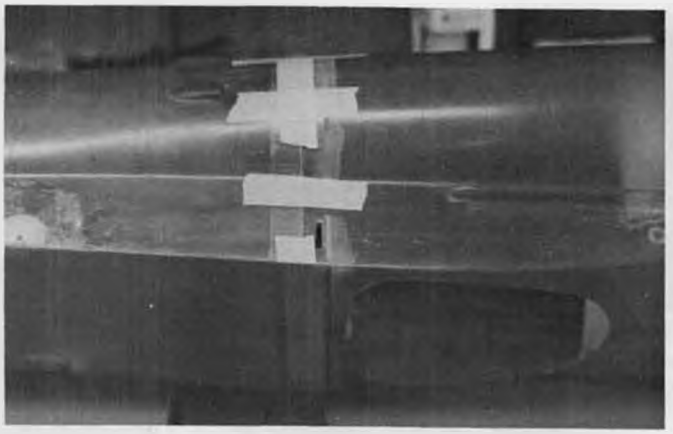
Bellcrank, links, and machined aluminum horn clamp control horizontal stab.

Nose gear retract servo mounted on 3/8 dowels.



If you want fixed landing gear, this is what the installation looks like. Wires go through discs; covered by spars.

Main landing gear retracts are faired over by molded plastic fairing. Servo is buried in foam wing.



Front and rear fuse halves joined by tape. Photo shows front wing guide pin and aileron bearing mounting plate.

Fin, stab, and rudder detail. Note streak of light on fuselage in stab's shadow indicating small gap present.

goodies, are standard items with this kit. Even the pushrods are included. All in all, this is a very complete kit! The only thing necessary to complete the airframe, is covering material for the wings and horizontal stab, plus adhesives and paints.

CONSTRUCTION

The instruction or owner's manual, as Byron calls it, is a slick glossy 12-page affair, that includes not only the assembly instructions, but fiberglass, epoxy/glass covering, and ABS parts finishing, plus items such as tools and glues needed to assemble the bird. The instructions are augmented with excellent quality assembly photos. However, the instructions are quite sketchy and left me with a number of questions during my perusal prior to starting assembly. Because of this, I am including assembly details in the areas that were questionable in my mind, and which may or may not help you if you decide to build this aircraft.

The manual's construction sequence is as follows: wing construction for retracts, wing construction for fixed gear, aileron installation, horizontal stab construction, rudder construction, and fuselage construction.

WING CONSTRUCTION-FIXED GEAR

The instructions and photos for this phase are quite explicit, and posed no problems.

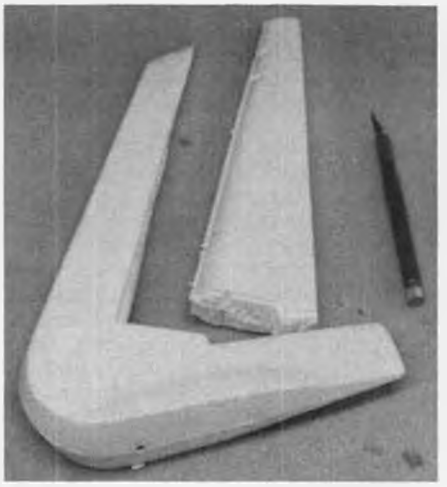
There are two 1-1/4 inch dia. cavities molded into both sides of each wing panel, as well as channels for the 1/32 die-cut ply spar covers, spar caps, and aileron hinge covers. Aluminum wing joiners are also molded into each wing panel.

The wing panels are symmetrical, and as both sides are identical, care should be taken not to end up with two L.H. or R.H. panels.

The 3/32 die-cut ply landing gear inserts are epoxied into the two cavities on both sides of each wing panel. Die-cut 1/16 balsa inserts are used as fillers to bring the insert areas flush with the surrounding foam. The 5/32 dia. gear legs were installed, and the die-cut spar covers installed.

The ailerons were then cut from the wing panels, using an "Ubie Skoobie" knife, and their leading edges sanded to shape. The 1/32 die-cut ply spar caps, and aileron hinge covers were installed, and the ailerons fitted to the wing panels.

All die-cutting was excellent, with the pieces being easily removed with a light sanding on the back of the sheets. The 1/32 die-cut ply pieces fell right out, and the edges were such that only a light sanding was required. The 1/32 die-cut ply root end caps were installed and the panels lightly sanded using #320 sandpaper.

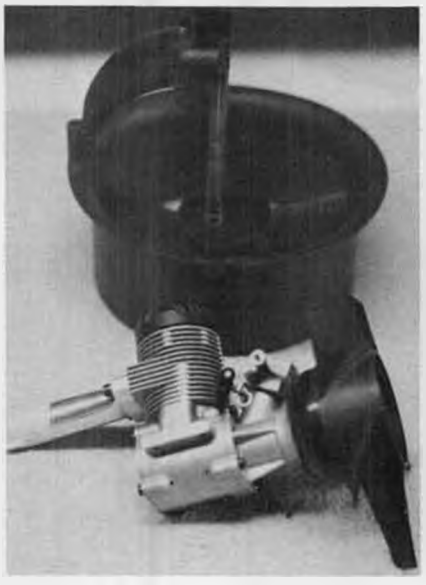


Fin post and front section of rudder need to be separated with sharp knife.

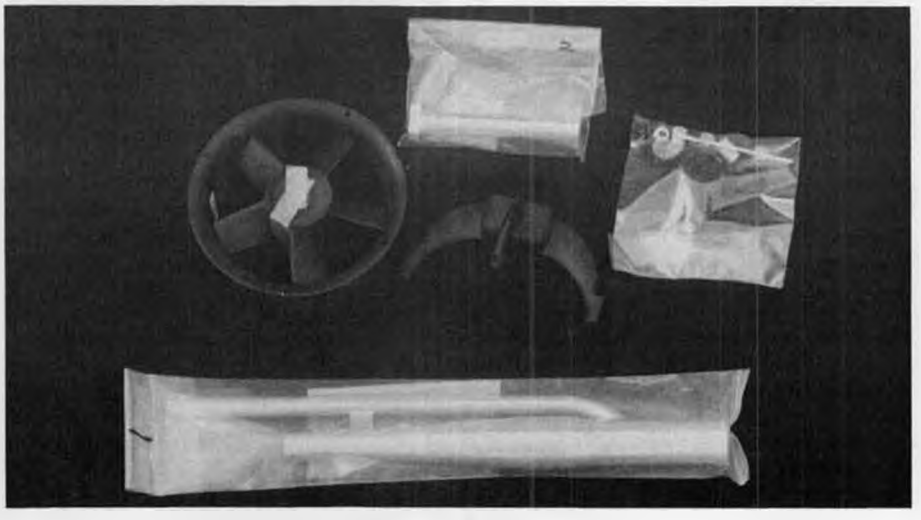
The foam horizontal stab pieces were also sanded at this time.

Byron has a glass cloth and epoxy kit available for covering the wings, ailerons, and horizontal stab. However,

Continued on page 100



Fan and header pipe on engine. Fan shroud with engine mount in back.



This is what comes inside the Byro Jet fan unit kit which is shipped separately in a smaller box.

Ha-a-a-umph! Alex "The (F3B) Kid" Bower assists Dave Peltz's six-pound, 12-foot Goose into the air at a recent Southern California Soaring Clubs ("SC squared") contest held at Soaring Union of Los Angeles' field. Goose is a 7 year-old design with new MB 303515 airfoil. Flys super!

R/C SOARING

By BILL FORREY

• R/C soaring is a broad field of interest, and it appeals to a wide range of enthusiasts as well. When you stop and think about it, there is no single stereotype flier in this branch of the hobby! There are the lone eagles who prefer the peace and solitude of the windswept slope, and there are the joiners who enjoy the fellowship and exchange of ideas that happen within the structure of the soaring club. Many like the comradeship and competitive spirit of the club contest or fun fly. Perfectionists can find plenty to become obsessed with . . . driving everybody else nuts! Builders, fliers, armchair adventures, talkers, thinkers, designers, there is room for everybody in R/C soaring . . . even the first-time model builder! In fact, there probably isn't a better place for a tyro to begin than in R/C gliders.

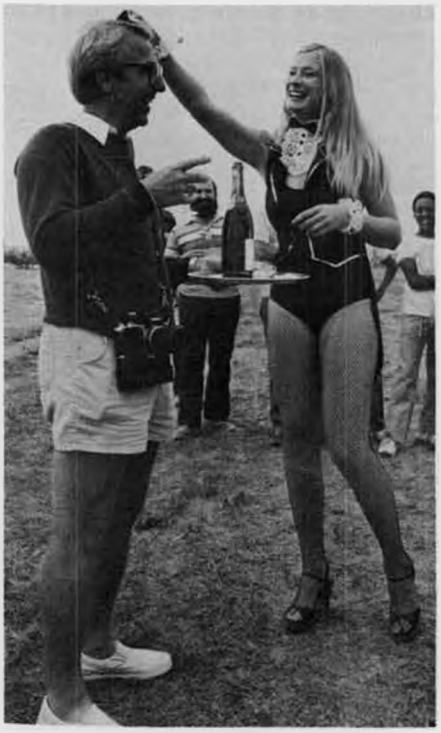
You're lookin' at the original, prototype Paragon wing and the Paragon's designer, Ed Slobod . . . both still fly well!

Take a quick look at some of the different areas in which one could get involved (just for the fun of it), within the topic of R/C sailplanes: slope flying: aerobatics, pylon racing, combat, recreational (fun) flying, English style cross country (on foot), even thermal flying from the slope; flatland flying: recreational (fun) flying, thermal contests (aka "spot landing contests"), F3B multi-task, Two Meter World Cup multi-task, F3E (electric multi-task), electric sailplanes and duration contests, aerobatics, fun fly contests with crazy tasks, scale modeling; open country flying: cross country closed circuit (a la Great Race), goal and return (a la Desert Dash), point-to-point races with multiple re-launch ("Crash and Dash"), open and declared goal record setting . . . the list could go on an on. There is so much diversification within the one subject of R/C soaring that there seems no end to the creativity, interests, challenges, potential, and future of the sport. I feel that of all of the R/C related hobbies, none has as much to offer as many people as does soaring . . . it's enough to drive a columnist CRAZY!

For most R/C soaring enthusiasts, life begins with the trainer. Typically, an airplane like a Wanderer, Gentle Lady, or Drifter II is recommended by the local hobby shop as a good first glider, and the would-be pilot walks away with enthusiasm, and desire to get under way. As it seems to me that winter is the season most likely to attract newcomers, I would like to point out a couple of most commonly made errors by beginners and how to avoid them.

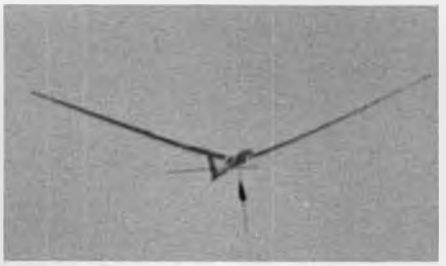
Wings

Following the manufacturers directions is very important to the successful completion on the model, so take the time to read them. Wings are not that



The things you see at an SCSC contest! Charlotte Jolly crowns Roger Roth with a garter on his birthday. Champagne!

Dave Jones launches his big Miskeet sailplane into the gray. The plane is an old Fliteglass kit no longer in production. Had VERY flexible wing rods . . .



. . . See what I mean?

difficult to build, but if they are built wrong, they can have the most disasterous effect on flying (or crashing) of any part of the airplane.

Shear webs are a pain in the neck, especially if you have to make them yourself from sheet stock. If you are buying a kit airplane, look for pre-cut shear webs.

Fitting shear webs to the spar of the wing is sometimes very tedious work. However, this is probably the single most important area of the entire aircraft's structure; make a mistake here and you may be building a second airplane sooner than you want to. Things to look out for here are: gaps between spar caps and shear webs (there shouldn't be any), poor glue joints, alignment of the shear webs, and grain direction.

Gaps between spar caps and shear webs that are not at least filled with glue, virtually cancel any positive contribution that the shear webs make to the spar system. The best thing to do if you have a shear web that doesn't fit right is to throw it away and make another one that does fit right. Glue is not a very good substitute for wood, but if you make a mistake, it's a whole lot better than nothing, so fill the gap with several applications of glue.

Before installing the top spar cap, sight down the tops of the shear webs that are glued to the bottom spar cap, they should all be lined up in a straight line and they should be vertical (perpendicular) to the spar caps. Wood grain direction should also be vertical.

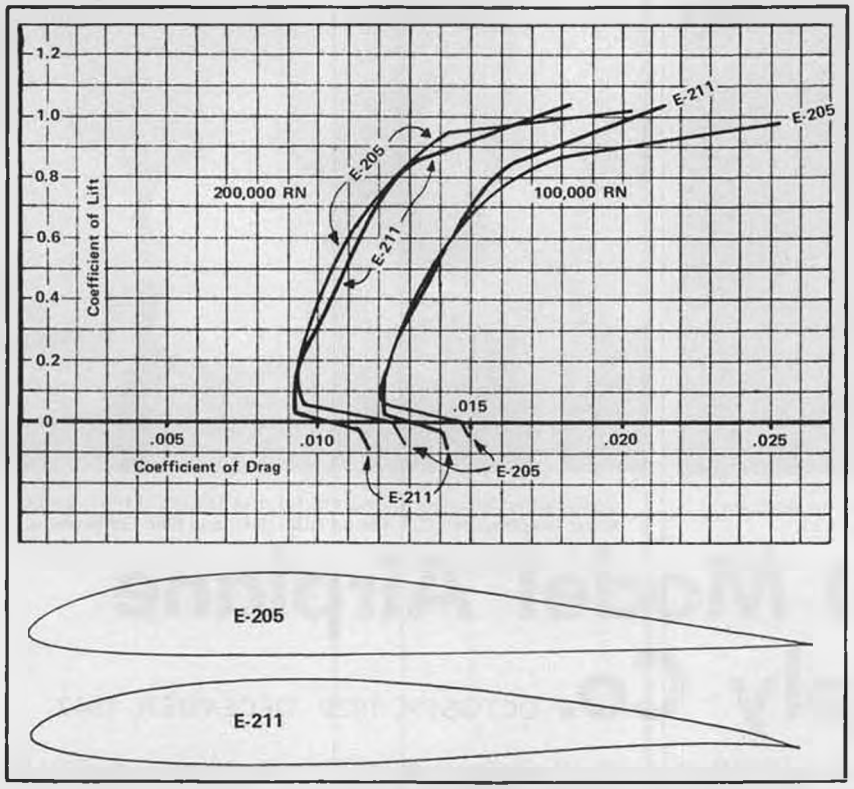
When the spar structure is all done, go back and double-glue every joint, making a small fillet with the glue. I find that a small modeling brush does a very nice job of spreading the glue.

The leading edge of the wing is the most important area of the wing's airfoil. Careful attention to leading edge shape is critical to maximum performance. The tools that you will need to do a good job of shaping the leading edge are: a razor plane and replacement blades, a sanding block (or two) at least six inches long, medium grit sandpaper (320), fine grit sandpaper (400 or 600), and 3/4 or 1-inch masking tape. It helps to be able to work in direct sunlight also, as you can use the sharp shadows to find bumps and irregularities in the curve of the leading edge.

My method of shaping leading edge is quick and easy for me. First, I take a look at what it's supposed to look like. Sometimes I make a template of the shape, but most of the time I "eyeball it" and everything's okay. I use the masking tape to protect the ribs (or D-tube sheeting) from careless sanding or accidental razor plane cuts. The tape is placed about 1/8-inch away from the leading edge stock so that as I near the contour of the ribs with the sandpaper, I can fair in the leading edge stock without leaving a lip the thickness of the tape, as would occur if the tape was

Buddy Fox and Larry Pettyjohn watch Jerry Krainock work a thermal in the heat of competition in SCSC at SULA.

Moment of release. Gary Ittner launches Jerry's Gemini MTS (actually Ed Slobod's prototype Gemini MTS . . . yes, it's still flying!) into overcast sky at SCSC contest.



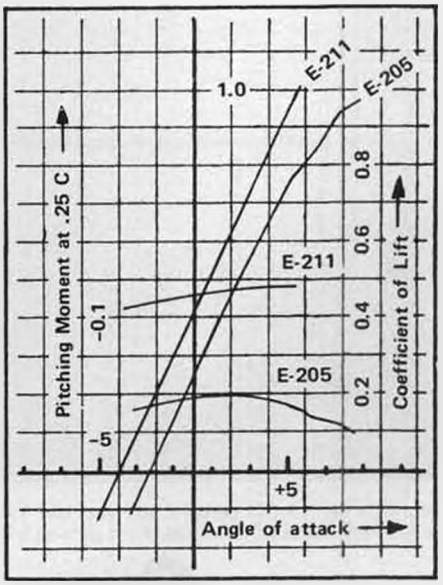
X: 100.0	99.66	98.70	97.22	95.29	90.12	83.23	74.96	65.67	55.85	45.94	36.32	27.29
Y: 00.00	.08	.35	.79	1.34	2.49	3.68	4.88	6.01	6.97	7.63	7.85	7.55
X: 19.14	12.14	6.58	2.64	1.32	.44	.02	.16	.90	2.15	6.15	12.02	19.56
Y: 6.76	5.59	4.13	2.50	1.67	.87	.16	-.43	-.97	-1.48	-2.34	-2.92	-3.21
X: 28.43	38.23	48.52	59.10	69.59	79.39	87.87	94.44	96.84	98.59	99.65	100.0	
Y: -3.24	-3.01	-2.44	-1.53	-.62	.06	.40	.38	.28	.15	.04	00.00	

butted up to the leading edge. The razor plane really speeds up the crude shaping process, I highly recommend that you use one.

Most leading edges are shaped by continuing the curve of the rib onto the leading edge stock then rounding the front to the correct radius. I usually begin with the top surface, first planing and then sanding the leading edge stock to the top contour of the ribs, then repeating the process for the bottom surface. The manufacturers aren't in the habit of supplying wood any wider or thicker than they absolutely have to, so once you have the upper and lower curves sanded into the leading edge, you should only have to round off what remains to achieve the proper shape. It's really quite easy once you actually get down to it and do it . . . and most satisfying too!

Fuselage

Not too many newcomers mess up fuselages to the point that they are unflyable, however, I wish I had a dollar for every crooked fuselage I've seen! Part of the blame for banana-shaped fuselages is due to the tendency of the fuselage side materials to warp in the box. It must be an unwritten law somewhere, maybe a corollary in the infamous Murphy's Law, that both fuselage sides come warped in the same direction, but it is invariably true! *(The other common problem is that one*

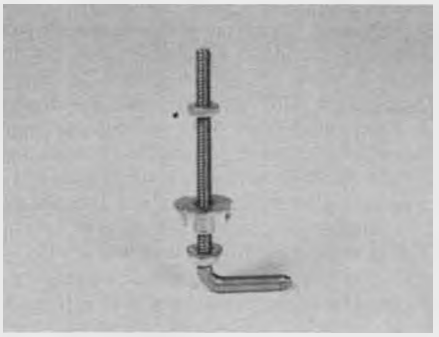


Theoretical glide polars with pitching moment and lift vs. angle of attack graphs for Eppler 205 and 211 sections. E-211 coordinates plot T.E. to L.E. and back again.

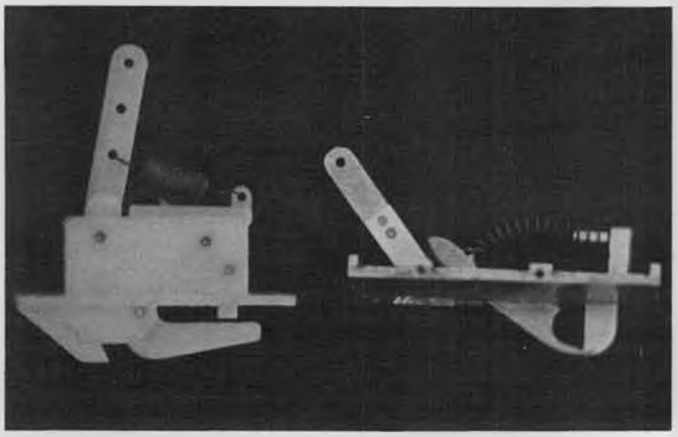
fuselage side is soft balsa, the other side is firm and stiff! wcn)

The answer to this dilemma is simple. Use the completed fuselage bottom as a jig to keep the sides straight. First, make a mark with a pencil at the center, bottom edge of each fuselage former, or bulkhead. Next, draw a centerline down the full length of the fuselage bottom. Mark the exact position of each bulkhead location on the fuselage bottom,

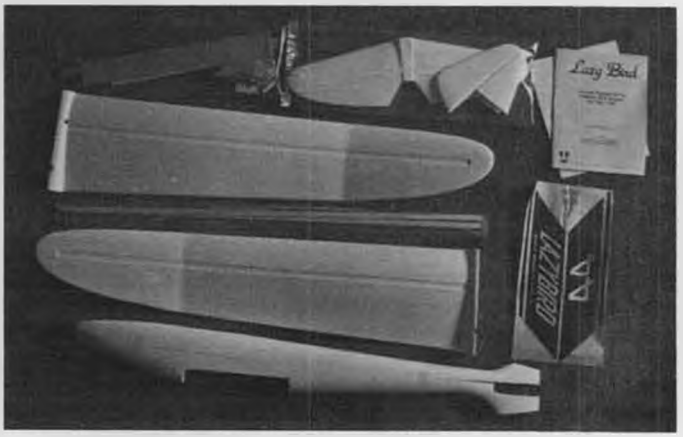
Continued on page 76



Gary Ittner's 20 penny common nail tow hook. Intended for serious launching!



Commercial and home-made releasable tow hooks. Yves Bourhis made his look-alike out of aluminum and steel.



Lazy Bird by Midwest Products Co., Inc. Construction is as easy as it looks.

Comet's first formal place of business, late 1930, like the sign says; 4205 West 22nd St., Chicago. First catalog issued in 1931.

Comet's first business partners in front of factory (l to r): Louis Kapp (Kapitanoff), Bill Bishop (founder), and Sam Goldenberg.

Comet Model Airplane & Supply Co. OCTOBER, 1929 - DECEMBER, 1947

By WALT GRIGG . . . Modeling historian and collector tells all about a leading kit manufacturer during the Golden Age of our hobby. Its lasting effect on a young generation will never happen again.

• From a humble beginning of sales amounting to $5.59 in October, 1929, Comet grew to annual sales of around a million dollars, over 50,000 square feet of plant area, employing some 300 people . . . "The business grew and ruined an excellent hobby" . . . so says Bill Bishop, the founder of Comet. This company, which kitted some of the finest flying models of the time, got its start as a result of a high school boy's ambitions. Bill wanted to take flying lessons, and later, to become an aeronautical engineer. Comet was started in order to make enough money to build a full-size glider. Bill's hobby was building . . . model airplanes, ships, and crystal radio sets. The radio sets were sold to raise money for his model projects. Comet became a business at 4150 Roosevelt Rd., Chicago, where the first price list was issued.

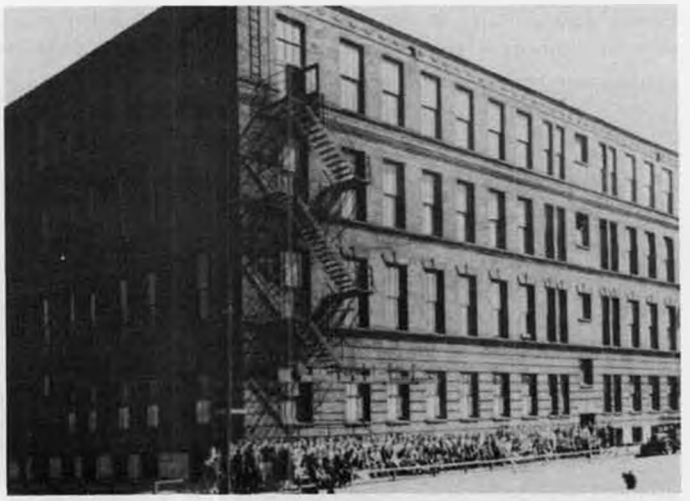
After the initial formulation, Bill's boyhood friend, San Goldenberg was invited to join the budding business. The third member of the Comet trio was Louis Kapp, a distant relative of Goldenberg, who was about to be fired from his job in a sweat-shop laundry. He bought himself into a sales position with Comet, his future pay to be one-third interest in the company, a healthy commission indeed . . . Kapp purchased his one-third for $100.00 . . . which matched the then existing inventory.

Soon after Kapp became a partner, a move was made to 4205 West 22 St., where, in 1931, Comet put out their first catalog. Bill Bishop has designed their original logo based on the Lockheed aircraft insignia of the period. Bill was the only designer at this time, and all models in catalog #1 were done by him.

In these early days, the boys sold Ambroid cement. They soon learned to make their own glue by way of scrounging around auto body shops for celluloid scraps (window panels on older cars were made of celluloid) and dissolving these in acetone. Customers would bring their own bottles, and everyone more or less guessed at the amount and price. Balsa was purchased from the Fleischman Yeast Co. They used it for crating products imported from South America.

The 22nd St. factory was a small store about 25 feet by 100 feet. Bill Bishop had a drafting table in one corner. "I had to constantly brush balsa dust off the work

Inside the first factory. Comet's first kit, the Dipper, was produced here. Note "Design Department" at right, far wall.



Comet's last factory, 129 West 29th St. Over 150 employees outside for photo. All factory and personnel photos courtesy of Bill Bishop.

Six-in-one solid model kit, with fuselages made up of laminations. Devised by employee Willie Witkin. Willie was once a passenger when Bill Bishop rolled Comet's Model 'T' three times! Neither was hurt!

Comet sales meeting in 1939, with Bishop, Goldenberg, and Kapp (l to r) in front. Standing second from left is Johnny Clemens, and far right is Carl Goldberg. Other I.D.s, anyone?

surface," he recalls . . . Sam Goldenberg operated the lone table saw, while Louis Kapp was out in the Model T selling the results of this enterprise.

Around this time, a happening which could have had unfortunate results . . . An advertisement in the mail offering what seemed to be a fantastic opportunity. For less than the cost of postage, a circular would be sent to thousands of prospective wholesale purchasers! What Bill and the others did not foresee, was that a buyer receiving this mass of advertising would doubtless give it a quick look, and throw the works into the trash. The inexperienced boys ordered 10,000 boxes for their Dipper kit, worked their butts off to get all in readiness for the expected avalanche of orders, and, ah, well, ah . . . Bill says they got one order for a dozen kits. With all these kits on hand, bills coming due, and such, everyone hit the streets to sell Dippers . . . This they did, to hardwares and school stationary stores . . . The Dipper was very much a success, with repeated sales ensuing. . .

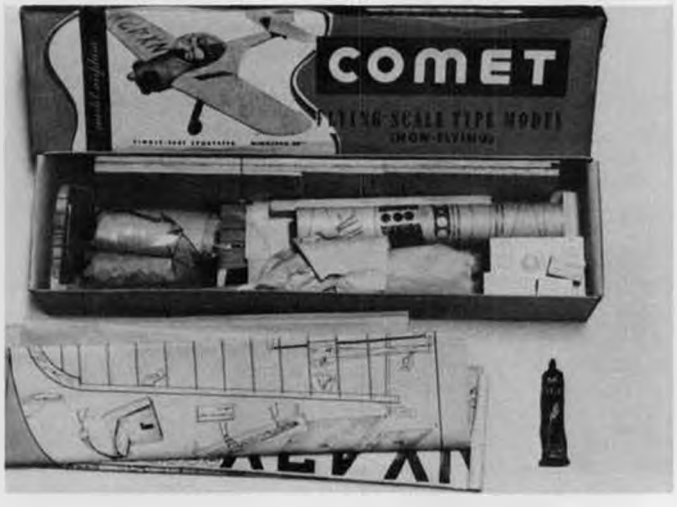
For the most part, Comet kits during the early days were uncomplicated flying types . . . In the 1931 catalog, only two scale models were offered, an SE5 for $3.00, and a Stinson Detroiter at $4.00. Almost all Comet kits at this time had parts cut to size, some even having the wing ribs cut out.

The near fiasco with the Dipper actually put Comet on its feet . . . In 1931, the Silver Ace Co. of Chicago went bankrupt. Comet bought what, at the time, seemed to be a pile of rubbish. This turned out to be balsa scrap, celluloid wheels and motors, (used in the Stinson kit) and a machine of unknown purpose. After some study, it was determined to be an automatic glue tube filling machine. Comet was able to discontinue their previous practice of pouring cement from a tea kettle into a tube, then using duck-bill pliers to squeeze the tube end closed.

On the subject of glue, Comet once led the industry with its cement. The Sherwim-Williams Co. was asked to develop a cement that would be the exclusive property of Comet. Bill Bishop and others worked with Sherwin-Williams, and after a bit of experimentation, came up with a clear cement that dried quickly, was strong, and not stringy. An inhibitor was developed which prevented any reaction with the lead alloy tube. Comet was the first to use this type of tube. In time, three of the automatic tube filling machines were used. By improving the machines, it was possible to use one operator who only had to feed the tubes into the machines. Another device developed by the company was that which crimped and corrugated the tube end, successfully preventing it from the tendency to unroll under pressure applied by a ham-fisted kid . . . (This didn't apply if one got mad when the tube nozzle stopped up. Some of my pants had big splotches of glue from crushing the tube under the influence of temper!) In later years the sales department became lax in its promotion of the glue, thereby opening the way for competitors. . .

In 1932-33, a subsidiary company was formed. Balsa Products of America . . . This was a little shop located in Maywood, a Chicago suburb . . . The idea being to process balsa and sell to competitors. This lasted a bit over three years. . .

During 1931, Robert Reder (now executive VP of Monogram Models),



Non-flying scale kit for Piper Skycycle, circa 1946. At least they were honest about it! Kit designed by Ed Lidgard.

A group of Comet kits belonging to author Walt Grigg, includes WW-II "Identification" solid model, bottom, 3rd from right.

Bill Bishop at drafting table, August 8, 1936. Note Heston Phoenix model . . . Comet had wide range of scale kits.

World War Two kits. Top left is from Amco line, by Comet, but with no Comet I.D. P-51 hardwood glider. Speed-O-Matic delux kit.

started to work on a part-time basis for Comet. This became full-time in 1934, with Bob doing design and engineering directly under Bill Bishop, who was plant manager.

By 1933, Comet had moved to 3114 Harrison, and was taking as much as two full page ads in Model Airplane News, still punching the flying models. Those color ads on MAN's back cover were the most attractive advertising done by any model company of the time. During the slow periods, Comet's ads shrank in size and were placed further inside the magazines in order to lower the cost. Bill Bishop recalls a rumor being started to the effect that Comet was in financial straits (they were not), nonetheless, they were forced to reinstate the full page ads to disprove this rumor.

In late 1933, the factory was moved to 2509 Cermak Rd., and here they stayed until 1940.

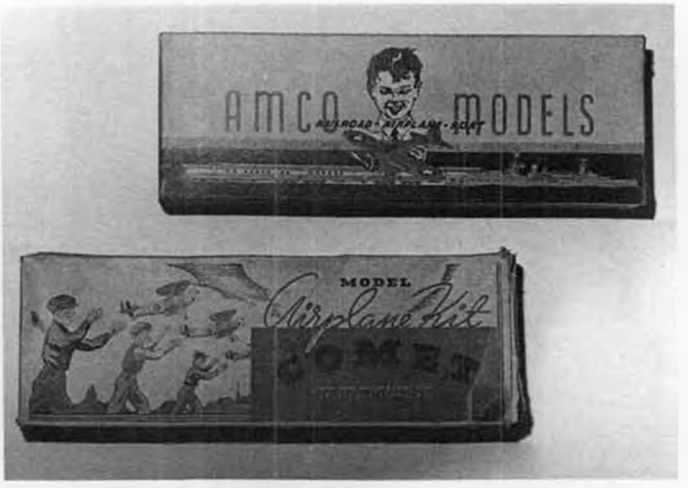
Comet continually grew in size and volume of business, many models of the flying scale type being added, and a few being dropped. An offshoot line was added (or modified as the case may be), called AMCO. This was American Modelcraft Co., and the address was simply one of the side street doors of the main plant! The AMCO line was created in order that Comet could sell kits with a different name in the established Comet dealer areas . . . (Every other company did the same thing). For years, the author thought that AMCO was Comet's cheaper line . . . they weren't. AMCO kits had exactly the same contents as the regular Comet line, but no name on the plans. Some earlier kits had the designer's name on the drawing, but later on there was nothing to tell of any association whatsoever with Comet. AMCO boxes were different, also . . . but not the price. The AMCO line was dropped around the middle of World War Two.

Some time in 1937, Comet decided to come up with a scale kit to rival anything from the Cleveland line . . . and brother, did they ever!! This was the Grumman Gulfhawk, Al Williams' beautiful orange and black biplane. . .! This machine was no doubt the most famous stunt aircraft ever! Not was, IS . . . It is now in the National Air and Space Museum, in Washington, D.C. Comet decided to go first class with this kit. After gathering together all available information, Bill Bishop contacted Gulf Oil, and was finally able to pin down Al Williams somewhere in Ohio. Bill and Bob Reder traveled to the airport, and were allowed to spend the whole day, photographing, sketching, and measuring the Gulfhawk . . . between flights, that is! It is noted that Williams was most cordial and helpful, and very pleased with the results. (Bob Reder recalls that he and Bill were unable to get Al to share his picnic lunch with them.)

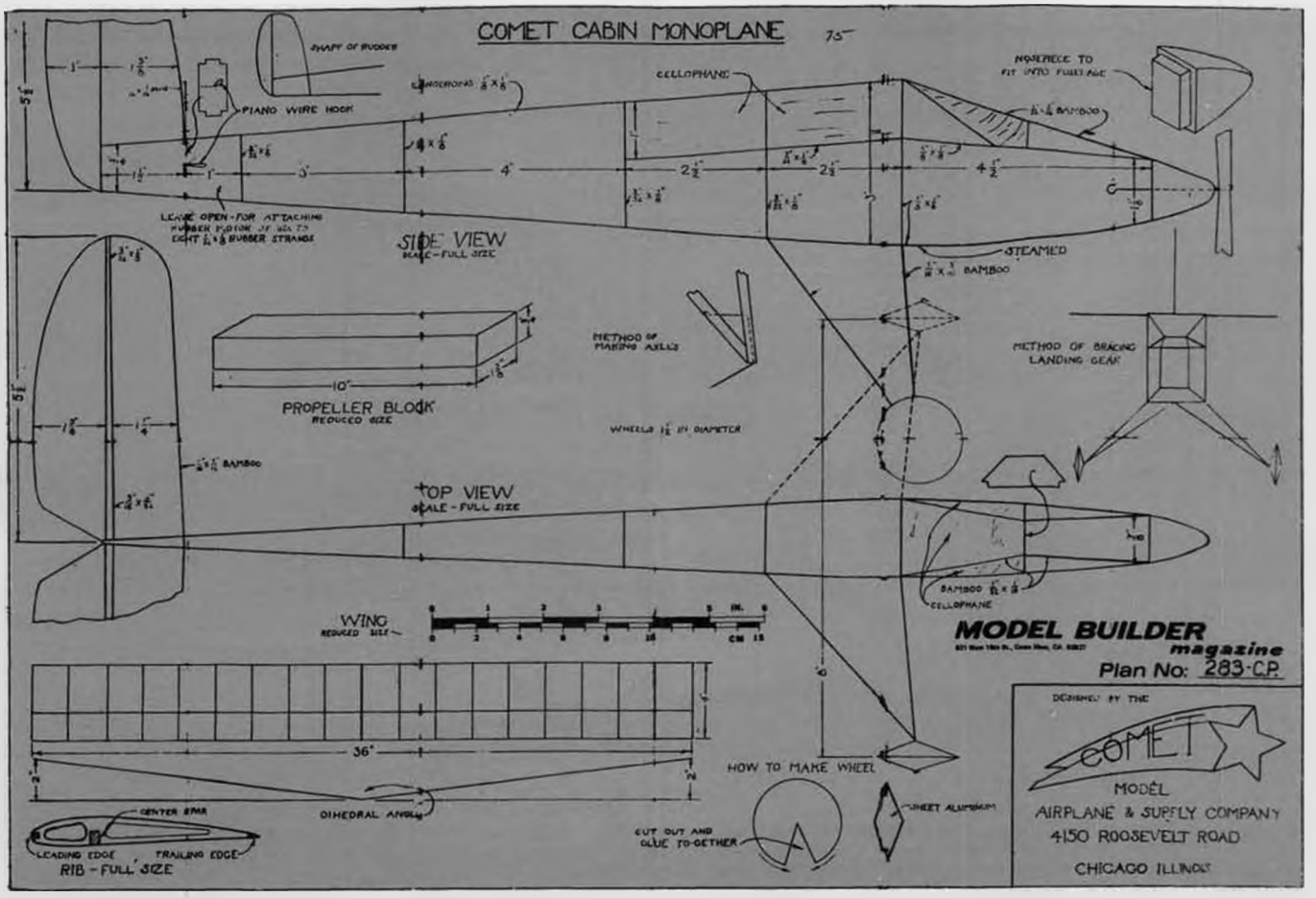
The Comet Gulfhawk was indeed a masterpiece. I doubt that any other scale model had the care lavished on it that this one had . . . Construction was quite similar to the original aircraft, with retractable gear, fully detailed cockpit and engine, moveable controls . . . the works! During the late thirties, this model probably won more big contests for scale than any other! Unfortunately, the Gulfhawk was not financially successful, due to its price of $3.95 . . . high for the time, but you get what you paid for. . .

Comet was ahead of its time in many ways . . . being General Manager enabled Bill Bishop to experiment with different facets of operation concerning machinery, personnel, and the like. Comet had the "coffee break" before it became mandatory . . . The First Aid dept. had a Registered Nurse. She worked on personnel problems in addition to the normal removal of splinters,

MB's editor built one of these in late '45 while on carrier out of Pearl Harbor. Kit caused furor. See text.



Boxes from the 1939 period. Lower one was made in several sizes to accommodate different kits.



Very early model designed and drawn by Bill Bishop. Plan came from Bill Cooksey, now in New Zealand, via Stu Richmond of Florida. Bishop now has copy hanging in his den. Full size plans available, see page 104.

and other aches and pains. She had records on every employee, so only a quick check would keep a man with a bad back from a job entailing heavy lifting.

Also, if an accident occurred, all work instantly ceased on that particular job. The General Manager and a committee of five, one from each department, would try to figure why the accident happened, and what could be done to prevent a reoccurance. The job was shut down until a remedy was found. If some mechanical device could be utilized on a machine to further the safety of workers, it took precedence over all other shop maintenance and repair.

The engineering dept. was very much first rate. . .! After being with the company for several years, Bob Reder was made head of this section. Each member if the design staff was required to work in the woodworking dept. in order to familiarize himself with the balsa saws and sanders. All plan dimensions had to be what one could measure with a ruler. When an assignment for a new model was given to a designer, the entire dept. stopped work and gathered around that man's table. Bill Bishop would then lead a discussion on what could be done to make this model better than the one before. These bull sessions built up the overall quality of the designs. Each designer signed his name to his own work, thus instilling a sense of pride.

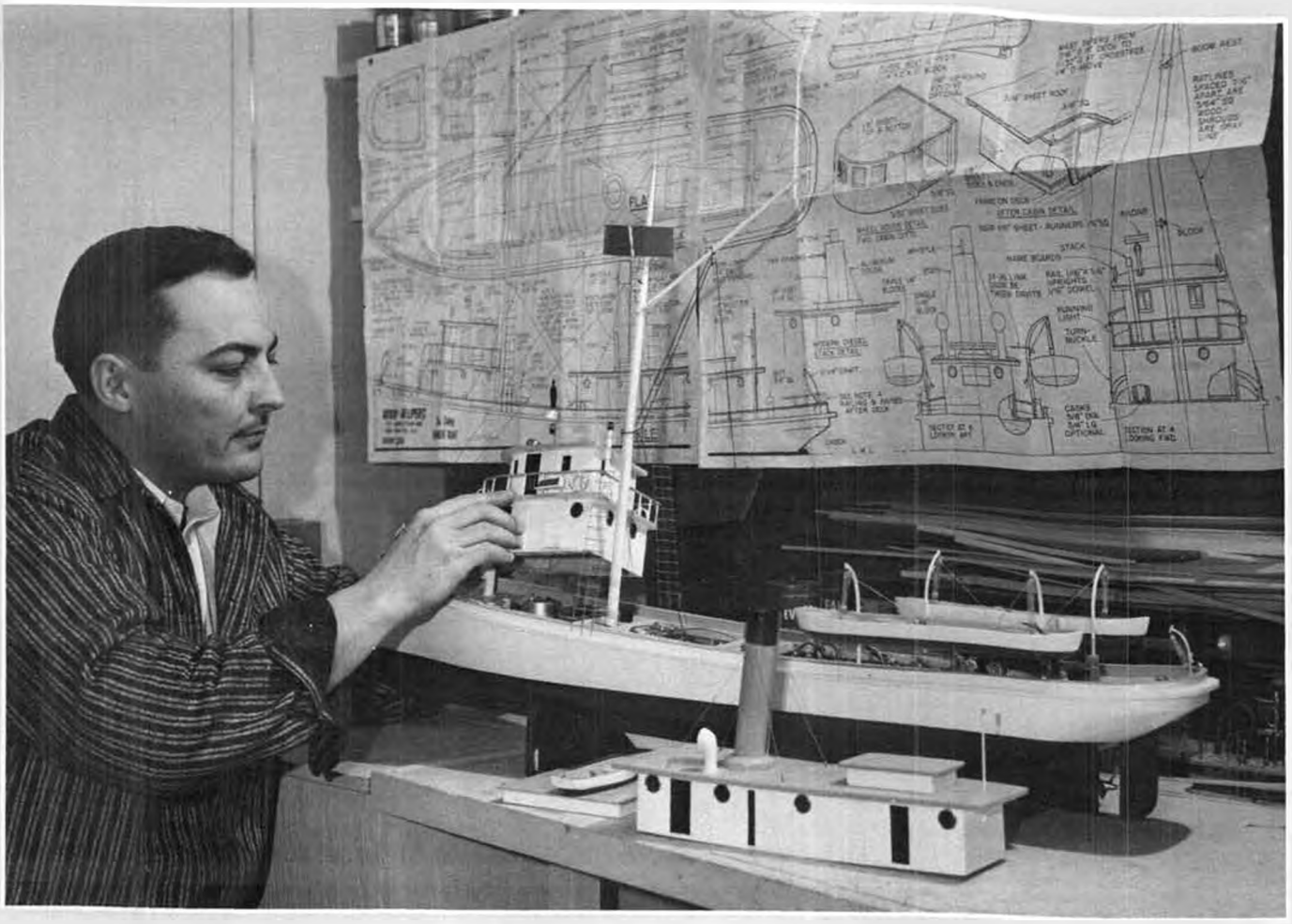
The Engineering Dept. was also responsible for quality control. They had the authority to stop production if the quality was not up to their standards.

All kit components were calculated in terms of board feet of balsa, and man hours per thousand kits. (A carload equalled thirty thousand board feet). The balsa was purchased in ten-car lots at a time, shipped from New Jersey, where the importer was headquartered. Japanese tissue was bought by the ream from another importer . . . and all who built models prior to World War two can vividly recall when this great covering material began to be replaced by Christmas wrapping paper . . . Only in the past few years did the Japanese tissue begin to make a comeback. . .

Hardwood wheels and thrust buttons were bought from the New England area, being made during the winters, when most farming ceased. Boxes were ordered in set quantities running into many thousands at a time. The two piece (accordion) box was preferred by most dealers, as this let the customer see what he was getting, but it also presented a loss and pilferage problem at the point

Continued on page 79

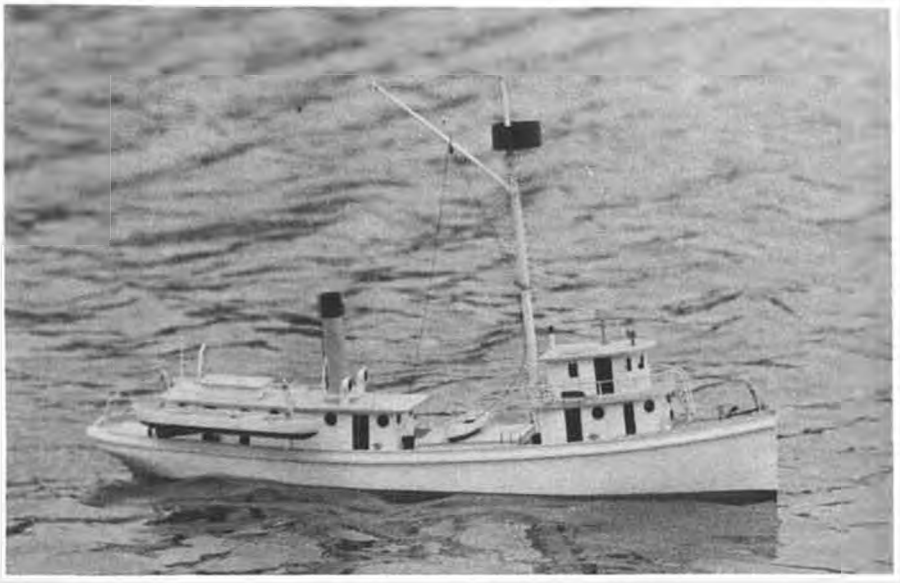
Comet printed matter, catalog/brochures from 1938, '39, '41, and '43.



Model Builder's editor, about 1957, with his version of the Bunker Boat, as originally published in *Young Men*, alias Air Trails.

Sea Going Bunker Boat

By FRANK LASHEK and S. CALHOUN SMITH . . . Back by popular demand, a reproduction of one of the most sought after model boat construction articles ever published.

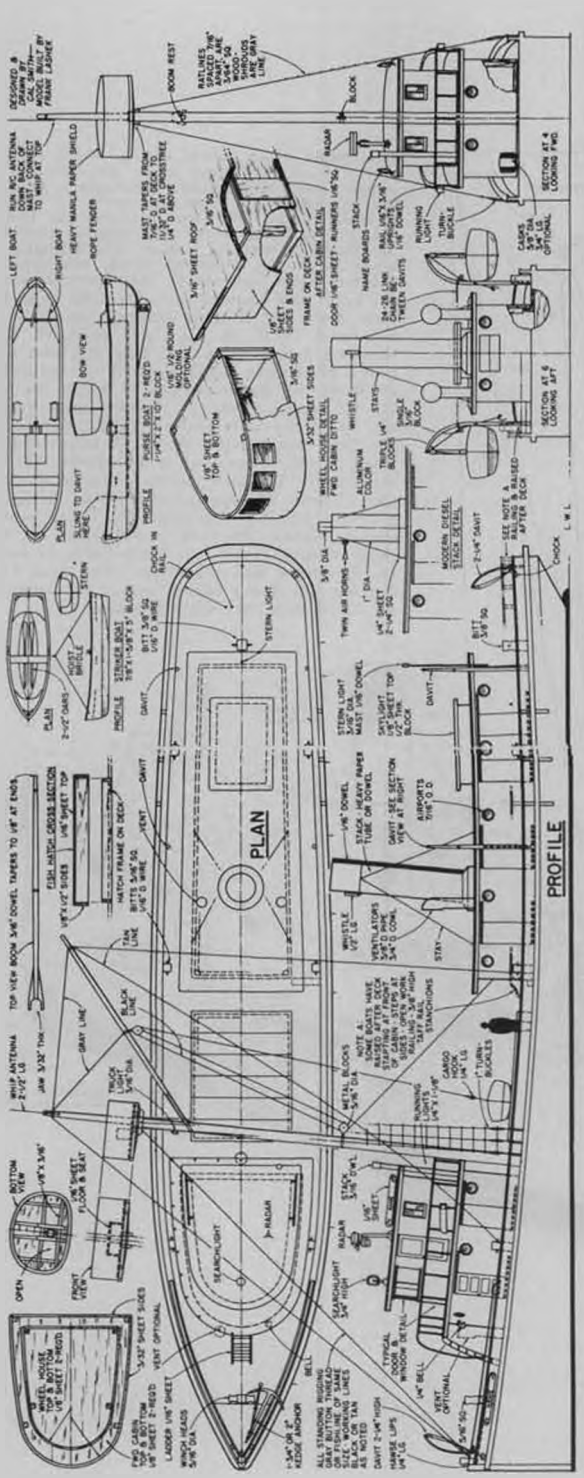


Repeat photo of *MB* editor's Bunker Boat, as published in the November '82 issue, which regenerated a clamor for plans, and resulted in this article.

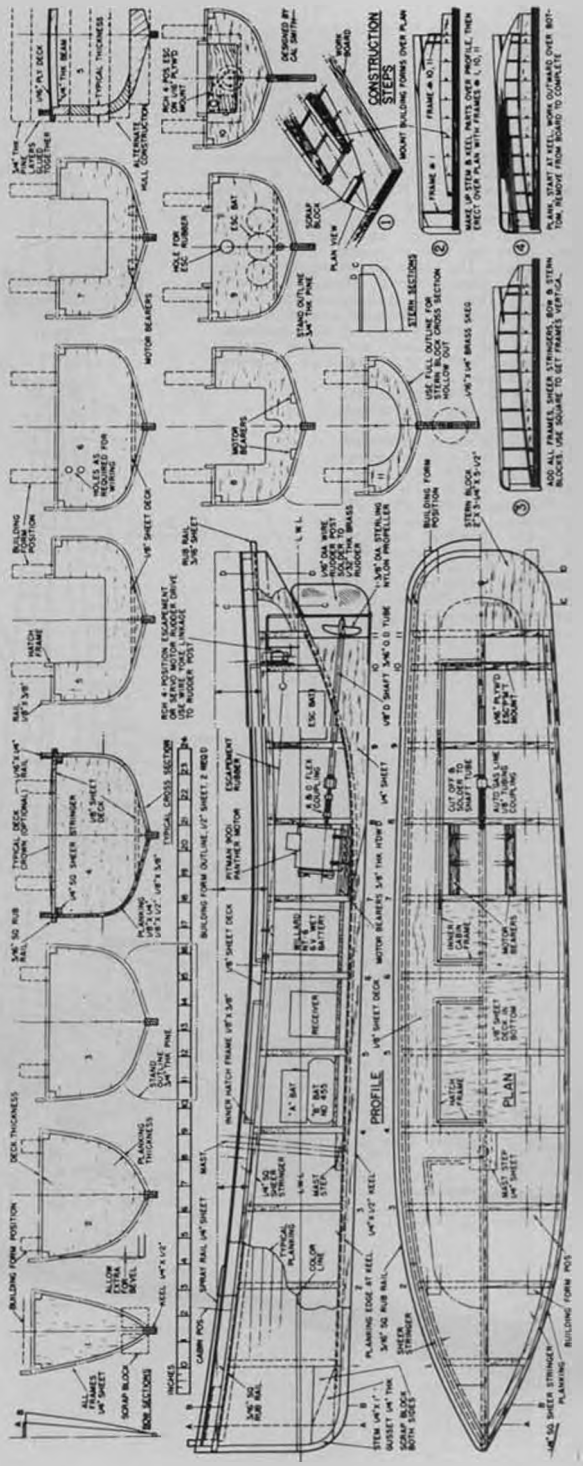
• The reason this article is appearing, and reproduction prints of the plans are being made available, comes from a classic example of "history repeats itself."

Going way back to 1955, the cover of the June issue of the now defunct *Air Trails* magazine, then going through a series of name changes that found it labeled as *Air Trails And Hobbies For Young Men* (That's right, girls, it *deserved* to fail!), featured a painting by the late Cal Smith of a bunch of model boats bearing down on a surprised scuba swimmer. One of the boats shown, a scale model of a commercial fishing trawler, brought about a flood of letters from readers, wanting to know where they could get plans to build the model.

Artist / modeler / designer / writer / photographer Cal Smith had painted the boat from some photographic source, but no model plans, as such, existed. However, Air Trails Editor, Al Lewis (first president of AMA!), put the



FULL SIZE PLANS AVAILABLE – SEE PAGE 104

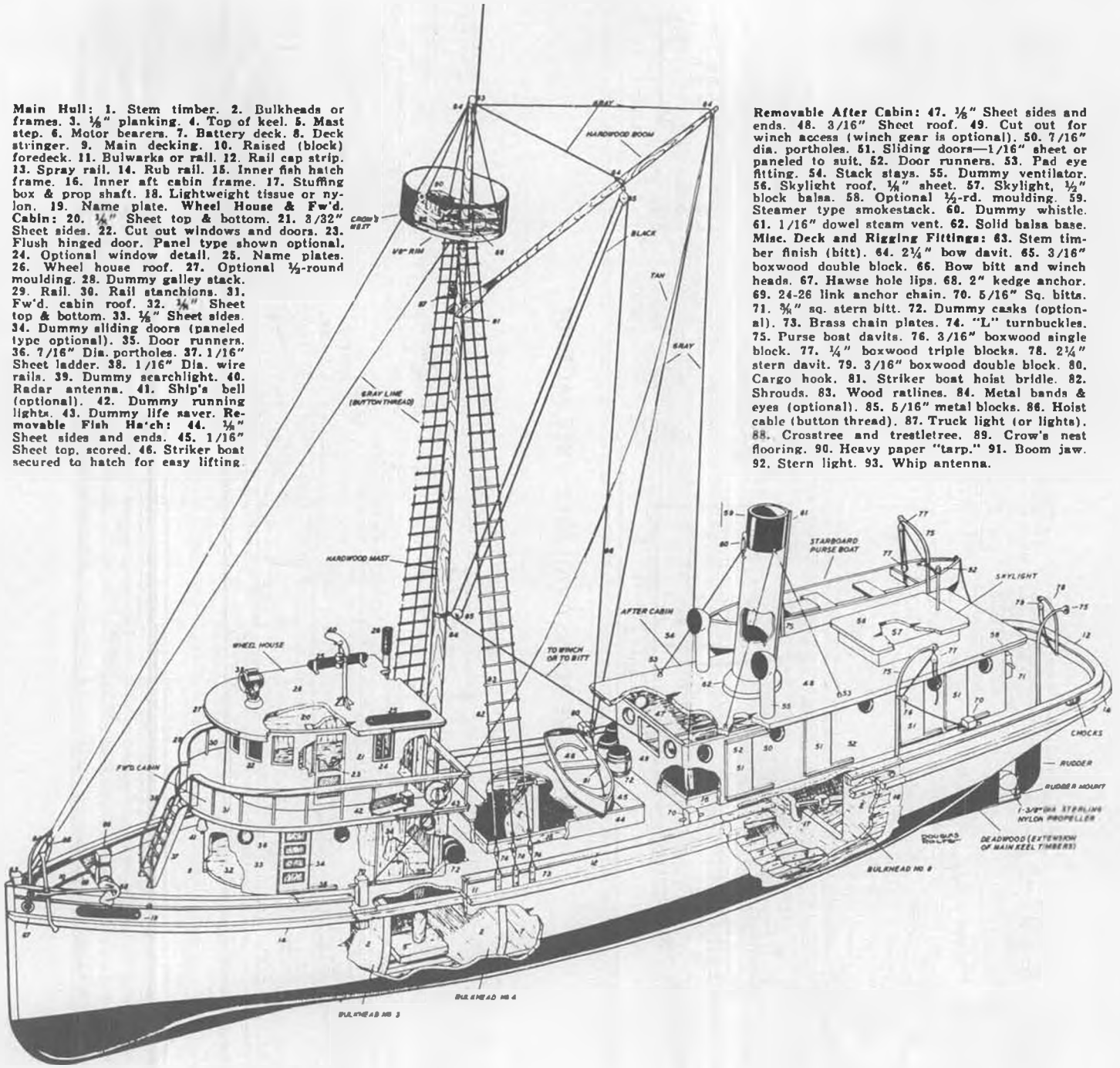


pressure on Cal, and his model boat specialist friend Frank Lashek, to come up with a construction project (. . ."only quickly, the readers are hounding us to death!"). And thus, in the February and March 1956 issues of . . . remember about the name changes . . . *Young Men* (they *still* didn't get it right, girls) the *"Sea Going Bunker Boat"* appeared, under the by-line of Frank Lashek and S. Calhoun Smith.

Sometime in 1956-1957, I purchased the full-size plans, and built the model you see in some of the photos herein. As that was in the days when tube-type, single-channel radios with relay switching dominated radio control, the boat was so equipped. But the actuator system I devised to operate that boat could have made Rube Goldberg look like an accomplished systems designer. From one channel, mind you, using a single push-button on the transmitter, I was able to get (most of the time) full trim positionable rudder; low reverse, low forward, high forward, and off motor speeds; on and off navigation lights; and a horn! Radio controlled navigation lights was definitely over-kill, but the switching was available and I *had* to do something about it!

The boat was still in good condition in 1970 when I left for the west coast, though I had removed the "Juke-Box" control system in anticipation of installing an uncomplicated proportional radio. I gave it to old flying buddy Graham Lomax, and unless he got tired of dusting it and removing cobwebs from the rigging, it may still be alive.

And how did history repeat itself? I frequently use a photo out of my own modeling past to lead off the *Workbench* column. For the September '82 issue, I came across, and used, a photo of the Bunker Boat. Within a week after publication, the letters started coming in, pleading for construction drawings.



Main Hull: 1. Stem timber. 2. Bulkheads or frames. 3. ⅛" planking. 4. Top of keel. 5. Mast step. 6. Motor bearers. 7. Battery deck. 8. Deck stringer. 9. Main decking. 10. Raised (block) foredeck. 11. Bulwarks or rail. 12. Rail cap strip. 13. Spray rail. 14. Rub rail. 15. Inner fish hatch frame. 16. Inner aft cabin frame. 17. Stuffing box & prop shaft. 18. Lightweight tissue or nylon. 19. Name plate. **Wheel House & Fw'd. Cabin:** 20. ¼" Sheet top & bottom. 21. 3/32" Sheet sides. 22. Cut out windows and doors. 23. Flush hinged door. Panel type shown optional. 24. Optional window detail. 25. Name plates. 26. Wheel house roof. 27. Optional ½-round moulding. 28. Dummy galley stack. 29. Rail. 30. Rail stanchions. 31. Fw'd. cabin roof. 32. ⅛" Sheet top & bottom. 33. ⅛" Sheet sides. 34. Dummy sliding doors (paneled type optional). 35. Door runners. 36. 7/16" Dia. portholes. 37. 1/16" Sheet ladder. 38. 1/16" Dia. wire rails. 39. Dummy searchlight. 40. Radar antenna. 41. Ship's bell (optional). 42. Dummy running lights. 43. Dummy life saver. **Removable Fish Hatch:** 44. ⅛" Sheet sides and ends. 45. 1/16" Sheet top, scored. 46. Striker boat secured to hatch for easy lifting.

Removable After Cabin: 47. ⅛" Sheet sides and ends. 48. 3/16" Sheet roof. 49. Cut out for winch access (winch gear is optional). 50. 7/16" dia. portholes. 51. Sliding doors—1/16" sheet or paneled to suit. 52. Door runners. 53. Pad eye fitting. 54. Stack stays. 55. Dummy ventilator. 56. Skylight roof. ⅛" sheet. 57. Skylight, ½" block balsa. 58. Optional ½-rd. moulding. 59. Steamer type smokestack. 60. Dummy whistle. 61. 1/16" dowel steam vent. 62. Solid balsa base. **Misc. Deck and Rigging Fittings:** 63. Stem timber finish (bitt). 64. 2¼" bow davit. 65. 3/16" boxwood double block. 66. Bow bitt and winch heads. 67. Hawse hole lips. 68. 2" kedge anchor. 69. 24-26 link anchor chain. 70. 5/16" Sq. bitts. 71. ⅜" sq. stern bitt. 72. Dummy casks (optional). 73. Brass chain plates. 74. "L" turnbuckles. 75. Purse boat davits. 76. 3/16" boxwood single block. 77. ¼" boxwood triple blocks. 78. 2¼" stern davit. 79. 3/16" boxwood double block. 80. Cargo hook. 81. Striker boat hoist bridle. 82. Shrouds. 83. Wood ratlines. 84. Metal bands & eyes (optional). 85. 5/16" metal blocks. 86. Hoist cable (button thread). 87. Truck light (or lights). 88. Crosstree and trestletree. 89. Crow's nest flooring. 90. Heavy paper "tarp." 91. Boom jaw. 92. Stern light. 93. Whip antenna.

Shades of 1955!

As luck would have it, my original full-size plans were long gone, but the reproduction company which does all of our plan work, was able to make full-size autopositives from the reduced plans published in *Young Men*.

Note that in those days, plans were offset printed. This meant the sheet size was limited, and thus plans for larger models had to be pieced together. You can notice the mis-matched joints on the Bunker Boat plans. Also, offset printing of plans was expensive, unless large quantities were printed. Consequently, only a single, large run was made. When that was sold out . . . no more full-size plans for that particular model. Today's Blue or Black-Line printed plans may not always have the clean quality of offset printed plans, but at least they never became extinct, and large wings and fuselages are in one piece.

When building from these full-size plans, you have to fudge a bit where the mis-matched drawings sort of jog the lines. Fortunately, the bulkheads were not affected. It is only necessary in the Bunker Boat to fair the lines of the "Building Form Outline" and the hardwood keel.

You'll find that some of the construction lines are kinda fat. They were drawn this way so they would show up well when reduced for the magazine. Unfortunately, this makes it sometimes difficult to accurately trace off parts. Again, you have to fudge a bit, and trim the parts for smooth lines. We try to keep these lines as thin as possible on all Model Builder full-size plans, figuring it's better to have accurate full-size plans, and weaker lines in the magazine-size plan reproductions.

Incidentally, a copy of the complete *"Young Men"* construction article for the Bunker Boat is included with MB's full-size plans.

Have fun and send us photos of your Bunker Boat. •

South Africa's P. Martin brought this beautiful Sopwith Pup to Reno to compete in Stand Off at 7th Scale World Championships.

1 TO 1 SCALE

By BOB UNDERWOOD

• Last month in this column I mentioned some musings that had developed during a recess period at school, concerning a scale event with a slightly different approach. I referred to it as "Impression Scale". In the intervening month I have mentioned the idea, in passing, to a number of scale type individuals (No, that doesn't mean that they are only 1/5th there!). I really wasn't trying to sell the idea, but surprisingly, most of those who I chatted with were enthusiastic about it. Basically they felt that it returned to the "Sport" scale approach. *(The original Sport Scale concept before it was "improved"? wcn)*

For the last several years here in St. Louis, my club, the Signal Chasers has held a scale-only contest on the first weekend in July. In approving the idea of having the contest in 1983, we are considering having this type of event. There are fine points to be honed and I would really like to have your feeling about the idea as far as its desirability and practicality (I hope you still have last month's issue of *Model Builder*).

While talking about earlier columns, I must send a little message along to the one devotes out there in "scale world". It seems that I wrote about some scale rules proposals such as "Home Sport Scale", all purple models, and Samsonite luggage drop options. My friend, t'was all in jest! There are no such proposals, so relax.

HOW THEY FLY

Some years ago, Ray Weiderhold, a modeling buddy here in St. Louis, developed one of those uncontrollable mental itches that gets to each of us at one time or another. His mental itch resulted in his producing a book that he feels will help develop skills and understanding for the R/C modeler. Perhaps this urge came about because Ray participated in the Newcomer classes that I have held most every year (lovingly referred to as the Eight Week Crash course). He spent part or all of an evening helping with the instruction by giving some basic information about aerodynamics and flight characteristics, in a simple, understandable manner.

The book that Ray has written is entitled **How They Fly,** and covers basic aerodynamics, terminology, hints, and assorted information. A liberal use of illustrations is helpful in conveying the information. Ray asked me to do some editing of the material after he had prepared the original manuscript. He is a technical publication writer who produces various types of manuals. He has worked at developing an easily read, understandable text which imparts useful information. That is not an easy task.

His company, Midwest Technical Publications, Inc., 1741 Big Bend Blvd., St. Louis, MO 63117, is currently making the publication available for hobby shops, etc. The retail price is $9.95. While I didn't write it, I did spend a number of hours reading it carefully. It appears that Ray has done a good job in making it a helpful publication. (Maybe Ray ought to work on one called *How They Are Repaired*)

BACK TO SCRATCH

Over the several years of writing this column, we have thrown in some thoughts relative to scratch-building your dream scale project. Some recent efforts at producing a couple of new models for 1983 tempted me to put down more comprehensive thoughts on the subject. By now, assuming you have read this column on a more or less regular basis for a year or so, you realize that my approach to scratch is compromised by my inability to produce any type of detailed plans. I work *only* from marker pen outlines produced by enlarging the three-view using an opaque projector. I would like to list some of the basic thinking that goes into my actual "plans" development.

Let's assume several things from the outset . . . first, that you have selected the model and that you have *all* the presentation that you need. For the umpteenth time, do not attempt to build the model with a skimpy presentation, with the hope that as you build you will find additional material. You are almost always doomed to failure with this type of approach. Secondly, we will assume that you have decided which event you are building the model to fly in. This makes a difference in the size of the model, choice of engine, and other details.

1. WHAT SIZE TO MAKE THE MODEL? The answer to this is simple: make it as large as is practical. There are, of course, some governing factors. Total weight is important, but bear in mind that certain ingredients in your model pie change very little. Engines, radio gear, retracts, etc., except for the super giants, change very little between a .40 size and a .60 size, or between a .60 and a .90. Certainly the resulting airframe weight of a larger model will be greater, but it will be considerably less than you might think. The bottom line will be that the wing loading will be less and that will tend to produce a much better flying model.

The type of aircraft modeled means a lot as well. An open framework, fabric covered aircraft will tend to be much lighter than a WW-II type with fully sheeted surfaces. The extra items such as bombs, retracts, etc., simply tend to compound the felony. As a result, you can probably make the WW-II model much larger and still fit in the specific weight and engine size specifications. In addition, the manner in which these types are supposed to fly will be a governing force as well.

The final decisions for size probably will result from other considerations as well. Indeed, it may well include the inability to get it in your compact car if it's too big. More often than not, two basic items will govern the size. It's a safe bet that a number of models are built to a specific size due to the availability of proper size spinner or wheels. I know that many articles have been written that tell you how to produce these two items, but for the most part it's a lot more work than most fellas want to got to. Recently, I drew up outlines for an Avro Vulcan

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FUEL LINES

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

HEAD SPACING

Guys, according to some standards, I'm beginning this column by committing a cardinal sin . . . taking exception to the column of a fellow contributing editor. Fortunately (hopefully) our editor understands such things.

Who, where, what? Well, in the November 1982 issue of *Model Builder*, Dirty Dan commented about measuring head clearance and reported that, "The neatest way I have ever come across to do this is now making the rounds of the R/C car racers, and the trick is to simply stick a short length of 1/32 diameter resin core solder in the plug hole, rotate the prop shaft a couple of times (by hand, of course!), pull the solder out and using a micrometer, measure the squeezed down end to read the head clearance."

When I first read this, I was apprehensive to say the least. Nevertheless, I thought about giving it a try. First, however, I took a piece of resin core solder, which measured .034 inches in diameter, and subjected it to an arbor press test. After applying a 2000 pound-per-square-inch pressure, the piece of solder measured .013 inches. I did not try this experiment on a competition engine with a known .005 inch head spacing . . . simply because it would have bent the rod, crankpin or both.

Another fallacy of this approach is that all heads are not created equal. Take a look at the accompanying illustration. On the left, you can see a head-piston clearance where the squish band is parallel to the top of the piston. The middle drawing shows a tapered squish band. The right drawing shows a hemi shaped combustion chamber without a squish band. If you think about it a bit, I'm sure you'll realize that compressing a piece of solder can not only be damaging to other engine parts, but it also can be misleading, depending upon exactly where you "measure" the solder.

Fine! Does KK (my nickname) have a better solution? Absolutely! To begin if you're really interested in maximum performance, you'll know that proper head spacing is essential. What's the best head spacing? Only you can tell. That's simply because, among other things, displacement, fuel, and density altitude affect maximum engine performance. The manufacturer will provide you with an engine-head spacing setup that will be "in the ball park" for moderate nitro content fuels under generally average atmospheric conditions. If you want to improve upon the manufacturer's setup. I suggest that you be able to accurately measure head spacing exactly at the cylinder wall.

At this point, some readers may have visions of expensive measuring devices that will cost $100.00 or more. That's not necessary at all. Although, it would be quite convenient to own a $60.00 dial caliper gage, it is not essential. You can purchase a vernier caliper for less than $20.00. In fact, Manhattan Supply Company will sell you a five-and-a-half-inch precision vernier caliper, made of stainless steel, with chrome plated measuring surfaces, for the grand total of $15.40, plus postage, of course. With this caliper, you can measure internal and external diameters up to five-and-a-half inches. And, *you also can measure depths* . . . such as pistons and squish bands. All measurements are in one-thousand's of an inch . . . just like micrometers. In summary, guy's if you're serious about performance, invest a few bucks, and do it right. If you're interested, write to: Manhattan Supply Company, 151 Sunnyview Blvd., Plainview, Long Island, NY 11803.

The stock number of the above vernier caliper is 641002. If you want to inquire about other alternatives, call them, toll free: In New York state: (800) 632-7198; East of the Mississippi: (800) 645-7048; West of the Mississippi: (800) 645-7270.

Sorry about this Dirty Dan, but it may save some guys some ruined parts, and it also may help some others to improve engine performance.

GASKETS

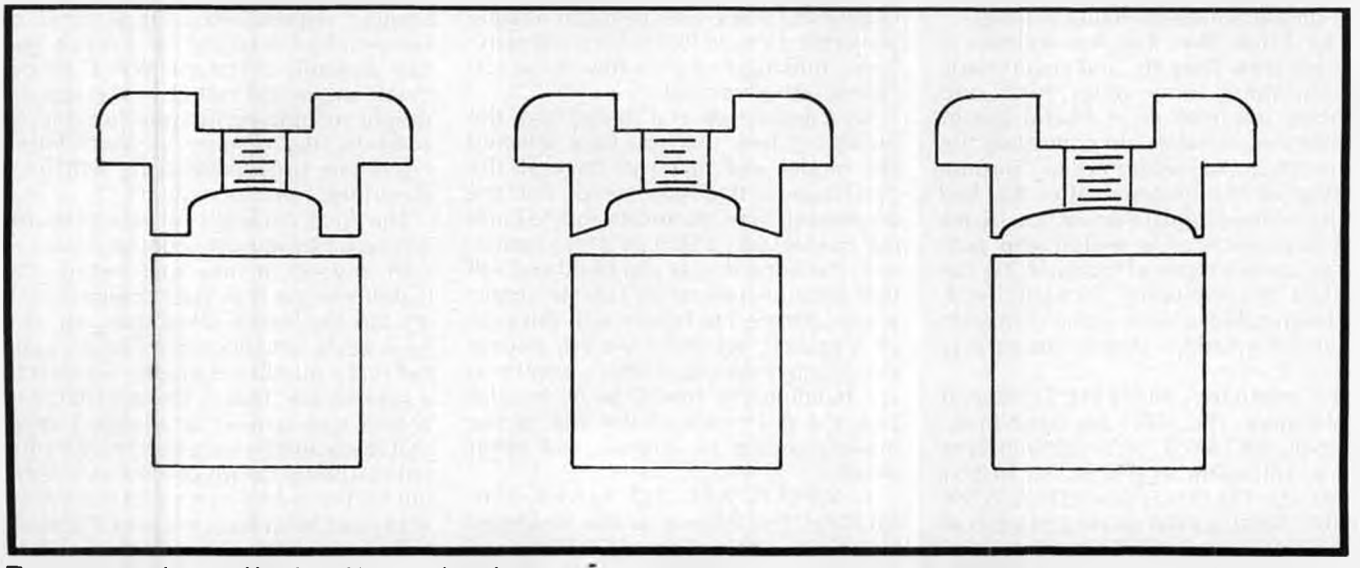
Ever disassembled an engine and torn a gasket? Don't feel bad or frustrated. It happens to all of us at one time or another. Even if you don't "rip" them, it's often obvious that a new one is needed. Just think about the standard procedure on automobile engines . . . always replace the gasket whenever you separate two adjoining surfaces.

Fine! But, what if you're cleaning an engine and don't have any spare gaskets? And the importer is out of stock . . . as well as your local hobby shop? And it's two days before the big weekend fun-fly, contest, or what-have-you? Answer! Make your own gaskets. How? Well, there are lots of ways to do it with lots of materials.

First, let's consider the materials for crankcase gaskets. Most any material will do as long as it is somewhat compressible. Think about automobile engine gaskets. A lot of them are made of cork about a sixteenth of an inch thick. That obviously won't do for our engines, but the principle is the same . . . a compression seal!

Forgetting the sophisticated materials, I've often used nothing more than Kraft brown wrapping paper to make

Continued on page 82



Three common piston-and-head combinations (l to r): Squish band parallel to top of piston; a tapered squish band; and, hemi-shaped combustion chamber without a squish band.

Pattern Flying

By DICK HANSON

• The last two months have been rather hectic for us . . . happily we have found time to fly our new Formula 750 with the thin wing and stab, plus work with our good friend Dave Stewart on the new C.A.P. 21 for the F.A.I. turnaround pattern. The photos show some of the features of the C.A.P.

Photo #1 gives a fair idea of size (82 inch span). The real treat, though, is that at this stage, the model weighs just under seven pounds.

Photo #2 show the epoxy glass cowl installed. The access to the engine is quite good.

Photo #3 shows the model less cowling. The three small holes in the firewall are the mounting points for the plywood cowl mounting blocks (visible in photo #2).

Photo #4 shows the huge air exit at the leading edge of the wing. Also, the removable wire landing gear and servo mounts are evident.

Photo #5 shows the stab mount. The four-bolt mount makes it easy for adjustments or removal for transportation.

The completed model turned out to be exactly what we wanted, and we will cover the flying stuff next time. We'll also show you pictures of the completed model.

For the record, we must point out that a model designed and built like this one is not suitable for the large (over one cubic inch) single-cylinder engines now being sold . . . there is simply not enough mass in the air frame to withstand the pounding these engines deliver. There is a lot of talk about "balanced" large engines, but unless the laws of dynamics have been repealed, these brutes require a beefy mount and airframe.

Typically, a model of this size, using large engines, will end up weighing 15 pounds or more. The problem then becomes high wing loading. For example, 10 lbs. on 950 sq. inches equals 24 oz. per sq. foot, but 15 lbs. on the same airframe means 36 oz. per sq. foot. 'Nuff said.

Last fall we showed you a shot of our formula 750 design for the turnaround pattern (photo #6). The plane turned out to weigh 7 lbs. 10 ozs., using an OS VF61 engine, Circus Hobbies retracts and radio (JR-8 channel).

Performance is interesting. Using a typical 11x7 pattern prop, the speed is excessive, to say the least. This means the maneuvers must be quite large to avoid it looking like a control line combat job. Slowing the model *way* down and using a 12 inch prop delivers a completely different picture. The vertical climbing legs of any maneuver can be made to look faster than the horizontal or diving sections. Snaps are excellent, with a little tendency to overshoot on upright, inside snaps.

We deliberately designed the model to have minimal yaw stability, and apparently the large bubble canopy blanks out the smallish vertical fin on *tight* inside turns. The plane doesn't snap accidently, but the headings tend to get vague under these conditions. We are changing the canopy to a very much streamlined version to test this further.

A few years ago we ran into this problem on a fun fly model when a

Continued on page 82

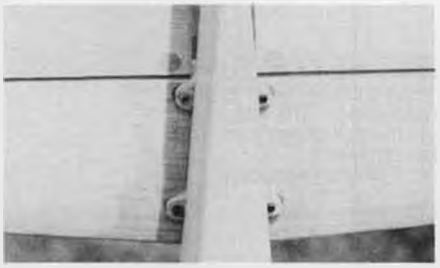


Photo No. 5. Stab mount. See text for details of all numbered photos.

Photo No. 3 Cap 21 minus cowl.

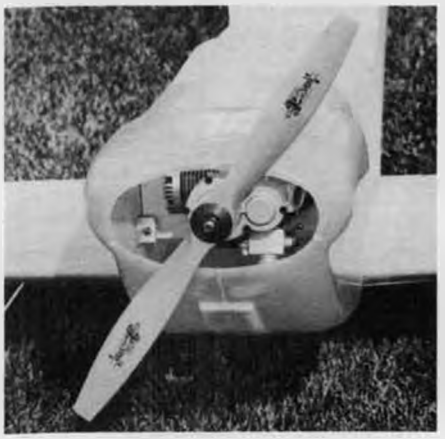


Photo No. 2. Cowl installed.

Photo No. 1. Dave Stewart holds his Cap 21 for photographer.

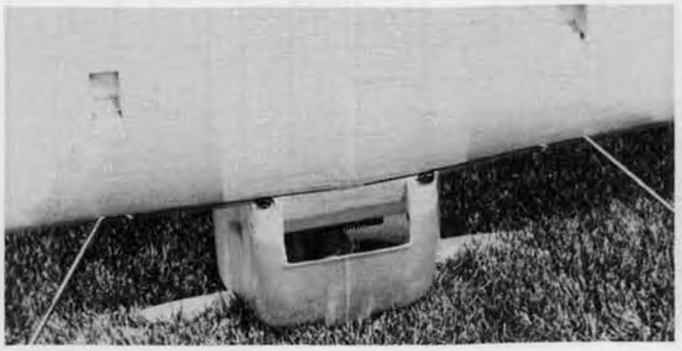


Photo No. 4. Bottom view of wing and cowl.

Photo No. 6. Formula 750 for turnaround pattern. 37F

SKI MACHINE

DESIGNED BY: PETER ANNABLE

ENGINE – McCOY .40

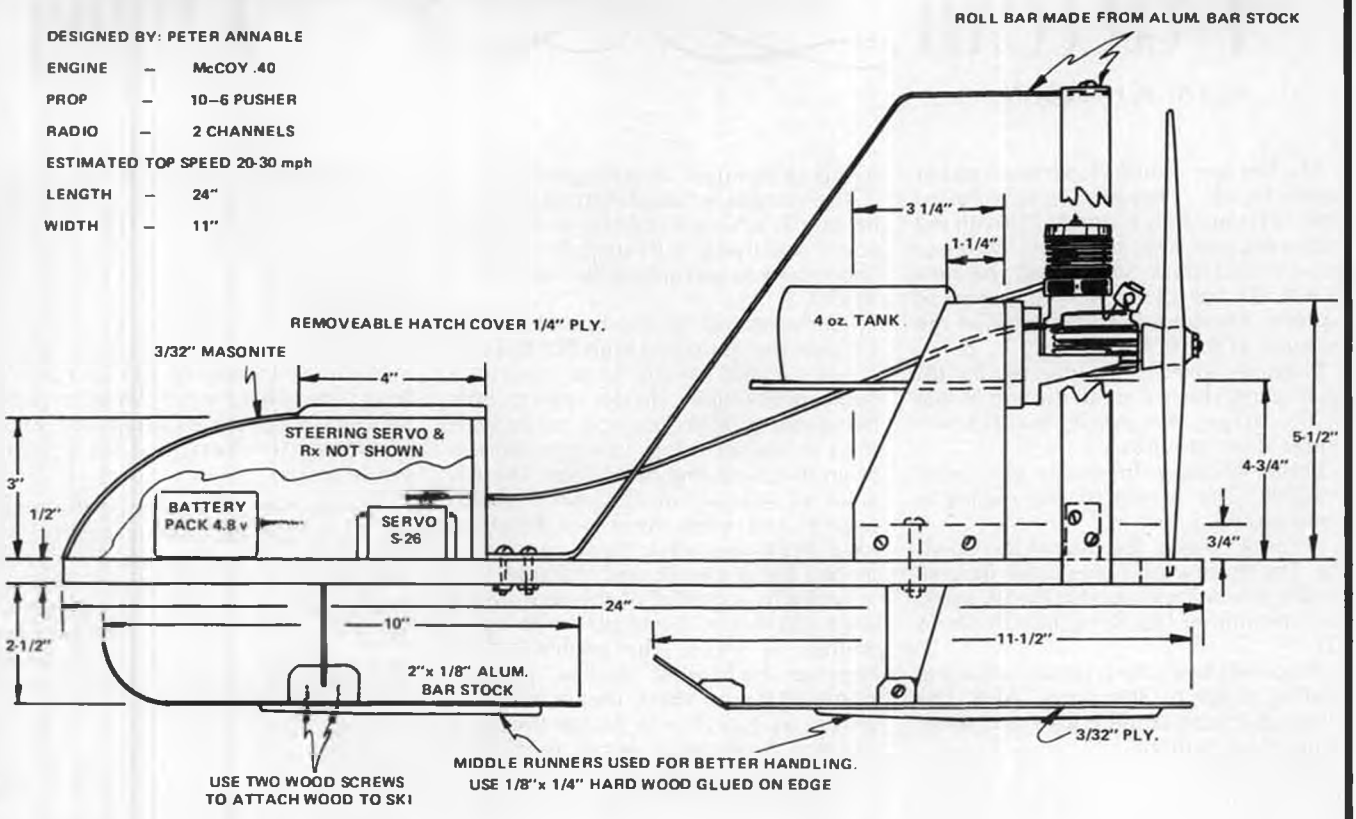
PROP – 10–6 PUSHER

RADIO – 2 CHANNELS

ESTIMATED TOP SPEED 20-30 mph

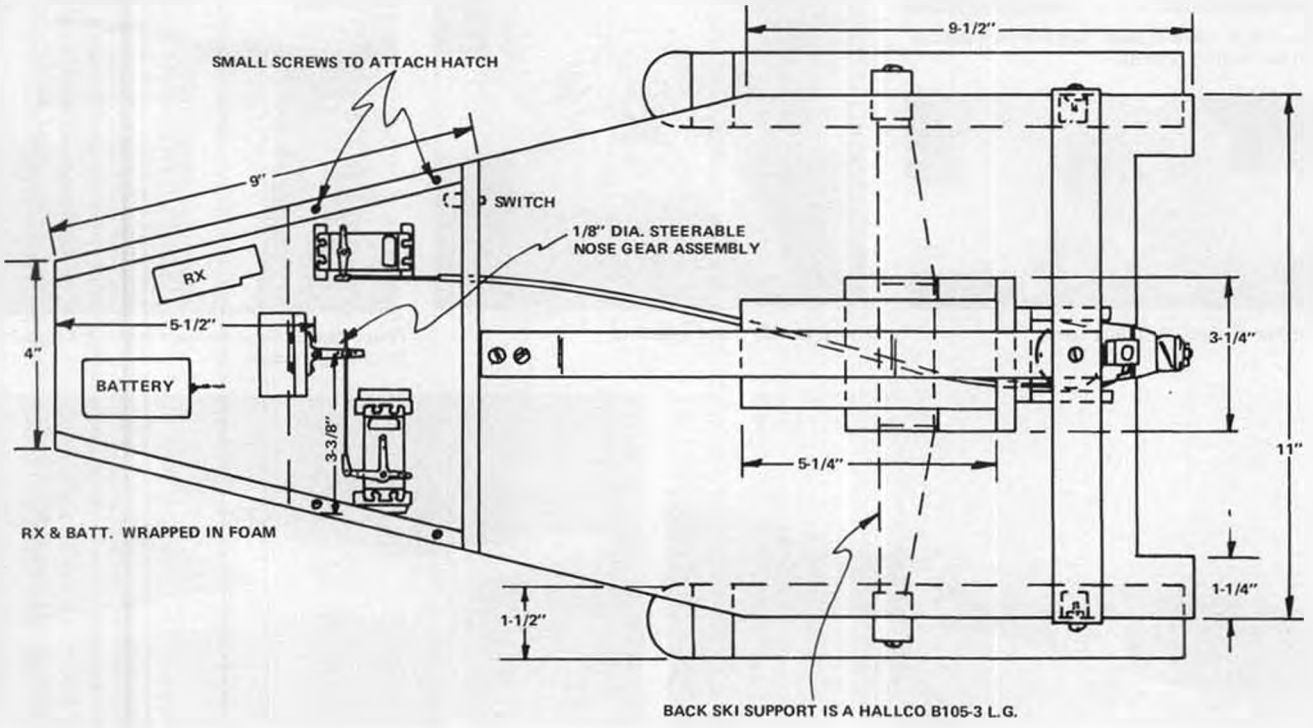
LENGTH – 24"

WIDTH – 11"



A .25 - .35 ENGINE COULD BE USED IF CONSTRUCTION USES LIGHTER MATERIALS. THE FRONT SKI IS MADE OUT OF 2 x 1/8-INCH ALUMINUM BAR STOCK. IF POSSIBLE, I WOULD SUGGEST USING IT FOR ALL THREE SKIS. THE ROLL BAR IS MADE OUT OF 1 x 1/8-INCH ALUMINUM BAR STOCK. THE PROTOTYPE RAN BEST ON HARD PACKED SNOW. IF IT IS TO BE RUN ON SOFT SNOW, LIGHTER CONSTRUCTION AND LARGER SKIS MAY BE NEEDED. WAX THE SKIS FOR IMPROVED PERFORMANCE.

PETER ANNABLE



NOT TO SCALE

SKI-MOBILE

By PETER ANNABLE . . . While the Ski-Mobile may not be the ultimate design in R/C ski machines, it will put an end to your mid-winter, snow country, reduced flying blues in short order. Anyone care to start a new class of R/C racing?

• After a fun summer flying a Drifter II glider, I decided I wanted to have something to run in the winter. As Michigan gets a lot of snow every winter, some kind of snowmobile sounded like a good project. The photo shows what I designed and built.

My snow machine is built around a McCoy .40 airplane engine and a Futaba radio. It turned out to be quite easy to build.

Construction

Start by cutting out the main platform from 3/8 or 1/2-inch plywood, as per plans. Next locate the position of the back ski support. I used a Hallco #B105-3 landing gear. This worked well, giving it shock absorbancy. After locating the support position, drill two holes in the plywood and ski support. Use machine bolts long enough to reach through both the platform and the engine mount. Do not bolt the support in yet.

The best way to make the skis is with aluminum bar stock, though they can be made from plywood. To make an aluminum ski, cut the bar stock to the proper length, then round the end. The curve of the ski is made by forming the end around a curved object such as a piece of pipe. Attach a small wood block to the top middle of each ski with two small flat-head wood screws countersunk in the bar stock. The wood block should have a hole drilled through it the right size for attachment to the ski supports. You may also want to round the edges of the block to make it look better. Wood skis are made the same way except that the top is a separate piece glued on with a small angled block for support. Screws are not necessary for attaching the block to the middle of the wood ski as, epoxy will work well.

I used the wider aluminum ski in front because the additional area was needed to support the weight of the model. The 1-1/2 inch wood skis in back worked fine on packed snow but wider skis would be necessary on soft snow. Wood runners were added to the bottom of the three skis to control sliding.

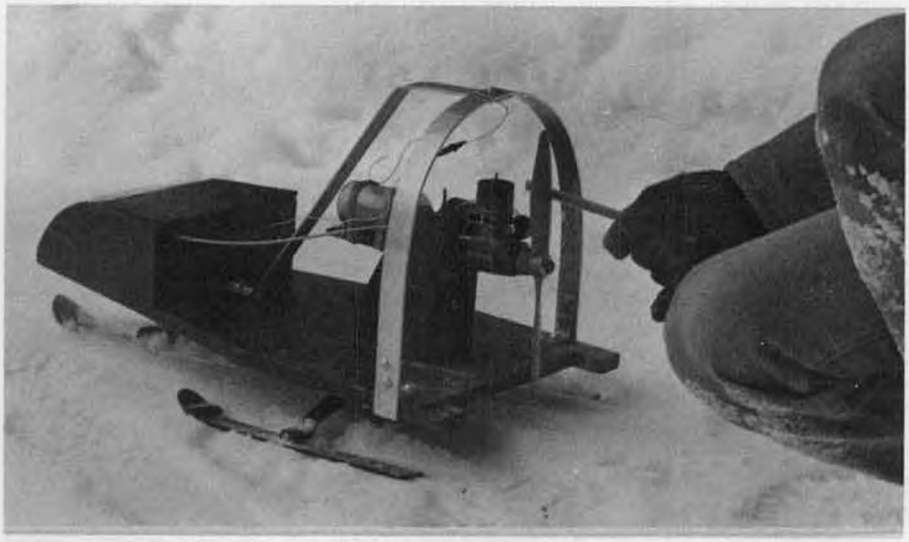
Next cut out the pieces for the engine and tank mount. Use 1/2-inch plywood for the sides and back and 3/4 inch solid wood for the bottom piece. Do not make the fuel tank platform yet. Drill two holes in the bottom piece the same diameter as the holes for the back ski support. The holes must be located so that they line up with the holes in the main platform for the back ski support. Assemble the pieces with wood screws. Do not attach the assembly to the platform yet.

The front ski is mounted using a steerable coil spring nose gear assembly. I used a Carl Goldberg #SN-180. Attach this to a 1-1/2 x 2 inch piece of 1/4 inch plywood. Find the center point of the main platform as shown in the top view. Then make a curved slot in the platform to allow the steerable nose gear to turn. The middle of the curve should fall on the center point. Use epoxy to glue the steerable nose gear assembly to the platform. Before doing so, make sure that the nose gear, when put in as shown in the top view, will travel properly through the slot. When ready to glue it in, use a 3/4 x 3/4 x 1-1/2 inch block to brace the assembly to the platform. You should mount it at the angle shown in the drawing so it will be easier to hook up the servo.

Now make the servo mounts and position them to allow for proper travel of controls. Some experimenting will be necessary. Make the steering servo's mount extra strong so it will not break when under stress. Make sure to allow room for the sides of the hatch when positioning the servos.

Next cut out the hatch sides from 1/2 inch pine. When cutting out the curve, do both at the same time to insure identical size. Glue the sides to the platform. Cover the curved part with 3/32 masonite, using glue and nails. Cut out the back of the hatch from 1/4 inch plywood and cut holes for the throttle, switch and antenna. The edges of this piece should be at a slight angle to line up with the hatch sides. Glue this piece in. Now make a hatch cover from 1/4 inch plywood and attach with small wood screws. The finished hatch should be tight enough to keep snow from the radio.

Fasten an airplane type engine mount to the wood mount. Make a fuel tank platform from 1/4 inch plywood. Drill



Using a "chicken stick" to start an engine in these conditions is a very good idea. Pain seems to increase in cold weather.

Continued on page 83

Pit area and flight line of the third annual KRC Electric Fly held in the southeastern Pennsylvania area last September. The two-day event drew fliers from eight states. Electric is "The only game in town" on East Coast. Ellis Grumer photo.

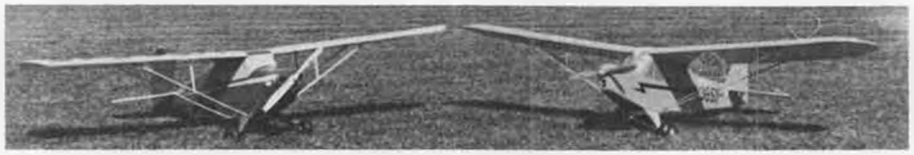
ELECTRIC POWER

By MITCH POLING

• Bob Kopski sent in a glowing report on the KRC electric meet in the weekend of September 18 and 19. His enthusiasm is best communicated by his own words, so I'll give you his report "as is."

"The third annual KRC Electric Fly was a tremendous success. The weather on Sept. 18 and 19 was very pleasant, and 26 guest fliers made the most of it. An estimated 300 people on Saturday and 250 on Sunday watched as planes and pilots from eight states showed why electric is the wave of the future! Notable attendees included Roland and Nancy Boucher, of Leisure Electronics, Jim Zarembski of RCM's Silent Power column, and AMA's Executive Director, John Worth.

"The most dazzling performance was presented by electric flier extraordinarire, Keith Shaw, of Ann Arbor, Mich. Keith had three planes. His pattern "Barbarian" by J.M. Glascraft, powered by a Leisure racing wind motor, made everyone stand still and watch . . . blistering aerobatic precision with all the common maneuvers, plus snaps and knife edge. For an encore he did the same thing with a magnificent Aerocommander Shrike, Astro twin 035 powered. Then to let everyone catch their breath, he flew his beautiful Zombie old timer, a real floater. Then, he did the whole show over again!



Porterfield (left) built by Austin Gutman of Valley Forge Signal Seekers, and Piper J-3 Cub (right) built by Bob Kopski of KRC. Both were on 53.4 so were unable to fly formation.

"While Keith was outstanding, there were no duds either. More than forty planes of all types flew very well. Variety and quality are the best words to describe the models, and there was virtually no time when there wasn't a plane in the air. Porterfields, Astro Sports, a variety of gliders, and many originals displaying fine craftsmanship showed what can be done with electric power. No one visiting the Electric Fly could have left as a disbeliever.

"The KRC Electric Clinic, an annual feature, managed by Heinz Koerner (a real expert), provided all types of technical assistance, tools, supplies, and conversation to anyone seeking help. A new feature this year, the Informal Seminar, offered advice and tips based on extensive experience to a large crowd each day. Roland Boucher, of Leisure Electronics, graciously joined in the spirit of the seminar and fielded many tough questions.

"Other new features this year were on-field refreshments managed by pretty Teri Fernstermacher, door prizes, surprise events, and a super raffle, all each day! This years raffle included a complete electric outfit, consisting of an Astro Sport, Rapid Charger, and an Astro

Teri Fenstermacher holds J. Pentimall's 1/32" scale China Clipper (47 oz., 376 sq. in.).

Ah, yes . . . a truely sad moment for Jim Himmelsbach and his Astro Sport which flew straight into the ground Saturday (TX failure). Plane flew again Sunday after post-midnight repair.

Kris Kopski poses with Roland Boucher's Electricus (72-in. span, 600 sq. in., E-205). "Longest Flight" award: 24 min. 46 sec.

KRC Electric Fliers (L to R): Austin Gutman with Porterfield, Keith Shaw with Zombie O.T., Roland Boucher with his Electricus, Bob Kopski and Euphoria Aerobatic. Variety!

05 XL Flight system each day. Second drawing each day was for a Leisure Playboy (beautiful kit!). A grand finale drawing on Sunday featured an ARF Airtronics Kitty with charger, and a RAM variable speed control. Who can top that!

"Also new this year was the Saturday Evening Informal Social at the KRC meeting room. Lavish dishes by the KRC ladies, and hours of friendly socializing at the Hatfield American Legion Hall topped off a super Saturday. We even had "glow fuel" in glasses that night! (Whoops-Bob, as a chemist by trade, I should point out that glow fuel is wood alcohol . . . don't drink it . . . it's fatal! Just goes to show that electric fliers are tough if they survived that! —Mitch). Wilma Kopski and Ruthie Hickey organized the social, and the room was filled to near capacity.

"Like last year, the Electric Fly was a fun fly, with no serious 'tooth and nail' competition. There were awards for 'Best Looking', 'Most Aerobatic', and 'Longest Flight' plus many unannounced prizes each day. The only disappointed people, what with all the socializing and flying, were those who had electrics 'at home' and had to be just spectators! KRC thanks all those who came to fly, and the twenty-six model hobby manufacturers who supported our efforts. Plans are getting underway for the fourth annual KRC Electric Fly. Will keep you posted! P.S.-the color photos are by Herb Dirks of KRC."

Thanks Bob, for the report and many photos. The magazine doesn't run color photos, so I converted them to black and white. As I do get many color photos, I think I'll give a description of how this is done. I use a close-up lens, a very simple one that screws onto my regular 35 mm lens like a filter, and put the color photo under a piece of non-reflective glass (semi-frosted, used for picture framing) to hold it flat and eliminate reflections. The photo is taken in daylight, usually in the shade to keep reflections out. I then move up to the photo so that it fills the view finder, than take the shot, using either Plus-X or Tri-X film. A tripod will make this steadier, and I use one now, though you can get good shots without it. From then on, you can leave the black and white processing to the commercial processors. The result is a pretty good black and white photo, not as sharp as a black and white taken of the original subject, but nearly as sharp as the color print. If you wish to send black and white and you have only color, you might try this technique. I have heard rumors that you can use the color negative to get black and white directly, but I haven't tried it, if anyone has, let me known how it worked out. Of course, I will take color photos if you wish to send them.

Well, back to the KRC Electric Fly. Multi-motor electrics are rare, which is surprising, since every one I have seen has flown beautifully. All the problems that multi-motors pose with glow engines disappear with electrics. The power is perfectly matched, and there is no way that one motor will quit before the other. One photo shows Teri Fernstermacher holding J. Pentimall's 1/32 scale China Clipper, which weighs 47 ounces on 376 sq. in of wing, with four Astro 020's. If you look quite carefully,

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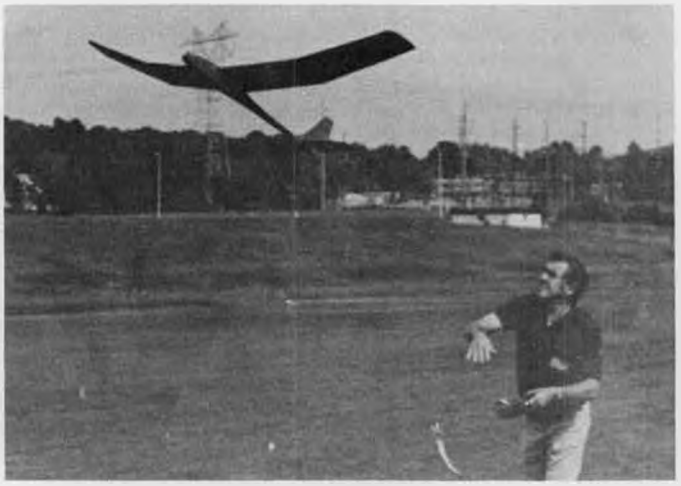
Sam Stitzer holds "Daydreamer" original. Has Leisure 05 and reducer, 11 X 7 1/2 prop., 64-inch span. A real crowd pleaser!



Mr. Leisure Electronics, Roland Boucher, launches the Larry Jolly design, Electricus. Also a crowd pleasing combination.

Here are a few of the many battery pack configurations available from SR Batteries, Inc. They have much higher capacity than standard NiCds. See text.

Melody Hanes, pattern pilot from Los Angeles. "A pretty girl is like a . . . "

Electronics Corner

By ELOY MAREZ

SP NICKEL-CADMIUM BATTERIES

There is little doubt in my mind, that if there was some way to record and post-mortem all of the R/C fatalities of this past weekend, next to running out of altitude, airspeed, and ideas all at the same time, the best greatest cause would be Ni-Cd batteries. Not that they are all necessarily poor; some of the problems with them is caused by operator error, such as improper charging, improper testing, stalled servos, inattention to total flying time, etc., but the end result is caused by the sudden lack of electrons to power the R/C system.

I have recently been testing and flying a battery that seems to be a definite improvement over any others that I have used in the past, and which seems to carry the answer to at least some of the problems that have plagued us R/Cer's in the past.

These are SR Batteries, from a company of the same name, whose address is Box 287, Bellport, NY 11713; (516) 286-0079. I'll first tell you about some of the claims, and then about some of the things that I was able to test and verify. These are supposedly aero-space grade batteries, not previously available to the R/C industry, of the type now being used in F-16, B-1, and B-52 aircraft, and in TOW (vas ist?) and Stinger missiles. They are unique in mechanical construction, as well as being subject to strict testing and quality control procedures, both by the manufacturer as well as by SR Batteries. They are claimed to be immune to the capacity memory that so concerns so many, as caused by the partial discharge/full recharge duty cycle we subject our Ni-Cds to. In fact, SR will replace any battery that forms a memory within a year of it's purchase date.

If you fly in extreme temperatures, you already know the undesireable things that temperature can do to battery capacity. SR's are claimed to have no capacity loss between -5 and +125 degrees Fahrenheit; special batteries with a greater temperature range can be supplied on demand.

For those of you who prefer or have to quick charge, SR's will accept charging rates as high as required for down to 15 minute charges, and can be safely charged at a 7-hour rate regardless of charge remaining. At the normal 14 to 16 hour overnight charging rates, your SR batteries can be left on the charger indefinitely without harm.

Naturally, you can't see all of the

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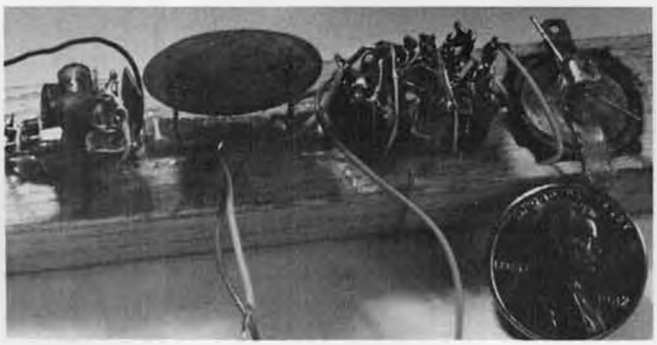
Kraft Systems KG-1 Super Gyro system. Will help stabilize chopper of fix-wing.



Fritz Mueller's experimental pulse receiver and actuator. Weight is a mere 27 grams including alkalines!

Ram's Simple Cycler is a low-priced non-automatic battery capacity tester. Will do everything the others do, with your help.

Photo No. 1. West Coast SAM Champs competitors Solenberger, Alten, and Kyncy all flew Playboys in Class C flyoffs.

Photo No. 2. Ray VandeWalker prepares his Ohlsson 60 powered Shereshaw Cumulus for flight. In R/C Old Timer, it's advantageous to fly an unstable F/F design.

PLUG SPARKS

By JOHN POND

• Last month this columnist attempted to outline those models that seem to dominate the contest season. To continue, Photo No. 1 is presented, showing three identical versions of the Playboy Junior scaled to Class C Size.

This photo was taken at the Merwin dichondra ranch, and aptly illustrates the expression originally generated by the free flighters: "The flying starts after the first three maxes." This was never truer with the Playboy Junior design when raised to 900 sq. in. size.

The advantage of the Playboy Jr. over the standard Playboy Senior lies in the size of the stabilizer, plus the much longer moment arm between the wing and tail. These factors enable this design to absorb the horsepower of hotter engines.

As an example, Ed Solenberger (left) features a McCoy 60 in his model, as does Jack Alten (facing camera). At the far end, Jim Kyncy's model features a Hornet 60. All motors have approximately the same power output. The surprising thing about these high speed racing engines (designed to turn small propellers at high r.p.m.) is that they will turn a 12/6 prop at speeds better than 10,000 rpm.

The advantage of using this Playboy design and engine combination is not readily discernible until one gets into the flyoffs to determine ties. Generally, in situations like this, the motor runs are cut in half. With 55 seconds as the standard engine run, 28 seconds is still plenty of time for these models to reach a respectable altitude.

The foregoing is one of the penalties of having competitions; like Darwin's Law, "Only the best of the species shall survive." Hence the reason for seeing Playboy designs in Class C, the Kerswap in Class A-B, Dallaire Sportster in Texaco, and scaled Cumulus models in Antique.

The writer has often espoused a handicap system somewhat similar to that used by the Western Associated Modelers (WAM), where they dock a certain model (or design) some many

Photo No. 4 Bob Benjamin seen retrieving his Buzzard Bombshell. Uses Ohlsson .60 for power.

Photo No. 3. Ten year-old "revitalized for competition" New Ruler with author/builder, John Pond at Alameda County Fairgrounds, California.

Photo No. 6. A 1948 pic of Vic Andrews launching his original design "Incognito" in East London, South Africa.

Photo No. 5. George Saunders' Enya .40 four-cycle powered Scientific poses for a snapshot in Addison, MI backyard.

points every time it wins. Pretty soon, the model simply wears out its welcome by being handicapped to the point where a new design model must be built. How about that idea? The columnist is well aware of the ramifications of this proposal, but it shouldn't be too hard to simply compile the winning models in contests over a period of six months to arrive at a handicap system.

In that same line of thought, Photo No. 2 shows Ray Van de Walker with an Ohlsson 60 powered Cumulus. This is a nice flying model that gets 10 seconds per pound of weight in the Antique Event. However, the Texas boys headed up by Bruce Norman have found that a Rossi 60 in a scaled up Cumulus is the most potent machine of all!

The startling performance of these models has led some of the Southern California clubs to start making special rules to eliminate the use of this model. In this writer's viewpoint, this is a wrong approach. Either build a better mousetrap or start a handicap system based on winnings to reduce the popularity of a certain design.

Not to keep beating the subject to death, but the Ben Shereshaw design, "Cumulus," was an unstable free flight design. This is exactly what you need in O/T R/C, as the model does not have that inherent stability to resist quick maneuvers. This is excellent for soaring in small pencils of lift.

Photo No. 3 further illustrates the point, showing Pond with a Spitfire powered New Ruler. (Yes we know the face is in the shadow but we're talking about the model.) This ten-year-old model is enjoying a revival, as the 1982 rules allow ignition engines a 55 second engine run. Makes just about any ignition powered model competitive!

WAM "All Quiet Day"

Not many modelers are aware of it, but the Western Associated Modelers run a contest strictly for gliders and rubber models. Hosted by the Concord Model Engineers on Sunday, October 17, this meet featured 24 events for novice, beginner, and expert. To top it off, there were four special trophies awarded.

As Myrtle Coad said, "Wow! What a day!" Over 78 different airplanes had to be timed. Main point of this writeup is be ready for next year. Most everyone can win!

Southwestern Regionals

SAM 31 will be staging the O/T R/C part of the Southwestern Regionals and really have their work cut out for them. This SAM Chapter is offering AB Cabin, C Cabin, AB Pylon, C Pylon, Antique, "Pure" Antique, and 1/2A Texaco.

Not content with that, they will also run the free flight portion, and are offering these events: ABC Cabin, ABC Pylon, and .020 Replica. All of this will take place at Buckeye, Arizona on January 22 and 23, 1983.

Accommodations are being set up at the Best Western Crossroads Inn located in Goodyear. For full particulars and entry forms, write to: Dick Bringgold, 1216 E. Encantada Place, Phoenix, AZ 85014. If in a hurry, call Dick at (602) 265-5918.

TRCC, SAM 42

No, that's not a code heading. All it represents is the SAM 42 contingent of the Tucson Radio Control Club. Received their newsletter, "*Noise*," from Andy Anderson, who is spark plugging the old timers in the Tucson area.

The SAM 42 boys recently held a meet at the Cholla Airport, located about 20 miles north of Tucson. Weather was just about perfect, with a light breeze coming up in the afternoon . . . just enough to make things interesting. Only one casualty, with Bob Cousin's Playboy Sr. landing off the runway straight into a concrete block.

Results showed Dick Bringgold of SAM 31 winning Class ABC, with Bill Roseberry 2nd and Clyde Courtney

Photo No. 7. A group shot of the Grahamstown Club members at the 1950 Capetown, South Africa, Nationals. 600 miles by truck!

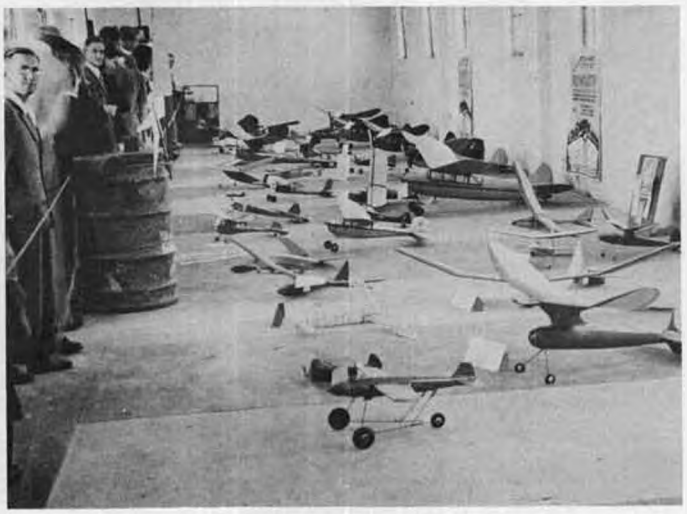


Photo No. 8. Model displays and shows were popular in 1948. This public display in East London was a success.

Photo No. 10. Earl Davis sent this shot of his scratch built Quaker Flash. Super Coverite with polyurethane paint. Gorgeous!

Photo No. 11. Beautifully built and finished Miss America by Esio Grassi. Powered by H.P. 40 engine.

third. In the Antique Event, G. Davis ran off with first place, closely followed by Andy Anderson and Bill Hempel. The 1/2A Texaco Event turned out to have the highest times, with Bob Angus registering a perfect 30 minutes. Bill Roseberry and Dick Bringgold placed second and third.

Based on the foregoing success, all the members are eagerly looking forward to the Southwestern Regionals.

Modeling Artist

Received a nice letter from Robert A. Benjamin, an artist, who has done several cover paintings for Bill Northrop. Bob is quite interested in reader reaction to his paintings.

Turns out Bob is also a modeler and likes old timers. As can be seen in Photo No. 4, the Buzzard Bombshell was his first attempt at O/T R/C. Built from a 4K kit, the model was covered with silk and equipped with an O&R front rotor 60 engine.

To show the model's versatility, it took first in the N.W. Expo at Puyallup, in 1981. This was followed by active flying in competition yielding a 2nd and a first in the SAM 8 Contests. Bob also flies with Bob Petro and Clarence Haight over at Coeur d' Alene, Idaho, and they were impressed by the performance of the model.

At the same time, we received Photo No. 5 from Donald Saunders, 231 Saunder Rd., P.O. Box 125, Addison, MI 49220, of his beautiful Scientific Commodore. Powered with an Enya 40 four-cycle, it has made very majestic flights. In his small area, of course, the model is radio control.

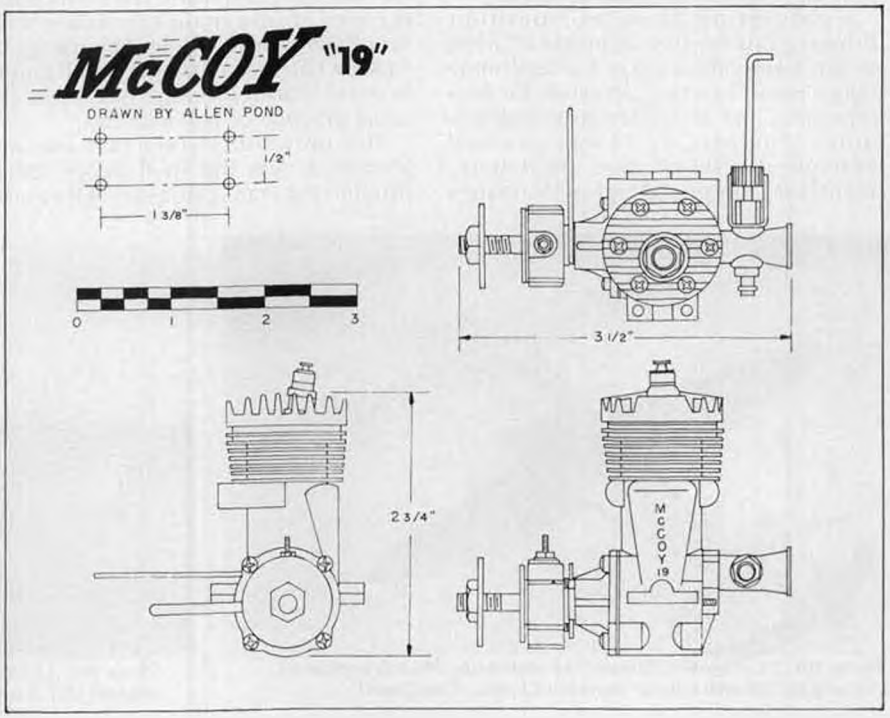
Engine of the Month

This month's engine is the ignition version of the McCoy 19. Not too many modelers were aware that the Duromatic Corporation actually put out such a version.

Of course, with the glow plug gaining such popularity based on ease of starting and operation, in less time than it takes to tell about it, all engines were converted to glow (sometimes with disastrous results) to capitalize on the latest trend. McCoy engines (as were K&B Torpedo engines) were ideally suited for the new glow plug, and in no time flat, McCoy engines held every conceivable speed record.

Not content with that, McCoy entered the free flight field, with its 19 engine, and enjoyed immediate success. The combination of a Zeek with a McCoy 19 was built by just about every modeler

Photo No. 9. Jack Abbot, Kieth Kayton, and Athol Perkins processing speed models at the 1950 Capetown Nats. Note the Dyna-Jet model 2nd from top.



Radio Control? Hah! She'll fly Free Flight, or by hung, she won't fly at all!

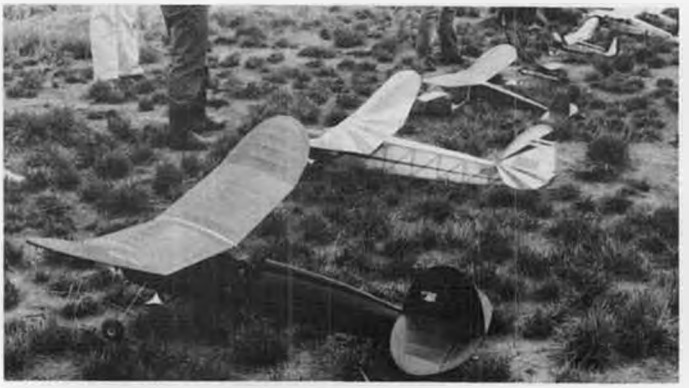


Photo No. 12. The beauty event lineup at SAM 8 contest. Red Zephyr finished in red and black as were the advertisements.

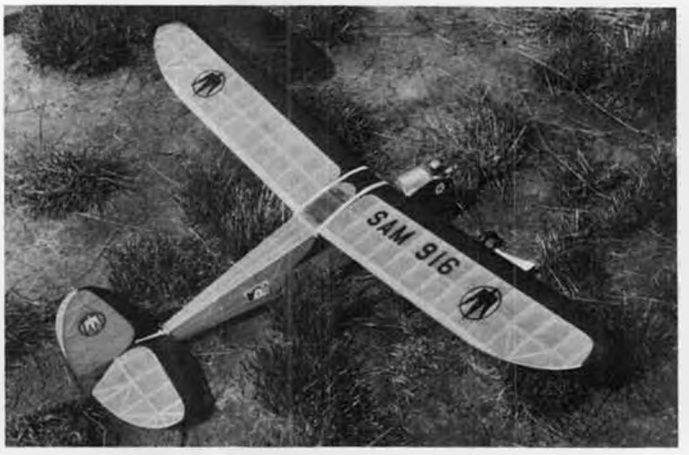


Photo No. 13. Clarence Bull built this 1/2A Texaco version of a Flying Quaker. Photo taken at SAM 8 meet.

worth his salt. McCoy 19 powered Zeek type contests were quite popular on the West Coast. It was quite some time before K&B was able to overtake the McCoy 19 engine for popularity with their new Green Head 19.

The McCoy 19 engine we are illustrating is the ignition version. At the time of review (Flying Models 1950), the three-views shown were of the glow version. A point was made that the engine was offered in two models: ignition or glow. Naturally, most competition oriented modelers chose the glow version.

No question about competition bringing out the best in manufacturers, as the tremendous craze for controline flying made exacting demands for performance and durability in model engines. The McCoy 19 was an ideal example developed from the requirements for a low priced high performance engine with beautiful die cast parts.

As was the design feature in the McCoy 60 and 49, the cylinder block, including the crankcase and intake tube, were cast in one-piece aluminum. The disc rotor valve was also an aluminum casting mounted in the main crankcase by a stub steel shaft. Also of aluminum was the front crankcase plate which was secured to the main crankcase with four Phillips head screws. This particular McCoy had a steel shaft in a full length bronze bearing, a departure from the usual practice of ball bearings.

The only other item that was not aluminum was the steel sleeve force-fitted in the crankcase block. Of course, this was fitted to an aluminum piston machined to accept two cast iron rings. Interestingly enough, the steel crankshaft and counter-balance were machined as one piece.

The McCoy 19 engine also differed from the larger McCoy engines by the use of a spray bar type of fuel induction. Claims were made that even the rankest beginner could start this engine easily.

To say the least, the McCoy 19 was attractively priced at $10.95 for the ignition version and $9.95 for the "hot point" (glow) ignition. Early engines came with the standard red head, a trade mark which was quickly abandoned as the demands of production did not

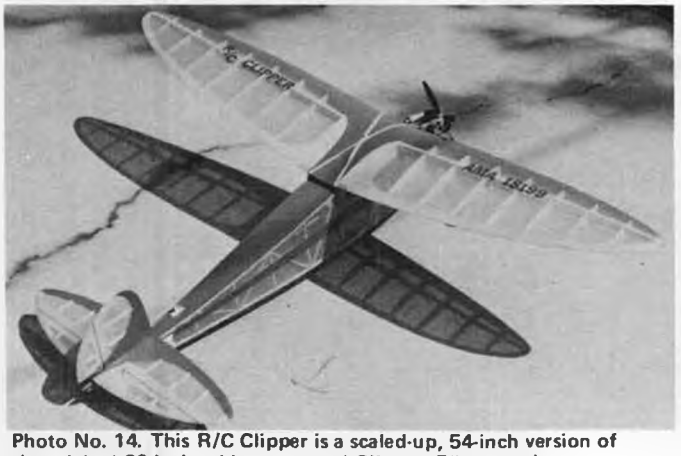
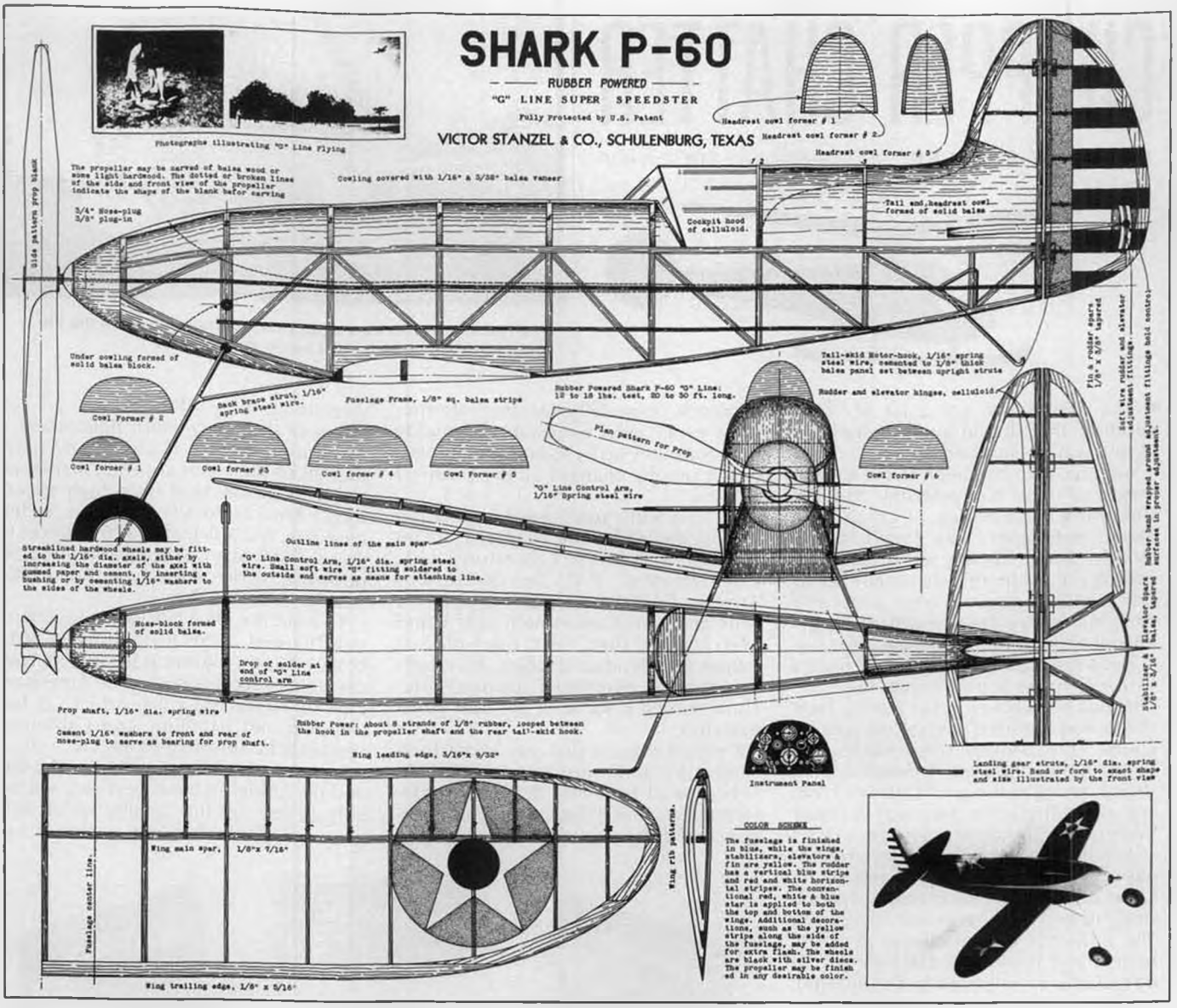


Photo No. 14. This R/C Clipper is a scaled-up, 54-inch version of the original 36-inch rubber powered Clipper. Flies great!

Photo No. 15. Jim Fullarton, Australian premier oldster, displays an original O/T Australian design by Reg Allamby.



FULL SIZE PLANS AVAILABLE — SEE PAGE 104

warrant the extra time and expense.

The McCoy 19 featured a bore of .625 and a stroke of .630, giving displacement of 195 cu. in. Weight, excluding tank, was about four ounces. Performance was sensational, being rated at 1/3 h.p. at 14,600 rpm. Using glow fuel, the engine ran at 12,300 with a 10/4 O&R prop, 10,500 rpm with an 8/8 Power Prop, and 10,200 with a 9/6 Power Prop. That engine could run!!

Thirty Years Ago, I Was. . .

For this month's material, the writer is indebted to Jack Abbot, 223 General Hertzog Road, Vareeniging 1930, South Africa, for his most interesting account of early flying in South Africa. Let's hear what Jack has to say (with some editing).

"In the early days, while living in East London and Grahamstown during the war, only rubber powered models were flown. Among the more popular were Korda, Flying Cloud, Miss Worlds Fair, and Gull models. The small fry enjoyed the Pacific Ace series, 16 inch Megow models, and an occasional Phantom Fury. Jim Walker's famous folding wing gliders, Ceiling Walkers, etc. were also popular.

"When the source of balsa dried up, we were left to hack out solid models from workshop scrap . . . tomato box slats for wing and tails. Coloring of the models was done with ordinary oil paint taking as long as 48 hours to dry. There were only a few exotic and detailed color schemes under that handicap. Brushes were always guaranteed to shed hair at a remarkable rate.

"At the close of the war, kits started to arrive, but no loose cut balsa. Luckily, we did not suffer from lack of cement, as it was made locally by Adhesian Chemicals under the brand name of 'Gold Cement.' This marvelous substance did triple duty as glue, dope, and filler. Alas, it is no longer available in small packs.

"The club continued to grow as more youngsters came in, but the average grade still crept up. Some of the more well heeled modelers graduated to car ownership, thereupon becoming a

Continued on page 97

SHARK P-60

OLD TIMER Model of the Month

Designed by: Vic Stanzel
Drawn by: Al Patterson
Text by: Bill Northrop

• Here's one that should be a real challenge to rubber modelers everywhere. When you talk about rubber, you're thinking in terms of free flight. But when Vic Stanzel talked about his rubber powered Shark P-60, he was thinking "G" line!

We don't expect too many modelers to build this one with the prospect of hanging it on a 20 to 30-foot "G" line and

Continued on page 105

CHOPPER CHATTER

By RAY HOSTETLER PHOTOS BY THE AUTHOR

The first step in making a replacement pushrod: measure the distance from ball center to ball center with dividers.

• This month I've got a lot of "little goodies" that should interest all of you in one way or another.

Anyone who has been flying for any length of time has probably had the sickening experience of crashing a model helicopter. Like I said several months back; tipping an airplane, or stalling out at low altitude usually brings fairly easy repairs. A new prop and straightening up the gear will usually get a fixed wing pilot back in the air.

But a helicopter that tips over from a two-foot hover usually brings the complications of broken rotor blades, bent shafts, and distorted control linkages. Of course, the broken rotor blades will need to be replaced. I detailed shaft straightening in the Jan. '82 issue of MB, and now I'll give the best way to repair pushrods in the control system.

Actually, few pushrods can be repaired with any degree of satisfaction. Only ones with minor bends can be straightened and returned to service. The pushrods with moderate to severe bends, and those that are bent in the threaded area will need to be replaced.

Rather than order replacement pushrods from the helicopter manufacturer (which will take days of down time and is expensive), I prefer to make my own replacement pushrods. Now making your own pushrods will not be much cheaper, except in the long run. (Or if you are a lousy pilot, the return will be quicker!) It will, however, save you much time and offer you a great *convenience*, especially for the intermediate-expert pilot who wants to modify his control set-up by remounting servos, which usually changes *all* the pushrod lengths.

To start with, you'll need a precision lapped die and a die holder. I obtain these from: Caltronic Laboratory, 461 S. Cochran Ave., P.O. Box 36356, Los Angeles, CA 90036. Caltronic Lab offers a wide and varied assortment of U.S. and *Metric* nuts, dies, taps, die holders, stainless steel rods and tubing, brass rods and tubing, machinist supplies, etc. Their service is some of the best you'll find, too.

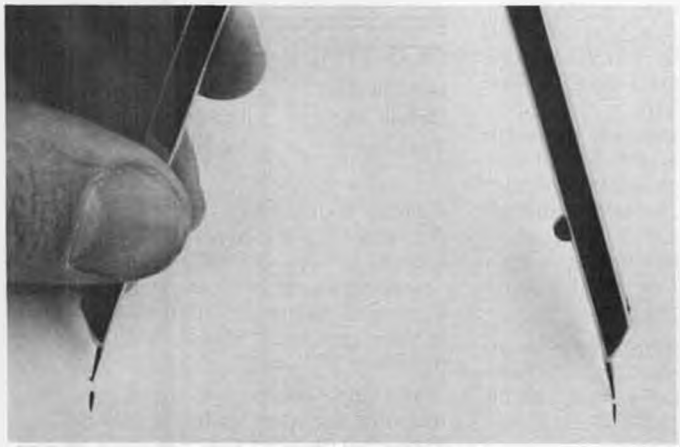
I would suggest that you order their catalog for $2.50, just to take a look at their line of products. If you're not interested in that, I'll give the part numbers and current cost, so you can order directly from my information.

Since I fly mostly metric helicopters, I use the metric die. (I should add here that all of their dies are ESO, manufactured in Switzerland from high speed steel.) Anyway, for the metric die, order type 501, M2 x 0.4, at $13.20 a piece. If you fly American helicopters with 2-56 pushrods, order a die type 501, UNC, 2-56, at $17.95 each.

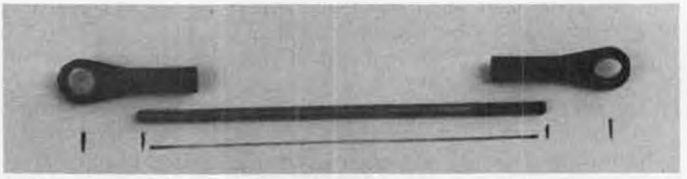
To hold the die while working with it, you'll need a die holder, type 801, #61001, 16 x 5 x 116 mm at $6.30 each. This die holder accepts both dies, American 2-56 or metric M2 x 0.4. Add $2.25 for shipping and handling, and California residents be sure to add 6% tax.

In a short while, you will have the die and die holder in hand, and you will be able to see the fine quality which will give you crisply threaded pushrods for

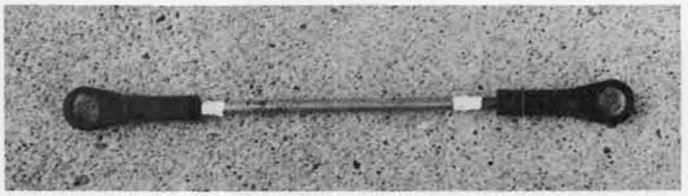
Kavan metric screws and nuts. Very handy to have around the shop.



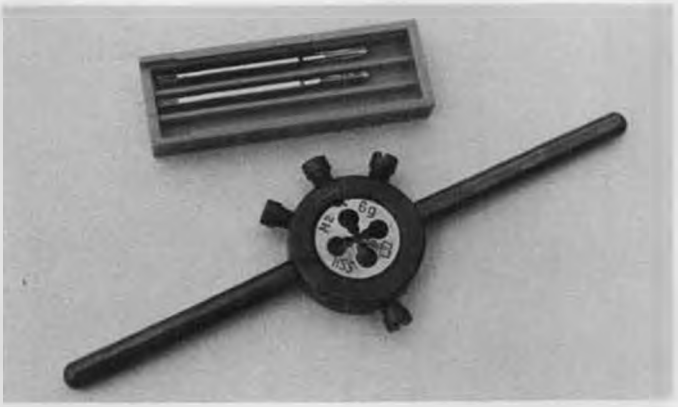
Step Two: transfer to a scrap piece of paper the measurement from step one.



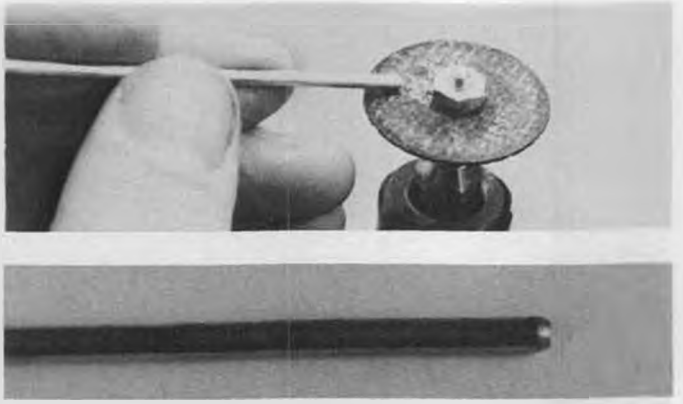
Step Three: subtract the non-threaded area of each link from the first marks. Cut rod to length, then thread it.



Step Four: completed pushrod. Link on left is completely screwed in. Link on right is not, to allow for adjustments.



Threading rods is easy using this beautiful die holder from Caltronic Labs (see text). Also shown are 2mm metric taps.



Step One: to begin threading rod material, bevel both ends of rod with dremel tool and Tuf-Grind wheel.

years.

Oh yes, I almost forgot. If there are some "big bird" pilots from Al Alman's column reading this, you may want a 4-40 die to thread the remnants of your Sig 4-40 pushrods, etc. You can order a die, type 501, UNC, 4-40 at $14.20. The same die holder listed above will fit this die too.

Next you'll need pushrod material. For metric helicopters I use the *tail rotor control pushrod* (not rail rotor driveshaft) from the Schluter Heli-Boy. I order two or four of these at a time so I'll have plenty of stock on hand. This way I can make any length of pushrod I desire quite easily. I just whack off the length I need and thread it.

As I rarely thread 2-56 material, I don't have a tried and true source of material, but I believe that the tail rotor control rod from American R/C's SuperMantis will work fine. As the 2-56 rod is slightly larger in diameter than metric, you cannot use one rod for both applications.

Whatever you do, please don't try to thread any hardened material such as music or piano wire!

Given that you have the proper material on hand, I'll go through a process that gives me perfectly sized pushrods every time, without trial and error.

Using dividers, take the distance from ball center to ball center. (photo) Transfer this length to a scrap sheet of paper. As this distance is the total length of the pushrod with ball links, we need to subtract the ball link on each end. I simply lay the links on the sheet of paper and make another set of marks denoting the actual pushrod length (photo).

Next, using side cutters, cut off a length of rod, slightly oversized if anything. Before you can thread the rod, you'll have to "dress" or bevel the end. This allows the die to smoothly start the threading process. It can be done with a bench grinder, or with a Tuf-Grind wheel in your Moto-Tool. Caution: Use only the Tuf-Grind wheels, as other wheels may shatter and break due to the side pressure needed for dressing the rod! The dressed pushrod should have both ends as shown in the photo.

Now you can thread the die onto the pushrod. A little cutting oil from your local machine shop is a good idea at this time. This will lubricate the die and rod during the threading process. Thread a length slightly longer than the ball link's threaded area. This will allow for minor adjustments for shortening the pushrod slightly if needed during the fitting process. Usually a threaded length of about half an inch is right.

Remove the die and clean the newly threaded rod ends before screwing the ball link in place. You should also "mark" the threaded end at this time, too. Let me explain.

Have you ever made a minor adjustment to a pushrod and wondered how much thread was left in the ball link? I used to screw the ball link off and check the rod length left, then make the adjustment. This took time, and unnecessarily wore out the threaded part of the ball link. Now I use a bottle of White-out (liquid correction fluid). Before screwing on the ball link, I mark the limit the ball link can be screwed in by a wide band of White-Out fluid. You could use paint, but the White-Out bottle is cheaper, has a built-in brush, and dries in seconds. Then I have a mark that will always tell me how far I can adjust the ball link in either direction.

Step Two: thread with die tool, then use correction fluid to mark end of threads.

That about does it. Thread the ball links on, make any minor fitting adjustments, and snap the new pushrod in place. You'll find that once you use this process and get used to it, you'll never

Continued on page 87

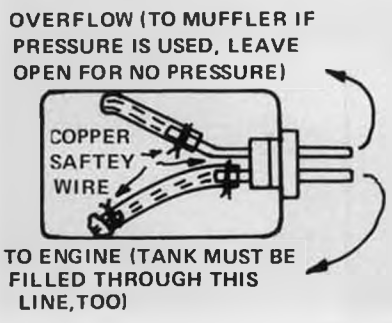


Fig. 1: Typical two-line hookup.

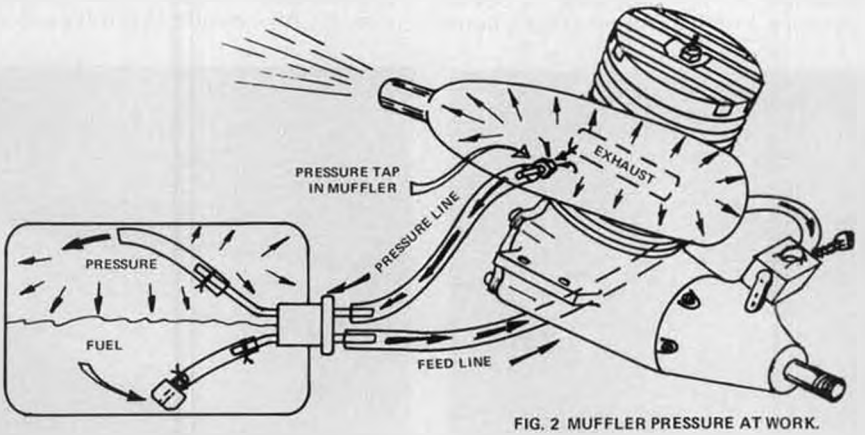
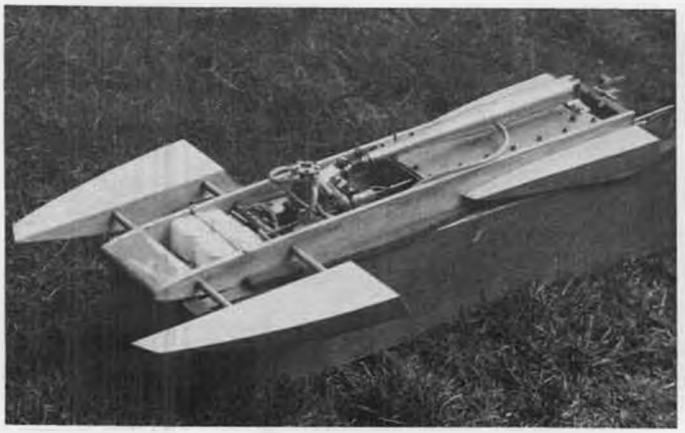


FIG. 2 MUFFLER PRESSURE AT WORK.

Fig. 2: Typical hookup using muffler pressure.



The Pinckert Coyote .21 rests on its starting stand between heats. Muffler used is an OPS.

Kicking up a good size Rooster tail as it speeds across the lake, the Coyote 21 can get you hooked in no time.

R/C POWER BOATS

By JERRY DUNLAP

SO WHATDAYA DO WHEN A LITTLE COYOTE ARRIVES ON YOUR PORCH?

If it's one of Don Pinckert's new outrigger hydroplanes you stick the pieces together and go racing. Pinckert Custom Boats, 9 North Grant Avenue, Masaryktown, FL 33512, recently came out with a new lineup of outriggers to replace the very successful Gator series. Anyone who has been around model hydroplane racing more than a couple of heat races has heard of Don Pinckert. There are those who say Don is the "Father of Outriggers." Seems like I read that in one of Don's ads a few years back. It might be that Don said it himself. Regardless of the familial relationship he has to the outrigger, few can deny Don Pinckert designed hydroplanes have won their share of national championships and set numerous national records. The Gator series was certainly one of the best known model hydroplanes at model boat racing events across this nation.

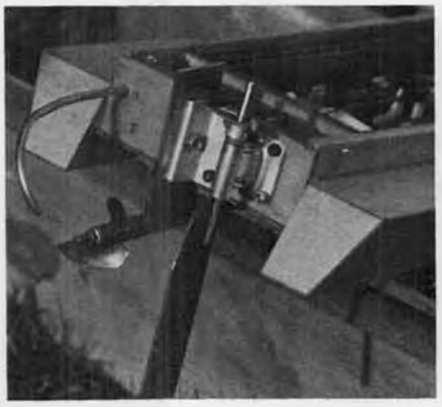
I don't know why Don chose to switch from amphibians to mammals when naming his new outrigger series. Heck, according to the dictionary, a coyote isn't even a native critter to Don's home state. However, I did find out that some say the name with two syllables, coy/ote, and some use three syllables, coy/ot/e. Personally, I've always pronounced it with two syllables. But it sure doesn't sound right to say the name of that cartoon character Wiley Coyote using the two-syllable pronunciation. But I digress. Dan Rutherford does that a lot in his articles, you know. But that's understandable. Anyone who flies control line is just a bit on the dizzy side.

The Pinckert Custom Models' Coyote that I received came as a pleasant surprise. I hadn't even asked for one of the boats to review. As those who regularly read this column know, I'm not a big advocate of outriggers. However, this should not be interpreted to mean I don't enjoy racing this type of boat. That isn't the case at all. A couple of years ago, I even won my district's .21 Hydroplane high point award, and I used an outrigger to capture that award.

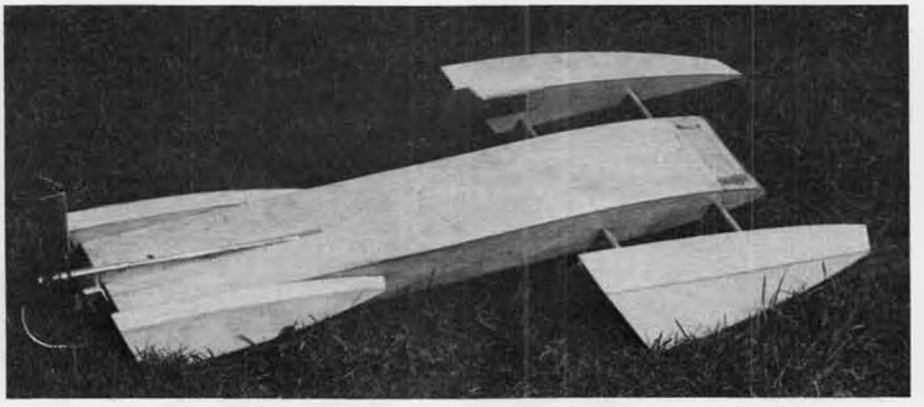
Besides being surprised by the arrival of the boat, I was most pleased to see that I'd been sent the "semi-built" version of the Coyote 21. I was also pleased that I'd been sent the .21 engine size. It's my opinion that this particular size hydroplne offers the most go for the dough in model boat racing. Shucks, they go just about as far as some of the bigger hydros, and the times they turn on a race course aren't all that much slower than the larger class hydroplanes. The part I like best is that the .21 class engines are less expensive, consume less fuel, and I have a batch of 'em laying around the garage.

The Coyote can be obtained as a kit or "semi-built" like the version I was sent. You'll have to contact Don Pinckert to get the different prices for the three size kits, and inquire about the cost of a "semi-built" kit. As most model boaters would rather call than write, his phone number is (904) 799-0595.

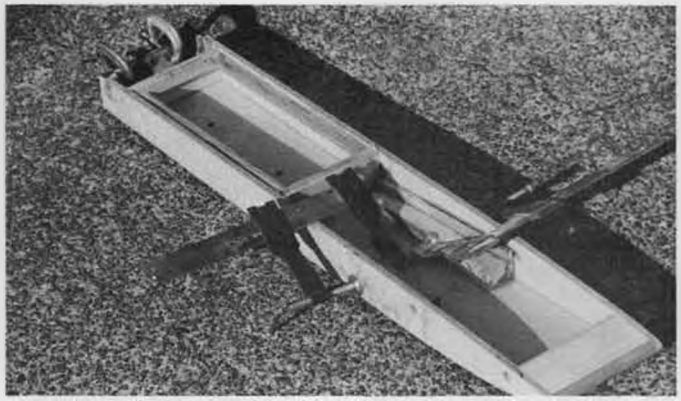
The instruction booklet showed the steps in building the regular kit version. There's nothing new or unusual about the building techniques employed to construct the main hull or the sheeted foam sponsons. Although the construction techniques are standard for an outrigger type of boat, it is important to emphasize a critical construction concept. That concept is proper alignment of all the parts. It makes no difference how high the quality of material pack-



Transom view. Marine Specialties Strut holds Dumas blade rudder. Octura X-447 prop.



The underside of the Coyote 21 reveals turn-fin and brass shaft housing for the prop cable.



This picture shows how the wooden motor mount rails and transom pieces are glued and clamped in place.

The semi-built kit version of the Coyote 21 looks like this when removed from the box and laid out.

aged in the kit . . . and the material in the Coyote was excellent . . . if the parts were not aligned properly, that boat is not going to perform as it should. It matters not if it's cars, airplanes, helicopters, or boats . . . if it's out of alignment, it's not going to really perform or it might not perform at all.

On the Coyote, this alignment becomes especially important when the front and rear sponsons are attached. I found the information supplied in the Building and Running Instructions to be most adequate for setting the sponsons. On an outrigger hydroplane, sponson depths and angles are critical. Be sure to take the time to get them set properly.

As I received the "semi-built" version, there isn't much I can tell other than what's already been mentioned about building the boat. With the boat I received, it didn't take much time at all and I was installing the running hardware.

INSTALLING THE RUNNING HARDWARE

Another pleasant surprise about receiving this boat is that Don sent along a hardware package for the Coyote 21. Basically, the package consists of a number of items from various hardware manufacturers, Marine Specialties, Hughey Boats, and some items that Don has specially made for the boat. For the person who doesn't wish to chase down a bunch of parts, the hardware package would be a worthwhile investment. For my Coyote 21, I substituted a needle bearing strut assembly for the bushed oilite strut that came in the package, and used a different rudder. A nice feature about the boat is the pre-drilled holes for items like the shaft housing, strut, and rudder brackets. This greatly speeds up the process of installing the hardware.

I encountered no problems with any of the hardware installations. Once again, the directions and photos in the instruction pamphlet were adequate. An important item in the hardware installation is the setting of the strut depth. This depth determines the ride attitude of the boat and must be set correctly. I set the depth as specified in the instructions and have had no reason to make any changes.

INSTALLING THE RADIO GEAR

I elected to use my Kraft radio system in the Coyote 21. This is the same unit I reviewed a few issues back when I used it in an outrigger powered by the K&B 7.5 Outboard. This unit proved very capable in that larger boat and has proven equally capable in the small outrigger. I still think the Kraft "staple gun" wheel transmitter is super.

Although there is an abundance of room for the radio equipment in the Coyote 21, it is necessary to lay the servos on their sides when mounting them in the radio compartment. This is the first time I've ever done this with servos. I fashioned two wooden servo trays and "Hot Stuffed" them to the bottom of the radio compartment. The photo of the radio installation shows this installation procedure.

For exiting the rudder and throttle linkages through the radio compartment, I used brass tubing. I can just hear some airplane guys going bonkers about metal-to-metal connections and radio interference. Well, if you don't tell my Kraft receiver I have metal-to-metal connections, it'll probably go on working just fine. A Du-Bro Kwick Switch Mount was used to install the on/off switch. This was located on the side of the hull because there wasn't sufficient room to mount it to the radio compartment hatch. When mounting an external on/off switch, be sure that the radio is turned *on* when the switch is pressed towards the hull. A lot of NAMBA types don't know it, but it's a NAMBA rule that external on/off switches must operate in that direction. It's a safeguard to prevent the receiver from being turned off while launching the boat.

DID I MENTION THE TWO FUEL TANKS?

Well, you probably saw them in the photos and were wondering why I used two rather than one. Simple, there wasn't a fuel tank available that would fit under the cowl and hold at least eight ounces of bug juice. Don Pinckert informed me he now has custom fuel tanks available for all the Coyote boats. The two Sullivan tanks I installed work great and engine runs in excess of six minutes are possible. Friends, if you have

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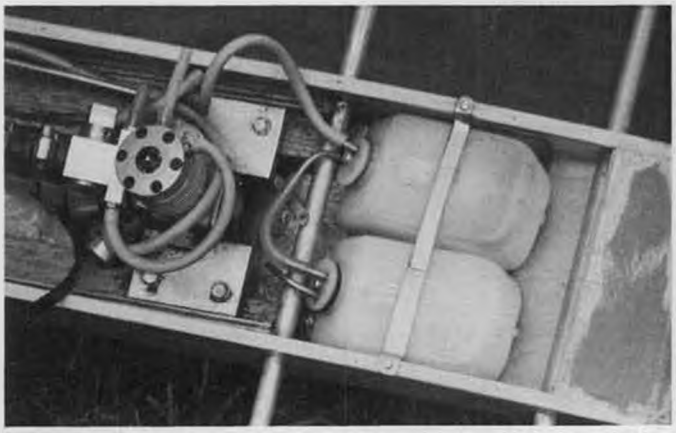
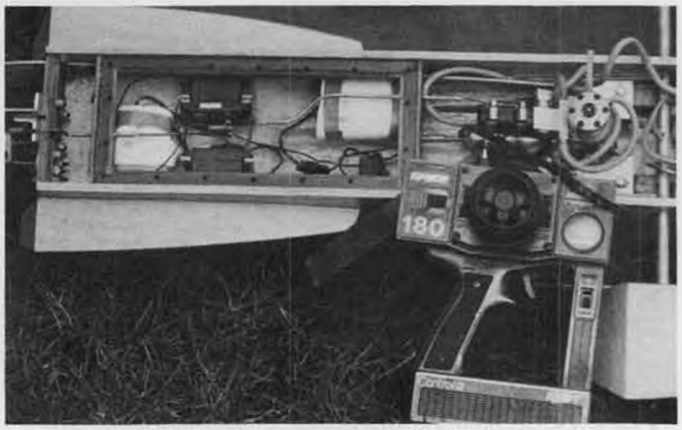


"Plumber's nightmare" or "can of worms"? Twin Sullivan 4-ounce tanks, K&B Inboard Marine engine with Prather exhaust throttle.



Lots of room for radio equipment. Kraft KP-3KW system used for control. All servos mounted on their sides.

R/C AUTO NEWS

By DAN RUTHERFORD

PHOTOS BY AUTHOR

Kent Clausen's Team Associated RC12i that won the Stock class at the World Champs. See text for complete breakdown of modifications.

• By now you have no doubt read the reports on the 1/12 scale World Championships, and while the usual race reports seem to fill some kind of need, they really don't tell you anything about going faster with your car at your track. Possibly we can help with this article, as I have convinced Associated and Kent Clausen to part with Kent's World Champs winning RC12i for a couple of weeks, and I believe that all of the tricks have been uncovered, to be gone over in this column.

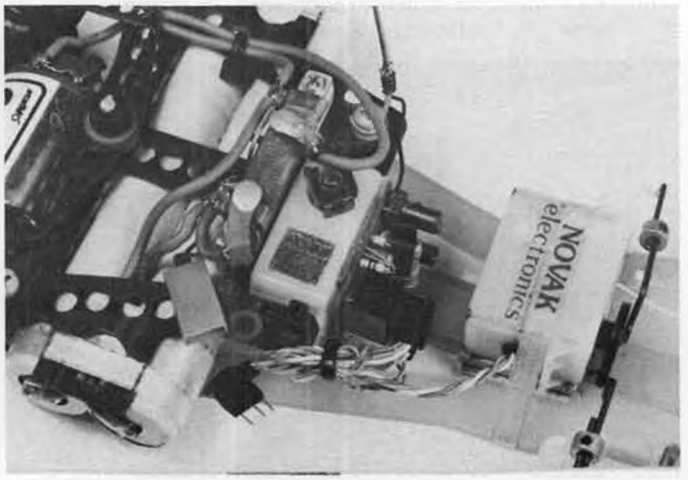
Actually, the original idea was to also go over Art Carbonell's Modified Class World Championship car, a prototype of the just released Delta Shocker (at least I think that is what they are going to call the new car), but when I called to get the car, I found out that Art had given it to a racer from Japan! He had built another, but that one was with him in South Africa and the other 5 or 6 cars were well-worn prototypes, so Delta took a pass on this article. The people of Delta are really good folk and very laid-back; how many RC car manufacturers do you know who would fail to capitalize on a World Champs win in every possible way? Anyway, we don't have a car from Delta, although there will probably be a test of a production version in the next month or so.

As to what we do have, Clausen's RC12i, I hope I didn't mislead you by saying that I discovered all of the tricks, as there aren't any real tricks at all. This is a car that can easily be duplicated by most any RC racer; in fact I will bet there are a lot of club racers using cars that have more modifications done to them, a few even use more exotic materials. What Kent's car is, more than anything else, is a very well detailed piece that he has set up carefully from one end to the other. It is not what you would call box-stock, but it isn't anything radical either.

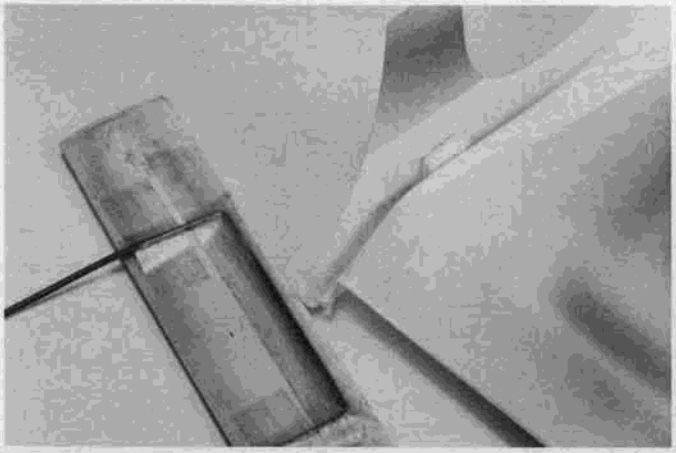
It is no secret that the RC12i is a little porky, so a number of things were done to get the car down to minimum weight. The body posts have been turned down to lighten them. (All those grams add up!) A front bumper is not used, the nylon nuts attaching the front cross bar to the suspension pieces have been cut in half. The rearmost tips of the tabs supporting the front suspension pieces have been trimmed slightly, a graphite axle is used in the rear and graphite has also been used for the cross bar, the radio tray, and the plate that boxes in the rear blocks and extends forward to the radio tray. The tray and the plate have been drilled full of holes, so they ended up very light, but with adequate strength. There are no connectors in the wiring, it is all what is referred to as "hard-wiring", or "hot-wiring". The rear wheel hub, only used on the left side when the car runs a differential, is nylon and drilled full of holes. A spacer on the right, and that is aluminum on stock cars, is also nylon. The front and rear wheels have been machined in the area of the spokes, the fronts having spokes only about 1/8 inch wide, on the rear wheels they are about 3/16 inch wide. The rearmost end of the chassis pan has been trimmed, and the motor cutout has been enlarged. The adjust nut on the diff is nylon and the rear blocks have been drilled some. The cam adjuster for gear mesh is not used, and those cap screws common to the graphite plate and rear blocks are aluminum. I had no idea aluminum 4-40 cap screws were even made! The body used was the TOJ so favored by Associated team members (and Delta as well, incidentally) and it was a light one. The shell is only .017 to .019 thick on top, .011 to .012 on the sides. Only enough paint to cover was used, no sloppy runs here. The Rx used is a lightweight piece, a prototype from Novak, no case is used, it is just stuck in place with servo tape. This Rx is the only item on the whole car that isn't generally available and even it might be out soon.

That covers all of the modifications done strictly to make the car lighter, but don't dare overlook the fact that the car is built with everything as simple as possible. Wiring is just the needed length, no more. No huge globs of

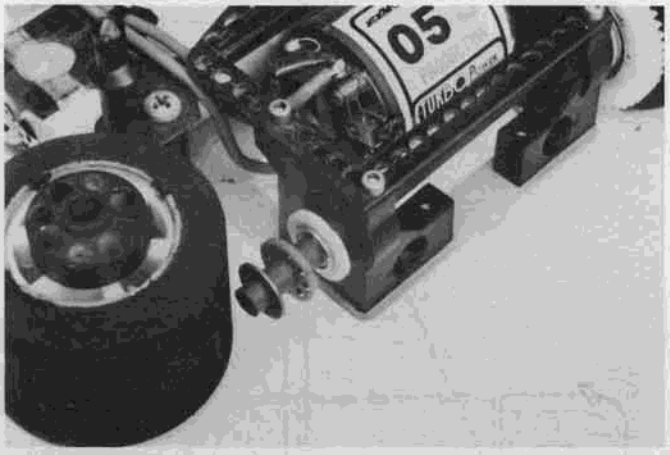
Front end of Kent's car. Note: lightened body posts, graphite cross bar, no servo saver (!), steering links on bottom of arm.



Close up shot of servo tray, lots of holes in the already light graphite parts. Car is neat, simple, no-extras.



Wing is attached to wires with strapping tape. Small piece of servo tape in fin keeps the body from bowing out in rear.



Thinned down nylon bearing adapter is visible in this photo. Also visible are rear body posts and light c/f parts.

solder anyplace, and so on. To further illustrate, look at the way the resistor is mounted. A simple nylon block was whittled out, notice that the screws attaching the resistor to the block are standard Associated aluminum screws with the heads turned down to the Phillips sockets. I doubt the screws were machined just to eliminate weight, that would be getting a bit ridiculous, especially as the four screws common to the chassis pan and front suspension pieces are too long and not cut down, but the small-head screws do make for a compact installation.

Interestingly enough, the chassis pan has not been recountersunk, so the screws are flush on the bottom of the pan. I always do this on Associated pans, but also chamfer the holes in the nylon parts, just to be sure the head of the screw, which extends slightly from the top surface of the pan, doesn't prevent a secure attachment of the part. Still, I note that Kent has chamfered these holes as well.

Ball bearings at all four corners, of course, with the rear bearings being the lightweight version available. I suspect these bearings were hand-picked, as they are very smooth running. At the least they have been kept very clean and oiled with a light application of very light oil. That reminds me that you guys who are using WD-40 to lube bearings, ought to quit doing so. WD-40 tends to leave a waxy residue in bearings, sometimes you can hear the clickity-click of the balls passing over spots of wax build-up.

I suppose that from here we ought to just go from the front of the car back. The caster has been reduced from the stock 4° to 2°. This was done by machining the bottoms of the suspension arms. As long as this was being done anyway, the arms were machined further, just so the car could be fitted with front tires that were only .020 over minimum diameter at the start of each race. Starting with such smaller tires can, on a track that is hard on tires, result in dragging the chassis on the round before the end of the race. To give you something to go by, stock arms mike .513 at the forward end (just in front of the forward screw) and .406 at the rear. After rework, Kent's arms were .370 and .308, respectively. If you want to keep the stock caster, just cut the arms down .093. As you can tell from the fact that the arms on this car are stock in color while everything else is dyed black, the reduced caster mod was made after practicing on the WCs track, so don't expect this change to be the hot tip at all races. In this instance, it is assumed that Kent wanted the car to turn in better at the entrances of corners, which is what decreased caster will do for you (remember, this is a power-off or coasting condition). Less caster also results in less power-on steering, commonly referred to as throttle steering, but that evidently wasn't a problem at this race.

One of the problems I had with the stock RC12i tested in this column a couple of months ago was a tendency to take a tweak in a front end impact. That problem has been neatly solved in this car by leaving one of the nylon nuts anchoring the cross bar just loose enough to allow it to move easily. If you don't do anything else to your RC12i, do back off one of those nuts a turn or so!

The steering blocks have been drilled oversize at the kingpin location and bushed with 5/32 o.d. brass tubing. This gives a little tighter feel to the steering and it will probably wear longer. The steering blocks are shimmed to further eliminate any slop; in this case it is with a .012 washer between the lower side of the steering blocks and the bottom ear of the suspension arm. The kingpin has also been shimmed, in this instance with a nylon washer. A small amount of tweak has been eliminated with a .005 mylar shim under the left suspension arm. The use of mylar is interesting, it is easy to cut out a set of shims with scissors.

A linkage modification that I understand came over with the British racers is to run the steering rods from the bottom of the servo output arm instead of from the top. This is meant to eliminate any bump-steer and is effective. You will notice that Kent elected to race without a servo saver . . . Definitely not a suggested practice for club racing!

The above mod requires raising the steering servo slightly, Kent used available (try a model railroad shop) Plastruct tubing, in this case with 3/16 x 1/4 pieces. The Plastruct is stuck to the pan with servo tape, the servo is mounted to the tubing with the same tape and then the whole assembly is backed up with strapping tape run under the pan and over the servo. I still think that is a tacky way of attaching the steering servo, but it is effective. The steering servo, as well as the throttle servo, are the latest type

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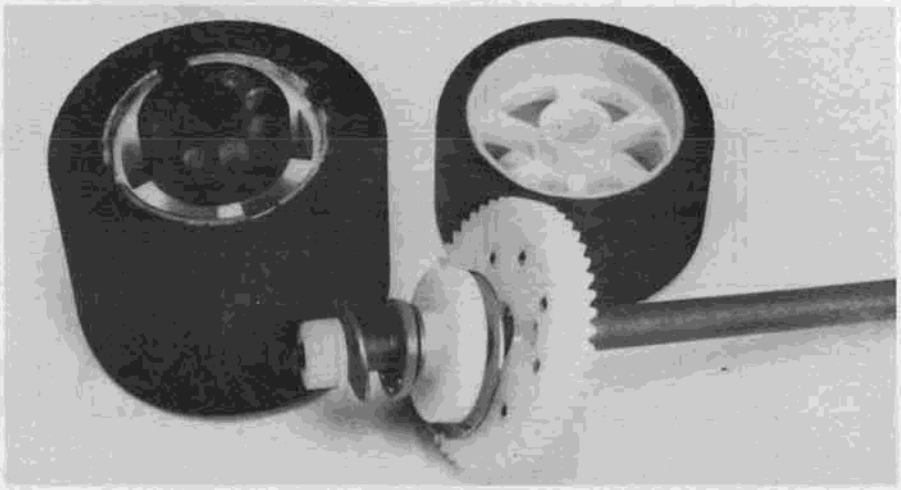


Stock diff, except for the nylon spacer. Front wheel spokes are lightened, as are the nylon rear wheel hubs.

GRAHAME–WHITE TYPE 20

Maj E. F. Heyn 11.82

3/32" O.D. ALUM TUBE

6" PLASTIC OR BALSA PROP

TURNED BALSA COWL PAINTED SILVER

A B C

5 STRINGERS ON TOP DECKING

TWO LAYERS 1/32"x 1/16"

BAMBOO SKID

1/8"

FUSELAGE FRAME & STRINGERS OF 1/32" sq. BASSWOOD

A

1/16"x 3/32" REINFORCING

BOND PAPER COWLS PAINTED WHITE

LANDING GEAR, CABANE & WING STRUTS OF 1/32" BASSWOOD

1/2" BOTH WINGS

B & C

1/32"x 1/8" EITHER SIDE

B

1/16"x 1/8" T.E.

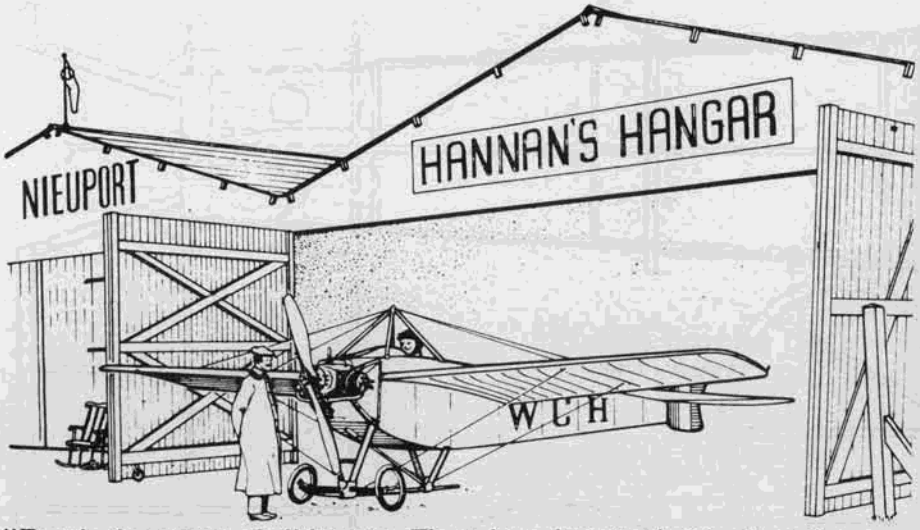
INK IN AILERONS

1/32" sq, BASSWOOD SPARS

1/16" sq. L.E.

80 H.P. SEVEN CYLINDER CLERGET ROTARY OR 80 H.P. NINE CYLINDER LE RHONE 9c ROTARY

EPOXY CENTER ONLY



"Zest is the secret of all beauty. There is no beauty that is attractive without zest."

• This month's lead-in line is by designer Chritian Dior, and certainly all model builders are zestful!

ANYONE FOR BLERIOTS?

The Smithsonian Institution has been favored by remarkable aviation writers down through the years, commencing with its Secretary, Samuel Pierpont Langley (1834-1906), who documented his model and full-size aircraft experiments in meticulous and scholarly fashion. Paul Edward Garber has also been prolific in publishing, including a comprehensive model and kite book in 1928. Louis S. Casey's Glenn Curtiss book of 1981 was reviewed in this column some time ago; and the works of Bob Mikesh and Walt Boyne are well-known among aero enthusiasts. Curator Tom D. Crouch is continuing the tradition with his recently released *Bleriot XI, the Study of a Classic Aircraft.*

Much wider in scope than its title might suggest, the volume should appeal to anyone interested in vintage flying machines. Trying to compile a complete catalog of Louis Bleriot's activities is a formidable task, since misinformation and disinformation seems to abound. And, while this book does not fill in all the missing links, it is doubtless the best available English language attempt to do so. Starting with a splendid John Amendola painting of a Bleriot looping over the Statue of Liberty (appropriately another French design), it progresses through the story of Bleriot's early failures and triumphs, his epic crossing of the English Channel, and subsequent aircraft developments through 1914.

Also briefly presented are glimpses of some of the important personalities relating to the Bleriot saga, including his arch-rival and fellow monoplane champion, Hubert Latham, who nearly beat him across the Channel; lovely Harriet Quimby, the first woman pilot to cross the Channel; Adolph Pegoud, Bleriot's aerobatic star, and the controversial American, John Moisant.

One chapter, devoted to restoring John Domenjoz's Bleriot in the Smithsonian shop, is particularly thorough, and could easily inspire construction of a highly-detailed scale model. Even its colors are discussed, a subject usually ignored by historians, much to the frustration of modelers! This particular machine seems unusual in that some of its wire bracing was painted white. Internal features are beautifully revealed by excellent photos.

The book is lavishly illustrated with photographs, which strangely are not source credited. One shot, that of the Bleriot VI (Libellule) in flight, is interesting in that it is so "heavily retouched." An undesecrated print of this appears in the prestigious French magazine *Icare*,

Nicola Blagg, of England, holds her father's Bleriot canard free flight model. More about Bleriot designs in text.

of Summer 1979, which makes a startling contrast. The original photo depicts the machine flying in front of one of the many tall smokestacks adjacent to the Issy-les-Moulineaux field, where the Libellule was tested. In the background appear the Eiffel Tower, many trees, and the exposition Ferris Wheel. Evidently some retoucher feared the photo might appear to have been "faked", as the smokestack gave the appearance of supporting the Bleriot. While in Paris during 1975, I saw a print in a Bleriot family album in which only a slight modification of the smokestack had been made, to separate it visually from the aircraft. But the Smithsonian book shot has been *totally* retouched in a truly barbaric manner to completely eliminate the entire background!

Also featured in the book are numerous line drawings, always of prime interest to model builders. These include the seldom-seen drawings by *Scientific American* technical artist John Jay Ide of the Bleriot XXIII racer, various sketches from aircraft magazines of the era, and the more commonly-known Hayward and John Rozendaal delineations.

Questions? A few. A comment on page 73 seems to reflect misunderstanding of the term "cantilevered"; and it seems quite unlikely that batteries

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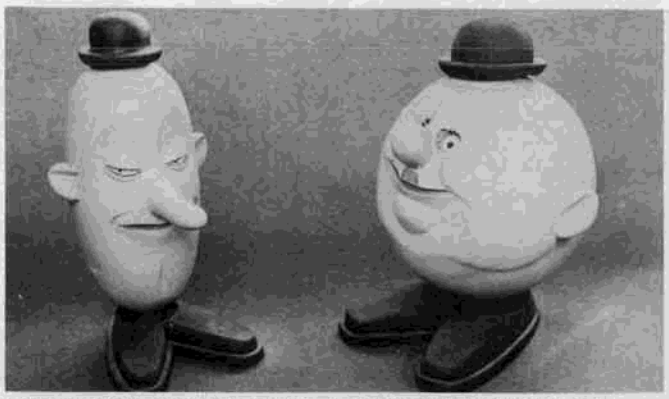


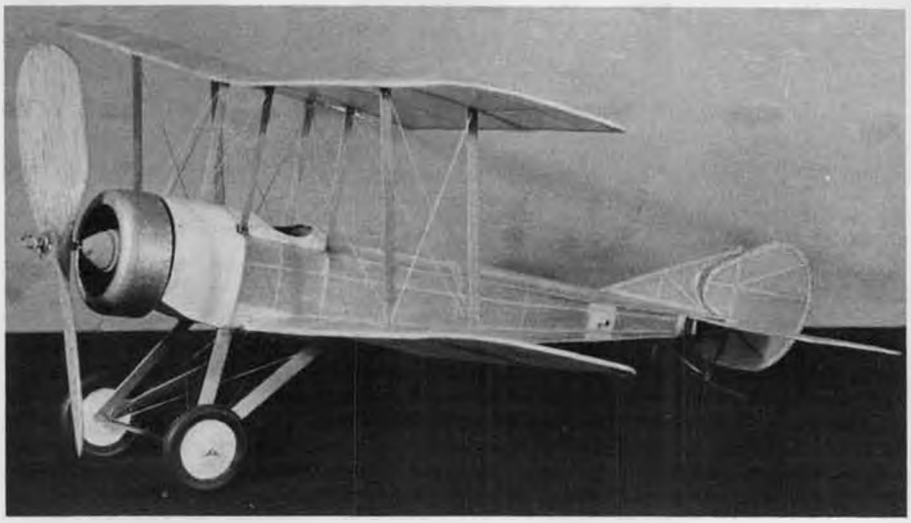
Recent visitors to the Hangar, these Laurel and Hardy characters were sculpted by J. Fred Williams from solid balsa.

Twin Brown Junior CO2 powered Northrop flying wing built by Daniel Walton for the Northrop wing contest.

GRAHAME-WHITE 20

PEANUT SCALE

By Maj. ED HEYN . . . Here's a biplane with gap-to-chord ratio that won't quit! Lots of effective wing area in 13".



• Claude Grahame-White, one of the pioneers of British aviation, produced his first airplane, the Grahame-White Baby, in 1910. In succeeding years, his organization built many aircraft under license, primarily Morane-Saulnier and Voisin types, and developed several original designs. One of these, the Type 20, seemed to me to be a likely entrant for FAC type WW I combat. Plans and data may be found in Vol. I of "Warplanes of the First World War" series by J.M. Bruce. As no actual dimensions are given to develop a scale, a photographic blow-up of 13 inch wingspan was used.

The Type 20 proved to be easily adjusted and very stable in flight, especially indoors. Construction is quite conventional and should present no problems to those biplane lovers, like myself, who have built a Peanut or two. The author was fortunate in having learned to fly in the latter thirties, and having the opportunity of flying many of the now famous old biplanes. Prior to WW II, I owned a D.H. Gypsy Moth, and even after having flown Uncle Sam's hottest jet fighters while on active duty, I still remember what a fun plane the Moth was to fly.

Note that the basic fuselage frame and the stringers are all of 1/32 sq. basswood, available at model railroad or boat shows. I have used this method on indoor scale ships of up to 18 inch wingspan with no problems of breakage. I feel that the nice visual effect of the thinner section outweighs any very slight difference in weight over balsa strips. Former A, as shown, is of 1/16 sheet, while all other formers are of light 1/32 sheet.

When laying out the side frames, do not join the longerons aft of the rear vertical member. Later, this will be a slot into which the stabilizer will be inserted. The side stringers extend from "A" to the last vertical member. Fill in between the stringers at the rear peg position. Small doughnuts of 1/64 ply are glued inside to reinforce the peg.

I turned the balsa cowl on a small lathe, but it can be carved and sanded. The cowling blackplate of 1/16 sheet is cut to match former "A", leaving the bottom of the cowl open. A plug on the rear fits into the opening in former "A", which is reinforced with 1/16 by 3/16 on edge behind the opening. The whole cowl assembly with dummy motor and prop removes for winding. Filling in the lower wing mount area, from the lower longeron to the side stringer, leaves a slight angle which must be matched by a like angle sanded into the lower wing root rib. The bay behind the cowl and the top to the rear of the cockpit, is covered with bond paper and later painted white.

The stabilizer is made in one piece, although the prototype had an all-moving stab which rotated on the rear spar. Indicate this with an ink line. The leading edge of the stab is left free to be adjusted by shims until the best trim is attained. Fine brass wire at the tip of the fin and at the tailpost allows rudder movement for trim. The inner arc of the fin and the rudder outline are laminated. Bamboo, split to approximately 1/64 sq., is used for the tailskid apex. One vee comes from the outer ends of the horizontal tailpost to below the rudder, while the other vee is from the lower longerons back to the rear vee. The tailskid is in the center.

Wing construction is conventional, however, the lower wing root ribs require three pieces each to space the trailing edge away from the fuselage. I covered the entire plane with light weight white tissue. Only the fuselage was given two coats of thin clear dope. The rest, after shrinking with alcohol, was given one thin coat of clear lacquer to minimize warpage. As only the one actual prototype was constructed, no markings show in any photograph, so it is bonus time again. The 1/32 thick basswood wing, cabane, and landing gear struts were stained with Minwax Puritan Pine woodstain. I found that without the gray silk thread rigging, the high mounted top wing was quite weak. So use thread or monofilament for the rigging.

Power for indoor flying is one loop of 1/8 FAI rubber. I haven't fully trimmed this ship for outdoors yet, but you should be able to work up a loop of 3/16. Flight pattern is left-left, with no side or down thrust and very slight rudder offset.

Join the Flying Aces Club, and have fun. **Full size plans on centerspread 54 and 55**

Since this article was written, this peanut has taken a first place in WWI Combat at Glastonbury. Rudder is sensitive!

World Championship F1C teams, 1981, Spain. Left to right: third place Russians, first place Americans, second place Chinese.

U.S. team left to right: Doug Galbreath, Reid Simpson (manager, with a WC trophy), Roger Simpson, Charles Martin (2nd WC trophy).

SPAIN '81

First of two installments.

By REID SIMPSON . . . A very carefully and skillfully prepared treatise on the trials and tribulations of team participation in world championship level competition. A guide book to anyone in the same situation.

• As the American Team at the 1981 Free Flight World Championships in Burgos, Spain, we felt all three of these sensations . . . **Tickled** to be America's Free Flight Team with a chance to compete at the World Champs; **Pickled** by "FENDA," the Spanish Aero Club who hosted the worst World Champs in history and their retaliation against anyone who objected to their whims; and **Proud** to be Americans who watched their nation's flag hoisted and heard their National Anthem played in honor of their winning.

In writing this article about the '81 Champs in Burgos, Spain, I am going to retrace the steps in the forming of the nine fliers into the '81 Free Flight Team. I do this for two reasons: one is that I believe it will be interesting reading; the second is that I believe that "would-be" Team members should realize what is ahead of them at a World Champs and what is expected of them as a Team member.

During the period of January to June, specific projects were undertaken to develop our Team. A series of letters, questionnaires, telephone calls, and an informal Team meeting of seven out of the nine members resulted in the development of a list of objectives and tasks for the Team and myself to accomplish.

Communication — From the very beginning, we all realized that nothing was possible unless a spirit of communication was developed, not only of the Team members with myself, but the Team members with themselves.

Teamwork — Realizing that team victories come from unselfish teamwork, we all worked on getting to know the other two members of each respective event team. An effort was made to learn their flying habits, air-picking criteria, and techniques, and any supporting equipment to aid them in this task.

Mini—Teams — To lend an even stronger emphasis to our teamwork, we developed three mini-teams consisting of three fliers, one from each event. This way, on each of the three competition days, there were always the other two fliers to help the competing Team member with his early morning test flights and also in the flyoff periods. All members of the mini-teams became familiar (during the stateside practice and overseas testing prior to competition) with the other two fliers' airplanes and equipment.

Uniforms — With the emphasis being on teamwork and unity, uniforms were selected for three functions: A warmup suit for early morning and evening flying, T-shirts for mid-day flying and trading, and golf shirts with a specific emblem for opening and closing ceremonies. The warmup suits turned out to be ideal, with all the cold weather we had. It should also be noted that having the entire Team in uniforms (a mandatory rule) was extremely helpful, as you always knew where everyone was without having to remember what they were wearing. Uniforms are also helpful when you stop to remember how much identification of individuals through binoculars was required when conducting launching and retrieving activities, especially when you are out in the field looking in.

Pins and Decals — Every World Championships is an expedition into a foreign land. As an exercise in goodwill ambassadorship, we elected to do as many countries do and give out souvenirs to the host country officials and their timers. This year, the Team's emblem (designed by Roger Simpson) was not only put on the T-shirts and golf shirts, but was also made into decals and beautiful small pins. Souvenir packages were then made up with two decals and a pin. All together, 48 packets were taken overseas.

Funds — Where does the money come from to pay for uniforms, decals, and pins? In the past, contributions were sent to the Team from the modeling industry. This year these contributions were small. Additional letters to Free Flight cubs brought in the much-needed funds, with a surprisingly large number of individuals sending personal contributions. The biggest surprise came at the Team Practice when I was handed two checks totaling over $500.00 Needless to say, we were overjoyed. It also meant that we had the funds to buy much needed retrieval equipment which will benefit future Free Flight teams as well as ours.

Team Equipment — Lists were compiled prior to the Team Practice as to what equipment would be required at the Champs. When we left for Spain, our suitcases were packed with the following items: Water jugs, Gator Ade, binoculars (one pair each), a tracking device to follow the airborne models and to record a compass heading once down, three hand-held CB radios, compasses, fluffies, signal flags, the two best thermistors I've ever seen work (Carol Allen's and Hank Cole's), two large ground covers with short tent poles for covering the models from sun and rain, two 16 foot mylar streamer poles.

When the contest ended, I knew that we had been the best equipped team; we had all used the equipment to our advantage and, looking back, could not think of anything we had needed in

addition.

Team Practice — Our final objective was a successful Team Practice. During this five-day period in Taft, the mini-teams realized their potential by working together in the pratice sessions held on Friday. During this time period, abort situations and preparation and use of second models was practiced. Additionally, two other phases were practiced: picking air and retrieval. Most Team members equate making the Team with flying at the World Champs. This is true, but 66% of the time you are chasing and helping others. This takes planning and execution, the willingness to do both, and then at the Champs, you must give 110% each chase day, maybe two in a row prior to flying. And, yes, you will be tired . . . I know we all were. The Practice went extremely well; it was a period of getting to know each other as well as getting the job done. We put Team members into the flyoffs in two out of the three events, winning one of them. But the point was, we were there to learn, and that we did. If asked if the Team Practice was necessary, I would have to say yes, yes, yes.

I don't think enough can be said about making prior plans for travel. In this case, it was getting in touch with the right someone with the booked airline. For our trip, it was Mr. Jim Anderson at TWA in San Francisco. TWA had been selected for reservations as they were the most reasonable. In March, while calling TWA to see about special handling of oversized boxes, I was directed to Jim Anderson in the Passenger Department. An instant rapport was established, and Jim looked ahead on his work schedule and saw that he would be working on our departure date and promised he would insure smooth sailing. At that time, I didn't realize just how smooth he would make it, nor how desperately we would need his help.

The reason I am emphasizing this connection is because of the now infamous Joe Foster event. Our scheduled departure was for 8:40 a.m. Sunday, the second of August. On the preceding Friday, I got a call from Joe. Bad news . . . heart problem. He was in the hospital and scheduled for most tests on Tuesday. If he passed the test, he could leave Thursday to join us Friday with one day to test (plus process) and then it's official flying. And at that, he couldn't guarantee that he would pass the tests. What to do.

We talked of many things, taking his planes and proxy flying if he couldn't get there . . . who to use proxy? Alternates; could they be ready to go? Who had funds for additional fare for an alternate? My next call was to AMA Headquarters; man, did I have a million questions to ask. "Sorry," they said, "*all* of *AMA* has gone to Texas for the Nationals!" A rash of calls to Texas found one reserved room but no bodies. A call to Les DeWitt, the first alternate . . . he couldn't go, business commitments. A second call found the second alternate, Bob White, on the way to Texas for the Nationals.

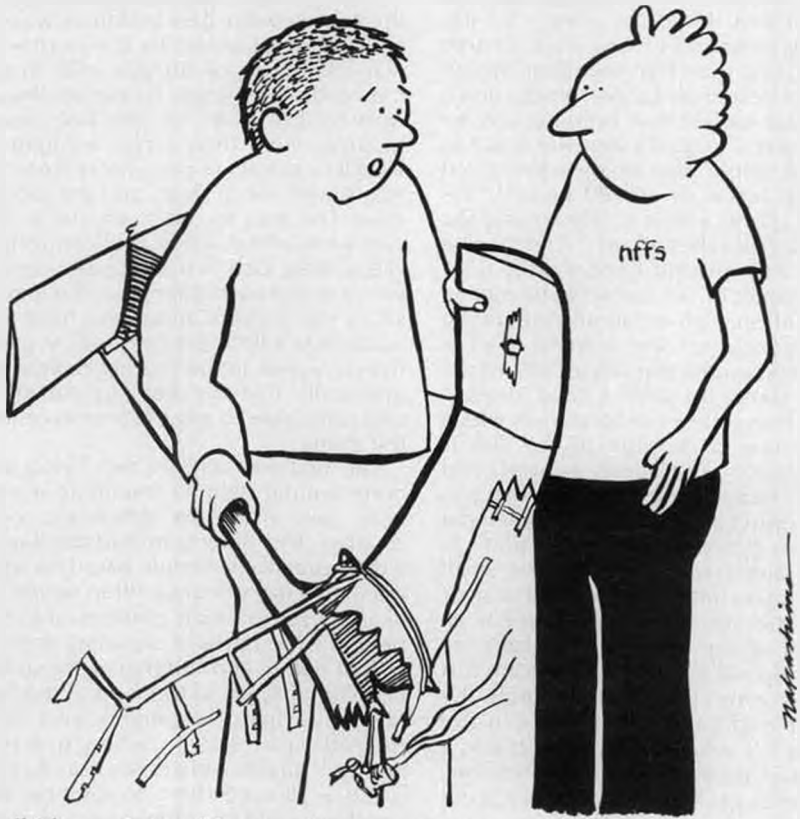
By this time it was mid-afternoon and I received a phone call from Joe Foster again. Please change his and his wife's tickets to the next Thursday and he will pay the difference of his advance fare and the new fare. OK, no sweat, new reservations, but a $2,000 increase. A return call to Joe. He was quiet after hearing the cost, then said, "What are you trying to do, man, give me heart problems?" He then informed me that he would not go at that cost.

Now what? No flier, no alternate, no AMA. Shortly thereafter, Joe called again. "Hey, man, the wife and I are going to go as scheduled on Sunday morning," Great, all of my problems were solved. But . . . when calling back to my booking agency to cancel his Thursday reservation, they said, "But you have already lost the Sunday flight for Joe." I have? In the process of getting his Thursday flight, his Sunday flight was lost. Let's get it back. "Sorry," they said, "we can't." I called TWA tickets; same story, no way. Remembering Jim Anderson, I called his office; he wouldn't be in till early Saturday morning. Nothing to do but wait . . . not much sleep.

Up early the next morning, I made a list of pleas to turn loose on Jim including the fact that Joe was the 1953 World Champion going back for another chance. My call to Jim was barely 20 seconds along when he said, "Hey man, I can take care of that no sweat." Within five minutes, he had Joe all fixed up, plus he arranged all seating for the thirteen of us leaving from San Francisco all the way to Madrid.

The next morning we all arrived at San Francisco International Airport early as requested by TWA. At that point, I found out who Jim Anderson was; he was the Field Manager in San Francisco for TWA . . . a somewhat important position. Jim took instant charge of our group: no standing in lines, all baggage went to a special check-in station and out to the jet, all of the model airplane boxes were loaded onto a cart and off they went. One group was then ushered to the check-in station where after five minutes of paperwork, we were then escorted aboard the airplane 15 minutes prior to the other passengers. Boy, was that ever great treatment!

Our next stop was New York City, Kennedy Field. Here we met Charles Martin from Seattle, and Carrol Allen and his wife. Our trip on to Madrid was taken up by sleep, bad movies, and many snacks. Finally we arrived in Madrid. By our California time it was 11 p.m., but no, in Madrid it was 8 a.m. and a new day was ahead of us. So was a 150-mile trip north to Burgos. But what a trip! Our transportation was a small nine-passenger minibus, a Spanish Ford diesel powered sweetheart. It had taken all morning to get the paperwork straightened out, so at noon six of us (Charles Martin, Doug Galbreath, Carrol and Jan Allen, and my wife Lynn and myself) plus many suitcases and model



"It put in three five minute maxes, but I had to keep tweeking, and on the fourth flight, splat!!"

boxes were loaded into it. The trip up through the mountains with one stop for lunch took five hours and 30 minutes. Low gears with heavy loads made for slow going . . . but at least it was fun.

Finally, our destination, Burgos. And now where is the Hotel Rice (pronounced Re-cee)? Our Team had excellent pre-World Championships housing ($21.50 for two), thanks to the efforts of the FIA Team Member, Juan Livotto. Juan works for TWA, and in March he had taken a weekend scouting trip to Spain. Accompanied by some Spanish Free Flighters, he journeyed from Madrid to Burgos where he scouted the flying field and after six hours of hotel hunting, managed to secure 12 rooms for the USA Team. Also, during this trip, Juan took a series of photos so that the Team would know what to expect. By the time we arrived at the Rice Hotel, we were really beat and boy, did the faces of the rest of the Team look good!

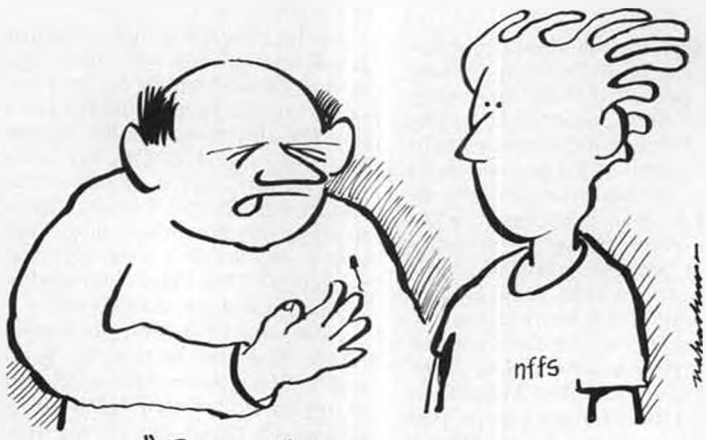
By nine that evening, life looked a little brighter after a good shower and a nap. At the Team meeting that night, the FIA Nordic Team briefed us on what field and flying conditions were like. (The FIA Team had arrived four days prior and had already become acclimatized to the time change and altitude.) Plans were made for a morning testing session, and then the Team broke into groups for a late dinner. But, as we were to find out, dinner was served from 2 p.m. till 5 p.m. each afternoon. The restaurants opened again at 9 p.m. to serve snacks (hot and cold). We also learned that things are done a lot differently in Spain in many ways. Charlie Martin had found an excellent Meson (Spanish restaurant) three blocks down the street earlier that evening, and he volunteered to guide my wife and I so that we might also enjoy some good cooking. Just as we arrived, he said, "It's a great place; a little junkie around the floor part, but they all are." And then he left us. As Lynn and I opened the door and stepped in, we saw what he meant. The small Spanish restaurants where the evening meal is taken is more of a bar than a restaurant. But at least 50% of the bar is taken up with a food display. Many, many dishes of food from which you choose. A portion of the dish is ladled onto your plate, heated, and served. Some dishes, like the octopus salads, didn't get tried, but the squid did and was delicious. As each plate is served along with two or three small napkins, you find a small table to sit at, or many times you sit or stand at the bar. At the end of the meal, as the plates are picked up, all of these napkins are just brushed onto the floor to await the once-a-night sweeping. Early in the evening it's not too bad; later it gets a little deep, especially around the corners where they get kicked. The food was still excellent.

Early the next morning, we journeyed to the flying field, Villifria Aerodrome, a small Spanish military field. Its runways were once, but no more. Now it was a crushed stone field with some rock runway numbers at the northeast end of the field. The runways ran southwest to northeast. Anywhere to the north side of the field were the Base buildings, woods, and industrial areas. To the northwest was the town of Burgos and heavy industrial complexes. To the southwest were wheat fields for the first three-quarters mile, then across a highway, woods, a stream, a river, more trees, an estate with mean dogs, and the mountains. The area to the south and to the east were wheat fields and low, rolling grassy hills. Our first impression (mind you, it was close to calm) was that maybe all of the rumors about the field and wind were a little exaggerated. As it was five days prior to the World Champs, we practically had the field to ourselves, and were able to get in some excellent test flying.

The first two days of test flying was done among light to moderate winds, rain, and warm to downright cold weather. The glider team had developed a daily practice schedule based on what the actual day of competition would be like. They arose early, journeyed to the field prior to daylight, stopping to get a cup of coffee and roll (typical breakfast in Spain) and on to the field at the first rays of daylight. Test flights were conducted until 9 a.m., when practice "official" flights were flown hourly. This practice allowed them to see how the weather would be at the various rounds. The only trouble with this was that the weather was so varied during the nine days of test flying that patterns were not discernable. During the first two days of practice we established a policy that would hold throughout the entire practice and competition time period . . . team meetings, at least one and sometimes two times each day. During these meetings we discussed our current needs, what we had learned, and how what we had planned back stateside was working here. Communication within the Team was kept at a high level. Also, during the first two days, we held practice drills of retrieving by car utilizing radios and compasses. We found out it wasn't easy as one would think. It was also sort of hard to be serious about practicing in front of the other nations' fliers. But we did it with good results.

Dawn on the third day came with high winds. We went to the field and found ourselves doing the same as all of the other fliers . . . grouping around cars and talking . . . looking . . . and touching someone's models . . . each group being a separate event. Not wanting to waste a day, we decided to spend the time exploring downwind. For the next three hours, Jim Wilson, Walt Ghio, and I wandered around the airfields, woods, rivers, crop fields, and industrial areas. Also during this time period, we drew a composite map of the available traversible roads and associated hazards. Back to the launch site. A test flight by a Wakefield was to be tracked. Joe Foster got out his oldest bird and his thermistor. Radios were coordinated and back downwind we went. The first checkpoint with binoculars and a radio were dropped off at the end of the field proper, where a slight rise gave view of

Continued on page 91



"Regarding the contest:
It's too far to go.
It's too hot
It's too cold.
It's too much trouble.
It's too costly.
I'm too tired.
I've got to clean my garage.
I've got to umpire a little league game.
Whaddyah mean I'm a loser?!"

"Spanish Fly Event" launch at Maxecuters meet. Left to right: Jim Daily and his Fiat CR-32, Don Srull and his He-112, and John Hunton and his He-111.

Congratulations and felicitations to Barnaby Wainfan and Lynn Buben (holding a Dean Deltair) who were married recently.

INDOOR

By KEN JOHNSON

MORE ON FLYING SIGHTS

Last time, I discussed the problems in securing a place to fly indoor models. For those of you who may have been discouraged in this pursuit, I submit this success story.

The indoor flyers in Southern California are split into two groups; the San Diego area flyers and two Los Angeles groups. As I live in the L.A. area, I will discuss these groups.

The indoor duration group (including people from San Diego and those from even the San Francisco area) sticks pretty much to itself and flys at Santa Ana. They prefer to keep themselves a small and select group as they are only interested in duration models, such as Microfilm, Paper Stick, Easy B, Pennyplane, etc.

The other indoor flyers in L.A. are interested in events like: Flying Scale, Manhattan and Boston Cabin, Peanut Scale, Hand Launch Glider, Hawthorne Flying Wing, A.I.R. XX (Oldtimer), Ornithopter, etc. Chris and Ken Johnson have been flying with this group. Recently we noted that modelers were falling away from our ranks because the buildings were rather small. These buildings included two school gyms and a community recreation center.

Several years ago we flew in the Navy/Marine Corps Armory in downtown Los Angeles. A fire in the building two years ago brought an end to our flying at this facility. The building was ideal because of the 300 foot floor and the clean 50 foot ceiling. Recently contact was again made with the commanding officer at the armory. A meeting was set up between Von Whitlock (current president of our club), your indoor editor, and Lt. J.G. Joan Unglaub, U.S. Navy, at the reserve site. We took along our models. Lt. Unglaub was very gracious and friendly with us and watched our models fly with interest. She related that we would be welcome to again use the building on a once-a-month basis. We have an arrangement that is renewed every three months. Needless to say, we are most grateful to Lt. Unglaub, Capt. Catriz (Joan's superior officer) and the staff at the armory.

With this site, I hope that we can encourage the indoor scale group to begin flying some duration type events. If we can get the seasoned duration modelers to come and fly with us, much can be learned from their expertise in trimming and building the exotic indoor craft. The youngsters and oldtimers alike can benefit from this arrangement.

Word has come from the flyers in Miami, Florida, that the Opa Locka Blimp hangar is again OUT for indoor flying. Doc Martin relates that flying is cancelled indefinitely due to the building being leased for other uses. Such a pity. However, the M.I.A.M.A. club meets will be held at Miami Dade South College's 27-foot high gym. If you are in the area and want to fly indoors, call (305) 858-6363 to confirm times and get directions. The address is 11011 SW 104 St., Miami, FL.

A GREAT IDEA FROM PITTSBURGH, PA.

Mr. Ron Ganser, mentor of your indoor editor, suggests a new event for the 1983 West Baden meet . . . a "Flap Happy" contest for ornithopters to be added to the other delights for the indoor crowd in '83. Ron allows that this will bring the ornithopter builders out of the woods and into the atrium at West Baden. To sweeten the pie, Ron suggests a cash prize be offered for anyone who puts up a "flapper" flight of five minutes. Other awards might be magazine subscriptions, etc. I, for one, would like to try for a five-minute flight at WB. The models should conform to AMA rules, so that records could be established in this category. More on this later.

SPEAKING OF WEST BADEN

Indoor expert Stan Chilton has been

Bill Kalb's Peanut Santos-Dumont "Demoiselle" at DC Maxecuters indoor meet. Pilot adds a lot of realism to model.

F.A.C. Scale judge John Preston checks out Les King's Grumman Bearcat, Navy Scale winner.

Doc Martin and Millard Wells compare notes in Grapenut scale. ("Pistacio scale"). Wells holds up laminated motor stick.

MIAMA's Walt Everson (Florida Indoor Champ, 1981) prepares to wind his Easy B model. Bob Andrews photo.

appointed to the Board of Directors for restoration of this very historical building. Stan has personally donated considerable funds to this effort, and is accepting checks from indoor enthusiasts who are interested in supporting indoor and the Northwood Institute at West Baden. The people at Northwood have been very kind to us. They have allowed us the use of their building many times. We appreciate their hospitality. Write your check to West Baden Springs Hotel Restoration, Northwood Inst., West Baden, IN 47469. Stan suggests $25.00 as a nice round figure.

BUILDING INDOOR PROPELLERS

There are several types of propellers that are used on various types of indoor airplanes. Many scale and peanut scale modelers prefer to use store-bought plastic props on their models. I do not recommend this. They are much too heavy and the pitch is too flat. The area is also incorrect for most models. The indoor flyers who have flown with yours truly, have only seen plastic props on my models when the rules of the event dictate that only plastic is acceptable. I have withdrawn from contests because I was unwilling to use this type of propeller. The only way a plastic propped indoor model can fly, is fast. I, for one, dislike models that fly fast. Show me a fast flight and I will show you a short flight. The object in indoors is to fly slow and long! The way to accomplish this is to use built-up wood props that are covered with microfilm, paper, or Microlite; or use sheet wood props.

Sheet wood props are used for Scale, Peanut scale, Pennyplane Easy B, Boston and Manhattan Cabin, A-6, etc. The blades are baked around a tin can (after soaking in warm water) at a 15% angle to vertical. A hard balsa hub is drilled for the shaft. The ends of the hub are cut to an angle to set the blades in the correct position. The blades are sanded to an airfoil shape and balanced.

Built-up props are more difficult to construct, but perform much better than other types. Begin by carving a prop block for one blade. A built-up block may be fabricated using sheet and strip balsa wood. The prop spar is selected from stiff, hard balsa and is sanded round and tapered to 1/64" round at the tips. This is accomplished by spinning the balsa back and forth through a folded square of sandpaper. This technique will become easier each time you do it.

The blade outlines are of very thin strip balsa. These are soaked in water and taped around a pre-cut cardboard form and baked in a 300° oven for 20 minutes. Much care must be used in handling these fragile outlines. After the prop spar is drilled at the center and balanced, the shaft wire is cemented in place. The shaft is then pinned to the prop block and the shaft wire aligned in the correct position. The outline of one blade is tack glued to the block and the ribs are cut and cemented over the lines drawn on the prop block.

The blade and the spar are then carefully cut away from the block and rotated so that the other side of the prop can be constructed on the same block. Be sure that the shaft wire is positioned at the same point on the block so that pitch on each blade will be equal. Be careful to use the same amount of glue on each blade so that both weigh the same.

The prop is now ready for covering.

Florida's Junior Champ, Heather Arak with her Pennyplane. Bob Andrews pic.

A table full of Peanuts at the maxecuters meet. Halberstadt by Nick Ropar and Pacific Standard by Jim Daily in the foreground.

Gabe Mora of Flightmasters is one of the better Junior Fliers in L.A. area.

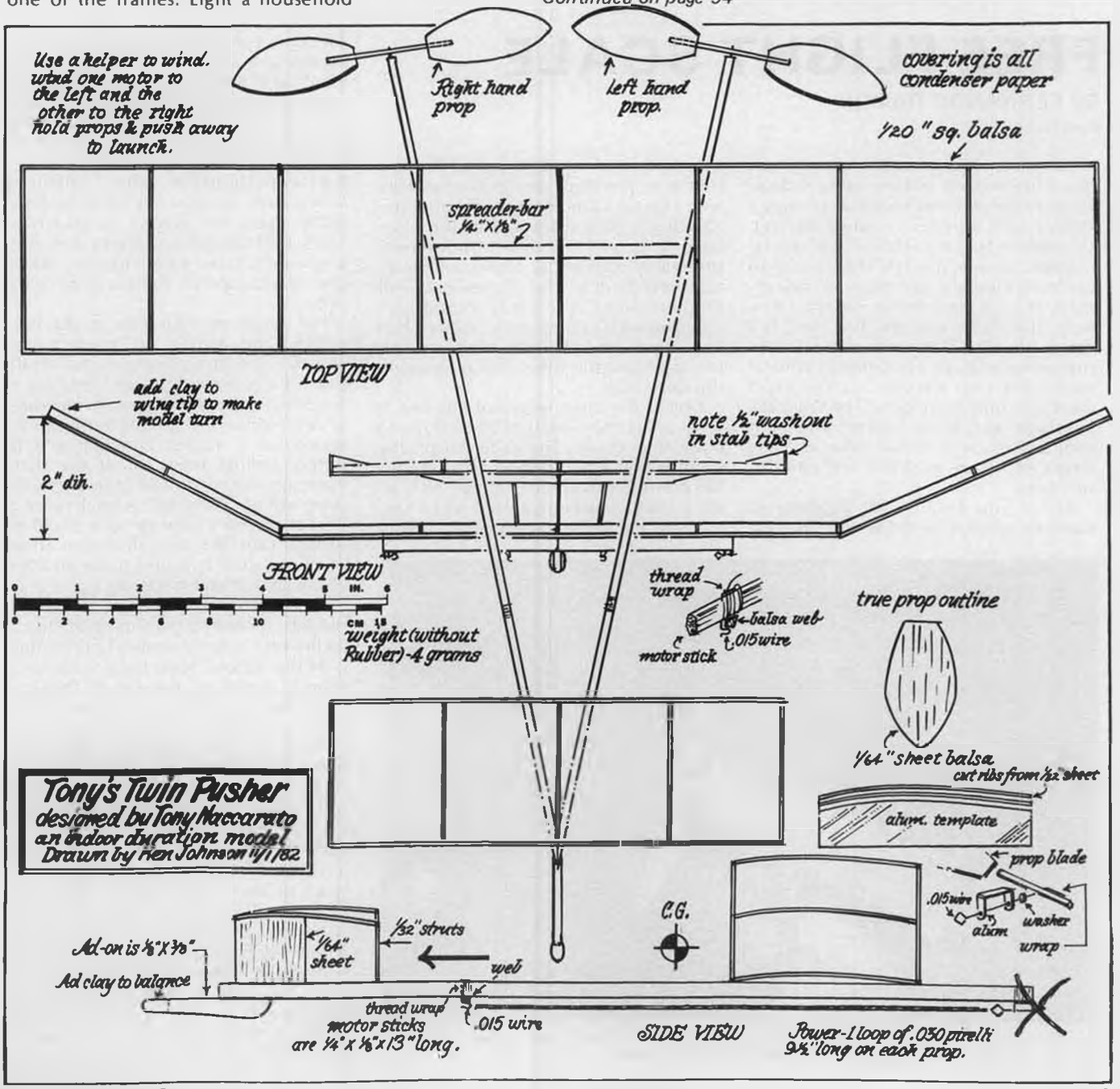
The problem with covering prop blades is that it must conform to a curved surface. Method 1: Construct 1/16 sq. balsa frames and transfer microfilm to these frames. Crack the frames at opposite corners so that the film bends at an angle to conform to the surface of the prop blades. Wet the outline of the blades and press each against the film on one of the frames. Light a household candle and hold a thin wire in the flame until red. Use this hot wire to cut the film away from the frame. A fine brush dipped in water will adhere the ragged ends of the film to the prop blade. When completed, the prop should be balanced and ready to attach to the airplane.

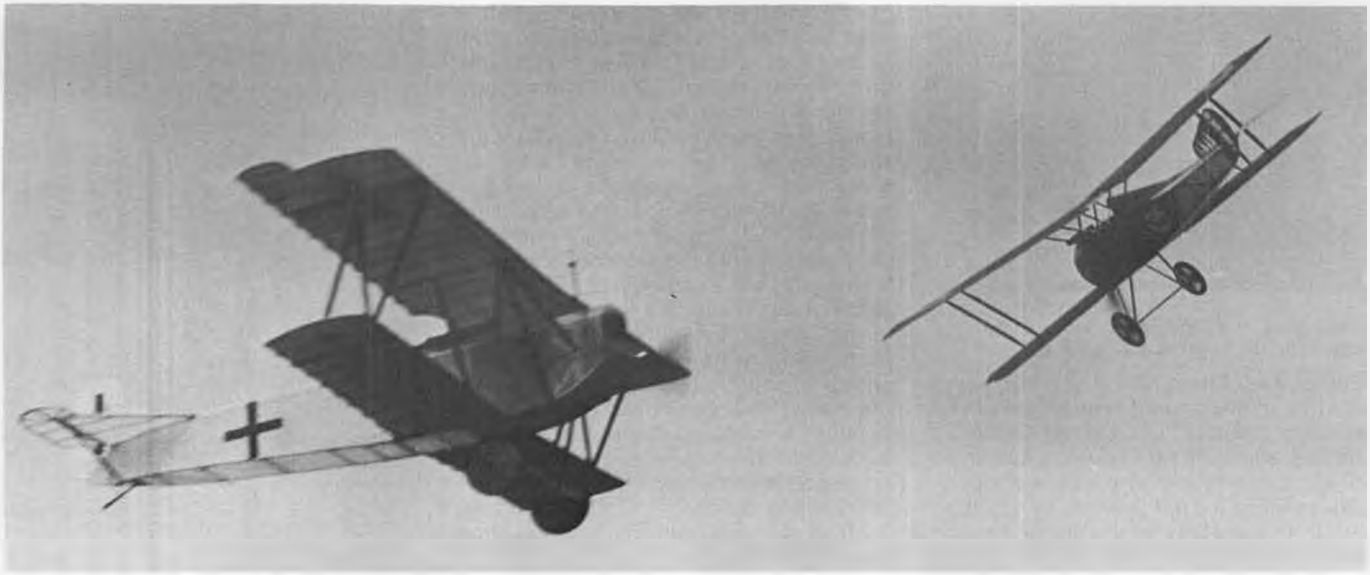
Method 2. Section off the areas on a large film covered Mic frame with strips of narrow masking tape. Cut 3 sides of a section away with the hot wire or a small brush dipped in acetone. While the patch of film is hanging down under the larger frame, attach the prop blade framework to the film. Cement one edge and roll the opposite edge against the film. This technique is described in detail in Ron William's book, *"Building & Flying Indoor Model Airplanes."* Look on page 136 in this excellent volume on "Everything Indoor."

Covering with Microlite or Absolite can be done with the technique used in

Continued on page 94

Carl Hedley from Florida with modified Peck ROG. He is a good competitor!





Staged dogfight photo by Lubomir Koutny, of Czechoslovakia. The Fokker D-VII and Hanriot are both CO_2 powered models.

FREE FLIGHT SCALE

By FERNANDO RAMOS

PHOTOS BY AUTHOR

• At a recent Flightmasters Annual, I saw many fine models and several new ideas. Have any of you ever heard of covering a model with Kleenex? I surely haven't. Dr. William Harris, of Hawaii, had several models covered with the common ordinary Kleenex. Are there any advantages to using this flimsy material? Yes, only one that I can see, however, is a major one. Dr. Harris was able to cover the entire fuselage of a Gruman Wildcat with only two pieces . . . You read correctly, only two pieces! The Wildcat's fuselage has many curves, and with ordinary tissue it would take as many strips of tissue as there are pairs of stringers.

All of you know what happens to Kleenex when it becomes wet, so great care and handling is in order. The first step is to pre-dope the entire fuselage with several coats. A single sheet of dry Kleenex is placed up against the fuselage. A section at a time is moistened, preferably with an air brush, and carefully attached to the framework with thinner. Doing it this way should provide you with a completely covered half of the fuselage. When dry, the first side is trimmed and the other half covered in the same way.

Due to the open weave of Kleenex, it takes at least five coats of 50-50 dope to close this weave. The other surprising thing is that when doped, the Kleenex has pretty good tensile strength. All I can say is that I was flabergasted when Doc told me his models were covered with Kleenex. For those of you who like to experiment, here's your chance. With giant size Kleenex available, all your models do not have to be Peanut in size!

Our Peanut construction article contributor this month, Maj. Ed Heyn, examining his Swallow TP. He's from Norwood, Mass. Photo by Bud Gay, Bristol, Conn.

Cliff McBain has sent in a super drawing showing exactly how the back end of Vince Castingo's rear free wheeling device should be. When I submitted Vince's free wheeler, my drawing didn't really show the groove as clearly as Ciff's. Cliff has also included a sketch for a revised Garami free wheelers, which can be attached on the backside of the prop.

For those of you who might have missed the article on Vince's free wheeler, it simply allows you to literally slip on a prop without any method of retention. It provides a means by which several different propellers can be tested on a model, and changed by simply pulling them off of the shaft. Naturally, when wound or in flight, the prop will not come off! A small piece of insulation from hookup wire could be slipped onto the prop shaft, just ahead of the prop, if it would make you feel better, but it isn't necessary.

Vince uses this system on all his rubber models, including old time Wakefields. So this isn't only for small rubber models.

At the '82 FAC Nats, Dave Scott had a superb model of the DH-4. Those of you familiar with the Liberty powered DH-4 realize that the cowl has numerous louvres. On Dave's model. These were faithfully reproduced and were very clean and crisp. I asked Dave how he made them. The procedure is surprisingly simple. The louvres are made on card stock. Therefore, it would be adviseable to first cut the light card stock to size. Then mark off where the louvres will be. With a sharp #11 blade (Uber or XACTO) make a clean cut where each louvre opening is. Do this with all the louvres at the same time. The next step is determined by the size of the louvre, and practice is recommended. With a straight edge, step back from the cut or louvre opening 1/16 of an inch.

While holding the straightedge firmly in place, carefully insert the blade into the cut and lift the edge. This will allow you to insert a small, flat, blunt tool into the slot. This is then run back and forth while still holding firmly onto the straightedge. Obviously, care has to be taken while doing this step, otherwise the corners will tear. Each louvre is made in the same way. Quick and neat!

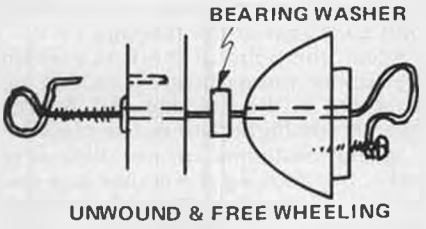
A step that I would recommend, is to saturate the underside of each louvre with regular Jet or equivalent. This would really stiffen up each louvre so that its shape will be maintained. Now, I have no excuses for not building the Douglas Mailplane (M-4?) and 0-38!

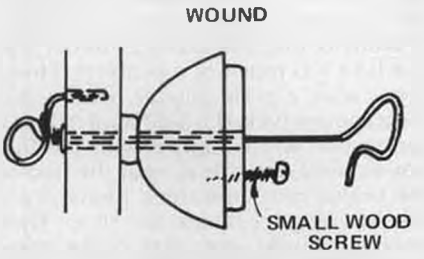
For as many years as I can remember, every plan I have ever seen of a rubber model shows the motor peg way in the back of the fuselage. This is true particularly in the old timer models. Many even show the rear anchor attached to the tailpost. I'm pretty certain that this was done in order to provide as much rubber as possible for more duration. To look at their plans, you wonder if the designers ever paid any attention to C.G.? I know several "oldies" had a wing you could shift fore and aft either on a pylon-like structure or directly onto the fuselage.

Scale models are no different, the motor peg is right back there near the stab. Not only is C.G. a problem, but on many scale models, such as a Monocoupe, the rear fuselage is so narrow than an unwinding motor just tears up the covering. Also, with a scale model, there is nothing worse than a beautiful model with a big hunk of clay hanging under the nose!

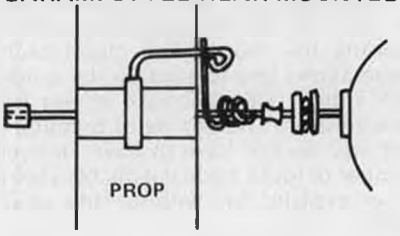
One solution is to pick out models like many of the new crop duster types, or like the Swiss Sclepp. with long noses which can counteract the weight of the motor in the back. Naturally, not everyone wants to build a crop duster. The best solution; move the motor peg forward. The last two Flying Aces Nats showed me something I had never seen done here in the West. That is, the motor peg is mounted just aft of the wing's trailing edge, either one or two bays back. This appears to provide less rubber length than the usual anchoring place. Actually, I think there is more rubber. The excess length is not as critical, because the rubber, when completely unwound, just sits in the fuselage at the C.G. with the motor peg in the usual position, you can't afford to have the motor bunch up anywhere, because you will get a drastic C.G. change.

Cliff Mc Bain's version of Vince Costanzo's clever free-wheeling device, which allows removal of the prop for repairs, substitution, etc. Only a tubing sleeve retainer is needed.





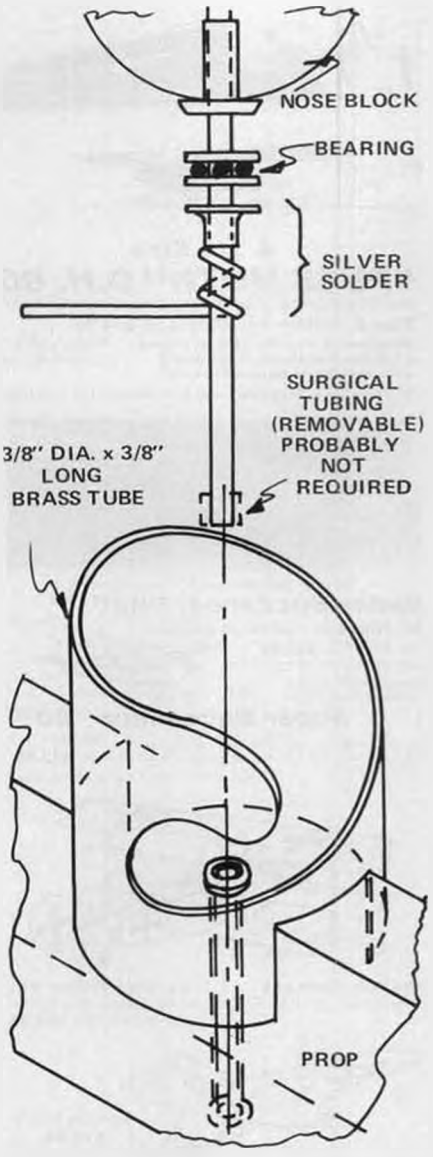
ONE TYPE OF SPRING TENSION FREE WHEELING DEVICE



Watching the "Eastern" modellers wind is an experience in itself! They stretch the motors so far out that one wonders how the rubber can take it. I know that after so many modeling years, I still have much to learn about the proper care and winding of rubber motors.

I've drifted a bit from my point! What I'm trying to say is, I recommend moving the motor peg forward from the normal position. Use the same motor length as you would if the "peg" were in the normal position. If after a test flight you found that the model came down with plenty of winds still left, add another loop of rubber half the size you started with. For example, if you started with two loops of quarter, then add one loop of 1/8. I don't think you will have to go to a third loop of the same size. One other solution would be to shorten the length of the motor, but at the same time you will be cutting down the duration of the model. So, I would stick to adding a bit more rubber until the flight and times are satisfactory to you.

If, on the other hand, you do not want to alter the position of the motor peg, then I definitely recommend the use of a spring tensioner. This will keep the motor taut between "hooks" so there will not be a change in the C.G. For those of you who may not be familiar with this device, it is simply a spring that attaches behind the propeller (see drawing). When the motor is tightly wound, the spring obviously compresses, and remains so until the last several winds. The spring then overcomes the motor's tension, and the prop shaft's hook catches a little screw in the back of the noseblock. This in turn prevents further



Vince Costanzo free-wheeler permits instant prop change. Notch tube for prop first, at least 1/8" into prop. Then drill 1/8" dia. hole and sculpture cam with Dremel cutting wheel no. 409 or equivalent. Prop shaft goes into aluminum tube with washers epoxied on ends on prop. Epoxy brass cam to prop well. Be sure shaft is long enough to go through prop when wire is up on top of cam in free-wheel mode. Also allow length so that motor tension load is on soldered bushing, and prop is free to move forward and aft in a floating fashion. Also note direction of wrap on catch wire, so that torque load is not tending to unwrap wire.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unwinding of the motor, and the prop then goes into a free-wheeling mode or folds back against the fuselage.

Again, the point of this is to prevent the rubber motor prom bunching up anywhere in the fuselage and altering severely the flight path of the model.

Spring tensioners are not difficult to make, but moving the motor peg forward is a lot easier. The most difficult part of the spring tensioner, is to find a spring with the right amount of "spring". With a large model like an old timer Wakefield, they use so much rubber that this isn't too much of a problem. However, with a scale model, where not much power is used, it's difficult to find a spring that will compress with the low power used, then relax near the end of the motor run. One thing I have done was to visit a local auto tire shop. They generally throw away all the valve stems on tires they are replacing. These units each have a neat spring that can be used for our purpose. If you find that one of these springs isn't enough, try two, with one threaded between the other.

Finally, there's a third and easier way to cope with bunching motors, that is braiding the motor. This clever technique allows you to load up the model with rubber and still have it taut between hooks. The beauty of braiding is that you do not have to have an even number of loops to do it with. Let's see if I can explain this without any visual aides.

Let's assume that you want to braid a three-loop motor. Anchor the knot end of the motor onto a peg or have someone hold it. Take two loops and stretch them out a bit and put about 15 turns of a winder on them. Have someone hold that end. Next take the single loop and do the same thing. Take the two separate windings and slip them into the winder, and let the winder handle go. The two wound loops should intertwine to form a single braided loop. Place the braided motor into the fuselage. You may find that it sags quite a bit between hooks. To remedy this simply stretch the motor out of the fuselage, put in a few winds, and stuff it back into the fuselage. The motor should no longer be slack. Easy eh? This will work with any number of loops.

O.K., now you choose which ever method appeals to you the most, and the one that will do the job for you. Maybe, a combination should be considered. •

Counter . . . . . *Continued from page 9*

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★ ★ ★

Northeast Aerodynamics, 568 Main St., Haverhill, MA 01830, (617) 374-0229, is currently manufacturing what it believes is a truely practical, economic, easy building and flying, first trainer, appropriately named the Train-Air .20.

Following the philosophy, "Why learn what you have to un-learn later?", Northeast Aerodynamics believes in four-channel operation for all its trainers (including the Train-Air .20) rather than the more common three-channel configuration which Northeast feels is "outdated." The Train-Air .20 is a 52-inch span model designed for engines of .15 to .25 displacement. The kit is first-rate, and includes: all pre-cut parts; plans and instruction manual; pre-formed landing gear; and engine mount pre-drilled for nose gear. The Train-Air .20 builds accurately on a flat building surface without the need for special jigs.

Beginners will be relieved to note that wing and fuselage kits can be purchased separately . . . just in case . . . The Train-Air .20 is available from your local dealer for a suggested retail price of $49.95. If he doesn't have one available, contact Northeast Aerodynamics directly.

★ ★ ★

Attention Wankel rotary engine lovers. World Engines, 8960 Rossash Ave., Cincinnati, OH 45236, (513) 793-5900, proudly announces the long awaited, completely redesigned, .30-size O.S. Wankel. Now in production, the new Wankel rotary no longer has the aluminum cooling shroud around the rotor housing that the previous model had. Boasting improved metallurgy throughout, this engine should prove more durable and reliable than its predecessor.

So, if you dislike the appearance of cylinder heads sticking out of the engine cowl of your favorite flying model, and you are looking for a compact, smooth running engine, look no further; the O.S. Wankel rotary is here! Available exclusively from World Engines.

★ ★ ★

Hunt Models has recently released the Porterfield, the third in Ralph Hunt's series of CO2 powered planes. The Porterfield has the same high quality precision cut balsa parts, pre-formed wire landing gear, full size working plans, and building methods as the Fly Baby and the Longster which have been on the market for some time.

The Porterfield features a new technique for building the wing struts, and the kit comes complete with inflatable wheels by Trexler. Look for the Porterfield at your local hobby dealer, or write to the manufacturer, Hunt Models, P.O. Box 21B, Dassel, MN 55325. Dealers contact Midwest Model Supply, Romeoville, IL.

★ ★ ★

Kimbrough Products has improved its line of widely used servo gear-saving output arms, and is currently manufacturing them for use with most Futaba, Sanwa, Kraft, Novak, and Bantam servos. If you need to protect your servos from the inevitable jolts and shocks of R/C on or off-road car racing, whether it's 1/10 or 1/12 scale (and who doesn't?), then you're going to want to upgrade your rig with these high quality units. They are available to fit: 4.5mm square drive (.177 in. sq.); 4.3mm sq. dr. (.169 in. sq.); 4mm sq. dr. (.157 in. sq.); and 21, 23, 25-spline drive servos. At $3.00 each, these servo gear savers are cheap insurance

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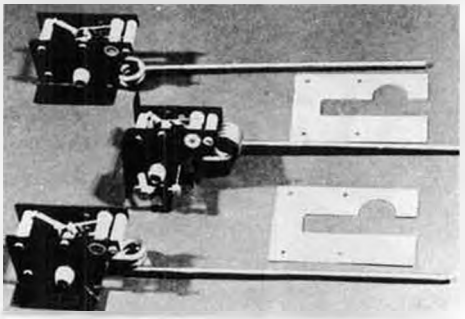

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against stripped and broken gears.

And while we are on the subject of gears . . . Kimbrough Products now has a line of replacement differential gears for your 1/12 car, whether it be an Associated. Bolink, Thorpe, or Leisure diff. The gears are made using the latest in plastic gear technology, with computer designed molds and very low friction plastic materials. A 1/4-inch to 3/8-inch plastic bushing is included with each gear. And to make gear identification easier, Kimbrough molds in the number of teeth near the outside edge of the gear where it is readable on the car without disassembling the diff. These precision differential gears come in 44, 46, 48, 50, and 52 teeth versions for $3.00 each.

Both servo savers and diff gears are available directly from Kimbrough Products, 1430 East St. Andrews Place, Unit E, Santa Ana, CA 92705. If you have any questions regarding these items, write Kimbrough or phone (714) 557-4530. Minimum order is $10.00, California residents add 6% sales tax.

★ ★ ★

Attention Sunday fliers! The BIG "E" from E&L Manufacturing is here. The BIG "E" is a fun-to-fly, quarter-scale size, aerobatic airplane designed to impress the experienced pilot, yet gentle and forgiving enough for the beginner.

The BIG "E" kit comes partially prebuilt to save many hours of building time. It features a new, lightweight, synthetic laminate wing covering that comes pre-bonded to the thick, symmetrical foam wing core. A box spar is already installed in each wing panel when you buy the BIG "E", so you are assured a strong, durable wing. Likewise, the turtle deck, and full length fuselage sides come pre-formed from this laminate with all internal vertical and horizontal stringers glued in place. The firewall comes pre-drilled for the EVRA motor mount, but can be modified to accept other engines in short order. Kit includes all hardware.

BIG "E" specs read as follows: wing span, 84 inches; length 70 inches; ready-to-fly weight, 14-1/2 pounds; engine, EVRA or similiar quarter-scale engine.

You can buy a BIG "E" kit directly from the source by sending a check or money order for $199.95 (plus $15.00 for shipping and handling in the U.S.) to E&L Manufacturing, 8631 East Laredo Lane, Scottsdale, AZ 85253.

Also note that E&L is now a "factory authorized EVRA repair station." They have available a $45.00 update kit for the EVRA engine, or if you prefer, you can buy an assembled E&L EVRA engine for $110.00 (plus $5.00 for shipping and handling in the U.S.).

★ ★ ★

Worried about aileron flutter? Concerned about aileron hinge gap, warping control surfaces, and the cost of hinge material? Then you should consider Granite State R/C Products new iron-on gapless hinge. At $2.49 per 46 inches, you can't go wrong. With nothing more than a Monokote iron and some of this material, you can have a strong, flexible, gapless hinge in seconds. That can either be painted or Monokoted over for a beautiful finish. Contact the distributor, Granite State R/C Products, Inc., 405 Main Street, Nashua, NH 03060, (603) 888-3302 to place your order. Dealer inquiries invited.

★ ★ ★

DJ's Multi-Stripe and Accessories has just come out with a handy little set of items that every modeler and handyman should have in his hardware collection . . . metric bolts with washers. If you've ever been delayed on a project for the lack of a few metric bolts, then you will want to stock up on these 3mm x 12mm, and 4mm x 12mm bolts and washers, to prevent future frustrations and aggravations. These Phillips pan head gems are available through your local dealer at 50 cents for a package of four. If you don't see 'em, ask for 'em, or write DJ's directly at: 4959 York Blvd., Los Angeles, CA 90042.

★ ★ ★

For the guy who loves 35cc Quadra powered scale models with as many truely scale-like features as he can get his hands on, or the BIG Bird flier who wants an extra measure or convenience when he flys . . . Mid Am Products, 1506 South 16th Street, Fargo, ND 58103, (701) 280-0755, has announced the availability of a remarkable on-board starter system for the 35cc Quadra engine.

This compact, quality engineered, starter system sells complete with engine mount with vibration isolators, all metal gears, 12-cell NiCd battery, wire harness, micro switch, and complete assembly instructions for $199.00. The vibration isolator mount can be purchased separately for further starter motor installation; it costs $40.00. The system does not restrict space for a muffler, it mounts ahead of the firewall, and it fits behind most engine cowls. What more could you ask for?

★ ★ ★

Gleason Plan Service, Rt. 2, Box 125, Austin, MN 55912, (507) 437-3781, is offering a scale model aircraft plan locator service, and full-size plans list from old kits and magazines for the scale modeler who likes to be time-efficient and accurate.

Dick Gleason has gone through all plans and hand traced them to correct any errors and distortion sometimes caused by photo reproduction processes. A list of his full-size plans is available.

If what you need is a reference source to help you find where and when a particular scale model was published, then send a large self-addressed, stamped envelope, plus 50 cents per model requested to Dick Gleason. He will then look it up for you and send you back a photo copy of the index card that he has on file for that particular plane. On the copy will be the designer or

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The R/C world has been waiting for this product for 30 years! A dependable, fast/slow rate charger that will safely and rapidly charge both receiver and transmitter batteries from a 12V DC source, then automatically cut back to an overnight charge rate. For 4.8V receiver and 9.6V transmitter packs only. Charges a 500 mah receiver pack to 85% in less than an hour. Available in kit form or assembled. Both are furnished less connectors.

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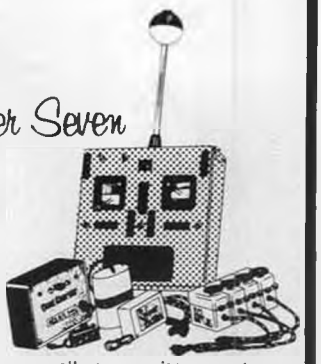

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artists name, publication, month and year published, model or plan scale, wingspan, published plan scale, flying power, and type of plan (three-view, plan with cross sections, photos, etc.). With 560 different makes, and over 1600 different models on file, he should be able to assist you in your search. Give him a try! •

★ ★ ★

P-43 . . . . . *Continued from page 19*

controls are installed. This permits removal if necessary to adjust the internal rudder, elevator, and steering linkage.

A polyurethane mold was made to form the canopy. I used the mold first to make a frame using 2 oz. cloth and resin. The mold was then blued to a 2x4, clamped to a folding chair and the plastic heated in the kitchen oven after stapling to a plywood frame. Not exactly vacuum forming but the technique has been working for forty years and I always get a good one by at least the third try. The canopy is separated at the windshield line and the frame glued on after painting. The sliding track is made from model railroad type plastic material . . . a slotted square for the track and an I-beam piece glued to the canopy . . . so smooth you will need a locking latch. The guys who watched me fly the P-43 at the Scalemaster finals in California will also tell you that the canopy stays on better if you remember to use the lock!

The wing fairing is added to the fuselage after the wing is bolted in place. Cover the fillet area on the wing with Monokote to avoid sticking of the resin. The fillet is made from urethane foam, glass cloth, and microballoons in resin.

COWL: The cowl is a big one. I carved it from urethane foam after first gluing pieces of foam together with a ply ring in place at the firewall position. The ply stays in as part of the cowl and is used to hold the cowl to the firewall. Two 10/32 nylon bolts at the top left and bottom right of the ply ring hold the cowl to the firewall. These are installed with a small socket wrench through the front of the cowl. This system proved so simple and positive that I have routinely removed the prop and cowl after each flight to refuel the model. It takes less than a minute for each flight. The cowl is glassed with a layer of six ounce and a layer of two ounce cloth with resin. When hollowing the inside, leave some thickness towards the front edge and glass over this for added rigidity. The cowl flaps are cut and reglued in position after the cowl is finished. The dummy engine is fastened permanently to the cowl and removed with the cowl.

TAIL SURFACES: I knew that I had to keep the rear end of this bird light, as it has shorter moments than most WW-II aircraft. (There are some a lot worse, Typhoon for example.) Construction was standard all balsa with 1/16 sheet covering. All surfaces then covered with silkspan paper and nitrate dope. Not the most recent technique, but hard to beat for weight. I did solder up a heavy duty elevator horn from 5/32 wire and brass (silver solder). This horn connects inside the fuselage to the fiberglass pushrod. I expected some additional vibration on the tail surfaces from the chain saw engine, but was pleasantly surprised to find even less than on my P-40 with the 90 glow engine.

LANDING GEAR: The retract gear on the P-43 is a modified version of the original design used on my P-40. It had to be compressed in height to fit into the thinner wing space. It does not have to rotate either. The P-43 flew with smooth tires and the five-inch Du-Bros with wheel covers are very realistic. By the time you read this, CB may have some that are even better. The homemade retracts have worked very well, but there are now a number of systems on the market that will carry a 20 pound model without problems. Just about any of them will fit.

I had already started to build the P-43 before I realized that the inner gear doors did not stay down when the gear was down as on the P-47. I did not pay much attention to those details when I was flying the original. It suddenly hit me that I was faced with a gear door actuation cycle that was to appear much later on the P-51 and F-82. In short, the

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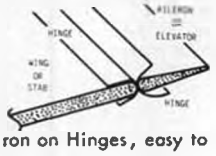

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doors are closed except when the gear is actually going up or down. I tried the Byron valve used for this operation on their P-51, but with the retracts slowed to scale operating speed, I could not get reliable operation without a three-position transmitter switch. I finally installed a Sonic cylinder drive for the doors, with a separate servo and valve. Air comes from the same supply as the main gear. Works fine as long as you remember where the transmitter switches are supposed to be.

The P-43 tail wheel did not retract inside the fuselage. On later production models, the tail wheel strut was moved back in flight about thirty degrees to reduce the drag of the extra long strut. (About the ugliest tailwheel setup I have ever seen on an airplane.) The long strut was added when pilots complained that the rudder was blanked out when the tail was low in the original configuration. The model also needs all the rudder you can get in any cross wind. A Sig nylon nose gear bracket holds the tail wheel strut nicely, with an internal steering arm connected to a Golden Rod push rod.

FINISHING: This is where things really got interesting on this model. The original was in factory-fresh natural aluminum, with only the basic AAF markings applied at the factory. Natural metal has always been a tough finish to make look right. This time I think I came as close as I am going to get, but not without a price.

First the model was glassed. Two ounce cloth on the fuselage and 3/4 ounce on the wing. (Tail was paper-dope) K&B resin squeegeed off and followed by auto primer. The entire model was now given a spray coat of Hobbypoxy Silver. Panel lines laid with 1/64 tape and rivit detail added. Now the big decision. I had picked up a spray can of Dupli-color Aluminum at the local K-Mart store, and made some experiments. Sprayed on and buffed, it looked more like real metallic aluminum than anything I had seen. It actually looked better than the real aluminum tape I used for panels on the model. Suspecting that anything that went on that easy could not be all roses, I took some test panels out to the flying site and stuck them in the exhaust gas from different models. Gasoline exhaust did not seem too bad, but glow fuel proved an instant disaster. Please do not entertain any thoughts of using this paint on a glow fuel powered model. You will wind up with the worst mess you have ever seen the first time you run the engine.

Yes, I did paint the P-43 with this stuff. When buffed within a couple of days after painting, the finish looks just like metal. It also takes about thirty days for the enamel binder to dry hard enough to prevent pressure marks from the fingers, and even after that, perspiration from fingers will leave permanent marks. Right now it has a good set of prints on the vertical fin. They were put there by a lady photographer in California who just wanted to move the tail around for a better photo. Remove the prints with a little Dupont Prepsol? Forget it. It takes the paint off right down to the epoxy coat.

In summary, this paint provides a super looking metal finish, if you can look but don't touch. It actually gets better with time as it tarnishes a little. On the plus side, it is easy to touch it up with just a light spray from the can. If you use it, plan on doing just that at frequent intervals.

RADIO: An eight-channel J series Futaba is currently flying the P-43, and all eight channels are used for competition flights, where the tank or bomb drop feature is wanted. Four Futaba servos work the ailerons, throttle and rudder, while two Kraft and a Heathkit move the retract valves and the bomb racks. Ace Atlas servos handle the elevator and flaps. The Ace 1200 ma battery pack looked like a good idea, with nine servos including a couple of heavy duty types.

Although the J series Futaba was not designed with scale in mind, some features can be adapted to make scale operations easier. The inner gear door servo is connected to the flap position and actually operated by the flap elevator mixer switch. This switch is at the top of the transmitter, next to the retract switch, so the two functions can be operated together without problem. The spoiler switch is used for flaps, giving two fixed positions, half down and full down. This switch is also at the top in easy reach. Channel 8 for tank drop is the nasty where you have to let go of the stick to work it. Not good if you want to simulate a low level napalm run.

ENGINE: Although this was my first Quadra powered model, I had a lot of advice from our local Quadra experts, Mario Yederlinic and Wayne Rippel. My only changes to the standard Quadra purchased from Balsa USA, were to add a spring-loaded choke and provide a direct throttle link to the servo, made from Du-Bro ball links and a bellcrank. This gives me a full range of throttle, including positive shut-off from the throttle servo. The scale exhaust extension is made from copper plumbing elbows and aluminum pipe. It is held in place with Hi-Temp Silicon Gasket material from G.E. The red stuff at your local hardware. After more than thirty flights, I still have not learned anything more about the Quadra engine. All I do is put a fifty-to-one mix in the tank and go fly. I start it with the Sullivan starter just like a glow engine. The choke is operated from inside the cockpit. Just hold it down until the engine fires and you are in business. I started flying with an 18x8 Dynamix prop, and so far, all flights except one have been made with the same prop. It turns 7400 on the ground.

FLYING: I checked the balance of the P-43 before installing the servos in the fuselage. It turned out a tad nose heavy,

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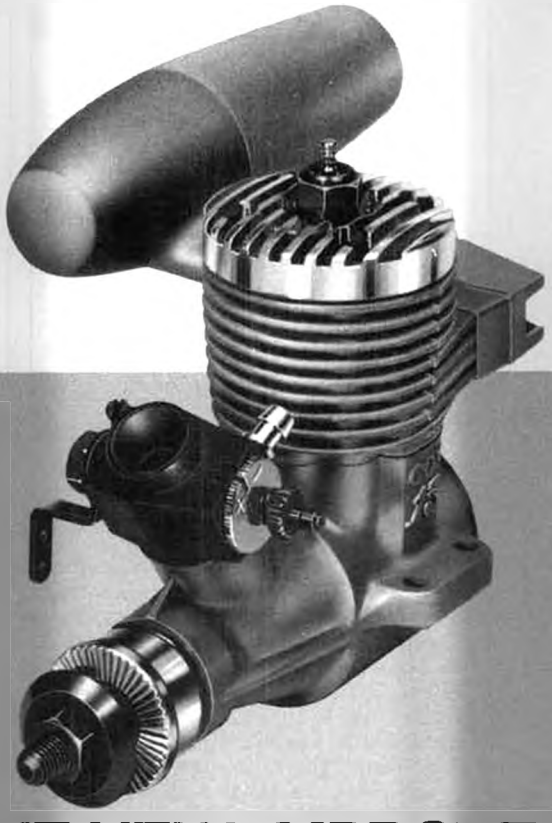

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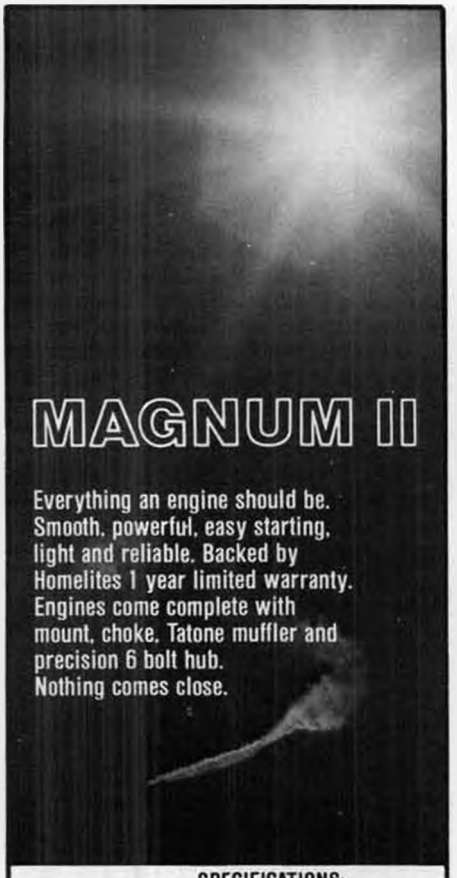

SPECIFICATIONS:
2.5 cu. in.
Engine weight 4 lb. 6 oz.
Solid state ignition
Roller bearing at flywheel
Ball bearing at rear
Hemi-head chamber
Schneurle ported
2 pc. con rod—bearings
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so I was able to move these servos farther back than I had originally guessed. The first flights were from a grass area at our local test field (Polo Grounds). The model turned out to be so easy to fly that I let a couple of our club members fly it on the third flight. No surprises, and it lands just like all the other Republic fighters that I have flown. Point at the runway, ease the stick back, and it squats and stays there. They did not call them lead sleds for nothing. I like flaps on a model so well that I have not even tried no-flap landings on any of my recent scale models. The split-flap on the P-43 adds just the right trim for landing.

I was shooting for something like 18 pounds all up weight, but the model, complete with drop tanks, finally came in at a hair over 20 pounds. This did not affect flight performance at all. The model can be horsed off in half the length of our 250-foot runway, although a longer takeoff looks more realistic. The Quadra hauls it at a good scale speed through loops, immelmans, or anything else you want to try. In other words, it turned out to be a gas engine powered fighter that flys like the original. Why not? The original also used a gas engine!

The P-43 model first flew between Christmas and New Years of 81-82. I took it to a couple of Biggie fun-flys before getting around to a contest. Last summer it was entered in three meets, where it did not do badly, with two firsts and then a third at the California Scalemasters finals. This may not be the ultimate P-43, but right now it may be the only P-43 in existence. This will change when you build yours. When you do, you will have a unique, classic early WW-II fighter that looks and sounds right in the air . . . and with the gas engine . . . you will have it in the air more than if powered with the usual engine. •

Big Birds . . . . . *Continued from page 21*

mind is a must for me; I feel more confident. And like most people, when I feel more confident, I act that way . . . which makes me a better and safer pilot.

Getting back to the hinge gap bit, I've settled on a method of hinging that all but eliminates any gap (you do have to recess the hinges with some care): using the relatively new Du-Bro 1/4-scale hinges, I discard the individual cotter pins and substitute one long, continuous piece of .047 music wire. This installation not only effectively fills the gap, but allows the control surface to be removed at any time for cleaning or repair in that area. The wire is kept in place by making two right-angle bends, about a 1/2 inch apart and with a tang about a 1/2 inch long, in one end; then after installing the wire through the hinges, push the 1/2 inch tang into the wingtip or stab tip, secure it with Hot Stuff and, if you're real fussy, cover with the same material used on the bird.

There's no "easy" or "magic" way to lick the vibration problem. Paying attention to the details while building and installing the control system, followed by *frequent* inspections (*that means before and after every flight*), is the only way to maximize both safety and enjoyment. Our miniature aircraft demand that kind of care!

NOT JUST ANOTHER PRETTY FACE

It's not that I thought he would lie to me, but when flying buddy Al Willaert called to extoll the virtues of a German chain-saw engine he had converted and tested, I really didn't take him seriously. . .

What kind of way is that to treat a friend? Well, there's nothing wrong with being a bit skeptical, no matter who's talking at you . . . and besides, I never really called him a barefaced liar. It's just that Al's a hard-core prop-drive addict (his A&M Aircraft Supply, 1801 S. Crest, Carrollton, TX 75006, custom makes single and dual prop-drives) and has stayed with slow engines all this time . . . so it was kinda hard to believe that he'd get so excited over a gas engine.

Al chewed my ear off about the six great flights he'd already put on this engine, and invited me out to fly it . . . which I did. And now I'm equally impressed, because his new mill started on the first flip every time (I made five flights), ran every bit as smooth as any other engine I've handled . . . including the Kioritz and the Kawasaki . . . and delivered solid, unfaltering power immediately upon request.

The test vehicle, an overweight (24 pounds) and decrepid "Ugly Tree" (a slightly smaller Big Stick with a foam wing), was, to my amazement, a pleasure to fly . . . and the 20x10 prop seemed to be a good match for that engine/airframe combination (Al hadn't tried any other prop sizes . . . yet). As you can see from the photo, this engine ain't no ravin' beauty; she's squat, and so much of a short-stroker that at some angles the cylinder head appears to be missing.

According to Al, this engine is rated at 3.97cid, with a bore of 1.77 inches and a stroke of (only) 1.27 inches. It has a magnesium alloy case, a double-balanced and double ball-bearing supported crank, a conrod with bearings on both ends, a single ring piston, pump-type carb, and a pointless magneto ignition. "All six pounds of engine will be called the '3.1 Whirlwind,' Al sez.

When I found out that she tached 7500 with that 20x10, I was about to open my big mouth and advise him to load her down with more prop to about 6500 . . . but had second thoughts; just about all other gas engines we're using are strokers compared to this "squat one" . . . and therein lies the difference. A long stroke engine can put out good torque at lower RPM, but a short stroke design has got to maintain a higher speed in order to be competitive. So it may well be that Al did have close to the optimum prop for this particular aircraft. He was definitely showing off by getting the idle down to a rather absurd low of

1200; at this setting the engine did run a bit rough, which was not too surprising. At a more normal idle of 1600-1800 she smoothed out completely.

The Whirlwind has presently logged almost twenty hours and is just starting to loosen up and put out a bit more RPM. The muffler shown in the pic is stock, and although it did a fine job of noise abatement, it is kinda bulky and will be replaced by an equally effective, but much more compact design . . . so the production/models may be a bit lighter.

One of the gang pointed out that by being short on the stroke, the Whirlwind would typically have a shorter life span than a "square" or longer stroked engine. Technically this is true . . . but as these engines have such fantastic longevity to begin with, a shorter life won't ever really be noticed. The odds are it'll be totalled hundreds of hours before it would have died from old age . . . and that's after much airtime and wearing out a couple of BIG Birds.

Being so compact should have its advantages: this 3.1 will be easier to cowl than most engines in its class, allowing it to be used on a wide range of aircraft; and uncowled, it should cause less drag. Its lighter weight should also be a big plus; and for its displacement, this engine is a miser, running a full minute on only 3/4 of an ounce of fuel. And for whatever reason, the Whirlwind seemed to have the smoothest and fastest throttle response of any engine I've ever heard (no . . . Al was not using super-fast servos) . . . with no hesitation or uneven running at lower RPM.

Even though the 3.1 Whirlwind couldn't by any stretch of the imagination be called "another pretty face," it'll certainly add to the growing list of smooth running and dependable engines available to us BIG Bird Lovers. I liked "The Squat One" so much I'm going to get one as soon as A&M has production models ready.

SOME "FUN SCALE" . . . AND ONE SCALE

Although some of us have no specific building season because we do fly all year long, most BIG Bird people utilize the winter months for building and refurbishing. I realize that you'll be reading this sometime in January, and may already have a good start on your new dream machine . . . but . . . just in case you're at loose ends, or feel that you can squeeze another project into your schedule, I've got a few suggestions. . .

1) If you'd like to stay with a sixty or ninety (either as a glow, or even better, converted to diesel or ignition), but are tired of the look-alike high wing puddle-jumper designs, why not consider the "90 Turbulent" by Chuck Cunningham (Sky Master Industries, 2440 Colonial Parkway, Ft. Worth, TX 76109). As his 60 inch Turbulent turned out to be such a dandy flying machine (RCM Sept. '82), and the 72 inch 60 Turbulent proved to be even better, it's obvious that the 84 inch 90 size will overshadow (pun in-

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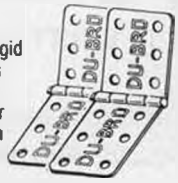

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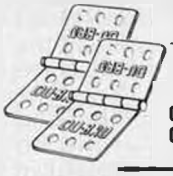

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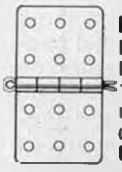

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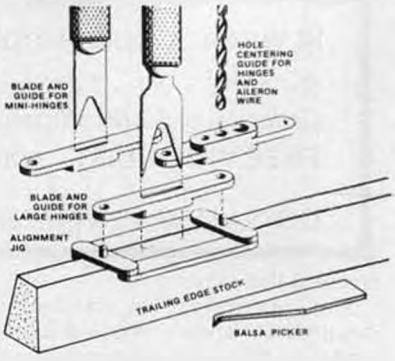

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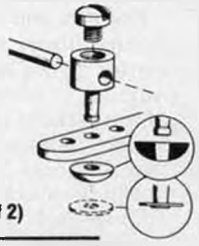

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Made for self threading, these "sure-lock" links for any throttle hook-up. The Mini-Links are only ¾" long.

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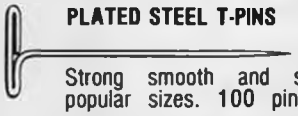

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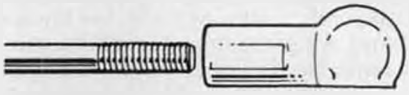

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tended) the others.

She's an attractive, stand-off scale design that handles well and looks nifty while on the wing; and even though a taildragger, makes everyone who flies her look competent on takeoffs and landings. The plans and instructions are good, the bird builds very fast, and she's strong without being handicapped by excess weight. In fact, because she'll come in at about 10 pounds, I'd recommend using a sixty instead of a ninety; the bigger engine just isn't necessary. Keep in mind that this isn't supposed to be a barnburning Formula I; she was designed for easy flying and loafing around . . . although with her low weight and wing loading, aerobatics can certainly be part of any flight schedule.

I've flown Chuck's 60 Turbulent and thoroughly enjoyed it, although I'd make the same two changes to it that I'd make on the 90; go to a smaller engine than the one called for, and the more realistic and less harsh sound of a diesel or ignition conversion.

This BIG Turbulent won't get lost in the shuffle or be overlooked by anyone, 'cause she's gonna stand out amongst all those Cubs and such. And for those who are power-mad, the portly Mr. Cunningham also offers a few pointers in case you've just got to do something with that extra Quadra that's gathering dust. . .

2) Now, if you're a bonafide gasoline engine man who digs fast building, fast flying, fully aerobatic fun-scale biggies, then contact Wendell Roberts or Randall Snow, c/o Air Tech, P.O. Box 9044, Little Rock, AR 72219. These guys have come up with great sport flyers; I saw their Pawnee and Eagle get handled and manhandled back in July at the 5th Annual Jumbo, and it was an eyefull. I've since had the pleasure of flying those two BIG Birds . . . and know what happiness is. These planes stay together, no matter how hard you try to take them apart in the air . . . and because they gross out at only 16-17 pounds, just an out-of-the-box Quadra is enough to make them highly maneuverable.

Roberts and Snow are a prolific duo, having flown their new Spinks Acromaster at the IMAA Ida Grove bash in August . . . after a mighty quick six days of construction. And for us "Fun-Scalers" who are also WW-II buffs, these two Arkansas Travelers are putting the finishing touches on a 90 inch P-47B Thunderbolt (yup! that's the razorback version) that will accept Robart's new 1/4 scale landing gear . . . and will gross out, with gear, at less than 20 pounds. I can't help wonder if these guys are gonna come out with a host of "Fun-Scale" WW-II birdies. How about a P-38 . . . please?

Air Tech's designs really hit me where I live, as do R&R Models and Snapper and Stinger. Up to now there's been nothing to fill that void between Big Stick and scale types . . . but both Air Tech and R&R have come to the rescue and given us Sunday flyers what we've been hankering for: easy building, good looking, great flying BIG Birds that have proven themselves. And thanks to some good old common sense and practical engineering, all of these fun-scale birds weigh in at an honest 16-17 pounds . . . thus becoming unbelievable performers on plain old Quadra-type engines.

Fellas, I'm not exaggerating or trying to make these airplanes sound better than they are. Just ask the guy who has one . . . and if you live close enough to him, he'll probably let you get some mighty stimulating stick time. You'll see how easy it is to amaze yourself and dazzle the spectators every time you fly. . .

3) Okay you scratchbuilders, here's the "one scale" I promised . . . and it's a beaut. It's gonna take a bit longer than those kits, but speed's not your thing anyway. It's the labor of love that counts, and here's a bird you can really become obsessed with: the Fairchild 22-C-7-E (F).

"My Child was a 2-1/2 year project," sez designer A. Lynn Lockrow, "and was finished just prior to Toledo '82. I had been to Toledo before, but never to enter a plane. First time out I placed second in Non-Military Stand-Off Scale with the Fairchild. Boy, was I surprised . . . and pleased.

"This bird of mine spans 96 inches, has a wing area of 1536 squares, and weighs 18 pounds with Quadra. She features two wing panels that bolt together, plug-in stab, adjustable in-flight stab trim, plug-in cabanes . . . and a field set-up time of only 15 minutes.

"The plans are mine. I worked them up from a set of old control line drawings . . . and made lots of changes, obviously. This was my first BIG Bird so I took my time and inspected many well-flown giant aircraft before putting pencil to paper. I wanted an outstanding scale ship that wouldn't turn out to be a 'hangar queen.' "

Unfortunately, Lynn does have a temporary hangar queen on his hands . . . but only because of a cantankerous engine. As I couldn't very well recommend a bird that hadn't flown, nor plans I hadn't seen, I asked Lynn to loan me a set. It didn't take long after unrolling the

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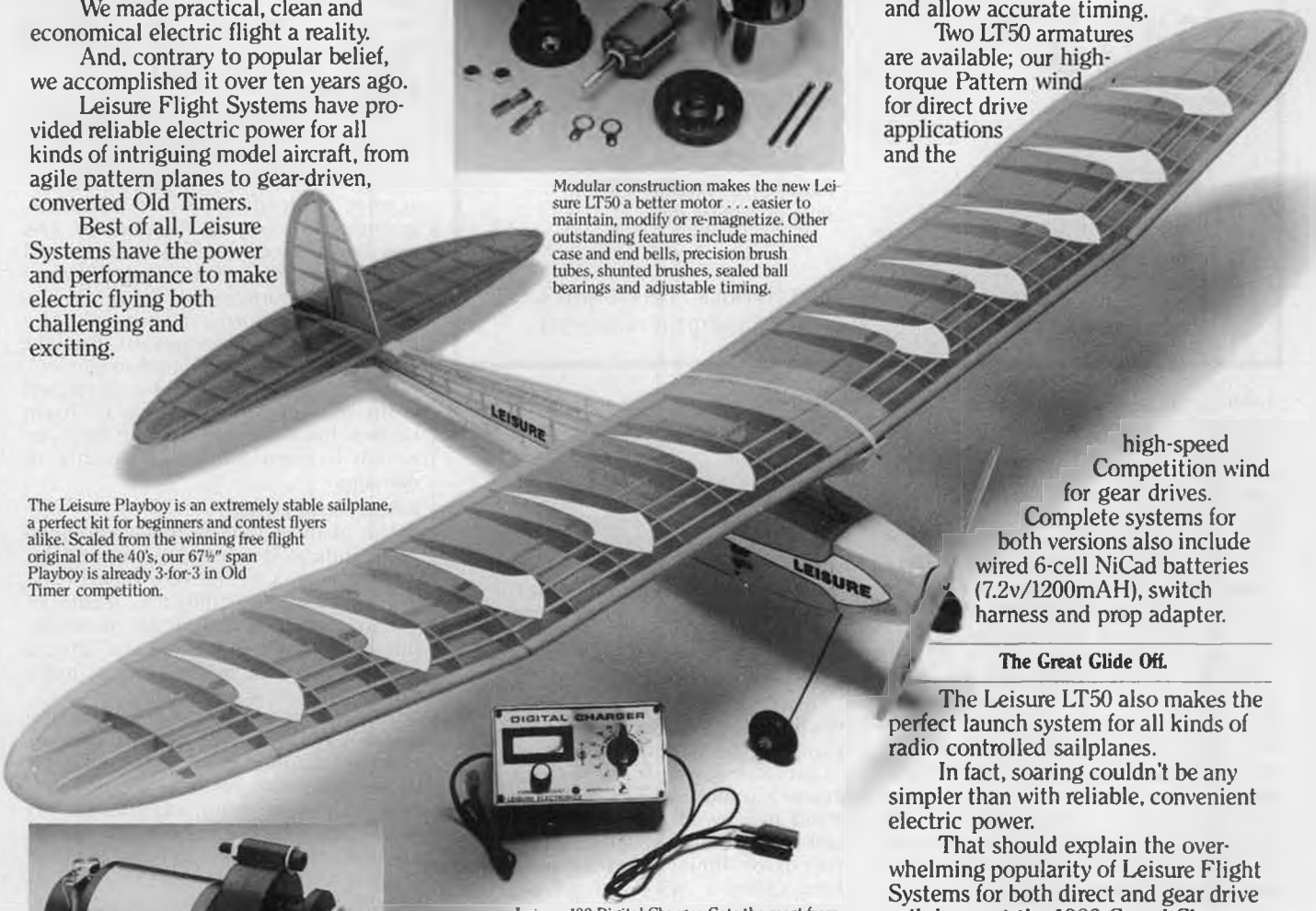

The Leisure Playboy is an extremely stable sailplane, a perfect kit for beginners and contest flyers alike. Scaled from the winning free flight original of the 40's, our 67½" span Playboy is already 3-for-3 in Old Timer competition.

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Two LT50 armatures are available; our high-torque Pattern wind for direct drive applications and the high-speed Competition wind for gear drives. Complete systems for both versions also include wired 6-cell NiCad batteries (7.2v/1200mAH), switch harness and prop adapter.

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three sheets to see that Mr. Lockrow has one great big love affair going with his "child." His plans are way above average, with good cross-sectional data and a number of cutaway drawings to show details like the oleo struts, adjustable flight trim and tail wheel installation.

The Fairchild should build well, with a strong but light framework that'll easily survive the rigors of handling and flying; Lockrow seems to have put the spruce, ply, pine, and balsa in the proper places.

And he says that although there are some other Fairchild 22's around, he's the only one (so far) who has the C-7-E (F). Soooo, this classic bird should be very appealing to the many who live and breath scale . . . and to find out more, drop a line to: A. Lynn Lockrow, 13 Byron Ct., Indiana, PA 15701. If you want the plans, include 25 American bucks. . .

STILL MORE SCALE COLORS

True to their word, the Hobbypoxy people are still ginning up formulas for those really hard-to-mix scale colors. Here's more for Navy and Marine aircraft. . .

The first color, Matte White, FS37875, not only duplicates the flat undersurfaces of WW-II Navy birds, but when mixed with Hobbypoxy's Gloss Hardener can also be used for the bottom of present day Navy and Marine airplanes. And here's how to mix up this witch's brew: to a 1/2 pint (8 fl. ounces) of H10 White, add 16 drops H81 Black, 6 drops H49 Cub Yellow, and 4 drops H33 Stinson Green.

You're gonna need a syringe for this next color; Light Gull Grey, FS36440, is presently used in a matte finish on the upper surfaces of the A-4, F-4, etc., along with Gloss White on the bottom. Here's the concoction: to 50 parts of H10 White add 21 parts H70 Gray, 2 parts H66 Dark Red and just one part of H49 Cub Yellow.

Hobbypoxy says there's still a lot more to come, so hang in there all you folks with English and German WW-II Warbirds. . .

I BELIEVE . . . IN BATTERY BACK-UP SYSTEMS

A few months ago I bench-tested the Ace "2x5 Redundant Power Supply" and it worked as advertised. And because it did so well on the ground, I got carried away and purposefully committed a BIG Bird to the blue with a poorly charged battery pack . . . and the 2x5, again did its job by isolating the "bad" pack. Since then all battery packs have been carefully charged and checked . . . and as a result, the 2x5 has been sandbagging. . .

Last weekend, however, George Steiner's brainchild earned its keep. A brand new, well checked out 1200ma pack went belly up after less than an hour of 'on' time . . . and that sweet little thing called a 2x5 saved my airplane, engine and radio.

The moral of this story should be obvious: there are a number of good battery back-up systems on the market, such as the ones by Ace and RAM . . . so use 'em. They work real good . . . and for an expensive hobby, they're pretty damn cheap insurance!

TIP OF THE MONTH

Here's something to ponder while selecting your goals with which to start this fresh new year: "No man is completely worthless; he can always be a bad example."

FLYING SAFETY IS NO ACCIDENT

Soaring . . . . . *Continued from page 27*

and glue all bulkheads in place on the bottom. You now have a kind of jig for keeping the sides straight. Using clamps, rubber bands, or worse, your hands, glue the assembled side panels to the bulkheads and fuselage bottom. . .when dry, it should be reasonably straight and true. If the bottom of the fuselage is cross-grained, you can still make it up beforehand, using the top view and cutting the pieces slightly overside. After butt-gluing together, draw the centerline and continue as instructed above.

The other most commonly made mistake by beginners in the area of fuselages is failing to anchor down the pushrod housings on the tube-in-tube type pushrods. If tube housings aren't secured at both ends and in several places in between, the pushrods will act "mushy" or flex too much.

Radio Installation

Radio installations in first-time builder's airplanes are frequently incorrect. Servos are usually installed with at least one giving the opposite control response desired. Here the most frequently made error is the elevator. The elevator surface should deflect upward when the control stick is pulled toward the pilot (assuming the transmitter is being held in a horizontal position). The rudder should deflect toward the right when the stick is moved to the right, etc.

Battery packs should be protected from impact by wrapping in foam rubber, the same goes for the receiver, which is even more susceptible to damage.

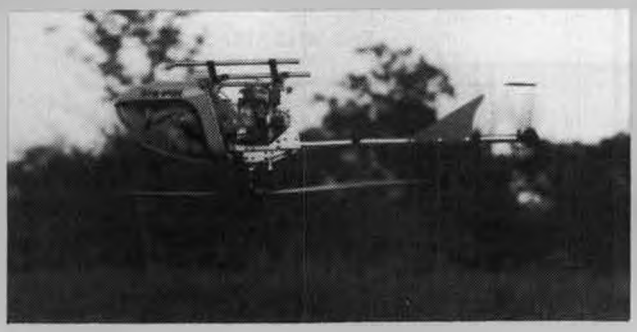
Balance and Flying

The plans will always have a balance point indicated somewhere under the wing seat area of the side view of the fuselage. It may be called C.G. (center of gravity), which is technically incorrect, but that is where the model should balance if rested on that point under both wings.

The final area of greatest error is in the test flying. The hardest thing to do after you have finished making your model is to give the controls over to someone else with more flying experience, yet this is the safest way to be sure it has the greatest chance of surviving the first couple of flights, where the trim is bound to be a little off.

I hope this has been a help to the newcomer to R/C soaring. I would like to recommend a few books for the fledgling flier. They will help the beginner to understand the fundamentals of soaring as well as round out the library of the experienced flier. Put together, these books are the "What You Always Wanted to Know About. . ." of R/C soaring, they are: *Radio Control Soaring*, by Dave Hughes ($19.95 from Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, CA 90403), and *Radio Control Thermal Soaring*, by George Stringwell ($24.95 at Wilshire). Both of these English books together make a pretty thorough soaring library, as they deal with everything from the very basics to advanced model design and flying techniques.

Going back a few years, Frank Zaic's *Model Glider Design* is still a good reference book for a lot of timeless information on the theory of flight, construction techniques, and NACA airfoil data, as well as the obvious design



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tips and "how to" chapters. This one may be a little hard to find, but definitely worth the search. I hate to sound like a broken record, but I bought mine at Wilshire Model Center and haven't seen it anywhere else.

One last reference book that I think should be on the shelf in every serious designer's library is Eric Lister's *Sailplane Designer's Handbook*. It covers a lot of ground in its 50 or so pages (8-1/2 x 11): How to determine the stability of your model design, how to find: its performance map, optimum wing layout, Reynolds number, correct decalage, even how to design your own airfoil, and lot more. Write to Mr. Lister for this one. His address is: 410 Regina Drive, Clarksburg, MD 20734.

For those interested in the complexities of aerodynamics, and for those capable of understanding esoteric concepts, I recommend *Theory of Wing Sections* by Ira H. Abbott and Albert E. Von Doenhoff. This book has about half of its 690-plus pages devoted to airfoil sections: their coordinates, characteristics, and profile outlines; very thorough. I think this one is available from the Soaring Society of America for about ten bucks.

LAZY BIRD

No, I'm not referring to your pet parakeet who does nothing but sit around in his cage making guano all day. The Lazy Bird is a relatively new glider on the market, designed by V.M. Garofalo and kitted by Midwest Products Co., Inc. It spans two meters, has a wing area of 550 square inches, and should weigh about 32 ounces when fully assembled. The Lazy Bird is a foam glider (that's ALL foam) with spruce, ply, and basswood reinforcements where needed. The airfoil is basically flat-bottomed with a little Philip's entry near the leading edge, and looks as though it would fly really well.

I would guess that the Lazy Bird was designed for the first time pilot. It goes together quickly, and should prove fairly tough. ". . .Beginner to expert flight characteristics," is the claim.

As you have probably guessed by now, I haven't put mine together yet. That's because right now I'm busy assembling a Silver Seven (Ace) transmitter. When I'm finished with the SS, I'm going to assemble the Lazy Bird, and I'll just have me a test flight with 'em. What a mis-match! Trick radio and simple sailplane; frills and no-frills. It's gonna be fun! Tune in next month.

AIRFOILS OF THE MONTH

This month I'm going to get off my thick airfoil kick and enter the less controversial realm of computer designed sections of medium thickness.

The first profile should be instantly identified by almost all modelers even without the "Eppler 205" label across it. It has been successfully used on many glider designs over the past few years: Airtronics' Sagitta, Dwight Holley's Gobbler, the Swiss Spartakus, P.M.P.'s Challenger two-meter, Dodgson's Camano and K-Minnow are available in 205 versions, Larry Jolly's Electricus (an upcoming *Model Builder* feature), and the list goes on! The E-205 needs no introduction, it is a very good, high performance sailplane section.

The Eppler 211, however, is a relative newcomer in the world of sailplane design. I know of only one sailplane that uses the 211, and it's an electric powered one at that . . . the Ultra IV which appeared in the January issue of this magazine. I have talked with Mike Charles (Ultra series designer) who has used the E-205 on a couple of his designs, and his observations are as follows: the 211 has a broader speed range than the 205 for sailplanes with Reynolds Numbers of approximately 200,000 or less. He has found that it carries weight better than the 205, which is an important consideration for battery-laiden electrics. The primary advantage that the 205 has over the 211 is that it's easier to build.

These two sections differ greatly both in appearance and performance. The E-205 is 10.4 percent thick and the E-211 is 11 percent thick. The mean camber line of the 211 is slightly flatter, with a high point farther back than the 205's. The thickness distribution of the 211 appears to be shifted rearward as well. Of course the most striking difference in appearance is the 211's trailing edge "cusp", which makes it look as if it has a bit of permanent flap deflection.

From the theoretical glide polar that

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has been worked out by Dr. Eppler, we can see the main areas of difference between the two sections. The vertical component is the coefficient of lift while the horizontal component is the coefficient of drag. At an RN of 100,000, the 211 has a slight performance edge above a coefficient of lift of about .6 and below .1 (it has less drag). Interesting to note is the difference in pitching moment, or the tendency to "tuck" or pitch forward about the aerodynamic center of the section (approx. 1/4 chord). The 211 rates a big -0.121 compared to the 205's -0.046. Flying wings require positive pitching moments because they have no horizontal stabilizer. Their sections have "reflex" (trailing edge curves up, not down) to give them stability. Does this mean that the 211 needs a bigger stab to overcome the pitching moment handicap? Possibly, I don't know, but it would be interesting to find out.

Another interesting difference in the performance characteristics of these two sections is where minimum sink occurs. According to Eppler: at an RN of 100,000, optimum coefficient of lift (the most lift for the least drag) occurs around 6.5 degrees incidence and 0.83 CL (.017 CD) for the 205. This compares with 4.5 degrees incidence and 0.88 CL (.017 CD) for the 211. Ah ha, more lifting power for the same drag penalty. Mike's on the right track.

If you have used both of these sections on similar or identical aircraft, I would like to know your results, as I think many others would, too. Empirical evidence means more to me than theory.
like to know your results, and I think many others would, too. Empirical evidence means more to me than theory.

TOWHOOKS

Gary Ittner has come up with a splendid idea for a towhook. He uses nails! As you can see by the photograph of one of his towhooks, he bends the nail to a 90 degree angle, cuts off the head, then threads the main shank. The point of the nail is rounded for safety, of course. One blind nut, one plain washer, and two machine nuts complete the towhook as you see it. It can now double as towhook and ballast holder by drilling a hole through your lead blocks and slipping them on the shank to be held in place by the second nut. Simple!

Yves Bourhis has developed a captured, releasable towhook similar to ones commercially available . . . with one important exception: his are made of metal, not molded nylon. Yves thinks he's made "the better mousetrap" and who am I to disagree? Just don't ask Yves how much they cost . . . each one is individually machined by hand . . . and are not for sale.

WORDS OF WISDOM

After all is said and done, when it comes to which airfoil is best, we should keep an open mind, and we should remember these words of wisdom from two very knowledgeable sources.

In the August, 1972 *Silent Flyer*! (newsletter of the SFVSF), Ed Slobod had the following to say on this subject, ". . .If it is difficult to see gross differences where we feel there should be some, it may mean perhaps the differences are not so great, and perhaps no one configuration is clearly superior to all others.

"It is quite possible . . . and I'm more convinced of this each day . . . that the skill of the flyer is more important then what is being flown. It might be much more rewarding at this stage in R/C glider development to devote greater effort to learning to fly what we have than to continue redesigning."

From the *White Sheet*, newsletter of the White Sheet Radio Flying Club, Sean Walbank reports on an interview with Sean Bannister in which Mr. Bannister made the following comment, quoting from the *White Sheet:* "When questioned about alternative sections *(Sean Bannister uses the E-193 exclusively, bf)*, in particular the Eppler 205, 211, 212 and 214, Sean referred back to the principle of finding a section that you get on with and then sticking with it, *for at least a year or two.* Sean finds the E-193 competitive and therefore sees no need to change . . . He believes that he can overcome any slight disadvantage that the E-193 might possess with its 'inferior' glide angle by practice and smooth flying . . . his results speak for themselves."

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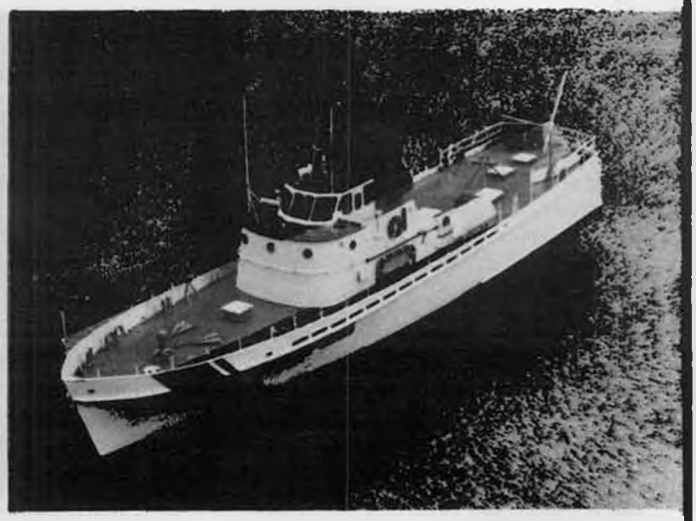

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Well, that's it for another month. Write to me care of *Model Builder* if you have something of interest to share with the soaring community, or if you would like to make any comments or suggestions regarding this column. Thank you, and good lift! •

Comet . . . . . *Continued from page 31*

of sale.

Comet had a very liberal policy concerning returned merchandise. . . which in itself presented a bit of a problem, as occasionally a dealer would send in a competitors product with the returned Comet product.

The author recalls that in his boyhood, he opened kit after kit, while trying to decide which to buy . . . It wasn't easy to open the little ten-centers without tearing the box flaps . . . conversely, it was even worse repacking the thing! The contents seemed to expand after you looked them over. . .

Comet had five conveyors for assembling kit components. Normally only three or four were in use at any given time. The others were being set up to run different kits. Tissue was inserted when the plans were folded, this done when idle time occurred . . . Wheels, thrust buttons, and wire prop shafts were inserted into the glassine envelopes to be stapled later. The conveyers moved intermittently, and at the proper time, a guillotine cutter would slice a piece off a long rubber tube. This dropped onto the assembled kit parts, thereby solving the problem of having workers untangle a mess of precut rubber bands. The assembled kit parts then slid into a sort of flattened funnel, and on into the waiting box.

Comet also conducted consumer research . . . Each month, around a thousand questionaires were placed in kits which were to be shipped to all parts of the country. Bill says that Comet was in a position similar to manufacturers of ladies garments . . . that is, they had to make educated guesses as to what the customer would want. Each month, a member of the design staff would compile the returned questionaires, and make a report. Comet salesmen were questioned concerning suggestions from dealers and model builders. Where practical, many of the suggestions were followed through, leading to the "head" sessions in the design dept.

Research at point of sales was also done (at the dealer). It was found that boys around the age of fifteen were the repeat buyers of kits. Also learned was that confirmed model builders have very good finger and tweezer dexterity. One theory had it that certain aptitudes (including dexterity), were inherent in 25% of the population . . . From this, Comet concluded that 25% of the age fifteen male population was indeed the total market. Bill remarks that "Theories of people measuring have not always stood the test of time". The author regards this as a polite way of saying "No one really knows" . . . and is inclined to agree.

The monthly master production was formulated by referring to data from the previous year(s). What was sold for a given month last year??? What was the trend for the ensuing month or two???

The principals involved were; the general manager (Bishop), purchasing and sales departments, costs, engineering, planning, and so on . . . Bill's most difficult task was to get the salespeople to make a forecast. When they were pinned down to a figure, (we will say ten thousand kits) the planning engineer might say there were parts enough for twelve thousand, should we use all of them??? Or, we have parts for ninety four hundred, should we stop there??? The cost analyst might mention that a particular item was costing too much . . . then engineering would speak up as to what could be done to reduce the item price . . . Purchasing might remark that some things were becoming difficult to obtain, could we design alternates??? All suggestions were considered, and those that could be used were adopted by Comet.

There was even a newspaper! THE COMET NEWS. Published monthly and distributed inside the plant, it was an offset printed 11x17 sheet folded once. It was worked up by the employees, with each dept. having a reporter. Drawings, cartoons, and art work were done by the

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Engineering Dept. During World War Two, the NEWS was mailed to former workers now in service overseas.

Comet was approached by its British distributor concerning a line of kits. Engineering worked up the models from drawings furnished by the distributor, and astoundingly, the company was able to manufacture and export the kits to England cheaper than they could be made over there. . ! The Comet line carried many British airplanes, thus giving rise to a rumor that Comet had been bought by a British firm.

During his tenure at Comet, Bill Bishop had many off-beat experiences. For instance, he traded many kits to a young man in Holland. The Dutchman paid off with tulip bulbs. Needless to say, the Bishop home boasted a fabulous flower garden. A phone call was taken in Bill's office . . . The woman caller said her husband, an engineer, was unable to build a certain Comet kit . . . She was told that the same kits were built by ten year old boys! Bill still wonders what kind of engineer the man was. A package arrived one day from Joliet Prison . . . Inside was a completed flying model crushed to fit inside the kit box. The wings were folded back, and the fuselage also deformed to fit. A letter from the inmate stated that he was not satisfied with the model, and wanted a replacement . . . as he had plenty of time to build another . . .

In 1939, Carl Goldberg came to work for Comet. The results of this association are well known to the modelling public . . . Without doubt the most famous gas model ever . . . the record breaking ZIPPER!! Soon followed by others . . . the Sailplane, Mercury, and the rubber powered Gull. Comet was really moving (in more ways than one). Now the move was to 129 West 29th St. and more working space. More models were added to the line, others were dropped, machinery was constantly being added, and (or) modified to suit a special purpose. All in all, a period of unparalleled growth and prosperity. . .

December 7, 1941 changed everything.

On December 9, a phone call from Washington, DC, asking if someone from the Engineering Dept. would come to the Navy's Special Devices Section. The AMA had given Comet's name to the Navy as the only model firm with a large enough designing and engineering staff to meet the Navy's needs. Bill Bishop arrived in D.C. the next day and was astounded at the material used for aircraft identification! *Nothing* was available for the Pacific Theater, and what they did have was Classified . . . When Bill asked why the secrecy, "Since every model builder already knew as much or more than the Navy had" . . . he was told the War Department didn't want the enemy to know how little we had in the way of aircraft identification...

The U.S. Office of Education launched the ID modelmaking program as a means of quickly getting models to the Armed Forces, while more elaborate preparations for injection moulding the black plastic aircraft models were put under way . . . Comet entered this mess with no idea of when they would be paid, but, nonetheless, they went into it full bore. In effect, this farmed out their engineering and design people, and inhibited civilian production. . .

At first, data was very limited, but soon, gun camera photos were given them, and the men became very expert at interpreting detail. For example . . . ground shadows were of great value at determining dimensions; aerial photos showing the pilot's head could be used for figuring sizes of the aircraft . . . Comet's design staff was quite knowledgeable in aerodynamics and could construct an airplane profile from skimpy information. . .

The end result, was that Comet did all the plans used in the "Schoolboy" ID building program, and even built some of the master models for use in making the initial moulds for the plastic IDs which were eventually turned out by the hundreds of thousands, and used in every area of the war. Kits and plans for ID models were exported to South America, even! This was nothing new, as Comet had been printing plans and instructions in Spanish and Portugese for some time. . .

In August, 1942, the "L" order was put into effect . . . This limited the use of balsa for model manufacturing . . . Only short cuts if lumber could be utilized (100 board feet), and when these were gone, balsa was out. Only the Strombecker company was completely unaffected, as they had been using pine for their kits. For all others, it meant trying to find substitutes, which for the most part, did not work. In the main, poplar was to become the ersatz balsa for nearly three years. It is a lousy wood, especially for modeling. In my old war-time kits, you can get seasick just sighting down the 1/16 printwood sheets . . . the poplar warped like hell! The only really successful war-time kit to use poplar was Comet's Speed-O-Matic line. These were dandy kits! All fuselage formers were made of die-cut cardboard, these were lined up with four outline longerons, with stringers added between . . . a very positive construction . . . And, these models were accurate! More so than any other model line from contemporary manufacturers. In fact, we disliked the substitution of balsa formers (for the cardboard) at a later date. . .

Other than the Speed-O-Matics, the Comet line was damn near unbuildable during the war! The stupid poplar was too hard for a kid using a broken razor blade. Not only that, but it would split even if you were careful about cutting . . . I do not remember completing any model of the time that had barfy poplar. A lot of pulpy cardboard was also used in these kits. These restrictive government policies nearly killed modeling during

the short time they were in effect. The official view was (or seemed to be), that building models was kid stuff, when as a matter of fact, the Army Air Force was extremely lucky in having a large group of modelers for the pilot training pool. I have felt for some years that the government was quite harsh with their rules and regulations concerning the manufacturing of kits and related materials. On seeing a war-time kit after thirty odd years, Bill Bishop feels they would have been better off to discontinue kits for the duration, rather than use the poor quality materials of late 1942 through 1944, but at the time, it was either lousy kits, or lay off workers. . .

Development of a flexible gunnery target was Comet's next job . . . This took form in a large kite which could be maneuvered very rapidly, giving the budding gunnery students a run for their money . . . Commander Paul Garber, of the Smithsonian, was a kite enthusiast, so this was his baby. The target kite was quite successful, economically fulfilling its purpose . . . The size was dictated by just under what a 170 pound guy could hold down . . . any larger, and it was like trying to hold a billowing parachute on the ground. . .

During a trip to Washington, Bishop was determined to try and find out just why balsa was so critical to the war effort. Balsa was (and still is) used in the construction of life rafts . . . He found that balsa rafts would remain afloat even after being holed by bullets. No other wood was able to stand up to this. Bill asked the Navy engineering officer if they would consider a different design for the floats, using less balsa, although performing the same purpose. Armed with specifications and blueprints, Bill returned to Comet, and with Bob Reder, worked on the design of a new float, which, incidently, is still in use. . . The new float had to withstand several tests, including being dropped from a certain height to a concrete hardstand! This new design resulted in less demand for balsa by the military . . . consequently, balsa was released from the "L" order much sooner than anticipated. Bill, and Comet's engineering staff most assuredly deserve a long overdue thanks for this.

Comet's B-29 kit was most highly successful . . . The design was from published material and Air Corps releases. Bill recalls some very interesting facts about this kit . . . Bob Reder conferred with Bill about a photo of the B-29 . . . there was a ground shadow of something sticking out of the tail which did not resemble any weapon then being used for a gun turret. The aircraft in the photo had been retouched by the censor, but the shadow had been overlooked. Bill and Bob were able to deduce that there was a 20mm cannon in the tail of the B-29. This was incorporated into the forthcoming kit, with advertising photos clearly showing the cannon. A very large flap ensued! . . . Model Airplane News was censored, and withheld from distribution for several weeks until the enemy knew about the 20mm tail cannon . . . Comet was in the clear, having used released material.

A training device used by the Navy was also sold on the open market. This was the Comet Air-O-Trainer, a large slab-sided silhouette resembling the P-39 Airacobra. The cockpit area was open, containing a seat, control stick, and rudder pedals. The controls worked just like a real aircraft . . . The author had one during 1944-45, and freely admits the influence it had in later years when he learned to fly for real. A great help indeed! Others must have had the same opinion, as Comet sold 70,000 or more from late 1943 through late 1945 . . . Not bad for a model that wasn't scale and didn't fly . . . at a cost of $1.50. The Air-O-Trainer was discontinued in early 1946.

As the war work drew to a close, Bill and plant superintendent had to go scrounging for work to keep the company going. One job was a three-month contract assembling hair pins onto cards . . . this kept 60 girls busy . . . Another job was building cabinets for portable radios, this for such firms as Zenith and Admiral. Comet's model experience suited them well for jobs such as this. . .

As with many firms at this time, the merciless cancellation of government contracts, shortages of material, tight money, and a general decline in kit sales, all combined with apathy on the part of the buying public was too much for Comet to bear. . .

The original Comet Model Airplane & Supply Co. founded by Bill Bishop, was sold at a sheriff's sale on January 1, 1948. The new owner changed the name to Comet Model Hobbycraft. It is still in business as Comet Industries Corp., having gone through several different owners since 1948.

A list of those who worked for Comet and went on to greater things, would be impressive indeed! Carl Goldberg, Bob Reder, Sid Axelrod, Ed Lidgard, and many others. Bill Bishop went on to form his own manufacturing company, which was operating three shifts when he sold it a few years ago. Bill is now retired, living near San Diego, in a home he had built for him . . . to whose plans???? You must be kidding! No, it doesn't look like a model airplane. . .!

An explanation is in order at this point . . . While the Zipper, Sailplane, and other gas models garnered much publicity during the late thirties, it should be noted that they were expensive to manufacture and did not make very much profit for Comet . . . These kits were purchased and built by the older modelers, and as such, they were high prestige items. Comet was touchy about being labeled a manufacturer of "cheap" kits . . . they should not have been! The sales of 10¢, 25¢, and 50¢ kits were what most of the companies were able to survive with! Comet's little kits were unexcelled in the industry . . . their

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plans were well engineered, as all the guys had been model builders prior to working for the company. As a boy, the author liked the one-piece stabilizers and wing alignment methods. Comet plans had a clean, concise, uncomplicated, sort of a friendly look about them. One who thinks as the author, is friend Phil Pestricher, of Fort Worth, TX. Phil has, through chicanery, manipulation, and a lot of luck, put together a compilation of mostly pre-war ten-cent kit plans . . . including the entire line of Comet's "A" series ten-centers. . .

It is high time that the ten cent "cheap" kits get the recognition they so richly deserve! Were it not for them, the hobby industry would not have been able to reach the hundreds of thousands of boys who could afford little else as beginner. We can all feel, indeed *know*, that the "cheap" kit was the life blood of the industry . . .

For some, happiness may be a warm puppy . . . but for me, it was a tube of glue, a broken razor blade, and a ten cent airplane kit. •

Fuel Lines . . . . *Continued from page 36*

gaskets when ones from the manufacturer weren't available. Kraft paper is usually about five thousands of an inch thick. It can be compressed to slightly less than that, and be a very adequate seal. Commonly, more than one thickness can be used.

OK, how do we go about making a "wrapping paper" gasket? Bum a hank (anywhere from three to ten feet) of that brown wrap stuff from any local merchant who seems friendly. Use your old gasket as a template and pencil trace the outline onto the Kraft paper. From here on, it's an easy operation with a sharp pointed model knife.

If for some reason or another you don't have a used gasket to use as a template, then you'll have to do some measuring and plotting. Here's another place that the $15.40 vernier caliper will be most handy. Just measure, plot, and draw yourself a gasket. Anybody can do it. And, if you can cut balsa with an Uber Skiver, you can cut a gasket. Just jump in and do it.

But what about head gaskets? In general, Kraft paper won't hack it. But thin aluminum, brass, or copper will do very nicely. Hobby shops often stock K&S brass shim stock and thin sheet aluminum. If there's none there, go to an auto parts supply store and ask for soft thin shim stock. You can usually get it in various thicknesses from two to ten thousands of an inch. Now, all you have to do is cut it to shape. Forget the king-size sheet metal shears or tin snips. Good sharp scissors, even quality manicure scissors (sorry about that, all you wives) will do a creditable job. I've also used a small model knife, held in an ordinary school grade compass, to cut circles.

From what's been suggested, together with your imagination and a bit of perseverance, you surely will be able to make a few emergency gaskets. Let me retract that. I suspect you'll be able to make as good or better gaskets than the commercially available ones. Admittedly, it'll take a little longer than unpackaging a set of manufacturer's gaskets, but if they're not available, it's either spend that extra time, or don't fly next weekend.

Guys, gaskets can be fun! (Geez, that's kind of sick isn't it?)

Take care, and fly. . . •

Pattern . . . . . . *Continued from page 37*

paper cup was attached to the fuselage top, forward of the canopy. This model would wiggle from side-to-side until the cup was removed. The vertical fin simply was not able to see undisturbed air until the model had yawed from center a few degrees. *(Years ago, I used to see some Kraft Kwik-Fli's do this. Could be the builders had used an over-size canopy, not being aware of this problem. wcn)* It may seems obvious that simply increasing the size of the vertical stab would cure things, but changing the lateral area distribution can be tricky. The rolling maneuvers are particularly sensitive and *ideally* you want the center of lateral area fairly close to the C.G. for good pattern performance. (About 1/3 of the area forward of the C.G.)

Our column hasn't had much about the current AMA/FAI pattern recently. We have not abandoned it for the turn-around . . . on the contrary. One of our on-going projects is working out the "Noise" problem that exists with fast revving engines. I'm willing to bet that noise levels will not be checked at any contests in the U.S. except the "Masters" and perhaps the Nats. Whatever, it would be nice to know what tricks are the most effective in holding noise down.

So far, the three-blade prop and the small aftermuffler used behind a good muffled pipe are the easiest fixes for current models. We have a rear intake engine which is going into a Tipo to see what happens. The engine is a C.M.B. 60, which we had fitted by Glen Dye (Performance Model Parts, the manufacturer of T.W.A. high performance en-

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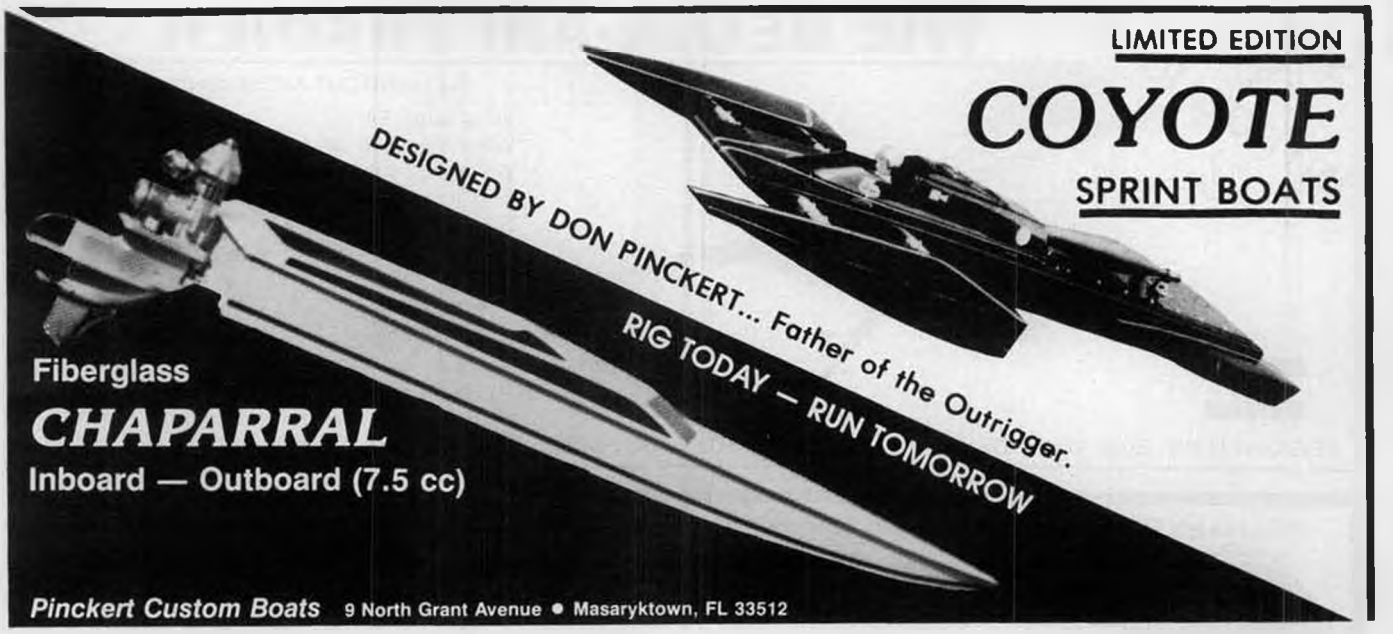

gines). Glen has also helped us on other engines. It's really interesting to see how many manufactures miss their performance specs by a country mile. By the time a .60 reaches over two H.P., as many advertise, it's a real runner! It's also very rare!

That's all for now. Let us know if you have any info you would like to share with other pattern fliers. •

Ski-mobile . . . . *Continued from page 39*

two holes in it, positioned so that a screwdriver can be used when bolting in the back ski support. Glue in the tank platform, adding small triangular stips along the edges to brace it.

Make the roll bar from 1 x 1/8 inch aluminum bar stock. Bend the pieces to shape and bolt in with "L" brackets and small bolts.

At last you are ready to paint the machine! I used Butyrate dope to protect the wood, as it is not affected by contact with airplane fuel.

Now fasten the servos in and hook up the linkage. Put the engine in with a pusher prop on it. Attach the skis. The front ski will need a collar to hold it on. Fasten the fuel tank in with rubber bands. I used a 4-oz. tank, which gave about ten minutes of running time. Now your ski machine should be ready to run.

Performance can be improved dramatically by waxing the skis. Use an old iron to melt paraffin on the skis. Smooth the wax with the iron and then with a cork. The model should run a lot faster with waxed skis.

When running my ski machine, I found it much easier to start the engine when it was warm. The trick is to let it warm up inside, then take it outside, starting it quickly before the engine cools off.

Another problem I experienced was snow freezing to the skis, creating drag between the ski and the snow. To prevent this, slide the model on the snow for about 30 seconds, enough to chill the metal.

You may find it necessary to trim the control on the front ski to keep the propeller's torque from causing the model to turn. The prototype ran straight only when the front ski was properly trimmed. Hard packed snow will give the best performance results, with a top speed of over 20 MPH on a good surface.

This model snowmobile is my first design, and I'm sure it can be improved, both structurally, and in styling. It could also be scaled to fit different size engines. Lowering the center of gravity would be another possible change to reduce roll-overs. Some kind of air rudder in back might help stability. My model, built just as I have described, gave me a lot of fun last winter, and I am looking forward to making some improvement and running it again this winter. •

Electric ..... *Continued from page 41*

you may be able to see in the background Heinz Koerner's four-motor Constellation. That one is big, 98 inch span, 76 inch length, 8 sq. ft. wing area, with either four Mabuchi 550 motors or Astro 075's. I am not sure that Heinz has flown it yet. I'll bet it flies well though; Heinz has a way of doing things right. Bob didn't give any other details on either plane, so I can't tell you more. You guys with multi-motors, write them up and send in the information, these are always interesting.

Sam Stitzer had an original design called the "Daydreamer", 64 inch span, 700 sq. in., 12% flat-bottom with a Leisure 05, plus reducer, swinging an 11x7-1/2 prop. Bob says this one flew really well, a crowd pleaser. It is nice looking, a lot like a bigger brother to the Q-Tee. Keith Shaw's Zombie used a Leisure racing wind with an Astro belt-drive turning an 11x7-3/4 prop. It was a real floater at 36 ounces and 550 sq. in. How Keith builds that light amazes me. I have seen some of his work, and it is art, believe me. Roland Boucher's "Electricus" took the longest flight event on Saturday with 24 minutes, 46 seconds. It is powered with a Leisure (what else?) pattern wind, 72 inch span, 600 sq. in., designed by Larry Jolly. It is certainly a sleek looking sailplane. *(MB construction article coming! wcn)*

Dan Mitten (KRC club) had a radar gun, and clocked Bob Kopski's J-3 on takeoff at 15 mph! This plane uses an Astro 15 belt drive on a 12x8 Top Flight prop, and flies at 4 lb, 6 ounces. The Astro Flight Porterfield is very similar, and I wouldn't be surprised if it takes off at the same speed. This is very close to scale!

Charles Hampton of Englewood, N.J., brought five electrics, including an electric helicopter. Bob says Charlie flew continuously the two days! Somehow, in doing the color to black and white conversions, I missed the photo of Charlie and his helicopter, so I promise to run it next time. The helicopter is quite interesting. It is the EH-1, manufactured by Ishimasa Co., of Tokyo, Japan. I don't know where Charles got his. I bought mine in London, from Henry J. Nicholls & Sons Ltd., 308 Holloway Rd., London. Mine costs about $200, without the batteries. I wish I could give you a flight report, but since I got it, I have been almost overwhelmed with things to do, so I haven't got "around-tuit".

The EH-1 is very well made (Ishimasa makes gas helicopters too), and powered by two Mabuchi 550 motors (05 size) running on eight sub-C Sanyo cells. The flying weight, with batteries, is 1.8 kg. max (4 lbs). The rotor diameter is 39 inches. The Skylark EH-1 draws about 20 to 30 amperes in flight, so flight time is about two minutes. A power cord is available as an option, and I recommend it, so that you can fly from a 12-volt battery. A 40 amp-hr battery is recommended, which would give an hour of

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flying. The Skylark weighs about three lbs., when flying with the power cord. The cord is 23 feet long, and is manufactured especially for the purpose, other types of wire will not do. I can believe this. The cord is very flexible, yet has a very large conducting cross-section. The helicopter comes nearly assembled, all that is required is installation of the tail boom, radio, and rotors, then adjustment. The manual is very thorough, and well illustrated. Now all I have to do is do it! It looks like Charlie used the cord . . . that is the way to go for hovering and learning. You could learn in your own back yard, with no noise complaints!

Last, but not at all least, the annual Astro Flight contest is coming up on February 5 and 6. This is a biggie, and always well worth attending, for the variety, neat ideas, and general fun of meeting fellow electric fliers. Not to mention, the weather in Los Angeles in February has to be experienced to be believed; this Northerner loves the summer that they call "winter" down there!

The two-day contest is new this year, and it opens up a lot of new events. On Saturday, the meet will be at Magnolia High School, Ball Rd., Anaheim, California, from 8:00 a.m. to 2:00 p.m., and will feature FAI F3E powered sailplanes, seven-cell and open, any motor; and electric oldtimers using a 1-1/2 minute motor run and seven-minute max with spot landing points, with two classes, seven-cell and open. There will be a lot of glider entries, I know! The open class is really impressive, with eight-foot spans and bigger, cobalt motors, folding props, and fantastic rates of climb.

On Sunday, the contest moves to Mile Square Park, Fountain Valley, where there is a real smorgasbord, with seven events; pylon race (seven-cell, any motor), sport pattern, sport scale (bonus for multi-motor), junior free flight (under 16 years old, any motor run, three-minute max), free flight scale, old timer 020 replica, unlimited free flight, and electric scale control line. This is going to be a photographer's paradise, if nothing else!

To register for the contest, write to Bob Boucher, 2301 Cheryl Place, Los Angeles, CA 90049. Registration is $10 for the R/C events, $5 for the free flight and control line. Prizes and merchandise totalling $1000 will be awarded, for those who are there to win! I'll be there to have fun . . . maybe there will be a worst crash award so I can get something!

Get a charge out of electrics, and come to the contest! •

Electronics . . . *Continued from page 42*

claimed improvement over other available cells, but some of them are obvious. For example, the metal straps used to interconnect the cells are welded on, as is common, but these are further improved with a strain relieving, vibration dampening "U" bend in the center. This is the accepted electronics industry method of eliminating component lead breakage; strap separation is not an unknown failure in R/C batteries.

Now for the capacity . . . one of the most impressive and easily verified features of the SR batteries. Think of it . . . a pack the size and weight of the average 500 milliamp battery, capable of providing you with 900 mils worth of flying! This alone is a feature worth considering, as all of the available SR battery types listed in its catalog provide more watt/hours, the measure of useful battery energy, by weight and size, than any other readily available rechargeable batteries that we know of. The SR 900, of the size and weight of a normal 500 pack, should be good for three hours of R/C'ing in the average airplane.

Additionally, an improved charge retention rate is claimed for the SR cells. All Ni-Cds tend to self-discharge if allowed to sit between the time of charge and use. SR claims only a 1% per day loss; only 7% if you charge one weekend and don't get to fly until the next.

My capacity tests, using my known-to-be-accurate Ace Digipace, and using various charge rates; all but the 15 minute rate, confirmed both the immediate and week later claimed capacities on the test 900 battery.

Admittedly, they are more expensive. At $19.95 for a 500 mil four-cell pack, they cost over twice what some of the bargain $2 per-cell-packs would cost you, but SR's reminder that the best radio gear is no better than . . . it's batteries, is not just an advertising gimmick, it is cold, hard fact. You'll have to decide for yourself just how valuable your airplane and time is to you, the added insurance seems to me to be well worth the price. SR's are available without connectors, or, for $2 or $4 extra depending on type, with your choice of Airtronics, Deans, Futuba, Kraft, or Kraft Sport plugs. The SR literature, available for a SASE, makes interesting reading,

and lists the entire variety of types available, including some 5-cell packs for Ace R/C's 2 x 5 Redundant Power Source, packs for electric power, as well as all configurations of airborne and transmitter batteries.

In this case, I felt that test flying was superfluous; my test instruments actually told me more, but I insist on flying everything that is meant to fly before I write about it. What's to say . . . they worked well, and I am excited enough about them to recommend them highly, if not for an immediate replacement, at least for strong consideration when your present batteries get questionable. But whatever you change to, do yourself a favor and change at the first sign of trouble, not when all doubts, along with the airplane, have been removed.

BOB WHO?

In our September '82 issue, I was telling you about Dunham's R & R, and those handy-dandy slide switch mounting covers that come out of Bob Dunham's plastic injection machines. What I did not know at the time is that things got a little crowded working in that post office box, and larger quarters had to be located. You can now reach Dunham's R & R, not only for switch guards, but for servo mechanics, gimbal assemblies, receiver and battery cases, and other plastic R/C necessities, at 1100 N. Lake Havasu Ave., Suite 1, Lake Havasu City, AZ 86403; (602) 855-4473. Please try not to call when the fish are biting!

RECEIVER ANTENNAS

For many years, in fact, since the early days of radio control, there have been two things that have become an almost unchangeable part of the hobby. One is that engine cylinder sticking up in the breeze, and the other is that long antenna wire trailing from an exit point mid-center of the fuselage, usually going to the top of the fin. The subject of engine cylinders, et al, I will leave to our able *"Fuel Lines"* columnist, Joe Klause, but let us take a close look at receiver antennas. It is time we made them stop lending an un-scale look to our airplanes, and put them back in the closet where they belong.

The closest in this case, is inside the fuselage. The fact is, that the average non-metallic fuselage does nothing as far as shielding the antenna from the desired radio signal. Its pickup will be as great inside a balsa or fiberglass structure as it is waving around outside it. The reason for trailing it externally was not always so much for a stronger signal pickup, as it was to get it further away from some of the other RF noise producing components which might induce an undesired signal into it, which would in turn get into the receiver, and result in one of those gray hair-producing airplane funnies that we have all experienced from time to time.

This was important in the early days of radio, when the ratio of desired signal to RF noise was not as high as we would have liked. Our R/C system manufacturers have made tremendous strides in the development of the systems available to us today; we now have extremely sensitive receivers, with better AGC (Automatic Gain Control), better noise rejection, and transmitters that much more efficiently radiate the relatively small amounts of power which they produce. The results are a very reliable radio link, which can be achieved and maintained with minimal antenna separation from other airborne components.

No, you can't just wrap the antenna around the receiver yet, but neither do you have to spoil the looks of that scale airplane with an ugly wire running to the tail and trailing even further behind. Most modern-day radio systems will operate perfectly well with the antenna no more than two or three inches away from the components and even closer for short distances where it has to pass by some of them. The idea is still to get it away from the rest of the airborne equipment as soon as possible, and preferably at right angles to it, but this is severely limited by the physical limitations imposed by the fuselage surrounding everything.

The bigger the airplane is, the easier this internal antenna installation is, though I have successfully flown Quarter Midgets hundreds of flights, with an internal antenna that passed no further away than half-an-inch from four servos, going on back through the tail, to exit under the airplane and trail for the necessary distance, about five inches. Not once have I experienced a problem which I felt was caused by a loss of signal . . . sure wish I could say the same for my brain and thumbs.

Internal antenna installation requires no more care than is normally recommended, and already mentioned . . . get it away from everything else as soon as possible. And of course, some kind of physical support must be provided within the fuselage before it is covered, or finished. A 36-inch length of one of the smallest diameter plastic pushrods can be used, or for a less expensive and lighter support, string enough drinking straws together to get the desired length. The antenna is then pushed in from the center fuselage section when the receiver is installed.

As with any other R/C system installation, an antenna-less, or antenna-down range check is important prior to flight, especially that all-important test hop. If you are internally installing an antenna on an airplane previously equipped with an external one, do a comparison before and after test, with the hidden antenna model raised above the ground to simulate the height above ground of the previous outside antenna. You should have an idea of the antenna-down range of any system with which you are familiar, if it is a new system, carefully read the maker's instructions for his recommendations.

As further insurance, when you are making those first tests, take an extra few minutes and run a noisy-servo test at the same time. To do this, make an antenna-

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down or antenna-less test with only one servo plugged in, and establish the maximum operating range, as you operate the channel into which the servo is installed. Then add one more servo to the system, and again test for the same distance, operating both servos simultaneously. Keep adding servos, one at a time, again checking the distance to which you have solid control. Any sharp reduction in range after the addition of one more servo is an indication of a fault in that servo, most often a noisy motor which is introducing noise into the system, in turn causing a reduction of input signal strength to the receiver. It'll do the same thing in the air, with the antenna fully extended, though it may not show up all the time. It will catch up with you eventually though, like on that long low approach when transmitter-to-receiver antenna orientation is at its worst. Such things don't cure themselves either, they only get worse and sit around waiting to drop on you.

Anyway . . . make R/C beautiful, hide that ugly fuel laden antenna wire!

AL ALMAN,
BIOGRAPHICAL SKETCHIST

I fully intended to ignore Mr. Alman's treatise about Mode One and us Mode One'ers in the December issue, until I had a call from one of my local friends who wanted to tell me he was waiting to read what I would have to say about it. He did admit that he read it only because his wife walked into the room while he was busily engaged enjoying the cover photo of my little friend Connie, he had to flip rapidly to the inside and that's where the pages happened to open.

Well, the first thing I will say about the subject is that I enjoyed the feud that once took place here in the pages of MB, between Dirty Dan Rutherford, and Pylon flier/writer Jim Gager, which was finally resolved at one of the Nats. As I heard it, all it took was for Dirty Dan to stand close to poor old Jim, who immediately threw in the towel, and come to think of, hasn't been heard from since.

But, I am not going to start another feud. After all, what chance would someone like me; slender, Pepsi-generation me; have against a cartoon watching 250 pounder who can move his hands in three different axes simultaneously? Besides, everyone is entitled to their opinion, though in re-reading (I had to re-read it, I have trouble comprehending something written at a MisteRogers level) Mr. Alman's ideas as to our ancestry, I was reminded of the words of Mr. John Kenneth Galbraith: "If all else fails, immortality can always be assured by spectacular error."

Seriously, I have three things to say. One is a repeat of something I have previously mentioned in this column: I have never heard a good reason for flying Mode Two. The oft mentioned opinion that it is how "real" airplanes fly I don't consider a good reason, as I find little similarity between piloting a full size aircraft and an R/C model. The complete absence of feel and contact between the R/C pilot and his machine, and the fact that he looks at the plane but not in the direction in which it is flying, makes completely different ball games of the two. If it was the same, any full-size aircraft pilot could fly R/C immediately, and I ask you, would you let even the chief pilot of a 747-equipped airline fly *your* Formula One racer?

The one exception, also dealing with full-size pilots, is that Mode Two might be more sensible for them, since it more closely relates to the control column, control surface movement, aircraft reaction, that is automatic to them. But for someone with no aviation experience, full scale or model, I can think of many reasons, also previously mentioned in this column, as to why Mode One is the shortest road to success.

Second thing: Just last weekend, the early part of November, as this is written, I enjoyed watching some of the world's best flyers, at the 1982 Tournament of Champions. By actual count, 40% of those there were Mode One flyer's, and the other 60% Mode Two'ers, all watched Hanno "Mode One" Prettner fly off with $25,000 dollars. In case your memory fails you, this is the seventh time he has done so . . . I can't even tell you the full amount he has won at this same competition, as my calculator just goes into a full stall and spin whenever I ask it to count that many bucks.

And for the third and last thing, I don't really know what to say about Big Al's comparing us to back hoe operators! I am indeed lucky, as I have many fond memories of many different vehicles, some of the flying variety, like a C-47 down inside Iguazu Falls in Brazil; a C-124 pivoting on a wingtip around the South Pole; a P-51 at full throttle over Tampa Bay; riding the back seat of a Thunderbird T-38 at 700 knots, 100 feet altitude over the Nevada desert; hoping for the first sighting of Gordon Cooper headed for splashdown in the Pacific, through the window of an Air Rescue C-45 . . . and some that didn't quite get off the ground, like a snowmobile in the snows of Labrador; the now retired overnight ferry between Christchurch and Wellington, New Zealand, probably the original "Love Boat"; a sea scooter over the crystal clear waters off Curacao in the Caribbean . . . these and many more, but I really don't know whether or not to be insulted when referred to in connection to something called a "back hoe". However, nothing with the word "hoe" as part of it's name sounds at all appealing to me, and in this case at least, I don't mind being ignorant and will do my best to stay that way.

27 MEGAHERTZ

There has been some concern expressed by the R/C model boating and car groups about the future of R/C

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operations on 27 MHz. Those frequencies are still in common use for such operations, and it seems that in some way or other, the word got around that the band was to be phased out with the introduction of the new frequencoes on 72-75 MHz.

You guys can rest easy, such is not the case. The AMA frequency Committee has distributed a letter to that effect . . . 27 MHZ for R/C is alive and well . . . and will continue to be legal for operation, with no cutoff date in sight.

I was able to locate a couple of local modelers who are using the band for sailboats and dunebuggies; they reported absolutely no interference ever, and even some advantages, as they are in the minority and can usually get more running time than they would on the more heavily populated 72 MHz frequencies. Makes sense! Technically, the successful operation is due to the short distances in which they operate, within which the receiver always has a strong solid signal to work with, which helps it reject all undesirable RF always present. Then too, being on the ground, or water, this makes it less susceptible to interference from some 1000 watt CB'er in East Treestump hollering 10-4.

Well, it's time to plan the weekend's flying . . . you guys up north are so lucky now being into that long building season, while here in California we're forced to keep flying last year's and even older airplanes. Let's see now, where did I put my sun screen? •

Choppers . . . . *Continued from page 49*

go back to guessing pushrod lengths and estimating the useable threaded area of the rod.

METRIC SCREWS

It seems that I'm always scratching through my assortment of metric screws for the long ones. Of course, they're usually all too short. Kavan makes an assortment of metric screws that go with its helicopter kits, but for every five I need there are fifteen that I don't need.

The other day I was glancing through a complete Kavan catalog, trying to find window channel for my father's new Jet Ranger. What I ran into along the way was a listing of metric screws, packaged by *bags* according to screw *length*! The thing that aggravated me was that they've been available for years, but I never knew about them. I thought you'd like to know about them, too. So if you need metric screws, Kavan makes up bags in 10, 15, and 20 mm lengths. Part numbers 139, 140, and 141 respectively. To go along with the screws you might want a bag of 2mm brass nuts, part number 138. All of these bags are available from Condor Hobbies, 17835 Sky Park Circle, Ste. E, Irvine, CA 92714.

BACK TO BASICS:

FUEL TANK INSTALLATIONS

What many of us may take for granted may cause problems for the newcomer to R/C helicopters. A good case in point would be fuel tank installations. There are many different ways to install a tank's plumbing. Each has it's particular advantages. I'll run through some of the major layouts that will get the job done.

The simplest installation is a two line system (Fig. 1) using only a feed and overflow line. The feed line in all helicopter installations should run to the middle of the tank, and not to the back of the tank as is customary with airplanes. The reason for this is that the fuel has the potential to slosh around more in a helicopter than in an airplane. With the feed in the center, it will still pick up fuel even when the fuel sloshes to the stopper end of the tank.

The overflow tube should be angled toward the top of the tank with a short length of fuel line attached (Fig. 1). The only exception to this would be the new Sullivan tanks that have a little bubble in the top of the tank for the overflow tube to fit into.

All of the fuel lines in the tank should be safety wired to the brass tubes by a wrap of small coper wire around the fuel line where it pushes onto the brass tube. This will prevent a bloated fuel line from slipping off and causing fuel starvation. There should also be a wrap of wire where the feed line attaches to the clunk.

In most tank installations the *tank centerline* should be anywhere from level to 3/8ths of an inch *below* the carburetor's spray bar. With these tank locations, a pressure line from the muffler to the overflow line is not really needed. The fuel will flow smoothly from the tank to the engine without any additional "push" from muffler pressure. (Though it can be used if you desire.) If the centerline of the tank is not within level to 3/8ths below the spray bar, muffler pressure is *mandatory and should be used.* This additional tank pressure will help the fuel flow be more consistent from a full to empty tank. You might ask "How does muffler pressure work, anyway?" Refer to Fig. 2.

The engine's exhaust air gets blown into the muffler. Since the muffler exit hole is small, air has to "wait" before it can exit the muffler. This delay compresses the air and forms a high pressure area in the muffler. Since the pressure tap is threaded into the body of the muffler, it is an easy escape for some of the muffler pressure. This pressure flows into the overflow (or pressure) line and blows into the fuel tank. Now a high pressure area forms in the tank, pushing against the empty portion of the tank and the remaining fuel. The only place for the fuel to exit the tank is through the feed line, so the high pressure gently forces the fuel into the feed line to the engine.

This takes place during the entire engine run. You can see that if the tank is mounted well below the engine, the engine will not have good enough fuel draw by itself to suck the needed fuel from the low tank. Adding the pressure

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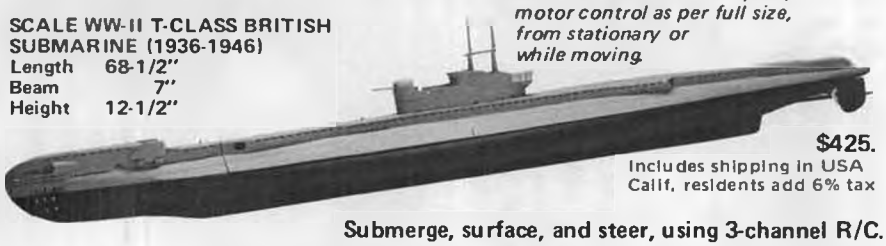

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line assists the engine drawing fuel by pushing the fuel from the tank "uphill" to the engine, which in turn provides a uniform flow of fuel as the engine needs it.

I'm out of space for this month. I'll finish the other tank installations next month . . . hope to see you then. •

R/C Boats . . . . *Continued from page 51*

to run longer than six minutes in a heat race you deserve to run out of fuel!

ABOUT THE ENGINE, PIPE, CARB, AND PROP

The engine is a completely stock K&B 3.5 Inboard Marine. No trick exhaust timing, just stock. For throttle control, a Prather Products exhaust throttle is used. The photos show the boat with an OPS 3.5 muffled pipe. It ran well with that pipe and was super quiet . . . Well, maybe super quiet is a bit of an exaggeration. But it didn't make as much noise as most 3.5 powered boats. I've since gone to an International Products pipe and I'm embarrassed to admit I don't even know the size. I think it's one of their old style 40 size pipes. It seems to give the boat better top end speed. I've also switched from the stock K&B intake venturi to R-C B. Products from Big Al Berry, Rt. 5, Box 45-A, Chickasha, Oklahoma 73018. Compared to the stock venturi, this intake has greater volume. The spray bar is double cut to increase the atomizing of the fuel. It certainly seems to work well and Big Al claims his carbs have been used to set records all over the world. The carbs are anodized and sell direct from R-C B. Products for $25.00. To date, I've tried three props on the boat, an Octura 1450, Octura X-447, and J.G. RH-25. They all worked well. However, I like the way the X-447 gets the boat out of the turns.

RUNNING THE COYOTE 21

Anyone notice I didn't mention "Painting the Coyote 21"? I'll get around to doing that one of these days as soon as there is a lull in events in which I can race the Coyote 21. It's more fun to run boats than paint them. If you want to know about painting a model boat, refer to my article in the November '82 issue.

The first time out with a new model is always exciting for me. There's been a couple of times I've taken new boats out for that initial running and the suckers flat didn't work. Such was definitely not the case with the Coyote 21. I'll tell you how well things went on that first outting. I probably made eight or nine runs with the boat, testing different props and adjusting the needle-valve, and not once did I need to row after the boat. In fact, I didn't even take the rescue boat out of the back of my pickup. That certainly isn't typical of a first time out. It's not typical of most of the time I go out running my boats.

On any of the props I tried, the boat immediately hopped up on the step. No "speed launch" was needed, just a nice easy toss. I'm sure you could just plop the boat in the water and it would hop up on step. The boat rides level on the water and tracks very well down the straightaways. I would estimate the boat was running in the low 50's. That's not near any records for the class, but it's not a bad speed for stock powered, oval racing design.

The boat groves nicely through the corners and exhibits no hooking tendencies. The most efficient method in making a turn was to let off the throttle just before you begin in the turn and then nail the throttle and rudder. That technique really powers the boat corner at full throttle. The only problem is it will drift out on the turn because the turnfin never had the opportunity to get a good bite before the turn. Don Pinckert refers to the "get off it, turn, get on it" technique as an explosion turn and that's a pretty good description.

A COUPLE OF IDEAS THAT MIGHT BE HELPFUL

The K&B 3.5 Inboard Marine engine features a sidedraft intake carb. A problem with this configuration is it's proximity to the bottom of the boat and any water that happens to be accumulating there. Al Berry told me that he uses a product called Chore Girl, a stringy, plastic cleaning pad, glued to the inside bottom of the boat to keep water from splashing around. The Chore Girl doesn't absorb the water. It just keeps it from vibrating around and getting up into intake carb. Good idea.

The other suggestion is to simply cut an angled hole in the bottom of the boat to allow the water to drain out of the boat. When a hydroplane is up and running, the bottom is out of water and the water can just drain out. If the boat isn't running, does it matter if some water comes back in the hull? I'd recommend gluing a 1/8 piece of plywood on the underside of the boat where you plan to drill your hole. This will allow you to get a little angle on your drain hole. Needless to say, the hole should be angled toward the back of the boat. We want a water exit not water scoop.

How well will the Coyote 21 do in competition? I haven't had the opportunity to actually race other boats yet. However, knowing what the other boats in the class are capable of doing, I would say that the Coyote 21 is going to be a very competitive boat. I'm very much looking forward to the opportunity of racing the Coyote 21. The only problem I may have is trying to get the boat away from my son, Paul. He drove the boat for the photo session and took a big liking to it. This was his first experience with a 50 mph boat, and Paul thought it was great fun to go that fast. You might say that my boy and I are howling with delight over our Coyote.

ANOTHER HOT SHOT?

It's not another tunnel hull from Dumas. Rather, it's a new product from those instant stickers down at Satellite City. The makers of Hot Stuff have just

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R. Tennison - Libby, Montana

"Your 19BB flies my DAS Little Stick very well, and it is a joy to fly"...
Don Austin - Redfield, Arkansas

"The Fox 19BB was installed on a Goldberg Eaglet, and what a super combination! The Fox started on the second flip and the needle settings were not the least bit critical"...
Walt Purdy - The Hobby Hut, Moscow, PA

"We installed the Fox 19BB in my RCM "Big Bird" and took it to the field. In one evening we had six or seven fellows flying it. They were all amazed at the power for a small engine"...
James G. Hand - Wellsville, NY

"We replaced the VECO 19 with a Fox 19BB...what a difference. We now have power to spare"...
Carlos Priemer - El Paso, Texas

"We are using your wonderful little 19BB in a balsa USA Swizzle Stick. The 19 is a perfect engine — good idle, good power and easy starting"...
Carl Liperti - Janesville, Wisconsin

"...have found your 19BB to be very reliable in starting and at idle. Also it outpowers many 20's and 21's"...
Paul Caulkett - Fairbanks, Alaska

"Installed your Fox 19BB in a Debolt P-Shooter which was set up for a 40. It took right off and never sagged or overheated. I especially like the excellent transition from low to high RPM"...
Pete Dillon - Jackson, Michigan

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released an accelerator for cyanoacrylate adhesives and they're calling it "Hot Shot."

Quoting from their release, "Hot Shot commands a *very* instant cure and can be used before or after the glue is applied. Gap filling is greatly increased and strong fillets can be made in just a couple of seconds."

Bill Hunter, of Satellite City, sent me up one of the pump spray bottles to give a trial. Just so happened I had my 21 tunnel sitting on the workbench in need of some repair. Seems like I forgot to turn on my transmitter before launching the boat. Before I figured out what wasn't on, the boat smacked into a float and mangled up a front sponson. You're right, it was a dumb move. But now I had a good reason to try out this Hot Shot on my boat.

Accelerator is the right word for this substance. You simply wouldn't belive how fast that Super-T set after I sprayed the area to be rejoined with Hot Shot. A note of caution is in order. When you use Hot Shot along with Super-T, be certain that the parts you are planning to join are in the position you want them. Once you make the joint by pressing the parts together, you don't have an opportunity to readjust them.

Hot Shot accelerator is priced at $3.95 for 3 ounces. By the time you read this, it will be at your hobby shops that already supply you with Hot Shot and Super-T. The quick get quicker. Jerry Dunlap, 119 Crestwood Dr., S.W., Tacoma, WA 98498. •

R/C Auto . . . . *Continued from page 53*

of Novak's Bantam Midgets fitted with the optionally available clear cases (these can be dyed to match your chassis parts if you like).

The rollover antenna is 7-3/4 inches from the tray to the tip of the 1/16 wire antenna. It is attached to the tray with an aluminum screw and cut-down nylon nut, a nylon insert isolates that antenna from the tray. The antenna lead from the Rx is soldered to the piano wire vertical antenna. Notice the lead is coiled around the base, acting as a stress-relief.

A double-layer pad of servo tape stuck on the chassis damper supports (very lightly) the bottom of the throttle servo. This pad is only stuck to the damper and *not* to the servo. The wiper arm is held in proper alignment by the lower half of one of those combination output arms furnished with Midgets, the end of the wiper is bent down to further anchor it in place. An effective strain relief for the wire that is soldered to the wiper is the small nylon tie. The clamp used at the high speed end of the resistor is a standard wiper and I believe that it was Kent who first used this idea, which is now common practice. The Futaba female plug is glued to the tray with Hot Stuff, excess servo wiring is bundled and tied with a nylon tie. (Although it doesn't show in black and white pictures, the servo wires are color coordinated to the body colors!) The 6-cell Sanyo batteries are attached with a twice-around wrap of strapping tape.

That chassis damper you see is bolted solidly to the pan directly in front of the motor cutout, using an aluminum screw and a metal nut that has been ground for clearance of the battery pack. At the forward end, the damper is fitted with an aluminum screw, fiber washer, spring washer, and nylon nut, a virtually identical arrangement to that used for damping the rear suspension, and so easily variable. Good idea that, worth trying on your car; the damper can be cut from an old chassis pan, all other pieces are off-the-shelf parts.

Oops, I have to go back to the resistor setup. The leading edge of the button on the wiper has been ground away slightly at about a 45° angle to prevent any chance of fouling the winds on the resistor. And radio wiring is straight-up, no dropping diodes.

In the rear end, the nylon adapters used for the lightweight rear bearings have been cut down to be only .090 thick, moving the bearings inboard. This leaves room for the added pieces which, from the bearings out, are a ball thruster washer (as used on the outboard end of the diff) and then a plain thrust washer, also as used on the diff. Same deal left and right except for an extra .021 aluminum washer used on the right, evidently just to get the spacing right.

Stock rear rubber is used. In the front, it is the SK type, which is a combination set, the old-style "soft" for the outer ring and rear rubber for the inner.

For this race, Kent cut the rear air dam down on the TOJ by 3/8 inch. The wing was run flat and had been narrowed to only 1-3/16 inches wide. The wing itself is attached to the wing wires with strapping tape; very light and easy to do, but if you crash much, the wing won't be there at the end of the race. The required little guy is simply stuck in place with a few small pieces of servo tape. Again, a nice way to do it, but crashers better put the guy in a little more solidly. The fins on the body have doubled over pieces of servo tape stuck up in there, just to keep things tucked in a little.

The Yokomo 05S motor required in Stock class isn't particularly interesting, as they aren't used in ROAR racing, but it is worthy of note that the gearing was used 16/48 for a 3:1 ratio, which is pretty tall gearing.

The only other modification from the stock kit is one that Kent didn't use. If that confused, it was supposed to. A number of the Team Associated racers have been boxing in the battery pack area of the radio tray, simply by adding an extra pair of stand off posts forward of the battery pack and tying the tray to the chassis. From the looks of Kent's tray he has used that setup at one time, but not for this race.

The only other thing that I can see is that there doesn't seem to be any toe-in at all in the front wheels. Try it if you want, at least a little toe-in seems to make most cars stable and easy to drive.

That should wrap it up. There may have been a couple of small items missed, but I doubt it. Now you know how to duplicate a race car that just won a World Championship. Spend the next couple of evenings massaging your own RC12i. And about 6 years practicing to drive it as well as Kent can!

Hannan . . . . . *Continued from page 56*

were attached "to the sparkplugs" of the Anzani engine (page 114) . . . ignition *system*, perhaps? And surely the photo labeled Bleriot XXIII is a Deperdussin? (page 123)

In evaluating history books of any sort one must tread cautiously in trying to separate facts from opinions, and this book is no exception. Mr. Crouch seems to adhere to the "Wrights could do no wrong" bias exhibited by the late C.H. Gibbs-Smith, who, in fact, composed the forward to the book. This viewpoint unfortunately tends to obscure or minimize the important contributions of the many aero pioneers who preceeded and those who coexisted with Wilbur and Orville. These reservations aside, we unhesitantly recommend this book as an excellent value for its $9.95 postpaid asking price. Let's build more Bleriots! Our copy was purchased directly from the Smithsonian Institution Press, Washington, D.C.

E.T.

Those magnificent flying bicycles in the hyper-successful move "E.T.", were in fact scale models, which benefited from the talents of Mike Fulmer, of Kentfield, California, and wheel "spokesman" Fulton Hungerford, of Titusville, Florida.

FULL-SIZE MINIATURE

Joseph Shultz, of Pottstown, Pennsylvania, who furnished the proof-of-scale drawings for Walt Mooney's delightful little White Monoplane published in *M.B.*, is now contemplating construction of a man-carrying example for the Experimental Aircraft Association Museum.

AND SPEAKING OF THE EAA

The Experimental Aircraft Association publishes one of the finest aviation magazines in the world. Although devoted primarily to homebuilts, their coverage also includes factory-built and special-purpose machines. In the October 1982 issue, we were somewhat amazed to see the colors of the most recent Soviet aerobatic aircraft: Would you believe red, white and blue!!!!

ANOTHER NEW MODEL CATEGORY?

According to Ichiro Yamada, of Japan, Mr. S. Tatebayashi, a most innovative designer, has been experimenting with outdoor CO2 radio controlled models. Spanning about 30 inches and weighing approximately 100 grams, they are of traditional stick and tissue construction. CO2 tankage installed permits durations of 90 seconds or more. Yamada calls 'em "Kindergarten R/C".

THE GOSPEL ACCORDING TO C.H. GRANT

Model Aviation Canada is the magazine of the Model Aeronautics Association of that country, and it is edited by Wally Batter, best-known in this country for his fine writing and illustrating in the *World War One Aeroplanes* model department.

Commencing with the August, 1982 issue, *Model Aviation Canada* has been featuring a series of articles from Charles Hampson Grant's monumental book *Model Airplane Design*. This long-out-of-print classic is today a collectors' item, but Batter hopes to make its information available again in his publication, and he offers subscriptions for only twelve dollars, postpaid to anywhere in the world. A yearly subscription (six issues) also includes news of activites in Canada's modeling community (free flight, control-line, and R/C), handy hints and excellent illustrations. Contact: Model Aeronautics Association of Canada, Box 9, Oakville, Ontario L6J 4Z5, Canada.

AIR MAIL ORNITHOPTERS?

After all these years of telephones, radios, television, and satelite communication, Lockheed Missiles & Space Company has decided to rely upon one of the oldest forms of information transmission, the carrier pigeon. Their eight-bird squab-squad transports unclassified microfilm data from the Sunnyvale, California factory to a test site in the Santa Cruz mountains, about 25 air miles distant.

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The pigeons cover the distance in approximately 40 minutes, by contrast with the company trucks which require about double that time over the twisting and crowded mountain roads. And needless to say, birdseed costs far less than gasoline! Our thanks to Carl Hatrak for bringing this item from *Lockheed Life* to our attention.

THE PITOT TUBE

The most often "corrected" word in aviation writing must certainly be PITOT as in tube. Almost invariably this term is transformed into PILOT by repro typists and typesetters. Well perhaps they can be forgiven; it is after all, a rather strange word. The device itself, used for measuring flow velocities in fluid or air, was named after Henro Pitot (1695-1771) who invented it. So now you know.

RESEARCH SERVICE LAUNCHED

Recently an envelope arrived at the hangar containing a clever scale logo and cartoon by renowned illustrator Jim Newman. Contrasted were a harried individual flipping through stacks of back-issue model magazines, trying to locate a certain three-view, and a much more relaxed individual simply doing his scale research by mail. We've all experienced the delay and frustration of digging for reference drawings, and so has Dick Gleason. However, he decided to do something about the problem, and has founded an organized system to help.

Having indexed scale model plans for over 1600 models published during the past 50 years, he offers to provide information at very low cost, quickly. For only 50 cents and a stamped preaddressed envelope, he will search his files and send in tabular form, the designer of the model's name, the publication in which it appeared, the model's scale, wingspan and type of power. If required, he can then provide photocopies of published material, or in some cases, blue-line prints of the full-size model plans, again at modest cost.

If this service sounds like the answer to your research problems, contact: Gleason Enterprises, 1704 29th Ave., S.E., Rt. 2, Box 125, Austin, MN 55912. And please tell 'em *Model Builder* sent you!

TRAILMARKS

Prompted by the passing of modeler Maurice Smith during 1980, *Flightplug* Editor Ken Sykora authored the following: *"At a time like this, the mind works in unusual ways. In thinking about this sudden and tragic loss of a modeling friend, we begin to see other faces. Other modelers who have touched our life down through the years . . . brought together by the common bond for our mutual hobby interests.*

"We remember. . .

". . .that towheaded grammar school chum, with the thick glasses, who shared our solving the mysteries of ignition systems. Can we ever forget the expression on his face when the Rogers finally roared to life?

". . .the grotesquely fragile young man who took time to explain the nether world of building indoor mike jobs . . . and guided the HL (glider) trimming that lead to our first OOS . . . out of the schoolyard, over the rooftops . . . and something finally to boast about!

". . .musn't forget the guy who opened the door to original designing. not just modifying kits or mag plans . . . but starting with a piece of butcher paper, and the excitement of our own ideas . . . and that feeling, when it flew!

". . .how strange too, the way some of these acquaintances began. A chance remark on modeling, in the student-jammed din of the college hamburger joint . . . and behind us a soft southern drawl asks, 'You, ah, build models?' Such a simple question. Neither of us could have guessed it was the beginning of hundreds of hours (often stolen from classes!) at the local flying site; and thousands of driving (all night!) miles to distant contests . . . and after 35 years and a continent apart, this friendship winds on. . .

". . .never forget the guy two bunks down in the service . . . built a great scale job . . . in half-hour sessions . . . on his footlocker lid. Learned something there . . . that environment can never stop a true model builder!

". . .and that flying buddy down the block in Dallas. He wrote the book on field repairs; and taught us something about the never-give-up kind of true grit that separates the winners from the rest of the entry.

". . .then there was the master scale maestro . . . whose love for airplanes transformed the design and building of models into a pure art form. His consuming drive for perfection was contageous . . . a subconscious honing stone that keeps us polishing out total lack of natural skills.

". . .and all those modeling clubs . . . kaleidoscops of individual personalities . . . and sifting down through the fine mesh of time, a handful of life-long flying buddies.

"But we are not unique. Anyone with our years of modeling could call up the same memories . . . only the faces and names would be different.

"And, perhaps, therein lies a subtle point in a modeler's life. Whenever we stop, look back and tally it up, it may be, surprisingly, not just the airplane and the flying that were important . . . but that they were a catalyst for all those Trailmarkers who guided our path through an interesting and rich life." •

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Spain '81 . . . . *Continued from page 60*

the launch area (about one mile away). Walt and I went back to the downwind highway and drove into a slight crest in a field (about one and a half miles downwind). Here we could see the launch site but could not distinguish who was launching nor could we receive clearly.

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At this point, we learned the valuble lesson of the need for a close-in check point for radio and visual contact and then a relay of information. After a lengthy wait for a thermal, Foster launched. The model did not climb high, as the high wind seemed to beat it down. The glide came downwind fast. It died at 3:05 and was on the ground at 3:15 at about one and a quarter miles downwind. Another quarter mile and it would have been woods, rivers, and bad dogs. We knew that if we got a high-climbing bird up in a good thermal, we were in trouble. Shortly thereafter, another flight by the Canadian Team drifted past us, giving credence to the problems feared. Armed with this information, we rounded up the rest of the Team and proceded on a tour of the chase areas where points were discussed and our retrieval plans were finalized.

Returning to the launch site, we learned that some more teams had arrived; the Cubans, the Danes, and the Japanese. Interestingly enough, all of the rumors we had heard over the past two years that Eugenio Verbitsky, the noted Russian F1C flier, was in Cuba as a modeling instructor, were in fact true. Verbitsky had arrived from Cuba with the Cubans and would, informally, it turned out, be their flying Team Manager. In looking around, we saw a large group of power fliers gathered around the downwind side of a minibus. Closer investigation found Thomas Koster and Verbitsky sitting against the van with their model boxes opened, doing a psych job on each other.

Aluminum wings, says Verbitsky; me too, says Koster, plus aluminum stabs.

Yes, says Verbitsky, and I have a new undercamber wing airfoil.

Me too, says Koster.

And I have wings with four equal panels says Verbitsky. Why, says Koster. Because they fly better, says Verbitsky. Oh, says Koster.

And, continues Verbitsky, I have hoerner tips. Oh, says Koster.

It looks as though Verbitsky is winning.

And on this model I have the fin in front, says Verbitsky, and on this one in the rear. Oh yes, says Koster, very good. But on mine I have three fins; they are of a new shape and they are aluminum.

It looks like Koster is coming back.

I have new carbon fiber props says Verbitsky. So do I, says Koster. And they are folding, says Verbitsky. So are mine, says Koster.

It looks like a tie.

But all of a sudden Koster says, I have electronic timers. Fantastic, says Verbitsky. And, continues Koster, they are set by plugging this microcomputer processor into this special plug. Oh, says Verbitsky, who then pauses a minute before continuing. Well, we shall see in the air, right?

Right, I thought, that will tell. I was amused at watching this scene, and I was also impressed with the beautiful models. The workmanship is finely detailed and really shows what fine craftsmen they both are.

In looking at the Cuban models, I found them to be carbon copies of Verbitsky's birds. Right down to the folding props and identical model boxes.

Getting to see your competition fly was almost impossible. Except for seeing the British Team put in some casual flights on our second day there, the wind curtailed everyone's activities. As it turned out, the evenings prior to F1B and F1C would provide 90% of the test flying for those classes. For F1A it was very hard and our Team held off until the hour prior to flying on their day.

During the mid-afternoon of Friday the 7th, we gave up on a break in the wind and journeyed to the University to check in. As we moved all of our gear from the hotel, we got our taste of the Police State. While we had seen soldiers at the Aerodrome with weapons, and even a few around the City Hall, we didn't think we would have our vehicles and dorms under the watchful eyes of many armed guards, all with business-looking automatic weapons of some type and always watching. The rooms in the dorms were quite nice; an entire wing of 12 rooms was set aside for the USA Team. It immediately became apparent that there would be no secrets in these rooms; the walls were uninsulated tile which carried sounds, and the fact that each room had a private bath was great, but all the vents in the bathrooms connected, and every time someone flushed, it sounded like someone was using your bathroom. Throughout the week, we had tried to find out the whens and wheres of the scheduled registration and model processing. As we were moving in, I kept seeing a line at the registration room. Twice, I asked what it was for; twice I was told it was for rooms and that since the USA had gotten theirs early, not to worry. But as time went on, I started to get more curious, especially when I saw other people come out with identification badges per Team member and supporter. As I worked my way to the front of the line, I found out that I had to produce the International License for each flier. Great, they were strung out between the dorm and the hotel in various stages of moving. We managed to produce eight out of ten, including mine, and with a promise to bring the rest to processing. I was given the ID badges which were to be worn at all times, both here in the dorm and while at the airfield. Once again, I asked where and when did we process. Tonight at the Manager's Meeting we will talk of this, I was told. I kept thinking that, boy was this poorly organized and no line of communication. I was just beginning to see that we had a problem. What I didn't know was that it wasn't going to get any better.

The Managers' Meeting scheduled to start at 10 p.m. on Friday night, the 7th of August, finally got underway at a little past 11 p.m. If you recall the old chant: one for the money, two for the show, three to get ready, and four to go. You

must realize that "FENDA," the Spanish Aero Club, only learned half of it, the first two parts. One for the money: well, they got us all to go to Spain, a moment of accomplishment for them, certainly one for the money. Two for the show: hey, if it came to making a show, they could do that; they made us wait until 11 p.m. to start a meeting when most only wanted to go to bed. They had fresh tablecloths, a newly organized table arrangement, plenty of wine, whiskey, beer, and brandy per manager. We would find that their opening cermonies and Mayor's Reception for the team managers would be super shows also. But the Team meeting, like the rest of the competition, would not be three to get ready, four to go. The evening started off by Sandy Pimenoff introducing the President of FENDA and the FAI Jury. The Jury then started the meeting off by asking us questions on the rules, and by then telling us how they viewed them.

- Their rules on line crosses: First attempt was the same as rule book . . . no sweat. The second attempt was to be a little strange. They said that if on the second attempt you crossed and couldn't get the model off, you received the time your model had been on tow. We couldn't believe them. And when we protested that this was incorrect, the FENDA officials got mad. The Head FENDA official on the Jury, Senor O'Connor, said he would resign if he didn't get more respect, and we received a short dissertation in Spanish (which was never translated) by a Senor Angel Infanta Moratilla, which I guess was sort of telling us what we could do if we didn't like it. This was met by a chorus of boo's and laughter.

Other FENDA ideas:

- No tow lines could be used that had a loop in the end of it (commonly used to put over wrist or finger). They were scared it could be untied and the line would be illegally lengthened.
- No tow line could be thrown if it had a ring or button tied to the end. This they said was a launching device.
- No towel waving under model to create thermal; very unsportsman like.
- No one was allowed on flight line to help launch but a helper . . . Who was a helper? Another Team member they said. But, protested teams, the rules don't say this and some fliers use their wives, children or friends to launch. This shook FENDA up; they then couldn't define helper.
- Absolutely no preparation of a second model until the first model up has landed. This meant another flier could not get a rubber motor out of the storage box until the prior flier was down. This brought a flood of protests from all countries and the question was never resolved.
- Can we get some official fuel for test flying? You don't need any, we were told. Again, laughter and boo's. OK, you can have some, they said. When and where . . . sometime tomorrow on the field, they said. (Sometime never came for the next two days.)
- Can we process an alternate model for an event up until the opening of a day's competition? Yes. Where and When? Somewhere on the field, they said. When we protested, they repeated the same answer and refused to be pinned down. (I don't know about other teams, but when we hunted for them, they were not on the field.)
- When and where do we process? On the field between 8 and 12 tomorrow. (Tomorrow? It was already 2 a.m. of tomorrow.) Where on the field? OK, they said, it's in the big Mess Hall. Fine, we said, what time does each team report? Between 8 and 12, they said. How can you process 36 countries in 4 hours, we asked. It will only take 10 minutes per team, they said. Simple arithmetic shows this can't be done. Their refusal to schedule teams caused some to think it would be first come-first served. But at the start, they called for teams to be processed in their alphabetical sequence. And, as Canada was less than 5 minutes late, they were ordered to the end of the line and did not finish processing until 5:30 p.m. that night.
- The talk then returned to the towel waving within 500 meters. Where was the 500 meters to be marked? It wasn't; Timer's discretion. And, they said, if a towel was waved, it would be disqualified. For whom, we asked, the flier or the towel waver? When they couldn't answer that, they thanked us for coming to the meeting and began handing out the contestant numbers and special souvenir packages to the Team Managers.

They probably figured we were ungrateful as there were still Team Managers trying to get questions answered. By the time I got to my room, it was 2:30 a.m. The Team had a meeting prior to breakfast at 6 a.m. so I could tell them of these great rules and let them know where and when to process. Then I climbed back into bed . . . boy, did it feel good.

Processing went very smoothly for us, except once again up popped FENDA and their versions of the rules. When our F1C team of Doug Galbreath, Charles Martin, and Roger Simpson presented their three models to be processed, they each presented extra motors to be processed. No, no, they were told; three models — three motors, no more. When I protested, they adamantly repeated the same and told us to move on. "No," I said and sat down on the table. You must move on, they said. "NO," I replied and refused to move. Finally an interpreter arrived and told me I must take the team and go. Once again I said no . . . and then asked him if they had a rule book. Yes, he said. Do you have anyone who can read it, I said. Up came Senor Moratilla who told me I must leave. I again refused and finally got him to read his rule book in Spanish as I read to the interpreter the rules regarding extra

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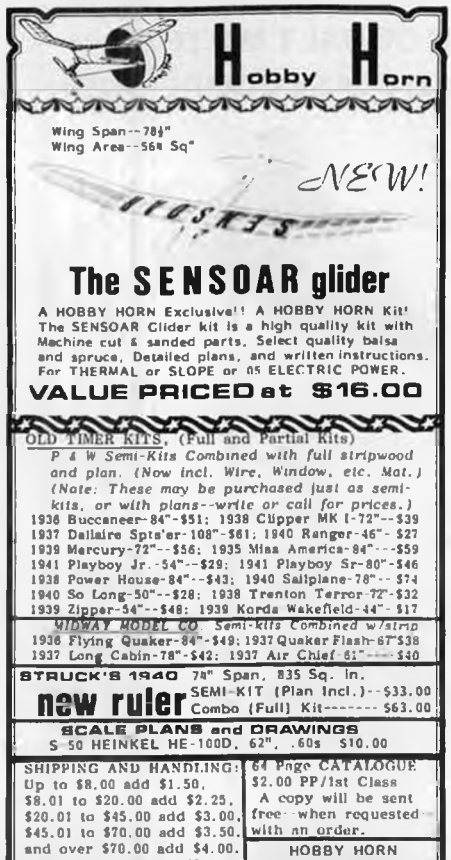

motors. OK, you can have one extra motor. Senor Moratilla said, but we will not process them here but will process them for you on the field whenever you need one. No way, we said, and once again sat down on the table. Finally, Senor Moratilla told the Processors to go ahead and engrave them and he walked off scowling. Little did I know that we would see a lot more of this guy.

Saying that the Processing went smoothly is one thing; saying it was good, or even correct, was another thing. The models were weighed on cooking scales; how accurate we don't know. In the case of F1C, they were set somewhere around 750 grams, the minimum weight. But no attempt was made to correlate the documented sizes of the airplanes to a required minimum weight. We asked them to increase them to 767 as two of Roger's birds are that big. They nudged the scales close to 765 and waved us off saying OK, OK. The rubber motor scale showed our test 40 gram weights to be a little underweight, and so all of our motors were no sweat, but so would have been any other size motor anyone wanted to weigh.

During the processing day and Opening Ceremonies, the wind just howled. The organizers were asked to delay the start of the contest one day, as a forecast showed decreasing winds. No way, everything must go as scheduled. Well, the opening ceremonies did go off on time. But I guess live TV coverage pretty well forced this. But, it was the last thing to be on schedule. That evening, my wife and I, plus Richard Bertrand, the USA's second Timer from Guatemala, attended the Mayor's Reception at 8 p.m.; it started at 9:15. Later that evening, Lynn and Richard attended the Timers' meeting scheduled for 11 p.m. It started at Midnight. Who presided over it and did not have the foggiest idea of how the job should be done, let alone how it was done at any prior World Championships, but our old friend Senor Moratilla. After spending almost two hours haggling over how the timing effort was to be organized, they dismissed the meeting . . . Rules, never mentioned. Just what the world needs, uninformed sleepy timers.

Indoor . . . . . *Continued from page 63*

Method 1, described above.

When covering a prop with condenser paper, remember to use only pre-shrunk paper. Be careful not to use more adhesive on one or the other blade. It doesn't take much to throw the prop out of balance.

One method of covering not mentioned above is used by Earl Hoffman, of Carpenteria, CA. Earl covers his built-up props with very thin wood sheet. Tail boom stock is about the right thickness of wood. Earl's Easy B prop was covered in this fashion.

The beginning difficulties in fashioning built-up propellers will all be forgotten when you see the marked improvement in the performance of your models.

One final note on props. If you must use plastic propellers on your models, use the type with a thin cross section at the hub. This prop has a higher pitch and is the lightest one made. The area is still somewhat undersize, but my son Chris has gotten rather good times on his biplanes using these props. Don't forget to trim the flashing and balance the blades if necessary.

MODEL OF THE MONTH

In a never-ending search for new and better events for indoor flying, we present an indoor twin pusher this time. This model was designed and built by hobby shop owner, Tony Naccarato of Burbank, California. Tony's mom, Addie Naccarato, was our latest profile on *"Women in Indoor."*

Tony's model is easy to build and a joy to fly. The motor sticks are 1/8x1/4 light balsa and the props are 1/32 sheet balsa and are counter-rotating. The wing and stab are constructed of 1/20 sq. balsa. The covering is condenser paper. The two motors are .040 Pirelli Rubber and measure 13 inches long. There is no vertical fin on this little wonder. The closest thing is a 3/4 inch high sheet wing mount on the forward plane. This 17 inch span canard airplane will turn to the right by adding a small amount of clay to the right wing tip. It can be built and enjoyed by novice and seasoned flyers alike. I wanted to be the first to build a twin pusher for indoor flying, but Tony beat me to it. This could be a fine one-design fun event model. Think I'm gonna build one this week.

NEWSLETTERS

Do you subscribe to any club newsletters from outside your area? The M.I.A.M.A. paper is from Dr. Martin's group in Florida. This is the only all-indoor club in the U.S. and their newsletter is well worth the $10.00 per year. Send your check to: MIAMA; Dr. John Martin, 3327 Darwin St., Miami, FL 33133.

Another is from the Washington, D.C. Maxecuters and is called MAX-FAX. Send $9.00 to Allan Schanzle, 8311 Exodus Drive, Gaithersburg, MD 20760. Many scale photos, plans, and scale drawings, plus news of upcoming meets and flying sessions.

MEMORIES OF WEST BADEN

Several years ago, while flying at Northwood Institute, I wandered over to where Hardy Broderson was winding a motor for his mike ship. The model was resting on its stand and all at once the prop began to rotate. My first thought was that a sudden movement of air had put the blades in motion. A closer look proved me wrong. Out near the tip of one blade sat a fine big wasp, having himself a snack of microfilm right from the blade. I could hardly believe my eyes. Who would ever dream that wasps would eat microfilm? Well, there he was.

Hardy stopped winding. He had noticed the prop movement also. He very

calmly reached over and picked the insect off the prop blade, dropped him to the floor, stepped over him with his shoe and begin winding again. Hardy didn't say a word and showed no change of expression. His mind was on winding that motor. I chuckled to myself and strolled off to another area. And I thought I'd seen everything!

FRANK ZAIC DOES IT AGAIN

A new 8-1/2x11 book on early model airplane activities has just been introduced by Mr. Frank Zaic, of Northridge, California. Those of you who own other Zaic books will want to add this fine volume to your collection. Frank's latest effort is titled *"Model Airplanes and American Boy."* It is a collection of aircraft articles from American Boy magazine from 1927 to 1934. The older modelers will enjoy the nostalgia of the twin pushers, early indoor designs, and the accompanying ads for kites, toothpaste, typewriters, etc. The under-30 builders can see how it was in the bygone era of our hobby. The designs featured in this book vastly influenced the style of models we are flying today. I noticed the names of Carl Goldberg, Golden Light, and Donald Burnham mentioned frequently throughout the book. This fine effort deserves to be on frequently throughout the book. This fine effort deserves to be on every modeler's bookshelf. Send your check for $9.00 to Model Aero Publications, P.O. Box 135, Northridge, CA 91328.

ENTER THE ULTRALIGHTS

Indoor scale builders are ever on the lookout for new sources for plans and photos. Have you tried a model of the new ultralight machines? A book titled *Ultralight Aircraft, The Basic Handbook of Ultralight Aviation* is now available. It contains three-views and photos of many of the new "Little Wonders". There are many good black and white photos of engines and even information on how to fly an ultralight. Among the subjects that look good to me for building models are: The Eagle, Birdman RB-1, Quicksilver, and the Goldwing. The most interesting one of all for a rubber model would be The Kimberley Sky Rider. This high wing monoplane is from Australia and looks like great fun to build and fly. Cost of the handbook is about $14.00, and the publisher is Ultralight Publications, Post Office Box 234, Hummelstown, PA 17036.

BEGINNER'S MICROFILM

Have you stayed away from duration models because building light and covering with microfilm was just too much to tackle at one time? Here's a possible half step to get you into light building and hold off on the microfilm for awhile. Cover your first few duration models with one of the super-light plastic materials. These plastics are very thin and will give you good flight times. Granted, the flights you get will not be near as high as with microfilm. They are much easier to handle while covering and are more durable when a crash occurs.

If these materials are not available in your area, order them by mail. Microlite is a milky transparent sheet and is available from Micro-X Products, P.O. Box 1063, Lorain, OH 44055, or Indoor Model Supply, Box C, Garberville, CA 95440. A new transparent film, Absolite, is now available from Old-Timer Models, P.O. Box 913, Westminster, CA 92683. The cost is about $3.50 for one yard.

The covering adhesive can be; model dope, thinned white glue, or condenser paper cement. A new trick is to spray the wing/stab/fin structure with a light coat of Spray Mount Adhesive from your local art supply store. The plastic covering can even be lifted and repositioned when using this spray. After you have successfully built and flown several Microlite covered planes, then you're ready to go all the way and use microfilm.

CAUTION: Trimming Microlite is tricky, so use a new sharp double-edge razor blade or a hot wire to cut the plastic away from your model parts.

AVIATION BOOK CATALOG

Are you interested in the latest aviation books being printed? The new catalog is now available, featuring scale reference, pilot manuals, homebuilt plans, and the like. Write to Aviation Book Company, 1640 Victory Blvd., Glendale, cA 91201. Hannan's Peanut Power is available from this source.

Send photos of your club activities, along with questions and comments to Ken Johnson, 16052 Tulsa St., Granada Hills, CA 91344. •

Scale . . . . . *Continued from page 35*

(British jet bomber) and when I hit on an optium size to get the fans in the model. I was pleased as punch to discover that 1-3/4-inch Ace wheels matched up beautifully. There was no way I was going to produce scratch-built jobbies for the model. It requires 18 of the little beggers!

2. INTERNAL FRAMEWORK. Once you've drawn the outlines in a size that you feel will work, some of the hard mind grinding begins. You've got to develop some construction techniques and figure out where all the little goodies will go. I would assume that you will tend toward techniques that you have used before. If you are a foam wing addict, fine. If you love to strip plank for round fuselages, super. Whatever you use decide on the techniques before you start drawing anything on the outlines. Remember, especially it if is an early scratch attempt, that you'll want to use methods that you are comfortable with. Look back at plans of models that you have built from kits to find ideas that you can borrow. Try to recall problems that you might have encountered at any

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of the stages, and see if you can prevent them from developing again. Consider carefully such items as where you are going to separate the wing from the fuselage, hatch lines, etc.

The wing, if it is built up, must now have the skeleton drawn in on the outlines. If the wing is to be fully sheeted, rib spacing is of little consequence (within reason). I generally choose a point near the tip of the wing (probably where the tip begins its curve) and consider that as the tip rib location. Then I divide the distance between the tib rib and the root rib into equal increments somewhere between two and three inches apart. Remember that it is most important if the wing tapers or varies in thickness to maintain an even rib spacing. If you don't, it will be hard to come out right later on. You may have to make some minor adjustments to accommodate items like wheel wells, flaps, ailerons, etc., but stick close to the established distance on the mavericks. In the case of fabric covered wings, you'll probably want to stay close to scale rib spacing. Generally you will find that this requires more ribs than is actually necessary to build an adequate *model* wing. You might want to create some false ribs to save weight, while achieving scale appearance.

The spars must be considered as well. The number, size, and type will vary according to your building technique. Remember that a sheeted wing really achieves its potential strength from the sheeting. If you cut out a flock of things like wheel wells, you will have to beef up the internal structure. Of course, the aircraft type again plays an important role. A non-aerobatic model does not have to have an ironing board-strength wing. To be honest, we often fool ourselves by assuming that a given wing is too weak, when we try to pick up the model by the wing tips only and note considerable flexing. In the air, the wing does not support the weight of the model at the tips alone.

As you place the spars, remember to let them serve duel functions. Landing gear mounts, bellcranks, etc., can best be built into spar locations. Perhaps they can be used as hinge lines. Consider where you are going to place the bellcranks and pushrods in order to actuate the flying surfaces. Aircraft with gull wings, or as in the case of my PE-2's flat center section, with dihedral beyond the engine nacelles, may require some special consideration.

There are those who like to use a number of lighter, surfaces-mounted spars to coincide with the joints in the sheeting. This does cut down on the likelyhood of wavy surfaces because you have a solid mounting for the butt joints along the entire length of the wing. A last thought on wings: don't forget to reduce the rib airfoil thickness the amount necessary to accommodate the sheeting thickness. Tail surfaces generally follow the same considerations as for the wing.

In developing the fuselage internal structure, I usually wind up laying a lot of parts all over the paper outlines. Engine and fuel tank considerations usually come first. I used to use a built-up beam construction for the engine mount, but recently have stuck with the firewall mounted metal or fiberfilled nylon mounts.

Consider, in developing your engine position, such items as cooling, exhaust, and fuel feed. It's amazing how often a little engine tilt off dead center, either from the vertical or horizontal position, will result in curing many problems. It may compromise your inate sense of symmetry, but it may save the day. Once you've located your engine position, draw in your firewall position. It really pays to have both the engine and the fuel tank located at this point, rather than have to guess.

Next you have to figure out some additional bulkhead positions. You may be fortunate and find that the three-view contained drawings for these and all that you had to do was trace them. More frequently than not, however, this will not be the case. Then you will have to interpolate a bit. The minimum number of bulkheads that I use, would include the firewall, leading edges of wing, trailing edges, and halfway point to tail. Certain model types will require more. Pay particular attention to the curve behind the trailing edge of the wing. In some cases there will be a sharp break there, and in others there will be a gentle curve. You may find an extra bulkhead is required between leading and trailing edges of the wing, because pulling the tail portion of the fuse together may cause an unfortunate budge at that point.

Once again, as with the wing, pay close attention to the size of the fuselage bulkheads. Allow a proper amount of thickness for the actual material when placed over the bulkhead. Check carefully to see that you will not sand through the joints in order to create the

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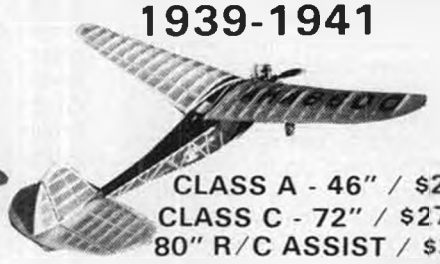

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proper amount of roundness to the fuselage shape.

3. MAKE A LIST AND CHECK IT TWICE. After I've developed a general pattern to work from, I try to generate a list of "watch out fers". These are the little items which will drive you nuts if you are not careful. On kit models, these items have been listed for you, more often than not. The list must be quite flexible from model to model, depending upon the type. It may include such items as: blind nuts for engine mounts, holes for fuel lines, internal control mechanisms (elevator, rudder, bellcranks, etc.) hinges, relieving bulkheads for fuel tanks, wiring for lighting systems, and on, and on, and on... These little items will save a lot of expletives, accompanied by cutting and regluing later on in the porject.

I would hazard to guess that no matter how careful you are at this stage, you will have to backtrack a time or two down the road. Remember, in the final analysis it is perfectly normal for you to spend at least as much time thinking about how to do the job as it does to actually do the job. Of course, as you become more proficient at scratch building, this ratio tends to decrease somewhat. You must be prepared to insert this time into your schedule.

4. LAST THOUGHT. It is most helpful in a scratch project if you "talk it up" with your buddies. I do not mean to boast, but rather that you share your problems with them as the project develops. Many, many times I have been confronted with a difficult situation and mentioned it to a bunch of friends at the hobby shop or at a club meeting. More often than not, someone will have a solution for the problem, or at least the brainstorming will produce a result later on. It is very much like the trees-for-the-forest bit in this case. There are those who are not receptive to this type of help. What a pity!

In closing, I wish someone could help give you instant success. T'aint possible. You will probably have to make a bunch of mistakes along the way. I recall a jillion years ago when I built an SE-5A. It worked out well... OK, almost well! The fuel tank disappeared in the front of the model, never to be seen again... it had about one fourth the amount of cooling that it needed... it took a circus acrobat with minute hands to dismantle the top wing... and I spent most of my building time cutting away things that I had done incorrectly in the first place. But I really loved that model! Good luck and happy scratching! One to One, Bob. •


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and even quicker repair of the wing made from Yarwood (a worse material than mugongo!) resulted before completing the trip to the field.

Photo No. 6 shows Vic Andrews launching the 'Incognito,' a handsome seven foot cabin model using an Ohlsson 60 for power. It would truly be a South African old timer, but alas, at that time we all used butcher paper to draw on, with the next result, the plans were actually used for wrapping... Sad.

"Flying fields were a problem in those early days, too. The Berlin Village Mgt. Bd. requested us to desist from using the flats as we were allegedly causing soil erosion! This, we humorously blamed on Roy Bryson's Guff, which was flown on double booster batteries after it was found the motor would not run on flight batteries. The batteries were not secured, so in the first stall, the batteries went aft, causing a horrendous tail slide. As the nose dropped, the batteries, of course, went to the front end, assisting in driving the Ohlsson 60 deep in the Berlin Flats. Ha!

"With fields in short supply, some of the undeveloped patches of suburbia led to some peculiar recovery problems. The bush there is as thick as any jungle. Starting engines was even a bigger problem. Once the engine was started, many a motorist was startled to find a Sailplane or similar ilk heading right at him.

"To point out the ignition problem, if you got a motor started, you were generally so delighted you immediately turned it loose. Witness Bob Masters and Alan Morris when they finally got the GHQ motor running, they launched it directly out of their workshop into the night. The model circled away in the dark over the suburbs, never to be seen again. A rather fitting end to the GHQ engine.

"Photo No. 7 shows the club members in 1950. Note that the club is still dominated by rubber and towline glider models. This shot was taken at the 1950 Capetown Nationals, a 600 mile drive!

"Photo No. 8 also shows a display at East London in 1948, showing a few easily identifiable gas models, most of them kit designs. As can be seen, controline had arrived with its attendant problems of how to make a suitable tank that wouldn't quit in the maneuvers. Countless ideas were tried until one finally worked. Ironically, in two weeks on the next steamer came instructions on how to build a reliable stunt tank. It'll do it everytime!

"Glow finally arrived on the scene and the flying fields began to smell like old boot polish (nitro benzine). Photo No. 9 shows a group of the boys processing their speed models in the 1950 Nationals. Jack Abbot can be seen on the left.

"The speed orgy finally culminated with the Dynajet. This engine required Ford spark coils, pneumatic pumps, and a crew of three. Once started, everyone

Plug Sparks . . *Continued from page 46*

popular source of transportation to the flying fields.

"I can still recall Vic Andrews swinging to the curb in his hand-painted Ford to pick up the faithful, and promptly wiping off the wingtip of his design, 'Incognito,' as the wing did stick through both rear windows. A quick trip to home

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would quickly scatter as the motor would glow red hot in three to five seconds. It was always a wide open flight, never under 100 mph, and sometimes as high as 150 mph. Exciting!

"Controline was not the only activity, as there was plenty of free flight going on. Rubber was getting hard to find, so the Cadets, Wogs, Banshees appeared in numbers in direct proportion to the new glow fuel becoming available.

"Of course, there were no dethermalizers in those days, so many a classic chase ensued. People seemed to be more honest in those days as a remarkable number of models were returned. Not all models flew away, as I recall one particular Keilkraft "Outlaw" overpowered with a Mills 2.4cc that everyone had an idea on trimming. The model flew great under power, practically straight up. Motor cut, and the reverse followed, a dive into a 44 gallon drum being used as a dustbin. Rather appropriate!

"The chief memory was that all crashes were greeted with laughter and banter. There was no point in crying, as the crash was invariably your fault and your peers had done it all before. They knew that it could happen to them on the very next flight, so what the hay! . . . have a good laugh!

"The best part of today is to note that this light hearted approach to aeromodelling is still prevalent at Old Timer Reunions. Even though some of the participants may not have experienced those magic days of trial and experiment when no one was an expert, the old timer flyers still recognize the ultimate object of the models of those days was to give their owners FUN."

Thanks for your comments, Jack. As this writer has constantly preached about old timers, the name of the game is FUN!

The Readers Write

In line with showing what our readers are doing, Photo No. 10 depicts a super flying Quaker Flash built by Earl Davis, of 7740 Morgan Estates Dr., Ooltewak, TN. The model was completely scratch built and powered with a Saito FA-30 four-cycle engine.

Earl reports the model flies like a dream. Covered with Super Coverite and painted with polyurethane, this model flies with very little parasitic drag. Many enjoyable flights to date.

Photo No. 11 shows Esio Grassi, of SAM 16, with his colorful (and patriotic) version of the Miss America. This shot was taken at the Signal Seekers field, in Bridgewater, Massachusetts. Grassi's Miss America, powered by an HP 40 rear rotor, never fails to place. Just another case of a marginally stable free flight model making an excellent R/C flyer!

Northwest Sallies

Bob Stalick, our intrepid free flight columist, writes to give us the latest dope on the betting odds that Foggy Moorhead won't finish his Red Zephyr in 1983.

The situation stands like this right now: Earle C. "Foggy" Moorhead, club president of the Willamette Models Club, Inc. (WMC), is well known in the northwest area for his promotion of the hobby and complete lack of building. As an example, he has ordered three sets of the Red Zephyr plan in 1971, and has since re-ordered one or two more sets as the others have faded in the light.

Perfection is what he strives for. He has built most of the Red Zephyr, including the stabilizer, three or four times. If it isn't perfect, he starts over again.

Al Grell has had two bets with Foggy that he wouldn't finish the Red Zephyr by the next contest season. These bets have been paid off in the late seventies.

As can be seen in Photo No. 12, the beauty lineup shows a Red Zephyr built by Bob Schafer, of Seattle, who constructed one in the hopes it might inspire Earle. Other WMC members have built 1/2A size Red Zephyr Texaco models to provide proper inspiration. Stalick has even named his "Foggy's Folly." This has been to no avail!

The Red Zephyr project is now entering its second decade, and all club members are at their wits end to find a method to energize Foggy into action. Stalick now asks for help from everyone, including this columnist.

This is indeed a problem. This writer is immediately struck with some good western ideas: like get the rope and brand him, or better yet, select the nearest white oak tree (understand the trees are mostly fir and pine up there). Some do-gooders may regard this as too radical, but drastic measures are in order. Maybe a revival of the old Massachusetts custom of dunking? How about the cat o' nine tails? I got it! Let's put him on public display in a pillory located centrally in the public square.

This columnist is on record that this lallygagging on the Red Zephyr must cease immediately and putting Moorhead on notice his name will be MUD if an immediate reformation is not forthcoming.

Also of interest from SAM Chapter 8 comes a photo from Clarence Bull, of Eugene, Oregon, of his 1/2A Flying Quaker. Photo No. 13 was taken during a SAM 8 O/T contest, October 8. Clarence claims 4-1/2 minute motor run using a Medalion Cox 049 with 1/4 oz. tank. (Ed. note: seems like a very long run with such low amount of fuel. Are we using standard fuel and/or standard Cox Black Widow engine specified for this event?)

Like most of the SAM members, Bull is looking ahead for the SAM Champs at La Punta AFB. The site is so terrific, it seems to be a modeler's dream free flight field.

Rubber Scaling to Gas

Well, we have heard of everything now in scaling for R/C, but Stuart Richmond, 1304 Palm Springs Dr., Apopka, FL 32703, has topped us all!

As can be seen in Photo No. 14, Stu has taken a 36 inch rubber version of the Comet Clipper and scaled this from 36 to

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54 inch wingspan (for R/C, of course). Stu is extremely enthusiastic over the model's performance using an OS25 for power.

Question suddenly arises in the mind of this columnist: Inasmuch as old timer gas models are built from only O/T gas powered designs, how do you classify a model originally a rubber model now converted to gas? Do you go the other way and say the original 70 inch model has been reduced to 54 inch? Think that over, you Philadelphia lawyers!

Foreign Exchange

The writer's 1982 trip to Australia is finally bearing fruit as far as the formation of a national SAM Chapter is concerned in Australia. In a recent exchange of letters, a special rate was quoted for an overseas drop type shipment of SAM Speaks.

This is an arrangement similar to what is presently being offered to England, a large "drop" shipment of SAM Speaks is sent to the national secretary and he, in turn, distributes them to the membership. This seems to work out quite well.

A recent postcard from Dave Owen announces the new officers of SAM Australia: President: D. Gordon, Vice President: Dave Owen, Secretary/Treasurer: John Tidey, Newsletter Editor: Dennis Parker.

With the officers now established, the new SAM group wasted no time in announcing the first Australian Old Timer SAM Nationals scheduled for Easter 1983 in the Goulbourn area of New South Wales.

For those interested, the weather isn't too hot that time of year and winds very low. Accommodations are no problem. Wanna go?

While talking about Australia, the latest "Airborne" (Aussie M.B.) came in the mail. Referring to the old timer column called "For Old Times Sakes," this columnist noted that Jim Fullarton was doing some of the column/article writing.

Jim is an old time modeler, having represented his country in Wakefield and other events. Photo No. 15 shows Jim at the last Australia Nats, Horsham, Victoria, with an O/T rubber model designed by the late Reg Allamby called the "Hervery Petrel." Jim has had many enjoyable flights with this particular model and describes it as quite competitive.

SAM Germany

Latest report from Gerhard Everwyn indicates that interest has developed to the point where a four-page review of SAM appeared in a special issue of Flug + Model, the leading model mag in Germany.

Gerhard states it has been possible to bring together 100 or so enthusiasts with varying interests in old timers, engines, and R/C gear, all of which are part and parcel of the movement. SAM-Germany (or do you say SAM-Deutschland?) is still very much in the mind only! No formal organization has been started, but Herhard reports that various enthusiasts are doing their bit to help to line up literature (includes all sorts of publications), model plans, engines, and radio control equipment.

Gerhard, himself, is extremely interested in obtaining magazines and books dealing with model airplanes in the late thirties and early forties. Of course, post WWII era, 1949 to 1960 are also of interest. He concludes by saying the main thing is to make the Society of Antique Modelers known as widely as possible!

Obit Notice

Just received a letter from Arthur Ryan, Box 292, Farmington, MI 48024, notifying this columnist that long time modeler, Jesse Bieberman, passed away on May 28, 1982, at the age of 77.

Ryan states he found the information in an amateur radio magazine, "73," Sept. '82 issue. Reason for Jesse's demise being chronicled in a ham magazine was because Jesse carried amateur radio license W3KT.

This very low number indicates Jesse dates well back into the early thirties. No question about it, Jesse was an early radio control pioneer, but details seem to be missing. Can anyone in the Philadelphia area shed light on this subject?

The Wrap-Up

Since becoming Secretary-Treasurer of the Society of Antique Modelers (SAM), this columnist has embarked on a one-man crusade to contact all delinquent members. Over 800 letters have been sent out with varying degrees of success for replies. Of course, when it is found that a SAM member has died in the interim between renewals, it is a little hard to collect dues!

Such was not the case of John T. Brennan, SAM member No. 1000. Mrs. Ina M. Brennan writes to say John passed away on April 4, 1976 and has this to say:

"Since John's demise, I have kept his membership paid every year as this meant so much to him. I intend to keep his number 1000 in his memory for as long as I live.

"John's whole life was building and flying, even spent three and a half years in the Air Force during World War II. He would agree that the old timers are the best darn model sport movement he could join, therefore I am enclosing my annual check for $10.00.

"When he passed away, I gave four of his models to the Museum in Portland, Maine, so that other men and boys could see and enjoy them. This, of course, was done in his memory.

"About two weeks prior to his death, John went flying with his models, making about 15 beatiful flights. When he came home and told me about it, his eyes just danced as he was so happy. I believe every man should have a hobby and what better one than O/T model planes. I have always supported him in this desire for all of the 42 years we were married. Good luck to all SAM members who enjoy modeling and all that you do."

Now, how about that! People are

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gradually getting the message I have been preaching all these years . . . FUN!

Byron A-4 . . . . *Continued from page 24*

in the interest of keeping weight to a minimum, I covered these surfaces with white Top Flite Econokote. I did not use any fillers on the foam prior to covering, as the panels were exceptionally smooth. The Econokote went on easily and the end results were gratifying.

The next step called for installing the ailerons, but I set these aside to be installed after the surfaces were painted.

At this point in construction, and during a telecon with MB's editor, I mentioned that I had the wing panels completed, and ready for painting, and that I had had no problems in covering the bottom wing panels even though the fixed gear was mounted . . . Dead silence at the California end . . . And then, a throttled gasp, "Whatayamean fixed gear! I thought we were gonna use retracts!"

I thought, "Oh boy, I've really gone and done it now!" With fingers, toes, and legs crossed, I assured wcn that removing the fixed gear and retro-fitting with retracts would be a lead pipe cinch.

A quick phone call to Cliff Rausin and his super gang at Exportations Ltd./Condor Hobbies in Irvine, California, had a set of Kraft retracts on their way to Maui. Fortunately, I had a set of Kraft retracts installed in Joe Bridi's new pattern bird, the XLT. I removed the nose gear unit, and used this for a pattern while waiting for the set from Cliff.

WING RETRACT INSTALLATION-RETROFIT

Editor's Note: In order to save space in Al's long review, we have eliminated his detailed, 28-step instruction for installing or retro-fitting the retract gear in the A-4 wings, and his 25-step instruction for retract gear installation in the fuselage. If you would like a copy of these instructions, send us a stamped, self-addressed envelope with your request and we'll forward them to you.

HORIZONTAL STAB CONSTRUCTION

As mentioned earlier, the foam stabs were covered the same time as the wings.

A flying stab is used, and its installation is fairly simple. Here again, all the necessary linkage hardware is furnished.

One of the extra 1-1/4 inch diameter die-cut ply discs (used for the wing landing gear insert), was prepared first by drilling a #44 hole (#2-56 bolt clearance hole) through the center of the disc. Disc was then epoxied to the aft L.H. side of fin base at the molded-in index mark. (Center of hole in disc is aligned to this mark). Disc does not lay flat on the fin side because of the fillet contour, so it is necessary to fill in the gap using micro balloons and epoxy. After the epoxy cured, a #44 hole was drilled through the fin base at the index mark. The bell crank assembly was assembled by first installing a #2-56 bolt through the hole drilled in the fin base and the 1-1/4 inch diameter disc. The bellcrank, with the Du-Bro kwik link and nylon socket assembly attached to it, was then placed on the bolt with the bellcrank spacer shoulder against the disc. A washer and nut was then installed, and the nut securely tightened down. Loctite was used on the threads where the nut went on.

Location indexes (indices?) for the stab spar tube are molded into both sides of the fin base. A 1/8 inch diameter drill was used at the index points and the holes opened up with a tapered reamer. Holes were enlarged just enough to allow a snug fit for the nylon spar bushings. Bushings were epoxied in using 5-minute epoxy.

The 1/4 inch diameter aluminum spar tube was installed, as well as the machined aluminum horn clamp assembly. This assembly was then attached to the bellcrank assembly via Du-Bro ball link and socket. The stabs are not installed on the spar tubes until final assembly of the airplane.

RUDDER CONSTRUCTION

This assembly consists of a foam rudder post, foam rudder, and ABS rudder skins for covering the foam rudder core. The foam rudder post and rudder are molded together and must be separated with a knife. These were separated and the leading edge sanded to shape.

The ABS rudder skins were cut out and fitted on the rudder core. The 1/4x1/8 spruce trailing edge stiffener was epoxied to the rudder core. Hinge cutout positions and rudder torque rod hole were marked. The marks or lines were made long enough so that the R.H. skin would not cover them up when installed. The R.H. skin was epoxied on and secured with masking tape during cure time. The R.H. skin overlaps the L.H. skin eges. This is not brought out in the instructions.

After curing, the tape was removed, hinge notches cut, and the hole for the torque tube opened up. The foam rudder post was temporarily installed in the fin and rudder fit checked. The post was held in via clamps, and rudder was attached to post via the hinges and torque tube. Position of rudder post was marked in pencil on the fuse and vertical stab sides. Assembly was removed and the rudder post was installed using Hobbypoxy 2. The whole mess was held in alignment using the clamps. After epoxy cured, rudder fit was again checked. Because the fuse extends beyond the foam rudder post to form an enclosed hinge cover when the rudder is installed, it is necessary to feather the fuse edges to prevent binding of the rudder.

Rudder is not installed until after painting. However, the instructions tell you to install the rudder, and hook up linkage to servo, even though the fuse hadn't been assembled! This is no big deal, as common sense tells you to

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ignore this instruction until later on. The point is, somebody is going to install the rudder at this point, and then realize that the painting should have been done first.

FUSELAGE CONSTRUCTION

The fiberglass fuse halves come joined together. However, the fuse is in two pieces: Fore and Aft. The first steps of the construction are performed on the front half.

The 3/32 die-cut ply servo trays F-1, F-2, and F-3, are cut out for Kraft KPS-15 servo trays. F-1 and F-3 use the single servo tray part number 200-102. F-3 uses the triple Kraft servo tray part number 200-092.

The aileron servo access hatch was removed using an X-acto hot knife. Outline of the hatch is molded into the bottom of the fuse. Hatch opening was cut a little undersize, and then opened to the hatch lines with sandpaper. The aileron servo inspection cover is of vacuum formed A.B.S., which needs to be trimmed to fit the access hole.

Since I only had one Kraft 200-102 servo tray, I modified the 3/32 ply aileron servo tray by cutting a 3/16 wide piece from each end of the servo tray center cut-out, and gluing them in at their respective ends, thereby shortening the hole in the tray so that the servo fits properly. I then cut two pieces of 1/8 thick ply, 3/8 inch x 1-3/4 inches long, and glued these parallel to the edges of the servo hole ends. At the end of the servo hole where the servo lead comes out, I used a 1/4 inch dia. round file and filed a notch to accommodate the lead. Servo was then mounted via four #4x1/2 inch S.M. screws.

In order for the servo tray to fit so that the servo wheel was not too close to the bottom of the servo hatch cover, I added a 1/8 inch wide strip of 3/32 ply to both edges of the tray.

With the servo mounted in the tray, the tray was put in place, and aligned so that the servo was in the center of the access hole. With the tray in position, Hot Stuff was then run along both edges, then a silicone rubber fillet was added to both edges and the fuse.

ELEVATOR/RUDDER SERVO TRAY INSTALLATION

This plywood tray is quite wide, and to stiffen it, I added a 1/8 x 3/8 wide ply piece across the bottom at the ends of the tray opening. The Kraft #200-092 tray, with switch-end forward, was installed on the ply tray with four #4x1/2 sheet metal screws. Location of the tray is shown on the fuse plan side view. I used two balsa braces tack-glued to the tray bottom and wedged against the fuse bottom to hold the tray in place while the epoxy cured. Engine former F-5 was temporarily installed to add stiffness to the fuse. Epoxy was first placed at the two front corners of the tray and allowed to cure. There was a slight gap between the fuse and rear tray edges. Epoxy was then placed on the tray edges, and the fuse sides pulled in and held with clamps while epoxy cured. A silicone glue fillet was then added to both top and bottom edges of the tray and fuse. Engine former F-5 was then removed.

AIR INTAKE INSTALLATION

The two 1/16 sheet ply air intakes were installed at the locations shown on the fuse plan side view and section C-C. When properly located, the top of the air intake edges fit against the fuse top. The bottom rear edges rest against the lower fuse sides. Epoxy was used to glue them in place, and after the epoxy cured, a silicone fillet was run along the top and bottom edges and fuse.

ENGINE SERVO TRAY INSTALLATION

Kraft servo tray 200-102 was installed on the ply tray and then the ply tray was epoxied to the insides of the ply air intakes. Fuse plan side view, and plan section C-C show the location of the tray. After the epoxy cured, I ran a heavy epoxy fillet on the top and bottom of the tray.

The next step was to install engine former F-5, but I chose to assemble the fan unit at this time.

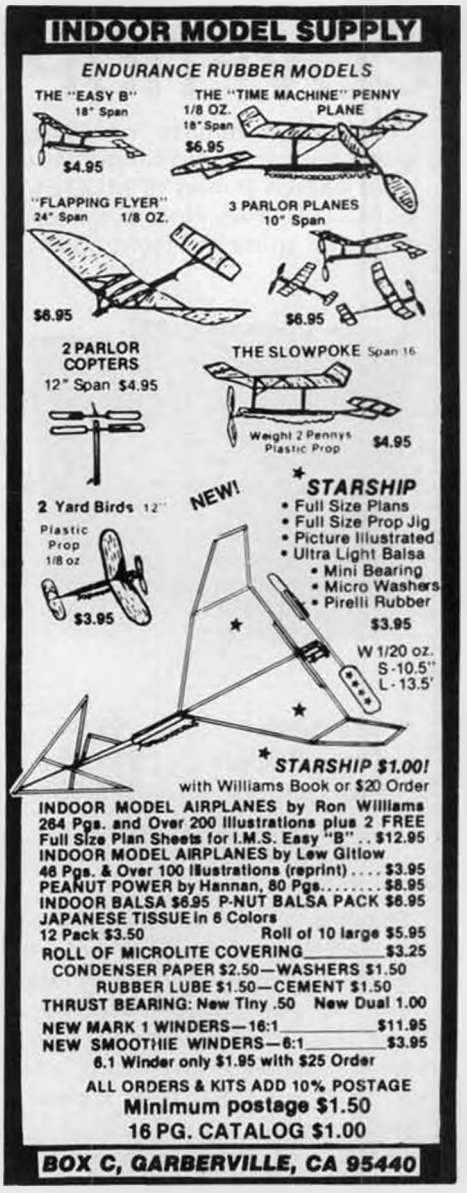
The instructions are included with the fan unit and, for the most part, are quite clear. The only gray area, and one that caused a little bit of head scratching, was the installation of the entry cone.

First, the fan was balanced as per the instructions. Balancing is simplicity itself, and really works! A nylon balancer is furnished, and is inserted into the fan hub cavity. The cone-shaped cavity of the balancer is rested on the point of an awl (also furnished). I held the awl at vertical, using a V-block and clamp. My fan was only slightly out of balance, and very little material needed to be removed from the hub interior wall at the low side. I used a Dremel tool with a high-speed cutter, as recommended by Byron.

The nylon balancer insert was removed, and the proper size nylon adapter that would fit over my Webra .61 prop shaft was chosen, and inserted into the hub cavity. There are several of these inserts furnished, and one will fit any one of the Byron-recommended engines. The fan was installed on the engine shaft. I then assembled the engine mount to the fan shroud using #8-32 bolts and nuts to hold the assembly together. Engine with fan was bolted onto the engine mount (mount is predrilled for your particular engine). The recommended gap between the fan and shroud stator is 1/16 max. and 1/32 min. I then measured this gap, removed the engine, and chose the appropriate thickness shims to obtain the required gap. Several different thickness of undrilled aluminum shims are furnished for this operation. I then drilled out the required shims to the correct engine shaft size. The shims were then placed over the engine shaft, and the fan installed against them. Engine/fan was again installed and the fan/shroud stator clearance checked. A 1/32 ply shim can be placed between these units during this step, and if the fan gently touches it and can be rotated, then the clearance is just right.

At this point, I discovered that the fan hit against the left side of the shroud; so much so that I couldn't turn the fan. I did notice that when assembling the motor mount to the fan shroud that one of the three legs had to be forced over to line up the engine mount and the shroud bolt holes, which could account for the interference. I tried shimming the right hand engine mount leg at the mounting bolt, but this didn't accomplish anything.

I then called Byron Originals in Ida Grove, Iowa, and told Bruce Godberson of my problem. He told me to return my unit and they would send me another unit that day. Approximately four days later, the new fan unit arrived, and this unit was out of alignment in the same manner, except the fan didn't quite touch the shroud. I again called Bruce at Byron, and told him about it. Bruce said, intalking to the person who molds these units, that shrinkage does occur. However, if the fan does hit the shroud, not to worry, as when the engine is first started up, the blade ends will immediately wear down to where they wouldn't interfere!! This is a true statement, because after final assembly, my fan



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blades did hit the shroud, and the blade ends did immediately wear down when the engine was first started. The engine didn't even grunt! Moral to this story: If the fan hits the shroud, don't worry about it, it ain't no big thing!

Engine and fan unit was then removed from the shroud. Fan was removed from the engine, and the entry cone was installed. As mentioned earlier, the directions were not too clear, yet once I figured out how it worked, it was ridiculously simple . . . Now that last sentence was a lie!!! I didn't figure it out by myself; in fact I asked Bruce during one of my telecons with him and HE told me how it was installed! Anyhoo, the entry cone is a black A.B.S. vacuum formed part that slides over the front engine housing and is attached to the housing using silicone glue. The concave section that goes over the housing was opened up so that it would not interfere with the prop back plate. The large diameter end that goes next to the front of the fan was trimmed so that when the entry cone was mounted on the engine, there was minimal clearance between the entry cone and the front of the fan. It is okay to have the two units touch, as the entry cone edges will wear down when the engine is fired up.

The four #8-32 blind nuts were installed on F-5, and the shroud was placed on F-5 so that the shroud mounting holes fit over the ends of the blind nuts that protrude through F-5. The predrilled holes in F-5 aligned up perfectly with the shroud mounting holes. This was a pleasant surprise, as die-cut former F-5 is big, and I expected to have at least one hole out of alignment.

The shroud was removed, and F-5 installed, using the molded-in alignment marks for proper location. It was tacked in place with 5-minute epoxy, and after the epoxy cured, a heavy fillet of silicone glue was added at both sides of the former. The silicone was allowed to cure for 24 hours, and the former was sealed (fuel proofed) using clear butyrate dope.

The aluminum spar mounting extrusions were installed on former F-5. Loctite was used on the threads. In fact, Loctite should be used on ALL threaded parts! Wing spar holes were then cut in the fuse.

The fuse halves were temporarily taped together, wing panels installed, and locations of the aileron male plug-in adapter and front guide pins were marked on the fuse sides. Wing panels were removed and the holes were drilled and opened up. The wing panels, with the ailerons, male aileron plug adapter and front guide pins temporarily installed, were placed on the fuse, and the aileron bearing mounting plate that mounts inside the fuse was placed over the aileron plug-in adapter. Alignment of all parts was checked, and the aileron bearing mounting plates glued in with 5-minute epoxy.

Fuse halves were untaped and the bearing mounting plates were glassed in using 5-minute epoxy and glass cloth.

Fuse halves were glued together using Hobby Poxy II. Alignment was again checked before the epoxy cured. After the epoxy cured, the vacuum formed A.B.S. avionics cover was installed.

Servos, horizontal stabs and rudder were temporarily installed, and pushrods (furnished) were intalled using silicone glue. The fan unit and engine was also installed so that the engine servo throttle hook up could be performed. The tuned pipe was also installed and the mounting hole drilled in the fuse. I made a needle valve extension, located where it came through the fuse, and then drilled and opened up this hole. Switch push/pull (on-off) wire hole was located in fuse and drilled also.

All above mentioned equipment was removed and the fuse prepared for painting.

FINISHING

The owner's manual has explicit instructions on finishing the fiberglass fuse, epoxy/glass covered parts, and A.B.S. parts. I followed their instructions to the letter with excellent results.

The fuse was sanded with #220 sandpaper and the voids filled with polyester body putty and sanded to match the surrounding area. A coat of K&B Super Poxy primer was brushed on and allowed to dry for 24 hours. Pinholes were filled with DAP and allowed to dry for 24 hours. Fuse was again sanded with #220 sandpaper, removing nearly all the primer, and the detail lines were cleaned. A coat of K&B Super Poxy primer was sprayed on, and was applied as if it were a finish coat, and was allowed to dry for 24 hours. This coat was lightly sanded using #320 sandpaper. Dust was removed with a tack rag. A base coat of white Dupont Centari Acrylic enamel (with hardner) was sprayed over the entire fuse. After drying, fuse was masked and top part of fuse was sprayed with gray Dupont Centari Acrylic enamel.

The A.B.S. parts were sanded with #320 sandpaper, lightly primed with K&B Super Poxy primer, sanded lightly with #320 sandpaper, and sprayed with acrylic enamel.

As mentioned earlier, to save weight, I covered the foam wings, horizontal stabs and ailerons with white Top Flite EconoKote. This is where the fun(?) began!!!! Never having attempted to paint EconoKote, I went through some back issues of several model mags to see how other modellers had performed this task. One article stated that the foam surfaces were covered with EconoKote, the surfaces roughed up with steel wool, cleaned with K&B thinner and then primed with K&B Super Poxy primer. This article also stated that the EconoKote "relaxed" after the application of primer, and had to be re-shrunk. Another article said about the same thing, except they used #320 sandpaper instead of steel wool.

Being a country boy and a little naive, (after all, these articles were in "respected" mags), I used the steel wool method of roughing the surfaces, and used K&B thinner and primer. The only difference was that my EconoKote did not relax as expected. I then lightly sanded the primer with #320 sandpaper and sprayed on a coat of white acrylic enamel. Results were beautiful! My next step was to mask the wings to that the top surfaces could be painted gray. While applying masking tape along the leading edge, I got one edge a little crooked and when attempting to lift the tape, the whole bloody finish, primer and all, lifted off! In fact, the top wing finish lifted off in one complete sheet! This proved two things: (1) The primer did not adhere to EconoKote and (2) Acrylic enamel with hardener is very tough and flexible, as you could fold the sheet back over itself and crease it without cracking. The primer did crack

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though, but still adhered to the enamel.

I next made a couple of test samples, and roughed them up with sandpaper. One was cleaned with acetone, and the other with reagent alcohol. A coat of K&B Super Poxy primer was applied to both samples and allowed to dry 24 hours. Results were the same, i.e.: the primer could be lifted off with a fingernail. I then called MB mag and related my sad tale. MB in turn got in touch with Top Flite (Scott Christensen) who said that EconoKote is made of a different type material than Super MonoKote, and that its rubbery consistency did not readily lend itself to painting. He did suggest using course sandpaper and roughing it up to a point where it was all fuzzy and almost sanded through. Then clean with K&B thinner. On my second call to MB to get this info, it was suggested to try Dupont Prepsol, as there were modellers who had good luck using this as a cleaner when painting Super MonoKote.

I made up two more test samples, and using #200 sandpaper, roughed up the surfaces till they were all fuzzy. One sample I cleaned with K&B thinner, the other sample with Prepsol. Samples were then painted with K&B Super Poxy primer and allowed to dry for 24 hours. A piece of light tack masking tape was applied to the surface, and pulled back on itself. Voila! Success! The primer did not come off on either sample. Flush with success, I then applied regular stick masking tape, pressed down real hard on it, let it set for about an hour, and then quickly yanked the tape off straight up. The K&B thinner-cleaned sample had a couple of tiny places lift off. The Prepsol-cleaned sample did not lift off. I then used scotch tape in the same manner. The K&B thinner-cleaned sample lifted in several places. The Prepsol-cleaned sample did not.

Going with the results of these tests,

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the surfaces were roughed up with #200 sandpaper till they were fuzzy (being careful not to make holes in the covering material). Surfaces were thoroughly cleaned with Prepsol. K&B Super Poxy primer was sprayed on and allowed to dry for 24 hours. Surfaces were lightly sanded to remove the fuzzies and a coat of white acrylic enamel sprayed on and allowed to dry for 24 hours. Surfaces were then masked and a coat of gray acrylic enamel applied to the top surfaces of the wings and horizontal stabs. Results: Absolutely no lifting of the finish when removing the masking tape. I did use a light tack tape, as I wasn't THAT confident with the test results! The black acrylic enamel trim was applied and rudder painted with the same color.

Rudder was installed as well as the radio, servos, and inner pushrods. Tank was installed according to the plans.

The shroud and engine mount was next installed. I found that the lexan thrust tube should be installed at the same time. The shroud/engine mount is put into position, and before placing it on the blind nut mounting shoulders, the thrust tube is inserted from the rear and the tabs bent around the shroud. Assembly is then mounted to F-5, using four 8-32 SH bolts and Loctite. To prevent the thrust tube tabs from coming off the shroud, I put silicone glue between the tabs and F-5. Engine/fan was installed and the throttle servo hooked up. Nose gear retract unit was installed and the nose gear steering hooked up. Tuned pipe was then installed.

Ailerons were installed and aligned as per instructions. Wing retracts and pods were installed.

The cockpit detailing was performed and the pilot installed. Canopy was trimmed to shape, painted on the inside and then cockpit assembly was fitted on the fuse and holes drilled for the #2 sheet metal mounting screws. I glued 1/8 ply blocks to the inside of the fuse for the sheet metal screws to go into. Decals were then put in place as designated.

The plane was assembled, and the battery pack moved around to obtain the proper balance point. I used a 550 mah pack and finally located it just ahead of the cockpit area to obtain the proper static balance. Actually, this position results in a slightly nose heavy condition, which I wanted for the first flights.

All up weight of the finished bird, less fuel, came out to be 10 pounds, 12 ounces. This is five ounces over the recommended weight of 10 pounds, 7 ounces.

FLYING

Before attempting to run the engine, fabricate a prop nut wrench with a 30 inch long handle, as there ain't no way that the prop nut can be tightened without it if it loosens up. And it will, if the engine backfires when starting. I have used mine several times so far.

During the course of this article, I mentioned several times to use Loctite on all bolt threads. I forgot to Loctite the four tiny screws on the Webra dynamix carb, and during initial run-up in my back yard, I lost three of them after about three minutes of running. I called several modellers on Maui, hoping against hope that they might have some screws, but no luck. I called my good friend and ole flying buddy, Stu Richmond, in Orlando, Florida, and within a week I had the necessary screws, and a note that said my old Kraft 61 carb would fit the Webra 61 speed #1030 rear exhaust, front valve, which was the engine that I was using. I assembled the Webra carb using the new screws, but I just could not get the engine to run right. After diddling around with this carb for a couple of days, I installed my Kraft carb, which worked perfectly.

Now that I was finally ready to fly, the weather wasn't. The trade winds blew steadily, 25-35 knots for six weeks, which is very unusual, as the trades normally drop to a gentle breeze at sunset, and don't really start cranking until about 1000 hours.

I finally got a break in the weather and was able to fly it. I had the control surface throws set as per instructions, except the aileron throws were a bit more than called for.

The old gal was fueled up with 10% nitro fuel, engine fired up, and one last range check performed. Everything checked out okay. Tank was topped off, engine was restarted, and the aircraft pointed down the runway. The takeoff run was longer than I expected, as I did not attempt to horse it off the ground. The nose dropped back on the ground after my first rotation. I let it gather more speed and the plane lifted off shortly after the second rotation. I did a gentle 180 degree climbing turn to the right, and during this climb-out, I found that I needed a lot of back pressure on the elevator, and when I leveled off there

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wasn't enough up trim to keep the plane level. In addition, the ailerons were too sensitive, and a 90-degree turn to the right after passing back over the field resulted in a 1-1/2-turn roll, and the plane ended up doing a left turn instead. After doing a few wild manuevers such as inverted flight, multiple rolls, and knife edge flight, I finally stopped over-controlling (I have dual rate plus exponential, and never thought to go to low rate or switch to expo) and began to enjoy the flight. The plane really grooves, even with the gear down, which I forgot to retract, and it handles a lot like a pattern bird and is about as fast.

The landing was anti-climatic, as after lining up on final, and throttling back, I started my flare at about six feet in altitude, and with the nose high, the plane slowed down and made a very gentle touch down on the mains and after about 15 feet the nose gear touched down, and roll out was only another 40 feet.

Unfortunately, the wind started blowing, cancelling out any more flights for the day. The nose-heavy problem was caused by the horizontal stab not being in the neutral position, and, in fact, setting at a slight down angle. The aileron throws were reset to the instructions recommendations.

The plane is stable, groovy, easy to fly, and it DOESN'T stagger around the sky. It is not a trainer, but if you can handle a pattern ship, then you shouldn't have any problem flying the A-4. The Webra .61 and Byron fan/pipe unit pumps out plenty of power to fly the plane. Takeoff is easy, as the plane tracks straight as a string, because of lack of prop torque. The big difference is that control response and lift is obtained only by increasing the airspeed, whereas with prop aircraft, control response and lift are developed almost immediately with addition of power, due to prop blast across the wings and control surfaces.

This was my first ducted fan project, and as far as I'm concerned, it was a success. Byron has certainly done its homework, and has brought ducted fan airplanes within the realm of us hackers.

Byron has spared no expense in the kit, and the only criticism that I have, and that is constructive, is that the instructions leave a lot to be desired. I feel that this cost could be better utilized by producing a dry copy (Xerox, Cannon, etc.) set of comprehensive step-by-step, hand-holding type of instructions, plus a separate photo sheet collated to the instructions. *Editor's note: Since this was written, several parts of the instructions have been modified and expanded in order to clarify certain areas.*

Would I build another Byrojet? The answer is YES!!! •

Shark . . . . . *Continued from page 47*

flying it in tethered circles. However, it shouldn't take much modification, if any, to convert the P-60 to an attention-getting free flighter. Even in it's "G" line configuration it seems to have adequate dihedral for stable free flight.

One important thought for a free flight version is cutting down weight. Stringer the top deck from cockpit to Bulkhead 2. Laminate flying surface outlines from 1/32 strip balsa. Stringer the top aft deck back to the rudder post, and introduce yourself to the wet tissue covering technique!

Hmmm . . . wonder if you could get a bonus flight time percentage for flying a P-60 in the P-30 event??? •

T.O.C. . . . . . *Continued from page 13*

Ivan Kristensen, the fifth of the top five, also flew a Laser 200, with Webra twin drive, 20x10 prop, Futaba J radio, Super Jet glue on a built-up framework, and MonoKote and Super Poxy finish.

There were four entries using Contempo's Magnum III ignition engine (3.5 cu. in.), including 8th place Steve Helms (Laser 200), 15th place Tony Bonetti (Cap 21), 14th place Steve Stricker (Super Chipmunk), and 19th place Dave Wilson (Super Chipmunk). Props were 21-1/4x14, 20x10, 22x10, and 20x10 respectively. The Super Chipmunks were all from Don's Custom Models kits, the third one being flown by Ron Gilman, who placed 11th. Ron's was powered by a much modified Tartan Twin (Did you know the Italian manufacturer of this engine is Fox? . . . not Duke!). The "Chips" were very much at home in the Aresti-type competition.

Benito Bertolani, of Italy, flew the

smallest aircraft at the T.O.C., a Yak 18, powered by the latest mark of the Tartan Twin. It was obvious that the manufacturer has done its own massaging of the original production model. Benito's Yak, however, suffered from its excessive speed, flying more like a pattern ship and blasting through the maneuvers. Benito certainly let it all hang out when he did some barnstorming on Sunday after the contest. Singer Bob Goulet, who came out to watch the finals on Sunday, enthusiastically led the applause as Benito made a high speed inverted pass with less than a foot of clearance between rudder and runway!

The only crash in the whole contest occurred on Thursday, the first day, second round. At the east, upwind end of the runway was a low wooden rail fence bordering the entrance road and flying field . . . at least that's all I noticed, and apparently all Gunter Hoppe noticed too, as he took off in a low smooth climb-out for his second flight. WHAMO . . . the Cap 21 suddenly separated, the wing dropping from about three feet high, and the fuselage rocketing forward and into the dirt just short of the rail. At this point we suddenly, quite obviously noted, an almost invisible fine-mesh wire screen about three feet high, supported by steel concrete reinforcing rods, across the end of the runway and about 20 to 30 feet in from the low, wood rail, put there to protect car traffic from the aircraft. Had there been a car passing at the time, it sure as hell would have been protected! Next morning, there was a brightly colored, pennant bedecked ribbon strung along the the top of the barrier. Gunters model was not a total wipe-out, but it would have taken too long to rebuild. Fortunately, he had a back-up model with which he completed the contest.

Another contestant who was not using his number one plane, was Giichi Naruke, of Japan. His Cap 20L met with an accident just before coming to the USA, and his only back-up model was not large enough to qualify. Dave Brown loaned him his No. 3 back-up, the Laser he flew in 1980.

Actual scores at the end of the seven qualifying rounds were as follows:

1.	Prettner	10637.7
2.	Matt	9825.5
3.	Brown	9638.6
4.	Frackowiak	9424.9
5.	Kristensen	9421.0
6.	Lowe	9396.8
7.	Radcliff	9258.0
8.	Helms	9150.3
9.	Hoppe	9140.4
10.	Weitz	9054.9
11.	Gilman	9023.0
12.	Koger	8987.0
13.	Schweiker	8826.2
14.	Stricker	8815.3
15.	Bonetti	8577.8
16.	Naruki	8511.7
17.	Akiba	8310.6
18.	Bertolani	8181.8
19.	Wilson	8072.6
20.	Tracy	4794.5

The finals, if nothing else, proved the consistency of the pilot's abilities . . . all five remained in the same order. Here are the scores as we figured them:

	KNOWN	UNKNOWN	FREE STYLE	TOTAL
Prettner	4645.2	2213.2	4437.1	11,295.6
Matt	4609.1	2028.3	4138.1	10,775.5
Brown	4302.0	1999.6	4077.0	10,378.6
Frackowiak	4473.6	2024.1	3773.0	10,270.7
Kristensen	4126.7	2009.0	4128.5	10,264.2

round, in the second known program flight of the finals, he scored 4609.1 to Hanno's 4449.4 (However, Hanno's first round known program flight was worth 4645.2, the lower score of each program was thrown out).

The USA got into the third and fourth positions, with Dave Brown collecting $9,000 for third, and Tony Frackowiak picking up $6,000 and fourth.

In the last rounds of the finals, Dave Brown may have begun to have a problem that he was not totally aware of until the last flight, when his Laser became very erratic at times, seeming to lose its zero roll centering after any aileron deflection. For perhaps five minutes after landing, as Dave checked his radio, and others wiggled this and that on the model, trying to find the problem, there appeared to be none. Suddenly, Dave found the right wing panel pivoting on its huge aluminum tube joiner, only the leading edge at the root, where it fit into a clearance notch in the engine cowl, prevented it from becoming a rotor wing! The locator dowel had either sheared off or come unglued and slipped into the wing panel. The only model there with variable incidence!

Tony Frackowiak could have been the dark horse, being the first T.O.C. contestant to ever make it to the finals on his first appearance. But it did not come as a great surprise to those who already knew of his capabilities. According to our calculations, he was only 107.9 points behind Dave Brown in the finals, and that's out of a 10,000 point total!

Even closer in the total points were Tony and Ivan Kristensen, of Canada. Canada's national champion finished only 6-1/2 points behind Tony, for fifth place and $5,000. Going into the finals, they were only 3.9 points apart out of 9,400 points. Obviously, all of the close competition was from Second Place on down. As in all past T.O.C. competitions, Hanno Prettner was in first place from the first round of the seven qualifying rounds, and was only out-pointed in one of the six final rounds. You could truthfully say he was not even in the competition!

The Seventh T.O.C. was dominated by Laser 200's and CAP's, along with three Super Chipmunks, a Yak 18, and of course, one Dalotel.

Starting with the winner, Hanno's Dalotel (he brought Nos. 7 and 9) was larger than his 1980 model, but smaller than the 1978 model . . . somewhere between. Power was the same two-to-one reduction twin-drive arrangement as in the past, but the engines were Super Tigre .75's. The large center drive gear was again fashioned from about half-inch thick phenolic material, which contributed to the aircraft's quietness in the air. You might say its quietness was about the only non-scale feature of the model. With full scale, you normally hear the alternate roaring and backing off of the engine as the plane works its way through the maneuvers.

Prettner used a Top Flite 20x12 prop, Giezendanner/AMT retracts, Castrol MSSR fuel (80% methanol, 20% synthetic lube), and the construction was balsa, ply, and foam, with MonoKote covering/finish to save weight. Hot Stuff was the only adhesive throughout, and Simprop was the radio.

Wolfgang Matt, twice World Champion, switched to a Laser 200 from a Zlin, before the competition. He used a Webra Bully (35cc) turning a carbon fibre 20x10 prop. Both he and Gunter's West German FAI teammate, Werner Schweiker, used the Bully. Gunter and Wolfgang each suffered one engine out, though we don't know if the causes were similar. The Bully is a glow engine. Hoppe used K&B 100, Schweiker used 95/5 methanol and synthetic lube, but we did not note Wolfgant's fuel. Matt's radio was the Webra FMS R Expert.

Dave Brown flew a Wayne Ulery designed Laser 200 (10 out of the 20 contestants flew Lasers) which weighed 17-3/4 pounds (20 was the maximum allowed). Dave, Don Lowe, Dean Koger, and Don Weitz all used Tartan Twins . . . Tartans in name and casual outside appearance only. Otherwise, they were extensively modified by Don Chapman.

Basically, and for normal use, the Tartan is a fine engine. However, for the rigors of Aresti-style aerobatics, with long vertical upward maneuver legs, more pulling power was needed. Thus, Don Chapman, of Dayton, Ohio, applied his magic wand . . . in the form of added porting, new reed valves, exhaust timing change, revised carburetor, and a new muffler system (may become available from Mac's). The engines ran very well, turning Max Dailey 20 and 21x9 props. The fuels varied, with Dave using 5% nitro, the others using 8% oil and no nitro.

Dave's Laser was good old stick-style built-up, of balsa and spruce, with foam wing ribs, cyano adhesive, and MonoKote covering. Radio was World Engines Expert.

Tony Frackowiak's Laser was similar in design, size, and stucture to that of Brown, Koger, Lowe, Helms, Radcliff, and Weitz. He also used the World Engines Expert radio. The engine, however, was his own geared twin design, using two O.S. 90 F-SR engines. Unlike Prettner, Tony used all metal gears in the drive unit, and the difference in sound was obvious. Tony ran the largest prop at

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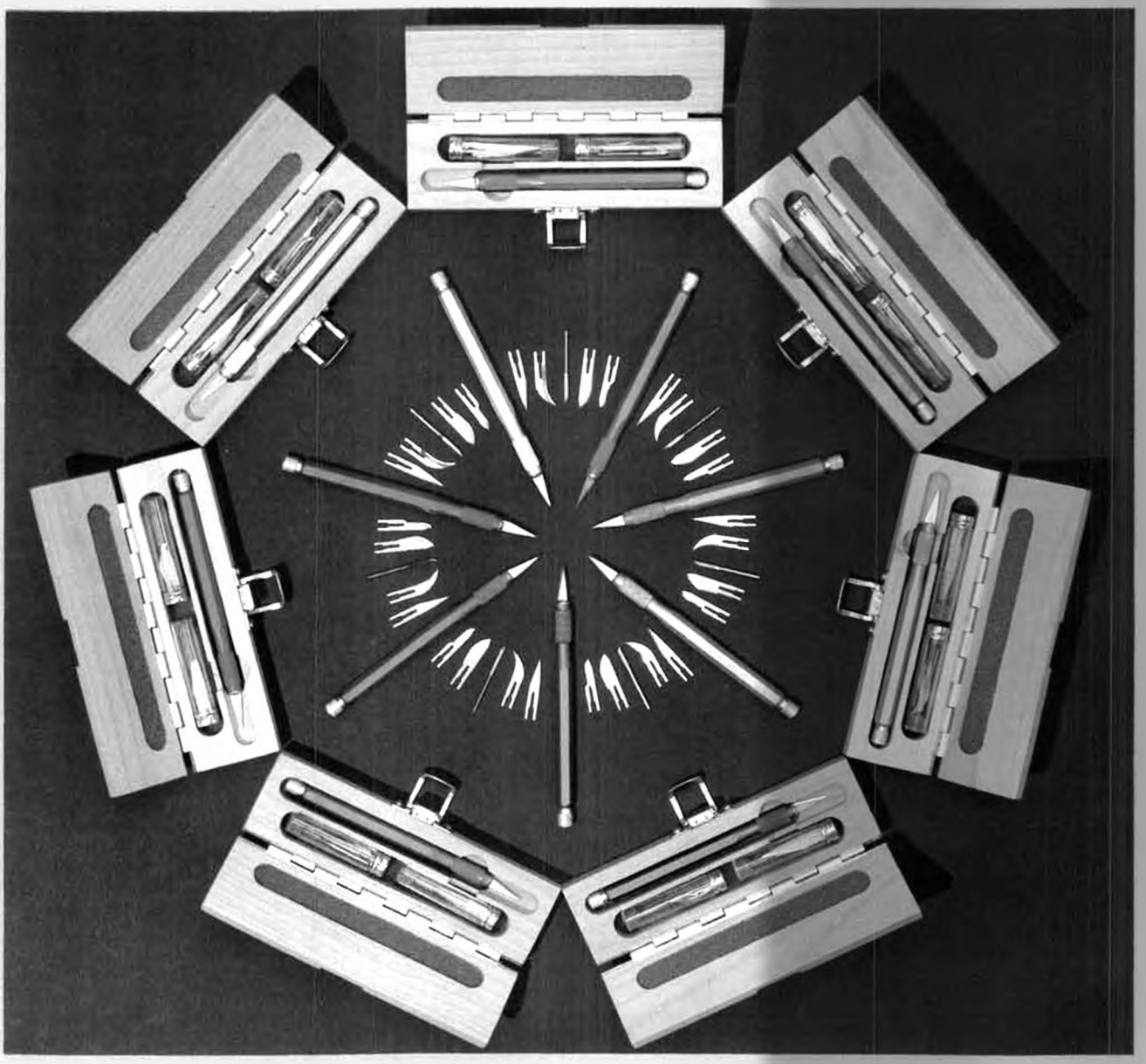

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the contest, a very wide bladed 24x10, and the vertical pulling power of the system was probably strongest of any entry. His plane was also the heaviest, at 19-3/4 pounds.

Note that Tony Frackowiak actually hurt himself with his own choice of maneuvers in the freestyle program. His best of the two Known and Unknown Program scores put him in a solid third spot, but then he dropped way down in Freestyle . . . both rounds. Still an outstanding performance for a newcomer to the tournament.

And what about the next T.O.C., number eight, in 1984? Yes, something excitingly new, at least exciting to this long-time biplane addict. Contestants will be encouraged to enter scale aerobatic biplanes in the next T.O.C., by means of a percentage bonus increase of earned scores. Before we left Vegas, there was some debate as to what the bonus should be. My suggestion, of course, was to eliminate the bonus question by simply making bipes mandatory! Several others, including Hanno Prettner and Phil Kraft, were suggesting a 7% bonus. My vote was to go higher, to 10%, with the thought that good, solid encouragement would be needed, and then, if necessary, reduce it, maybe to 5% for the next time, when the fliers have figured out the right formulas for making the bipes work better. The latest word from Phil indicates 10% is in . . . of course a lot can happen in two years, or I should say one year, as the rules will have to be firmed up in order to give the contestants time to plan their strategy.

Whatever the outcome will be, you can rest assured that the T.O.C. will continue to be the biggest and bestest show in town . . . any town. See ya there!

Workbench. . . . *Continued from page 6*

three un-contest events in which the models need only fly to qualify, and there will be an Electric Clinic open to all interested parties. Prizes for all events will total over $1000, and there will also be generous merchandise awards.

Saturday's events (February 26) will take place at the Harbor Soaring Society's Estancia High School field in Costa Mesa, California, and will include: 05 Two-Meter Sailplane class, direct drive, 6-cell, no samarium; Open Class Sailplane, any motor, any battery; and 05 Pylon Racing, 6-cell, no samarium.

Sunday's events (February 27) will take place at Mile Square Park, Fountain Valley, California, and will include: 05 Old Timer, S.A.M. rules; Golden Age un-contest, S.E.A.M. rules; Sport Scene un-contest; and Most Unique Model un-contest. Prizes for best entry in each un-contest . . . must fly to qualify . . . any motor . . . any battery.

The free Electric Clinic will be held at 11 a.m. and 2 p.m. Sunday only, with experts from S.E.A.M. (Society of Electric Aircraft Modelers) conducting. There will also be a question and answer session.

Entry fee for the events: $15 for the first, $5 for each additional. Send SASE to Leisure, 11 Deerspring, Irvine, CA 92714 for preregistration and info. Pilots' meeting at 8 a.m. each day.

TOIN!!

The clown is dead . . . long live the clown. . .

Most anyone who has been in radio control since the mid-fifties, who attended some of the great Navy-sponsored Nationals, who visited the WRAMS and Toledo shows of the '60s and '70s, and east coasters who attended those never-to-be-forgotten Indiantown Gap Labor Day Weekend Get-togethers . . . hardly anyone . . . could forget Harold "Goldy" Goldklank, the court jester of R/C, from Brooklyn, New York.

Goldy, after several years of failing health, and on a heavy dialysis machine schedule, finally gave in to kidney failure early Monday morning, October 16, 1982. His close friend, fellow modeler, and traveling buddy, Phil Cushman, was with him on Sunday . . . they went flying together . . . and if Goldy could have told it himself . . . "Jesus, William (he always called me 'William, Most Exalted Editor, Sir,' and I always called him 'Harold, My Boy'), did I ever go out in a blaze of glory. That damn engine stahted every time with one flip, the retracts retracted *after* I took off, the radio never glitched once, I was doing four-pernt rolls on the deck and straight as an arrow, and when I landed, even the scroungos came out of hiding and cheered. The Good Lord musta figured I should have one real good day of flyin' before I checked in!"

Goldy was in the hobby to have fun, and although he was very active as a contest flier, he never took it seriously . . . welll . . . he mostly competed in pattern, and he most always started a flight with good intentions, however, usually after three or four maneuvers, things would start to go wrong. "As I do these three loops, you will notice that at the top of each one the aircraft goes exactly through the sun. Just rest your eyes and pick it up as it comes down the back side." "Straight Inverted Flight beginning . . . now/maneuver complete." "As I do these three rolls, note that the engine nevah once leaves the aircrawft."

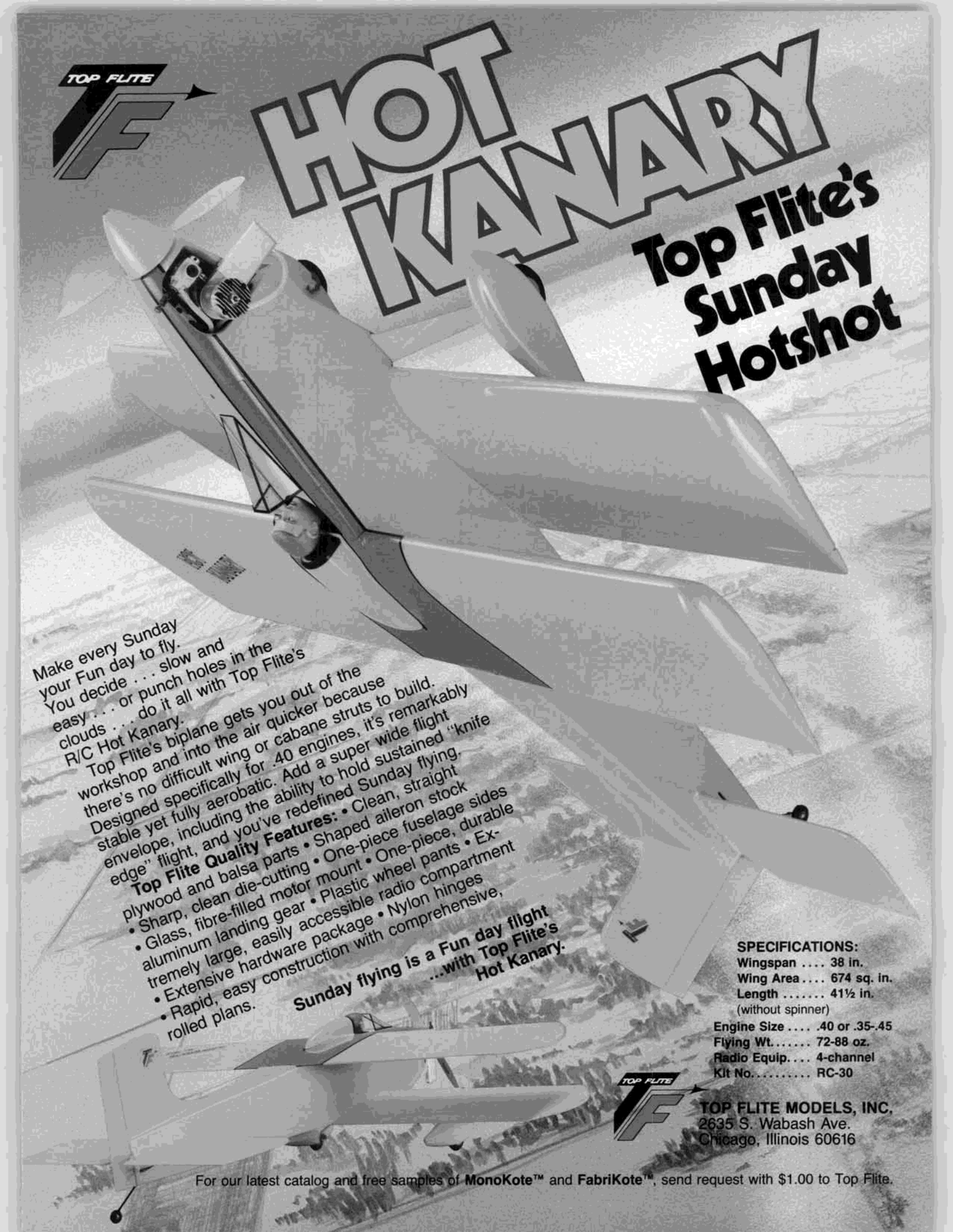
Goldy had a deep, resonant voice, and with that strong Brooklyn accent, it came out like a combination of comedian Phil Foster and singer Lou Rawls. One year at the Nats, he was calling turns for a flying buddy during Formula I Pylon. As his pilot's plane reached the appropriate spot at Pylon I, Goldy took a deep breath, pumped his elbows, and yelled **'TOIN'** loud enough to be heard in the next county. All four aircraft immediately did a 180 . . . no matter where they were on the course, and naturally, *his* pilot came home free . . . the only one who didn't cut!

In the early days, Harold's club, the SOB's (no, it stands for "Sons of Brooklyn") flew from a city dump. The wild tales about experiences in that dump, embellished with Goldy's own special version of wide-eyed truth, have been re-told many times. . .

- The "scroungos" were young kids who hid in the six-foot high weeds down-wind, waiting for out-of-control models to fall into their trap. Before the hapless modelers could find a runaway model, the scroungos found it first and made off with it. To aid them in getting there first, a modeler would grab what Goldy referred to as an "Ibick Stick" (sp?), which he would carry above his head as he charged into the weeds. Now the other modelers could follow his progress by watching the stick, yelling "A little more to the left," "Straight ahead," "Back this way and to the right. . ."
- Another time, they had a contest on Saturday morning. The first flier up was taxiing out to the runway, and turned his head to the judges as the plane rolled on. "After the taxi, I will stop, and then begin my takeoff from right to left." When he looked back, the plane was gone! You could hear the engine running, but it was nowhere in sight. They all ran out, following the sound, and there was the plane, sitting in a round pit, ten feet across and three feet deep . . . The Army Engineers had been out during the week, digging holes in the covered up dump areas to test the soil-bearing quality. They took the diggings with them, and left the holes!
- This guy overshot the field and his airplane disappeared over a rise, into the active dump area . . . nothing. It didn't come up again. Over the rise went the gang . . . to beat the scroungos . . . No scroungos around . . . probably at the other end of the field, in the weeds . . . but no airplane. After everyone had been looking for 10 or 15 minutes, one guy sees about a foot of wing tip on the ground, next to beat-up oven. He pulled open the oven door, and there it was . . . The model had flown into the oven, hit the back side, and the recoil slammed the door shut on it!
- Another day, another flier, but the same problem . . . overshooting the field . . . the plane goes over the rise and out of sight, but immediately appears again, going straight up, but not flying. It was in several parts, and they all flew into the air and then fell back down again. Over the rise go the modelers . . . to find a new addition to the dump heap . . . a much beaten up innerspring mattress . . . torn and tattered, but still very springy, and parts of the airplane lying all around it. Draw your own conclusions.

When reeds were the big thing, Goldy had an Orbit radio. Bob Dunham still remembers the time he received Goldy's radio for repair service. There was a note attached to the transmitter. "Please, get the bugs out of this thing!" When Bob removed the screws and popped off the back, out fell an assortment of dead, dried-up flies, ants, roaches, moths, etc.

Harold, my boy, you may be gone, but you are far from forgotten. . . •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