MODEL BUILDER

JULY 1976

volume 6, number 55

$1.50

COX Hobbies proudly presents the world's best value in R/C Systems.

Wherever in the world R/C model aircraft are flown, Cox engines have been the standard of excellence for over 25 years. Now Cox has joined hands with one of the world's largest producers of remote control devices to bring you the most advanced R/C Systems ever made. Cox/Sanwa offers you 2, 3, 4 and deluxe 6-channel systems, *all at better-than-competitive prices.*

The points of superiority are many. For example, the shock-resistant cases are made of metal and high impact plastic. The beautifully contoured fronts are sturdy aluminum. Rechargeable batteries are standard for both transmitter and receiver in the Cox/Sanwa 3, 4 and 6-channel systems, with a dual-function LED charger included. Available in all frequencies, plus the added feature of interchangeable plug-in crystals in the 27 MHz bands for convenient frequency changes in the field without adjustment.

In the Cox/Sanwa 2-channel system, we've made a significant breakthrough—perfecting a true digital proportional radio system which provides independent, simultaneous control of two control surfaces, at a surprisingly modest price.

Cox/Sanwa also offers a complete range of accessories and a field service program fully responsive to your service needs. Any component sent to the factory for service will be serviced and returned within 72 hours.

Check out Cox/Sanwa R/C Systems at your hobby dealer now and get the best of two worlds: sky-high performance at down-to-earth prices!

2-channel system	(Cat. No. 8020)...$ 79.95
3-channel system	(Cat. No. 8030)...$169.95
4-channel system	(Cat. No. 8040)...$264.95
deluxe 6-channel system	(Cat. No. 8060)...$319.95

3, 4 and 6-channel systems include nickel-cadmium batteries for both transmitter and receiver plus dual output charger.

CHECK THESE TRANSMITTER FEATURES

- 8-section precision fitted telescopic antenna. Extra strong.
- Advanced transmitter design human engineered to provide precise control with minimum fatigue.
- Unusually smooth closed-face sticks with ball-bearing pivots.
- Ratcheted trim levers with calibrated index to help accurately trim ailerons, elevator and rudder.
- Aircraft toggle power switch with unique spring-loaded handle prevents accidental power turn on or off.
- 2-position toggle switch operates retractable landing gear, or similar non-proportional controls. (6 channel only)
- Proportional actuator for controlling landing flaps or similar devices. (6 channel only)
- R.F. output meter with color coded scale.
- Flush-folding handle also provides a convenient stand.

Send 25¢ today for the 1976 Cox Hobbies Catalog with more information about Cox/Sanwa R/C Systems and other Cox hobby products.

COX HOBBIES

Makers of Cox Engines
Cox/Sanwa R/C Systems
Airtronics Kits
1525 E. Warner Ave., Santa Ana, California 92702
Dept. MB-7
A subsidiary of Leisure Dynamics, Inc.
Phone: (714) 540-8200

COX/SANWA

The Cox/Sanwa 4-channel system (as well as the deluxe 6-channel system shown) includes four rugged, powerful servos as standard equipment.

CANADA: Leisure Dynamics of Canada, 1315 Lawrence Ave. East, Don Mills, Ontario, Canada


TO SUIT SPINNER USED
LEE-VECO IS SHOWN
W/ PERRY CARB
GOLDBERG 2-1/4"
SPINNER
3/16" SHEET BALSA STAB
OUTPUT
POWER
COX / SANWA
DIGITAL PROPORTIONAL
RADIO CONTROL SYSTEM

JOIN THE DUMAS' SAILING FLEET FOR "76"

Beating to windward rail down, broad-reaching or running you'll sail right to the head of the fleet.

Our fully molded fiberglass kits are complete, including hardware and dacron sails by Chuck Black. The only thing you'll need to complete your kit is a radio and sail trimming unit. But don't despair . . . the new Dumas-Probar sail control unit is now available from your local hobby dealer . . . so you won't be looking at the water . . . you'll be out there sailing.

See the new Dumas sailing fleet and auxiliary hardware at your hobby dealer s now and start winning with a winner in "76".

BINGO
50/800 ACCR 1975 champion designed by Doug Peterson for the most discriminating skipper.

STAR
45" semi-scale model of the world famous one design available in wood or fiberglass* Cotton sails included with kit dacron sails optional

*Available summer "76"

ETCHELLS 22
50/800 stand-off scale designed by Skip Etchells for both fun and competition

EQUATION
36/600 semi-scale model of the famous ocean racer designed by Bill Barton.

dumas boats

Dumas Products, Inc.
790 South Park Avenue
Tucson, Arizona 85719

THE FINEST FIVES

These provide contest performance and reliability at moderate prices. They are the world's finest 5 channel radio control systems.

All models feature plug-in modular encoders as well as R. F. sections to provide standardization for improved quality and faster service.

KP-5C

Plug-in conversion to optional trainer switch is available.

The totally new two-axis gimbal stick assemblies are of the highest quality yet produced. They are designed to eliminate any possibility of centering error and provide excellent feel. They will satisfy the most demanding flyer. These assemblies should not be confused with the closed gimbal sticks used on lower priced equipment.

The solid state crystal filter I.F. receiver gives greatly improved selectivity and eliminates the requirement for alignment to its transmitter. Therefore, the addition of airborne packages on the same or different frequencies can be accomplished by the purchase of off-the-shelf receivers.

KP-5CS

Transmitter frequency changing is easily accomplished by exchanging plug-in transmitter R.F. modules accessible by removing the transmitter back. Since these plug-in modules are complete R.F. sections, the transmitter will not be obsoleted by changes or additions to available R/C frequencies.

A new open gimbal three-axis single stick version is now available at no extra cost.

If plug-in receiver frequency conversion is desired with the KP-5C or KP-5CS, the KPR-7C receiver can be substituted at a slight extra cost.

Four servo mechanics are optionally available to suit individual preferences (KPS-14 and KPS-15 shown). All feature our exclusive integrated circuit servo amplifier for unequaled accuracy, smoothness, and efficiency. Special high torque and high speed servos are also available at extra cost.

DIRECT SERVO CONTROLLER
This is an exclusive accessory for Kraft systems which plugs into the charge jack of the switch harness. It provides operation of throttle and retractable landing gear without interfering with others or being interfered with. It's an indispensable accessory for crowded flying fields.

One 550 MAH battery pack and two compact lightweight 450 MAH battery packs are optionally available to suit a wide range of installation requirements. For high current drain or long duration applications, a 1,000 MAH heavy duty KB-4F pack is available at extra cost.

KRAFT SYSTEMS, INC.

WRITE FOR FREE CATALOG

Worlds Largest Manufacturer of Proportional R/C Equipment

450 WEST CALIFORNIA AVENUE, P.O. BOX 1268, VISTA, CALIFORNIA 92083

LEARN TO FLY RC THE SIG WAY

BASIC: Start With Rudder Control KADET

SIG
KIT RC-31
$29.50

THE IDEAL TRAINER FOR BEGINNERS

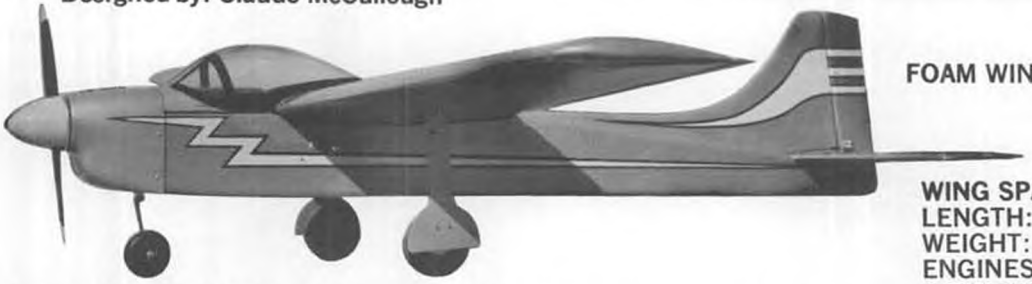
BUILT-UP BALSA WING

LENGTH: 42 In.
WING SPAN: 57 In.
WEIGHT: 4 Lbs.
ENGINES: .19 - .35 Cu. In.
UP TO 3 CHANNEL RADIO EQUIPMENT

Designed by: Claude McCullough

INTERMEDIATE: Progress To Ailerons KOMANDER

Designed by: Claude McCullough



FOAM WING

SIG
KIT RC-32
$36.95

WING SPAN: 62 In.
LENGTH: 44 In.
WEIGHT: 5-1/2 Lbs.
ENGINES: .35 - .50 Cu. In.
4 CHANNEL RADIO EQUIPMENT

ADVANCED: Move Up To Aerobatics KOUGAR

SIG
KIT RC-35
$38.95

FOAM WING

ENGINES: .35 to .50
WING SPAN: 51 In.
WING AREA: 550 Sq. In.
LENGTH: 45-1/2 In.
4 CHANNEL RADIO EQUIPMENT

Designed by: Claude McCullough

EXPERT: For The Graduate Flier KOMET

FOAM WING AND STAB

SIG
KIT RC-29

Balsa Skin $42.95
Plywood Skin $46.95

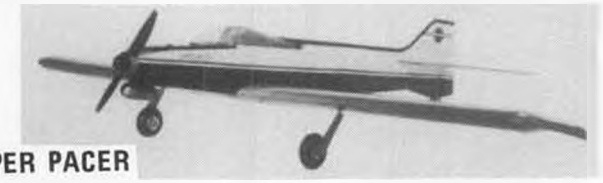
WEIGHT: 6-1/2 - 7 Lbs.
ENGINES: .45 - .60 Cu. In.
WING SPAN: 67 In.
4 CHANNEL RADIO EQUIPMENT

Designed by: Maxey Hester

See your dealer first. To order direct add $1.00 postage in the U.S., $1.50 in Canada. No C.O.D.

SIG MANUFACTURING CO. . . Montezuma, Iowa 50171

For many years, Ace R/C has pioneered the concept and development of small R/C airplanes and produced top quality kits, particularly in the 1/2A category. We've created rudder only airplanes designed expressly for pulse R/O (Dick's Dream, Ace High, Littlest Stick); a small, sport biplane was produced before the biplane bandwagon (All Star); we developed a sensible, solid 1/2A sport plane (Whizard); we conceived, established rules for, and produced the 1/2A pylon ship (Upstart); we conceived and developed the whole category of 1/2A pattern, offering two kits that remain the standard by which all are judged (Pacer, Mach None); expansion of the 1/2A pattern concept to larger engines resulted in a .23 powered pattern ship (Super Pacer). Check the record and stick with Ace R/C, the small plane experts.



SUPER PACER

A .23 powered pattern ship. Span 46"; area 408 sq. in.; weight 48 oz.; for .23 - .25's; three or four channels. 13K109 $32.95

PACER

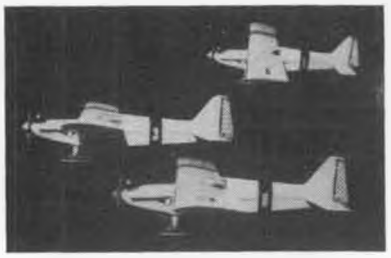
Top performance 1/2A pattern. Span 40"; weight 22 oz.; for Tee Dee .049/.051; two channel (aileron/elevator). 13L107 $19.95.

ACE HIGH

A beginner's glider. Span 72"; area 350 sq. in.; weight 22 oz.; for Babe Bee .049 and Pulse Commander Baby Twin or Standard. 13L104 $19.95

UPSTART II

The standard for 1/2A pylon. Span 32"; area 200 sq.in.; for Tee Dee .049 and small two channel (ailerons/elevator) 13K102 $17.95



DICK'S DREAM

The standard rudder-only trainer. Span 32"; area 185 sq. in.; weight 12 oz.; for Tee Dee .020 and Pulse Commander Baby or Baby Twin. 13L100 $11.95.

LITTLEST STICK

A snappy R/O performer. Span 19½"; area 83 sq. in.; weight 5.5 oz.; for Pulse Commander Baby System. 13H111 $3.95

MACH NONE

Top performance 1/2A pattern. Span 40"; weight 22 oz.; for Tee Dee .049/.051; two channel (aileron/elevator). 13L108 $19.95.

WHIZARD

The perfect 1/2A sport plane. Span 40 3/4", area 240 sq. in.; for .049's; single, two, or three channels. 13L105 $18.95

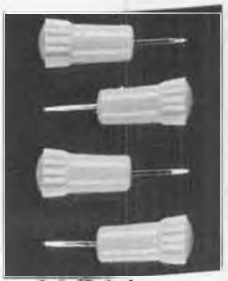
ALL STAR

A popular sport biplane. Span 34"; area 400 sq. in.; for .09-.15 and two, three, or four channels. 13L200 $24.95

NEW ACCESSORY!!
ACE PUSH PINS

These plastic headed push pins have hundreds of uses around the workbench and house. Handy for building, the bulletin board, etc. The plastic head measures about 1/4" X 1/2" with the pin length 1/4". Bag of 50.

40L250–PP Push Pins, 50 $ .59



See our catalog for our complete line of 1/2A items.

ACE R/C, Inc.

BOX 511 D, HIGGINSVILLE, MO. 64037

Please send me your complete catalog. Enclosed is $1.00 which is refunded on my first order. (Add $ .50 for 1st class mail return; add $1.00 handling on all other orders.)

Name

Address

City State Zip

WACO S.R.E.

RADIO CONTROL MODEL

SPAN: 56½" LENGTH 45 3/32" ENGINE 40 to 60 SCALE: 1 5/8" 1 FT

Its hard to find words to describe the breath-taking beauty and great flight performance of this graceful and beautiful cabin bi-plane of the "Golden Thirties". If you're an R/C flyer, whether Sport or Scale, then you are bound to fall in love with this magnificient aircraft. Beautifully engineered for ease of assembly and long-lasting ruggedness; the Waco S.R.E. has loads of room for R/C equipment and scale detail, (it can also be built for control line). It's truly a joy to fly and likewise just to look at, whether on the ground or in the air. The kit's a real dandy too . . . top grade-density selected balsa, sanded to micrometer tolerance. Die cut & numbered parts make assembly swift and sure as you follow the detailed step-by-step plans and instructions that cover every phase of construction. Formed Landing Gear, Alum. Engine Mounts, Giant Scale Decals, Linkage Hardware includes Pushrods, Aileron & Elevator Horns, Bellcranks, Clevis, Connectors, etc. . . also Plastic Cowl with molded-in-place dummy engine cylinder, Wheel Pants, and much more . . .

EACH KIT MAKES 2 MODELS

2 IN 1 Peanut Scale

Balsa and Tissue Construction.

Parts printed on fine quality balsa wood, density selected and sanded to micrometer tolerance-Strip Balsa, Colored Tissue, Scale Decals, Wheels, Propellers, Fittings, Contest grade Rubber Loops. Light-Strong Detailed Scale Plastic Parts-Clear-easy to follow step-by-step drawings and instructions-both models are fine flyers if built according to plan.

Peanut Scale models are rubber powered flying models scaled from real aircraft. Span is strictly limited to 13" and they may be flown indoors or outdoors. Sterling "Peanuts" are fun to build and fun to fly. Designed by experts, they are remarkably realistic in appearance and are great flyers. All material required is in the kit for both models except glue & dope (paint). In addition you need pliers, straight pins, hammer, tweezers, single edge razor blade, flat building board, Saran Wrap (or similar).

3.95

RUBBER MOTOR WINDER

A MUST FOR RUBBER POWER MODELERS

Molded of tough virgin Nylon this five to one ratio winder is a must for long flights and competition endurance. Compact and efficient, the Sterling Winder is just perfect for models using up to three loops (6 strands) rubber motor.

2.95

STERLING MODELS • 3620 'G' ST. PHILA. PA. 19134

If no dealer available, direct orders accepted — with 10% additional charge for handling and shipping. (60¢ minimum in U.S., $1.25 minimum outside U.S.)

- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories, etc. 50¢ enclosed.
- ☐ "Secrets of Model Airplane Building", including design, construction covering, finishing, flying, adjusting, control systems, etc. 25¢ enclosed.
- ☐ "Secrets of Control Line and Carrier Flying", including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints and control line installation instructions 25¢ enclosed.

No checks. Only U.S. money orders or currency accepted.

Name _____

Address _____ City _____ State _____ Zip _____

Sterling MODELS INC. PHILA., PA. 19134 U.S.A.

MODEL BUILDER

JULY

1976

volume 6, number 54

621 West Nineteenth St., Costa Mesa, California 92627

Subscriptions $15.00 per year, $27.50 for two years. Single copies $1.50. Add $2.00 for postage per year outside of U.S. (Except APO). Add 75 cents for Canada and Mexico.

Published monthly by MODEL BUILDER Magazine, 621 West Nineteenth St., Costa Mesa, Calif. 92627. Phone (714) 645-8830.

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

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

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SCALE VIEWS

CONSTRUCTION

Cover: When Hal Woods called about putting his Ed Bellinger-designed GYSOB on the July cover, neither of us had an inkling of the coincidence that would happen. On May 29th, weeks after the cover and construction article had been locked in, Doug Galbreath, who took this photo, flew his GYSOB, powered by the new Cox .40, to a Class C record, during the 1976 National Free Flight Championships at Taft, California!

The moment of truth! Sal Taibi launches our K&B .40 powered 900 Starduster on its first flight. That's right, we'rs holding our Signature Series Kraft transmitter. The completely hidden R/C system consists of rudder tab and trimmable stab platform. Engine's on Tatone timer, no throttle control. See text for more info. Woody Petersen watches, and if we remember correctly, we handed our Nikon to Tim Anderson, from North Carolina, to shoot photo at '76 NFFC, Taft, Ca.

from Bill Northrop's workbench . . .

WHAT . . . AGAIN?

We hope that everyone who is still sending us mail at 12552 Del Rey Drive, Santa Ane, California, will read this. In February of 1973, we moved the office from there to 1900 East Edinger. A year later, we moved to 1105 Spurgeon . . . still in Santa Ana . . and now, after staying put for two years and five months "GYPSY MODEL BUILDER" is packing again!

By the time you read this, MB will be all or mostly located at 621 West Nineteenth St., Costa Mesa California 92627. "All or mostly" because the business office will move first, and then the production group will follow later . . all in an attempt to make the move as painless to us, and our readers, as possible.

For those interested in the geography aspect of the move, we will be about 15 miles southwest of our former location . . . much closer to our home in Newport Beach, and about 3 miles from the Pacific Ocean . . . as the seagull flies.

Unless Southern California breaks off from the U.S.A. and floats out to sea, as some hopefully inaccurate soothsayers have predicted, we don't expect to move again. The new building has 5,000 sq. ft. of space, all on one floor, and for a change, as those who have visited us in Santa Ana well know, has plenty of parking space!

Though not necessarily the best, the most direct route to the office is south on Harbor Boulevard from the San Diego Freeway, right on 19th Street which is about 3 miles from the freeway past one traffic light, and we're on the left, next to a MacDonald's family restaurant. The new phone number is (714) 645-8830. Come on over, and see the waterfall!

CONTEMPORARY R/C F/F

This month's lead photo could cause a stir among modern-day free flighters, but there's no need for concern. It's something we've wanted to try for many years, and even discussed it in one of our columns when we were R/C editor for M.A.N. The Starduster 900 kit was purchased around 1967 or '68 and we finally got around to building it this spring.

We'll give a detailed report on the project in a subsequent issue. Just wanted to show you the first test flight, which was made during the 1976 National Free Flight Championships at Taft. Sal Taibi, The Starduster's Designer, who also loaned us the honkin' "75" Series K & B. 40 with tank mount for the test, is shown launching the 900 in typical fashion . . . straight up. Believe us, *this is not sport flying!* The Starduster ordinarily uses a 1/4 by 2 inch rudder trim tab for power adjustment, and we had to go to a 1-1/2 by 5 to get turn in the glide! The Signature Series Kraft, with switch-controlled, dual-range servo throw, really paid off.

First conclusion . . . it's a two-man job. Anyone who flies contempo F/F power knows . . . the first few seconds of power flight determine the fate of the aircraft, and you can't launch these beasts and hold transmitter controls at the same time.

More later . . . and incidentally, we'll have a complete report on the 1976 National Free Flight Championships, by the Contest Manager, Jim Scarborough in the next issue.

THAT IGNITION SYSTEM

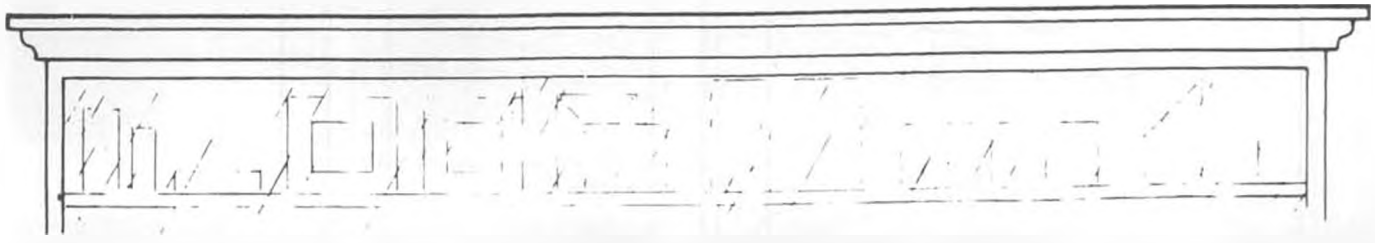
We've already heard from quite a few successful builders and users of Tom Bristol's transistorized ignition system (May '76 MB). However, Tom has discovered a possible source of trouble, and writes as follows:

"Some of the readers who contacted me were having problems with the system in that they could not get a sufficiently hot spark to run their engines. All of those who had trouble were trying to use the system with the large 3/8 spark plug. As a result, I made a few quick tests and confirmed that there was a problem using the larger plug. Since my first system was used with a large plug in a Dennymite engine, I was surprised to find a problem. In retracing my steps, I found that substituting the 1N2992A zener diode for the one I originally used (in an effort to save the modeler some money) I had built in a problem. To correct it, one must substitute a 1N3005 zener diode for the 1N2992A specified in the article. In addition a .001 microfarad capacitor should be substituted for the 0.1 mf called out for capacitor C1 in the circuit. With these modifications, I find that the system will provide plenty of spark for the larger plugs. I actually tried three different types of plugs with the unit, and was able to get my Anderson Spitfire to run with all of them despite the fact that I was hand-propping the engine. I am very sorry to have caused anyone any inconvenience through this oversight."

Tom also mentions that he will shortly send us a supplement to the original article. This will describe how to make a small module that can be built into the original unit, and will

Continued on page 91

OVER THE COUNTER



• Have you decided that your next airplane must look like an airplane, yet still be fully aerobatic, and use less than a .60 in the interest of economy?

If so, Olympic Models' "Sportsman" is for you. This good looking low winger tops the scales at 5 1/2 pounds, with a wing area of 620 square inches. The span is 60 inches, length is 46 inches, with enough room for any modern radio system and retracts, if desired.

While not exactly an ARF, some steps in that direction are apparent. The foam wing is pre-sheeted, with both leading and trailing edges attached. The cowl is formed, the wood parts are machine cut, and even a fiber-filled motor mount is included. It is obvious that no effort was spared in making this as complete a kit as possible. Check your dealer first. If he doesn't have it yet, tell him it comes from Midwest Model Supply Co., 6929 W. 59th St., Chicago, IL 60638.

* * *

A family glue? You'd better get two, if you expect to keep one in the workshop! Wilhold GLU-ON, claimed to bond almost anything to anywhere, it should have so many uses around the home that you'll never be able to call your tube your own.

GLU-ON features instant grab and tremendous bonding strength. It works on similar, and non-similar materials, is suitable for all craft materials such as leather, rocks, and glass, in addition to the common modeler construction supplies. The permanent bond is water proof, heat resistant, and does not become brittle. Items can even be glued to brick, concrete or stucco with this new adhesive.

Ace Digital Commander with D&R Single Stick assembly. CMOS single deck receiver.

Pro Line 3-channel system, available in open and closed stick configurations.

Available in 1-1/4 and 4-1/2 ounce recloseable tubes, or in 12 and 32 ounce cartridges. Application data upon request, from Wilhold Glues, 8707 Millergrove Dr., Santa Fe Springs, CA 90670.

* * *

Don't lose your flying field, as some clubs have done because of noise. There is really no need to; Semco Model Engineering has the muffler to fit your exact requirements.

Recently announced are two control line mufflers, a medium size for .29 to .40 engines, and a large size for .45 to .80 engines. Weighing less than two

D&R's new and improved replacement mechanics for Bantam servo, $5.95.

"Fantasie" R/C glider from Windspiel Models, spans 138 inches.

Olympic Model's (England) "Sportsman" for .40 power. Available from Midwest Model Supply.

Super-Mini Proportional Control System, by Cannon Electronics.

ADC Mini-Saw. Blade will cut anything, including piano wire.

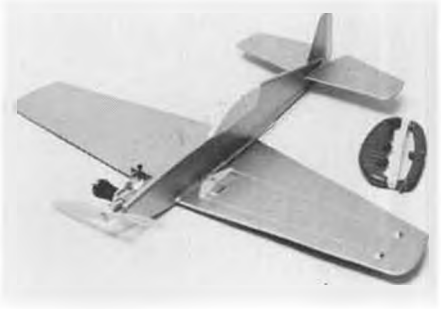
Rady-to-run Dumas Deep Vee 40 CF by Steve Muck's R/C Model Boats.

ounces, each muffler is complete with pressure fittings and uses standard Semco adapters. Only $12.95.

Some muffler applications are different, and more exact. For example, planes such as the Stafford "Acrosport"; and Sig's "Liberty Sport" and "Skybolt", as well as all helicopters, have their own special needs. The Pitts Junior Muffler takes care of the bipes mentioned, while the chopper owner will find a Semco Kavan Replacement Muffler will fit perfectly and provide the necessary sound reduction. Both are priced at $12.95, and use standard Semco adapters.

In addition to keeping it quiet, you have got to keep that power package together. Semco offers you some motor mounts machined from bar stock aluminum for light weight and strength. Six sizes with long or short beams are available, for engines from .29 to .80; $5.95 to $7.95 each.

And to hold your engine-prop-spinner together, try a Semco Steel Prop Nut, especially designed to use with Midwest type spinners. The steel construction allows you to apply the proper torque without fear of stripping threads.



Hobby Hideaway's Darell Polen Special II for .049 C/L.

Hobby Hideaway's Paul Mantz Bendix Trophy P-51 for .049 C/L.

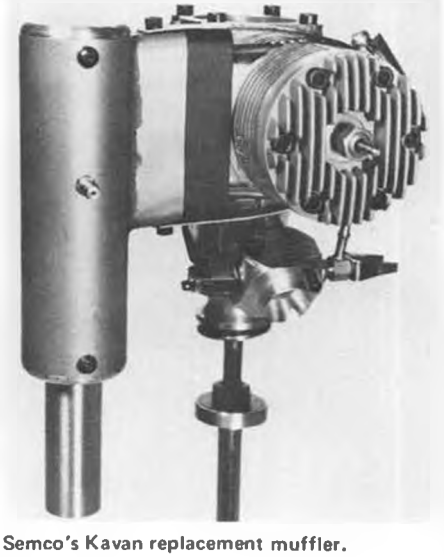
The price is .98, in your choice of sizes: 1/4-28 or 5/16-24.

For further information, contact Semco Model Engineering, 14 Water St., Waltham, MA 02145.

* * *

Paul Runge, of Ace R/C obviously listens to modelers and our constant 'Why don't they . . . . ? Due to many demands, they now have available the Digital Commander Transmitter Kit in the popular single stick configuration. Mechanically, it uses a light weight, thin-line case and a top quality D&R open gimbal stick assembly. Electronically, a high output (600 mw) assembled, tuned, and interchangeable RF deck plus an easily assembled encoder combine into a transmitter that offers dependability and performance, in addition to the enjoyment of building your own. It is available in the 27 (oh, well), 53, and 72 mhz band, in

Semco's Pitts Junior muffler.

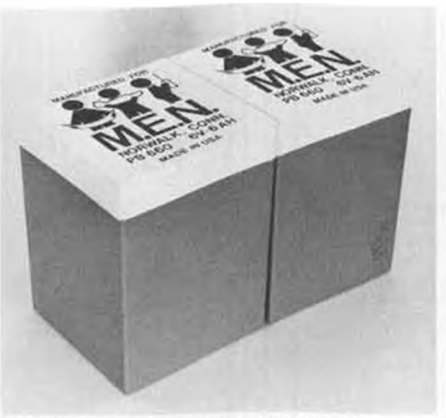


Semco's Kavan replacement muffler.

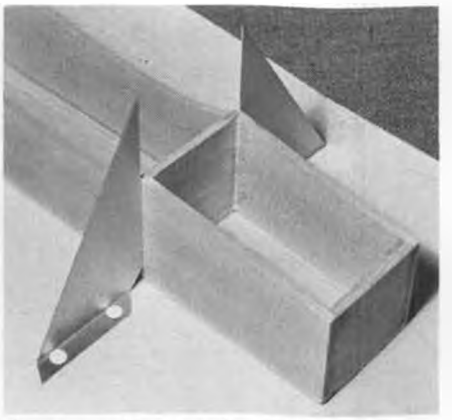
Semco's steel prop/spinner nut, for Midwest spinners.

Semco's aluminum bar stock motor mount.

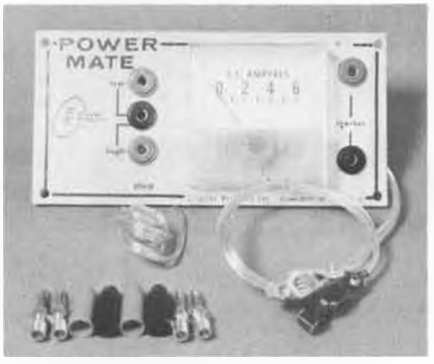
Charger for M.E.N. gelled electrolyte battery.



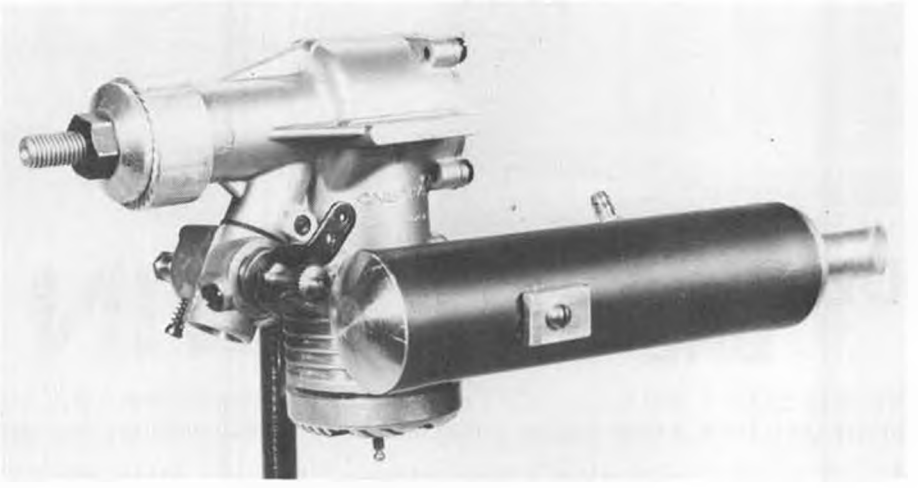
M.E.N. 6-volt gelled electrolyte batteries.



Aluminum alignment triangles by Ace.



Power Mate field box instrument panel, by Crystal Products.



Control line muffler comes in two sizes, from Semco.

five or seven channel configurations.

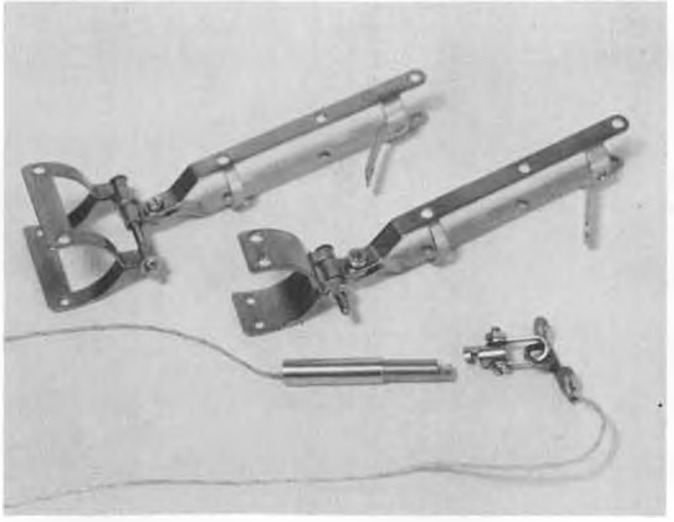
As a companion to your Digital Commander Transmitter, or to your present digital system, Ace now has its new 1 to 8 channel, CMOS Single Deck Receiver. It features a completely state-of-the-art design, low current drain ability to work with any transmitter, and 3 or 4 wire, positive or negative pulse servos. Your choice of bands is available.

Ace has just introduced another indispensible building aid, the Triangles II. These handy aluminum guides are a multiple use tool, to use as a straight edge for cutting, thumb tacked to your building surface as a self-aligning jig, or to mate tail surfaces perfectly perpendicular to each other. The longer you have them, the more ways to use them you will discover. A complete catalog of Ace R/C products is available for $1.00, refundable with your first order. Write to Box 511D, Higginsville, MO 64037.

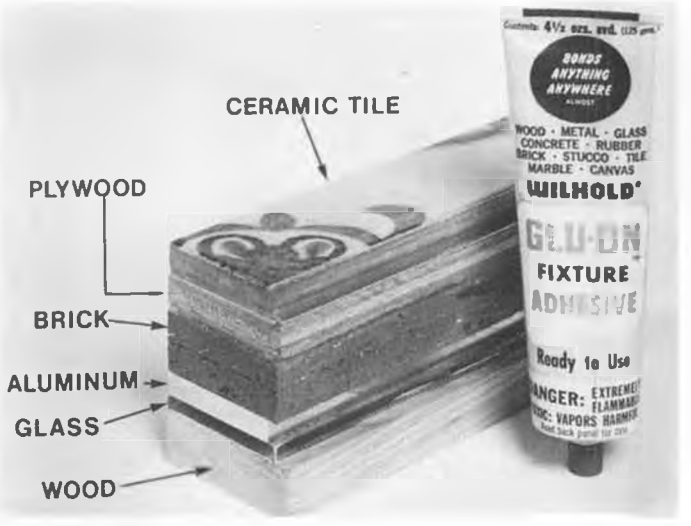
* * *

If you acquire one of the new Cannon Electronics Super-Mini Proportional Control Systems, and need glasses, you'd best keep them handy, 'cause if you drop part of it, you won't find it without them. This North Hollywood company offers what is described as the newest, smallest, digital proportional system in the world; in your choice of two, three, or four channels. Small and

Continued on page 93



Stainless steel goosenecks and snap-on turnbuckle mast stays for sailboats, by Probar.



GLU-ON adhesive, by Wilhold.

DE HAVILLAND DHC-6 TWIN OTTER

By ROY SCOTT and BILL NORTHROP . . . A slightly different R/C scale construction article, as explained in the text. Here is twin engine sound and performance without the hazards of single engine emergencies.

• This R/C construction article is quite apart from the usual, for two reasons. The first reason, to be absolutely truthful, is that the article we expected did not come through in time. It is very comforting to have articles stockpiled so that, in an emergency, you can dust one off and publish it. Several magazines do this. We, on the other hand, prefer to live dangerously, and try to survive from month-to-month with fresh material . . . of course, you can't win 'em all . . .

The second reason for this article being different is an off-shoot of the first . . . we had the plans, and the makings of a text, but no photos!

An acquaintance of ours, dating back to around 1967-68, with whom we have lost contact (if you're out there, Robin Lehman, please get in touch), commissioned Roy Scott, of England, to create the design. The model was built and flown with outstanding success, and was subsequently published in the great Japanese magazine, "R/C Technique."

By now, we had lost track of Robin, but had gained a new acquaintance in Japan, Yoshiro Sato. He in turn, obtained permission from R/C Technique's Editor, Mr. Tadokoro, for us to reproduce the article in MODEL BUILDER, and even provided us with a paraphrased translation of the text!

Meanwhile, Mr. Tadokoro had loaned the original drawings, with English call-outs, to Larry Hoffman, who lives in Japan. Fortunately, Frank Schwartz, who was our R/C editor at the time, went to Japan on a buying trip for his women's fashion store business back in Nashville, Tennessee, and while there, picked up the plans from Larry, and delivered them to us in Santa Ana . . . And you think TV soap operas are complicated!

The momentum behind all this effort, we must confess, was not so much to treat our readers with an interesting R/C scale twin, as it was to satisfy our own desire to build this model. It was our idea to build one and use it for model photos with the article. Unfortunately, we have been forced to put the cart before the horse!

However, perhaps it's all for the best. Each day, as we drive to MB's office, we pass the U.S.'s busiest airport (by statistics), Orange County. And almost every day, we see an Air West Twin Otter on its way to or from Los

Golden West Twin Otters run passengers between Orange County and Los Angeles International on a schedule that runs almost hourly every day. Note "flaperon" system.

Twin Otter model built from these plans by Dave Allen, Ontario Canada, and shown at the 1974 Toledo Trade Show. Long, skinny wing is evident in this photo, also wing fences, which are not on the Golden West aircraft seen at Orange County.

Angeles International. A brief detour on a recent mid-morning, netted the photos on these pages. Why build from someone's scale model . . . here's the real thing!

Although OC officials wouldn't allow us on the ramp, the Otter parked very close to the fence, and we could shoot through the mesh at close range without blurring the image. Twin Otters are used as feeder liners in many parts of the country, but if you're building this model, need some details, and can't find an Otter, let us know what you want and we'll shoot it for you!

While giving credits, we'd also like to mention Dave Allen, of Ontario, Canada who wrote us about his Twin Otter model which was displayed at the 1974 Toledo Trade Show, and was featured in a photo published in the May 1974 issue of MB. Several of his ideas have been incorporated into the drawings we have presented.

A construction project of this magnitude is not aimed at the "but the spars are an inch too long" kit assembler. However, a genuine MODEL BUILDER model builder will find it to be quite basic . . . the wood bill may be a little high.

If you've ever wanted to build, fly . . . and especially *listen* to a twin engine airplane, but were turned off by what you've seen or heard regarding the usually fatal flight characteristics of a twin that suddenly becomes a "single", the Otter may be your answer.

We think the best way to convince you of the Otter's recommendations is to go through its flight instructions first. It should make a believer of you. Incidentally, remember that the original model was built to fly as close to scale speed as possible. It was powered by O.S. Max 30 engines, and was not intended to be a "bi-motor bomb." Don't put larger than "sporty-forty" engines in it.

Incidentally, the following flight instructions and building suggestions are based on information from Roy Scott, who designed and built the prototype model.

1. Run in both motors *before* installation in the model. A sick or badly tuned engine can only lead to trouble.

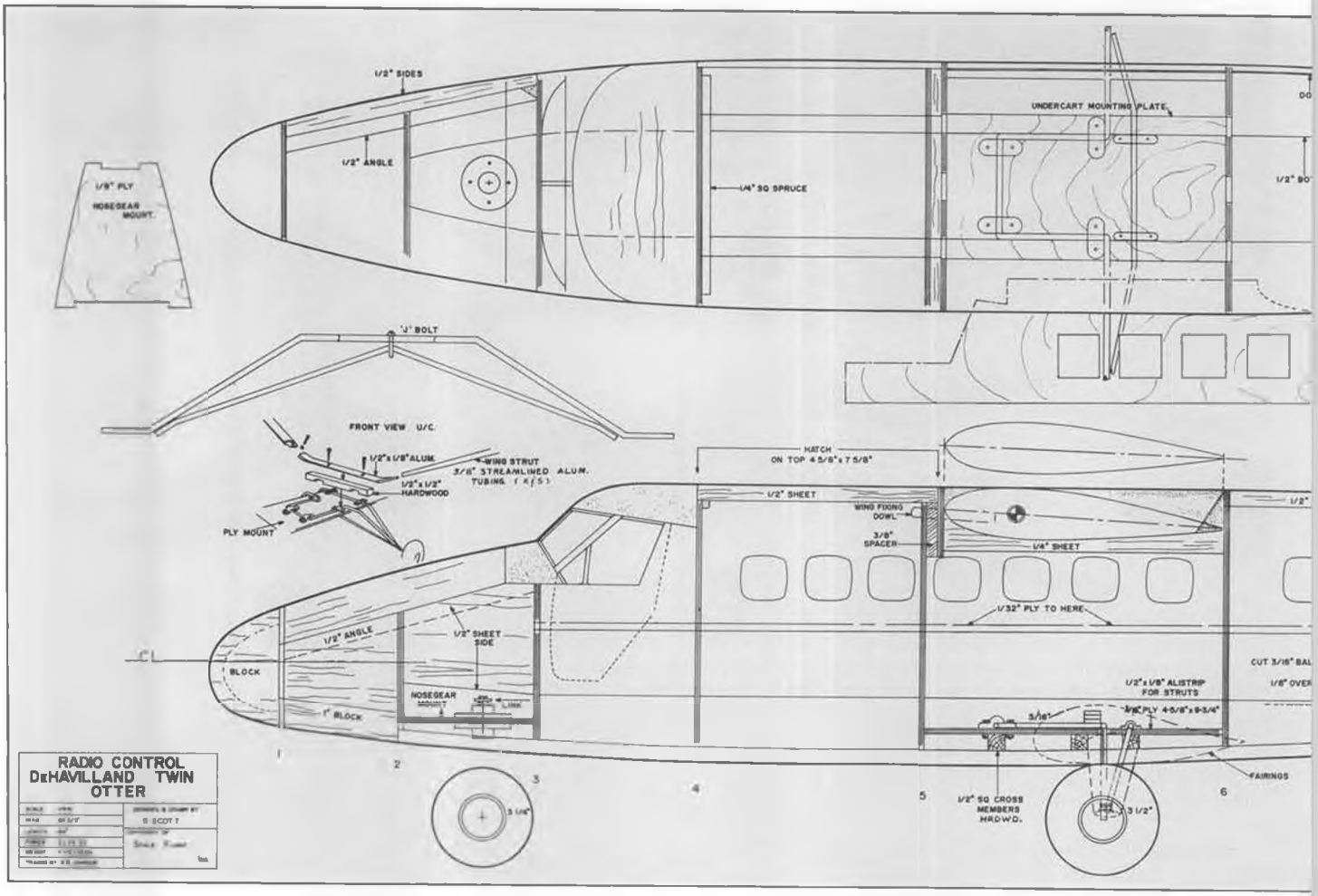
2. When both engines are happy, through a full range of speed, they're ready to go!

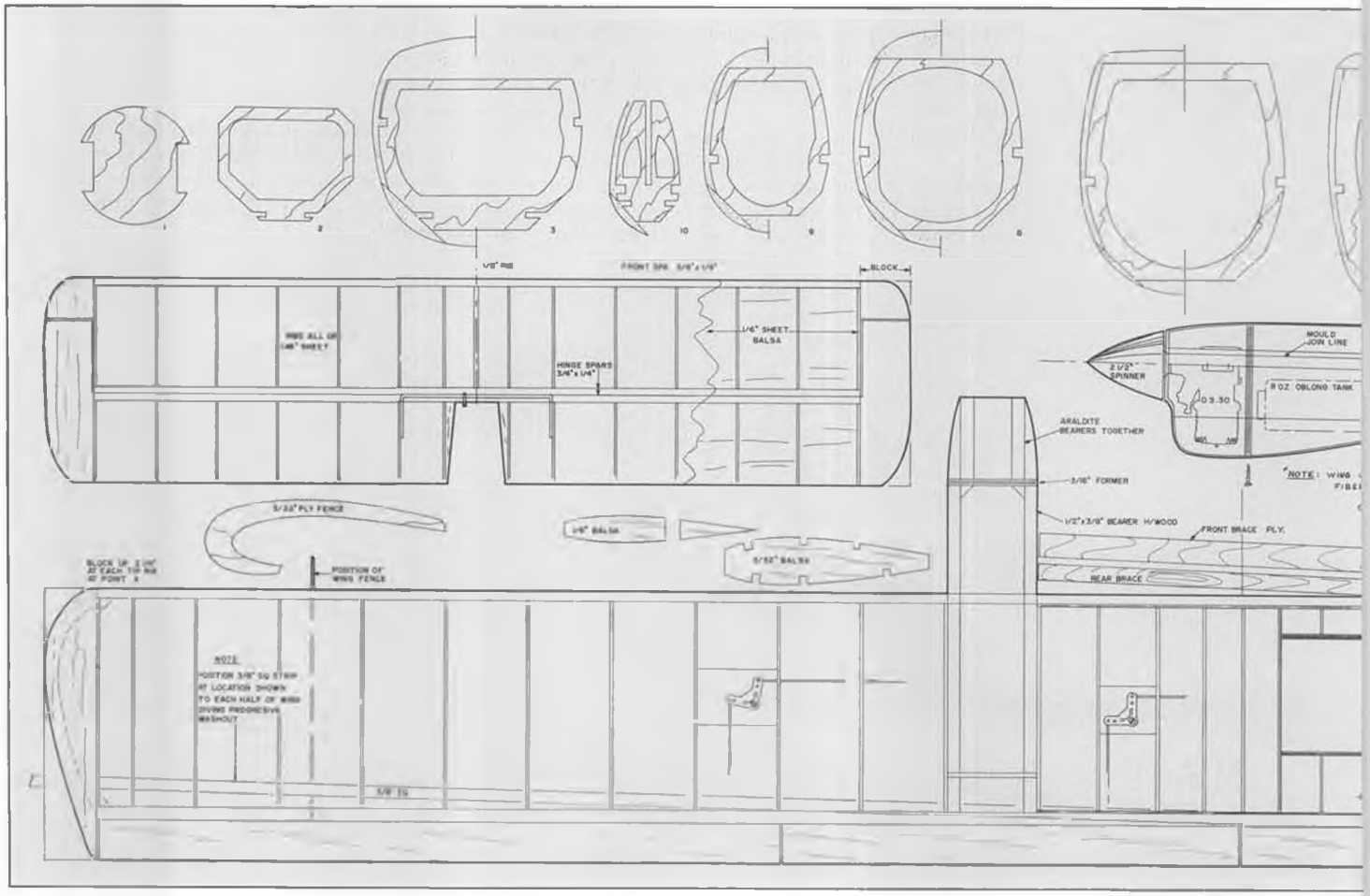
3. Tune each motor for maximum power. If they don't synchronize at full power, do *not* tune down the faster revving motor, as the power loss could be critical (remember, this is in reference to .30 cu. in. engines). Instead, trim the rudder in the direction of the faster engine.

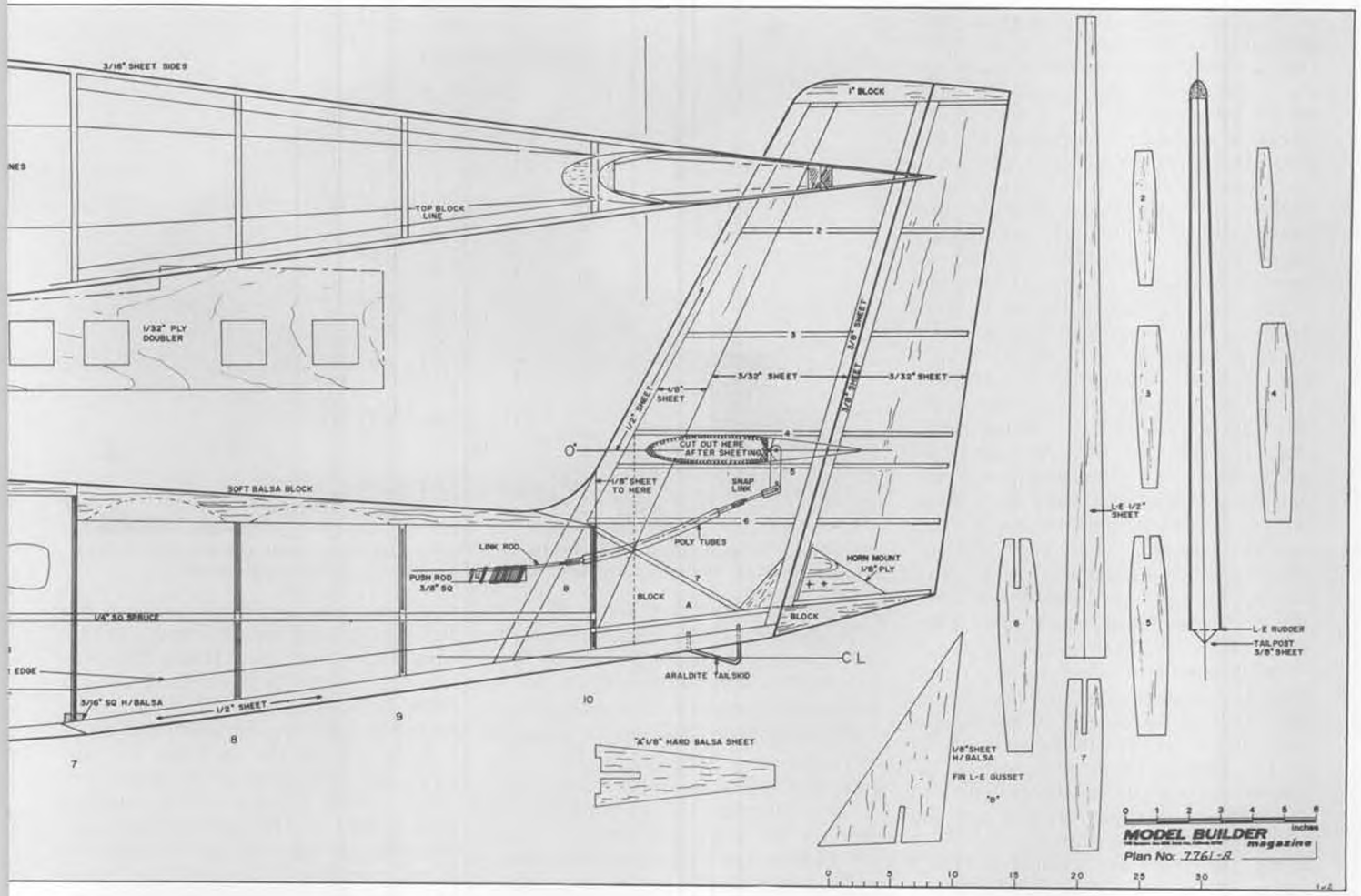
4. When motors are running at optimum power, hold the models nose-high for at least 20 seconds. If either engine slows down, it's too lean. Open the needle until the engine will hold power while pointed up.

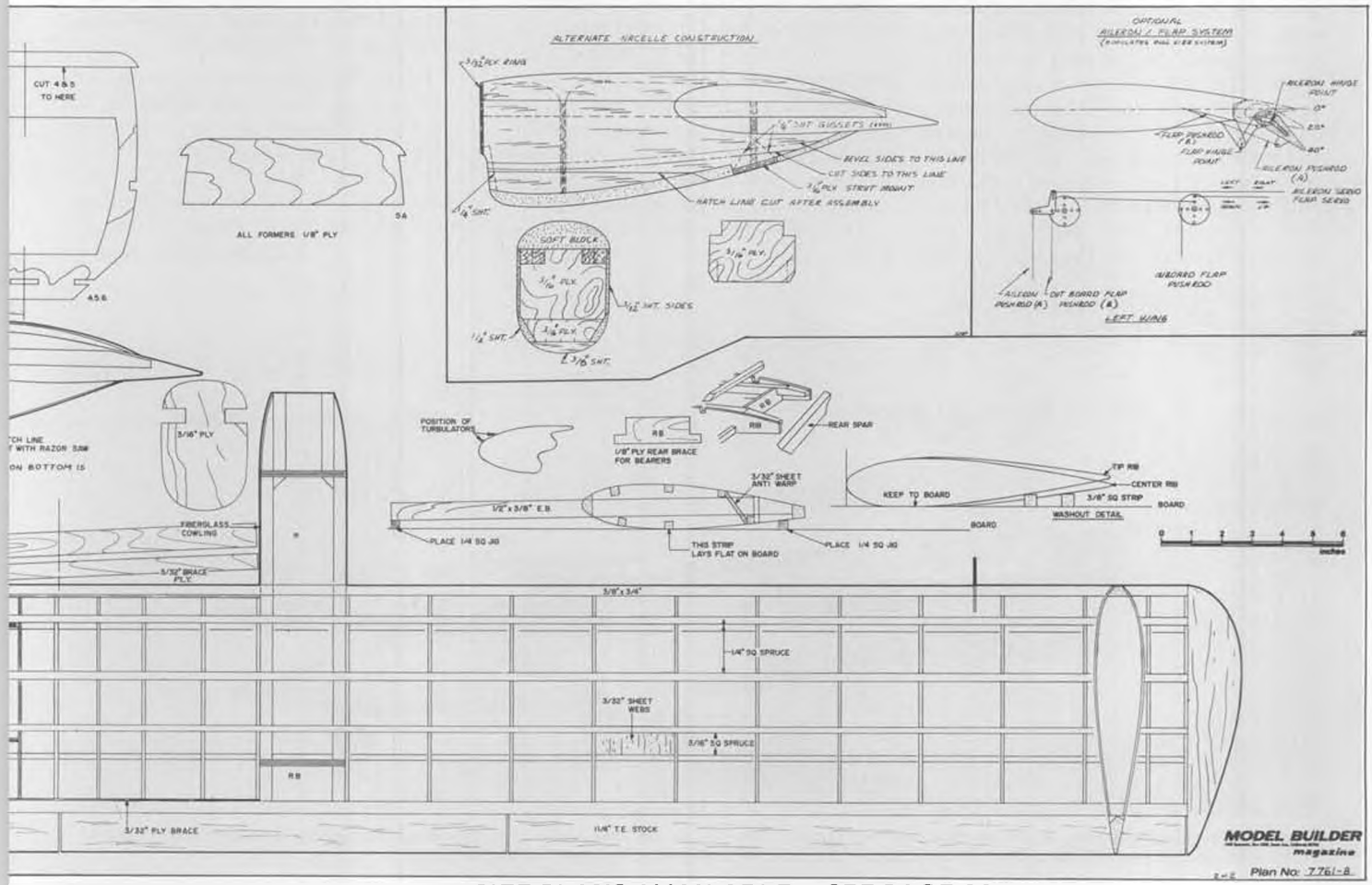
5. As two motors cause much more vibration than one, check servos for good operation with both engines going *full bore*. The best check is to suspend the model in the air using two helpers to

This photo reveals the actual rudder hinge line of the Twin Otter. Note full-length trim tab, and aerodynamic counterbalance at top, also small "stab", possibly to avoid turbulence at tip.


1/2" SIDES
1/2" ANGLE
1/4" SQ SPRUCE
UNDERCART MOUNTING PLATE
1/8" PLY
NOSEGEAR MOUNT
"J" BOLT
FRONT VIEW U/C.
1/2"x1/8" ALUM.
WING STRUT
3/8" STREAMLINED ALUM. TUBING (K&S)
1/2"x1/2" HARDWOOD
PLY MOUNT
HATCH
ON TOP 4 5/8" x 7 5/8"
1/2" SHEET
WING FIXING DOWEL
3/8" SPACER
1/4" SHEET
1/32" PLY TO HERE
1/2" ANGLE
1/2" SHEET SIDE
BLOCK
1" BLOCK
NOSEGEAR MOUNT
1/2"x1/8" ALISTRIP FOR STRUTS
3/16"
1/8" PLY 4-5/8" x 9-3/4"
FAIRINGS
1/2" SQ CROSS MEMBERS HRDWD.
3 1/2"
3 1/4"
RADIO CONTROL
DeHAVILLAND TWIN OTTER
SCOTT


1/8" RIB
FRONT SPR. 3/8" x 1/8"
BLOCK
1/4" SHEET BALSA
HINGE SPARS 3/16" x 1/4"
MOULD JOIN LINE
2 1/2" SPINNER
8 OZ. OBLONG TANK
ARALDITE BEAMERS TOGETHER
3/16" FORMER
1/2" x 3/8" BEARER H/WOOD
FRONT BRACE PLY.
REAR BRACE
5/32" PLY FENCE
1/8" BALSA
5/32" BALSA
POSITION OF WING FENCE
NOTE
POSITION 3/8" SQ STRIP AT LOCATION SHOWN TO EACH HALF OF WING USING PROMESIVE WASHOUT


3/16" SHEET SIDES
1" BLOCK
TOP BLOCK LINE
1/32" PLY DOUBLER
1/2" SHEET
1/8" SHEET
3/32" SHEET
3/32" SHEET
1/8" SHEET
CUT OUT HERE AFTER SHEETING
1/8" SHEET TO HERE
SNAP LINK
SOFT BALSA BLOCK
LINK ROD
POLY TUBES
HORN MOUNT 1/8" PLY
PUSH ROD 3/8" SQ
BLOCK
BLOCK
1/4" SQ SPRUCE
3/16" SQ H/BALSA
1/2" SHEET
ARALDITE TAILSKID
C L
"A" 1/8" HARD BALSA SHEET
1/8" SHEET H/BALSA
FIN L-E GUSSET
"B"
L-E 1/2" SHEET
L-E RUDDER
TAILPOST 3/8" SHEET
MODEL BUILDER magazine
Plan No: 776/-8


CUT 4 & 5 TO HERE
ALL FORMERS 1/8" PLY
ALTERNATE NACELLE CONSTRUCTION
3/32" PLY RING
1/4" SHT. GUSSETS (TYP)
BEVEL SIDES TO THIS LINE
CUT SIDES TO THIS LINE
3/16" PLY STRUT MOUNT
HATCH LINE CUT AFTER ASSEMBLY
1/4" SHT.
SOFT BLOCK
3/16" PLY
3/16" PLY
1/2" SHT. SIDES
1/2" SHT.
3/16" PLY
3/16" SHT.
OPTIONAL AILERON / FLAP SYSTEM
AILERON HINGE POINT
0°
20°
40°
FLAP PUSHROD (B)
FLAP HINGE POINT
AILERON PUSHROD (A)
AILERON SERVO
FLAP SERVO
INBOARD FLAP PUSHROD
AILERON PUSHROD (A)
OUT BOARD FLAP PUSHROD (B)
LEFT WING
3/16" PLY
FIBERGLASS COWLING
5/32" BRACE PLY
POSITION OF TURBULATORS
RIB
RIB
REAR SPAR
1/8" PLY REAR BRACE FOR BEARERS
3/32" SHEET ANTI WARP
1/2" x 3/8" E.B.
PLACE 1/4 SQ JIG
THIS STRIP LAYS FLAT ON BOARD
PLACE 1/4 SQ JIG
KEEP TO BOARD
BOARD
TIP RIB
CENTER RIB
3/16" SQ STRIP
BOARD
WASHOUT DETAIL
3/8" x 3/4"
1/4" SQ SPRUCE
3/32" SHEET WEBS
3/16" SQ SPRUCE
RIB
3/32" PLY BRACE
1/16" T.E. STOCK
MODEL BUILDER magazine
Plan No: 776/-8

hold the wings by rubber bands.

6. If one engine starts to go sick during takeoff, abort and start over. *Don't try to take off with one motor acting up.*

7. On takeoff, don't yank the Otter from the ground . . . a nice gentle climb is called for. Although it is not too responsive on controls, easy stick movement is best. It likes coordinated rudder and ailerons for nice, smooth turns. It will maintain altitude on 1/4 throttle (with some flaps) and has no tendency to drop a wing. On the first flights, stall it high in the air in order to get a feel for proper flare-out. On landing, remember that the Otter is a real "floater", so it's easy to overshoot.

8. On first flights, don't use more than 30 degrees of flap. If the model flies straight and level without flaps and with neutral trim, you'll find that the more flap is added the more down trim is needed to keep the model from climbing steeply. Full flaps and full throttle is not a good idea! Flaps slow the model down and motors speed it up . . . the net result can be a very steep climb.

9. In order to fly it safely, you should practice single-engine flight with the Otter. It performs well on one engine, but don't try it close to the ground until you're familiar with the model's behavior . . . low altitude doesn't give you much room to correct for a bad turn and still make it to the runway. The Twin Otter will maintain altitude and turn either way on one motor, but 1/2 throttle on the single engine is better than full bore. Trim the model with rudder and ailerons *against* the running motor. If in doubt, cut the throttle and land as if dead-stick, and if worried about stalling, don't use flaps. The prototype has had *no* tendency to spin with *one* motor full-out and full flaps, but don't try this until you are certain that you know your ship. Should you begin to spin, *immediately* put the flaps up, cut the throttle, and treat the Otter like any other model you have spun. But remember . . . in a badly trimmed twin, flaps can cause a spin on one motor. To be safe, experiment, but start nice and high!

Complicated hinging mechanism provides for a Fowler flap effect on the ailerons, even as they are being used for ailerons. Convenient hatch for baggage . . . or ballast, in a model!

10. Remember, the whole point of this project is scale-like flight. The Twin Otter flies beautifully and slowly on low throttle . . . so don't fly full bore all the time! Just think . . . you can sit back and watch your own model while it flies itself . . . When properly trimmed, the Otter will fly hands off. Just don't sit there, fat and happy, and let it fly out of sight. There are no points allowed for that!

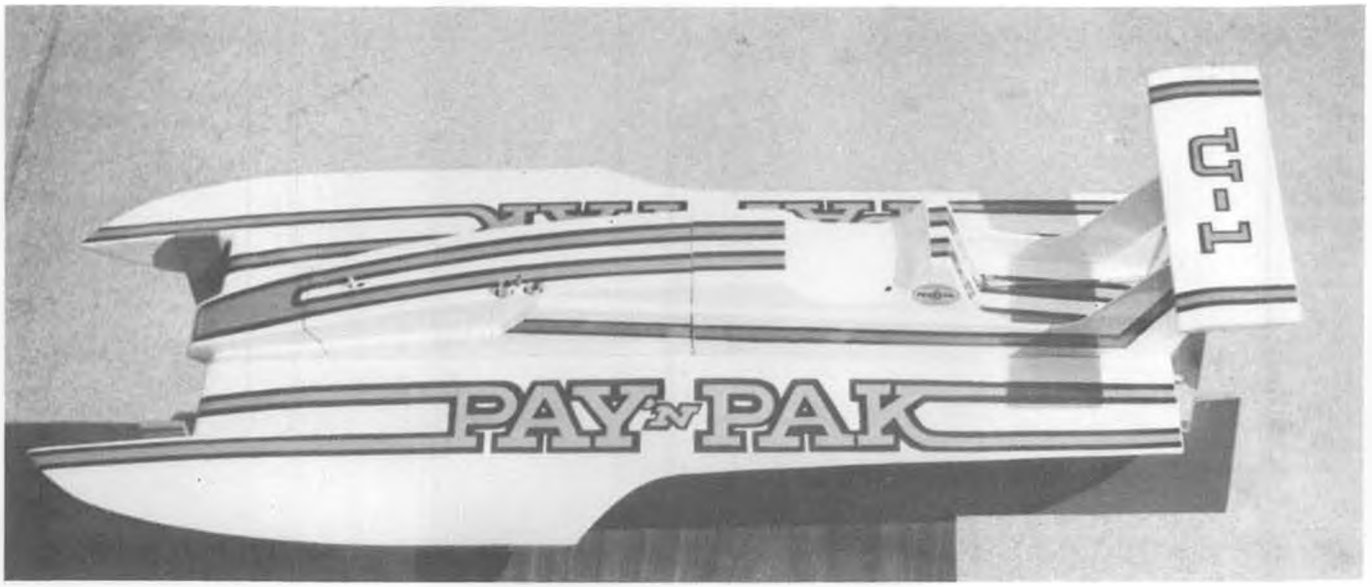
Now, if you're hot to trot, let's get into the construction. It's not very difficult to build the Otter . . . the problem is staying out of jail while raising the money for the balsawood required!

It should be noted before starting construction, that certain minor modifications have been made between the full size aircraft and the model, which simplify construction. This would only matter if the builder intends to use the Otter in AMA (Museum) Scale. Reference is made to the additional counterbalancing of the movable tail surfaces, relocated wing struts, and a few other minor changes. The museum scale builder is on his own in these areas. We feel the majority of modelers are more interested in the sight and sound of a scale twin at 50 feet than the microscopic details of a seldom flown static scale model at 50 millimeters.

Begin fuselage construction by cutting out parts and contact cementing the 1/32 ply doublers to the 3/16 sheet sides. Add the 1/4 square spruce locating strips. Assemble the sides with bulkheads 3 through 10, watching alignment at this critical stage. Install the

Continued on page 67

Generous fin and rudder area, ample dihedral, and fixed landing gear, make the Twin Otter an ideal subject for sport or museum scale. Original model flew well on two OS .30's, keeping it within the .61 limit still maintained on scale in the FAI rules.



R/C POWER BOATS

By BOB PREUSSE . . . First in a series of semi-monthly columns.

● If you are a bug on speed, competition, and fun, there is no greater thrill than to race a radio controlled hydro. For the experienced boater, there are many routes to go in selecting a boat; from outriggers, to the new 1/8 scale Unlimiteds . . . Or maybe even a twin-engine monster with a whining gear box. However, the new boater has to start with a kit that will be fairly easy to assemble and yet have quality contents and instructions to provide a good running boat.

The Dumas "Pay'n Pak" seems to fit the bill for both the experienced and the beginning boater. It is a scale model of the unlimited "Pay'n Pak" of racing fame. The kit is selling for $29.95 and can be purchased from your local dealer or write Dumas Products, Inc., 790 Park Avenue, Tucson, Arizona 85719. Let's review this kit and check out Dumas's building procedures.

BUILDING NOTES

Like most boaters, the first thing I notice when opening a kit is the plans. The "Pay'n Pak" has a very good set of 1" = 1' plans with three-views. They are complete with all details needed to complete the boat as a scale model. There is even a paint outline pattern so that you can make your lettering and mark-

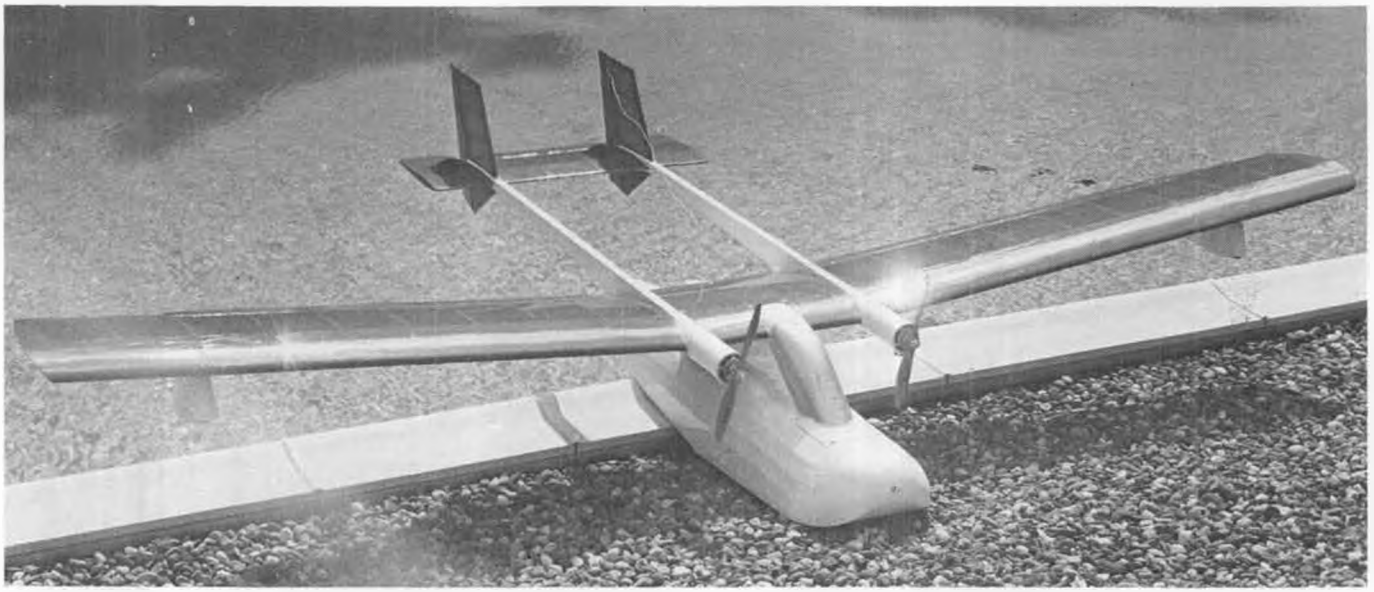
Continued on page 60

"Pay'n Pak" on shakedown run. Half throttle provides 25-30 mph. High should be about 55.

Running hardware; water pick-up, turn fin, strut, prop, drive shaft. Note belly pan.

Radio box installation. Location is far forward for good C.G. Belly pan allows engine to be lowered, giving room for moving radio ahead.

Installation of K&B .40 engine and Sullivan 8 oz. fuel tank. Most of the running hardware is as recommended by Dumas.



This could be a first. Old flying buddy, Neil Whitman, has successfully flown this twin Astro 15 electric powered R/C flying boat, including unassisted R.O.W. Span 82", area 767 sq. in., weight 110 oz. Flat-bottomed hull cut down water friction, but restricts takeoff to calm water.

'REMOTELY SPEAKING...'

R/C News, by BILL NORTHROP

• Our column is necessarily short this month, mostly because several of our regular contributing editors went overboard on their favorite subjects, took up all of the space, and have given us a chance to goof off. Also, the main subject or r/c conversation these days, the FCC's colossal blunder with the Citizen's Band hardly needs any more chewing until we get some new developments.

Two or three of our readers may be thrilled to know that the still uncompleted, 3 inch scale Aeronca C-3 is back on the building board after about an 8 year layoff. The old razor-back is being dressed in Permagloss Coverite, and to avoid any further delays, will be rolled out of the construction shed as a standoff scale model. As time permits, detail will be added . . . SURE it will!

Speaking of scale, we'll immediately get into our only subject for this month's column:

"THAT OLD SCALE SPEED BIT CASTS ITS SPELL . . . "

The following portion of a letter from Brad Powers of San Diego, California, is self-explanatory.

"In the March issue of your magazine you briefly discuss Scale Speed and conclude that it is simply the product of the speed of the full scale prototype times the scale ratio. Thus, a 1/6 scale model of a 300 mph airplane should fly at 50 mph.

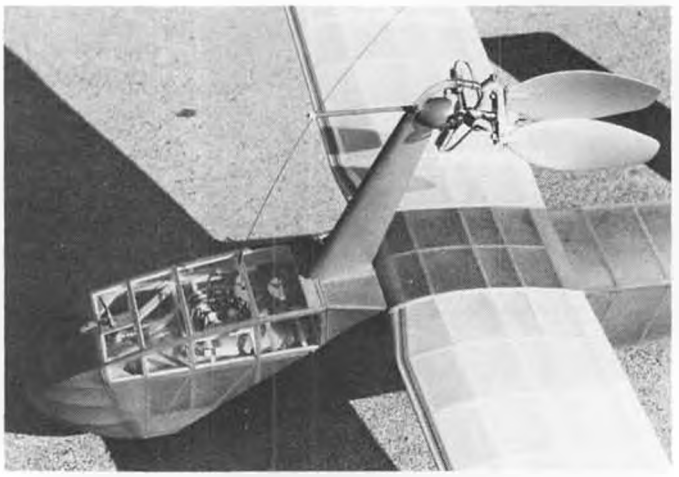
"In this connection, I would like to point out that there are two kinds of Scale Speed. One is visual, and the other is dynamic. For example: If an HO Gauge train is built to a scale of 1/8 inch to the foot, then it's scale is 1/96. To *look* natural, such a model would indeed travel at 1/96th the speed of the real train. If the big train were going 65 mph (96 ft/sec.), then the model would have to travel at 1 ft./second to *look* right.

"By the same token, your model airplane flies at 50 mph to *look* like the full scale aircraft at 300 mph. However . . .

"Model airplanes must sustain themselves in the air and are thus comparable to Dynamic models long used by engineers to ascertain the full scale characteristics of a proposed design. As such, they are subject to the laws of Dynamic Similitude, and the weights, speed, power, wing loading, etc., all vary in different, but quite precise ways with scale. For example, speed varies as the square root of the scale. Thus, a Dynamically Similar model at 1/6 scale would have to fly at $\sqrt{1/6 \times 300} = 1/2.45 \times 300 = 122.5$ mph. This may seem fast, but a little reflection will show that it does indeed account for the unrealistically fast flight of most models. This is further compounded by the fact that many hot .61 powered

Continued on page 91

Another possible first. This compressed air powered R/C model has been built and flown by Walt Winberg, Richmond, B.C. Canada.



All-up weight of CA model is 15.2 oz., with Ace Baby Twin. Span is 62 inches, area 420. Homebuilt engine turns 11 inch prop.

Partially automatic charger and 6-volt gelled electrolyte battery by Globe, who has trademarked the name "Gel/Cell." This 2.6 amp unit will power sail control in Vortex Santa Barbara sailboat.

Gelled electrlyte batteries from M.E.N. total 12 volts, for starters, etc.

GETTIN' A CHARGE OUT OF YOUR GELLED ELECTROLYTE BATTERY

Gelled electrolyte batteries are a great new power source, but you had better know how to charge them properly. Step into the classroom and pay attention . . . conducted by ELOY MAREZ

• Every now and then, some product appears that is a definite breakthrough in this hobby of ours. It can be a simple "why-didn't-I-think-of-that" item that most of us can duplicate, or a more complex product requiring specialized techniques and manufacturing capabilities. Often too, a product designed and manufactured for some use completely outside the modeling field finds its way into our workshop, tool box, or model, and become a standard for us.

Under the latter group fall the gelled electrolyte rechargeable batteries that are appearing in increasing numbers from various manufacturers and distributors. Even at this early stage, it seems that we are already on the way to mis-naming these batteries, by grouping them all under one name or type.

It seems to be the human way, and not necessarily the modeler or the American way. A few years ago I found myself in the wonderful little country of New Zealand, where adapting to the language was one of the enjoyable things about the visit. It took a bit of deep digging to understand the cleaning lady at the hotel when she asked permission to come in and do the "Hoovering". We did it here with "Frigidaire", and closer to home we have done it with "NiCad", The latter is the registered trade name for Gould nickel cadmium rechargeable batteries, yet we all refer to 'nicads' regardless.

All gelled electrolyte batteries seem to be on the way to becoming known as "Gel Cells". Which can be good or bad, and is mentioned only as a matter of possible interest. Truthfully, "Gel/Cell" is the registered trademark for the batteries manufactured by Globe, a division of Globe-Union, Inc. Other similar batteries are available such as the "Solid-Gel" from Elpower Corporation, M.E.N., "Gelyte" from Gould, while Gates Inc., refers to theirs simply as Gates Sealed Rechargeable Batteries. The latter cell does not fall under the gelled electrolyte class, but is described by the manufacturer as a 'semi-starved' electrolyte. This cell has not yet shown up in the market place as a 12 volt starter type battery, but is being used as the power source in the new 'Globee Fire Plug' glow plug lighter by Fusite.

On second thought, it is easier to say 'gel cell'.

As with any new product, a number of new words appear, which have to be understood before the total capability or use of the item can be understood. Therefore we are presenting for you a gelled electrolyte battery glossary which obviously also applies and refers to other types of batteries.

GLOSSARY

AMP HOUR: The current in amperes multiplied by the time in hours the current is drawn.

BATTERY: Two or more cells connected together.

CAPACITY: The ampere hours available from a cell or battery.

Discharge capacity: The ampere hours which may be obtained from a fully charged cell or battery during discharge.

Rated capacity: The discharge capacity in ampere hours which the manufacturer specifies may be obtained from a cell or battery at a given discharge rate.

CELL: An electromechanical system which converts chemical energy into electrical energy and also the reverse for rechargeable units.

Cell Reversal: The act of driving a cell into reverse polarity by excessive discharge.

Primary cell: An electromechanical device which is discharged only once and is then discharged.

Secondary or storage cell: A reversible electromechanical system which can be discharged and recharged a number of times.

CHARGE: The conversion of electrical

Continued on page 85

TABLE 1 STARTER CURRENT CONSUMPTION (AMPS)

	Free Running		Veco 61		K&B 40		Veco 19	
Type of starter	Start	Run	Start	Run	Start	Run	Start	Run
Penford	8.5	2.6	21.0	14.0	18.0	8.5	18.0	8.5
Kavan	13.0	2.5	24.0	14.0	21.0	8.0	21.0	5.5
Soni-Tronics	8.0	2.2	22.0	14.0	18.0	9.0	18.0	9.0

TABLE 2 BATTERY VOLTAGE REGULATION (VOLTS)

		Free Running		Veco 61		K&B 40		Veco 19	
Type of battery	No load	Start	Run	Start	Run	Start	Run	Start	Run
Nickel Cadmium	13.0	12.5	12.75	11.0	11.5	11.0	11.5	11.0	11.5
Gelled Electrolyte	12.0	11.5	11.75	10.25	10.5	10.5	11.0	10.75	11.0
Lead Acid	11.75	11.0	11.25	9.0	10.0	10.0	10.5	10.0	10.5

All the way from Vancouver, B.C. by dog sled, and still smiling! Gary Lennon and Mickey Stiffon. Apparently they had time to do a little shopping before the races.

"What the Hell am I doing in Bakersfield?" A report on the 1976 Western Formula One Championships, by ELOY MAREZ.

• You can't help but like folks who kid themselves, as the good citizens of Bakersfield California do, by proclaiming to the world on the front of their shirts that they also wonder just what they are doing there! We all make fun of Bakersfield; it is either too hot or too cold, it is too windy or dead calm, too wet or too dry, the beer is warm in the summer, the coffee is cold in the winter . . . And just as you find the right percentage of nitro, the temperature changes twenty degrees. Well, we gripe and complain, but deep down inside, we racers and racing fans know exactly what we are doing in Bakersfield; just what we looked forward to all year long; participating in and enjoying the most exciting, exacting, and best run race held on the West Coast, the 1976 Western Formula One Championships.

And the BARKS did it again in 1976, on May 15 and 16. With the retirement of Glen Spickler as CD, Jim Hill assumed the position, and it is obvious that he learned his lessons well. The contest went off every bit as smoothly and well coordinated as it has in previous years. Of course, Jim had some expert help, as will be mentioned later.

It takes help, the proper type of help, when you are face-to-face with 55 Expert and 59 Standard class flyers, and over 150 airplanes to process. They came from 13 states, and all the way from the Atlantic coast. They came from Hawaii, from Canada, and from Mexico. Why they even came from Texas, complete with boots and beautiful blondes, in a private airplane which must have been at least a 707 judging from the size of the group!

The races went as races go, some fast,

The pilot's briefing, with CD Jim Hill in charge, looked like Grand Central Station on any Friday afternoon at 5 PM.

All the way from the Long Island, N.Y. LIDS club; Paul Zink and Jack Landgale.

As far as the eye can see . . . Formula One racers lined up for handicapping.

Francisco 'Paco' Gonzales, competent Mexican racer, with his twin Toni's.

The way we look from a Formula One with too much up trim! Aerial photo shot through the courtesy of Marty Barry and Kraft Systems.

Janet Ruble, of Visalia, California, shows off her brother's toy airplane. Both nicely built!

some slow. Some very close, some when nobody finished, some when everybody cut. We will give you the results later, after we have some Tums and a long nap . . . as we were all fed in what seems to be the BARKS way of doing things . . BIG! The Saturday night banquet was held in one of Bakersfield's Basque restaurants, and if anybody went away hungry, it was their fault. From soup to cheese, with 9 courses in between, plus freely flowing red wine, it was more than enough for most of us.

During the banquet, a number of awards were made. First, for 1975, the Top Ten Formula One flyers received those beautiful NMPRA shirts, as follows:

1. Terry Prather
2. Bill Zantner
3. Al Lopez
4. Jim Maki
5. Bill Williamson
6. Ed Hotelling
7. Jim Bertoglio
8. Pete Reed
9. Kent Nogy
10. Hal DeBolt

For her many hours of hard work during this and previous races, and apparently at all BARKS functions, Anne Redwine was acclaimed and presented with a set of BARKS license plates for her automobile. These are not just signs, but legal personalized California license plates.

A standing ovation by the more than 150 persons present followed an award of matching digital watches to Mr. & Mrs. Glen Spickler; hers for keeping Glen on the straight and narrow, while allowing him the time necessary to develop racing and races in the manner with which we are all familiar. May you keep time together for many years, Betty and Glen.

Unfortunately, a note of sadness was introduced this year, as the Expert's Expert, Ron Gilman, still holder of the Formula One record time (1:13) could not be present. Ron was involved in an automobile accident the Monday before the race and was in the hospital during the big days. His doctors have assured Janet, his wife, that it will take some time, but he will eventually be all right. We look forward to seeing his ever present grin and fast thumbs back at the local flying fields. His many friends can reach Ron at 569 S. Lansing, Tulare, CA 93274.

After two days of fast and furious flying, the dust finally settled . . . Or almost settled, as a number of flyoffs in both Standard and Expert classes had

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Can't keep an old war horse down! Connecticut's Pete Reed called and flew.

Mark "J.L.Seagull" Smith, looking for a hi-start, now flying Form One. Rod Smith refused to come and watch!

Sharon and Ed Allen, caller and pilot, from San Marcos, Calif. The Super LR-1A will soon be a kit.

A Series I B-534, very similar to the Series II in the drawings, with two guns in the fuselage and two in the wings. Note huge wood prop made of twelve laminations.

The CZECHOSLOVAKIAN AVIA B-534

By PETER WESTBURG

Is it believable that vintage biplane fighters of the 1930's would attack Consolidated B-24 bombers? It happened!

In August of 1943, when B-24's of the U.S. Army Air Force crossed Bulgarian airspace on their way to Ploesti, Bulgar Air Force Avia B-534's rose in a hopeless attempt to intercept them. On their return from the disastrous bombing mission, the surviving Liberators again flew over Bulgaria at low altitude and scattered all over kingdom come. More than sixty of the Bulgars waited for them, but the courageous fighters were unable to make more than one quick firing pass before the Liberators flew out of range, some of them unaware that they had been attacked.

Such was the Avia B-534, one of the toughest and best biplane fighters ever built. Little known outside of Europe, its performance was better than that of the Fokker D-XVII, the Curtiss Hawks and the well-known Hawker Fury. It had a powerful 750 hp Hispano-Suiza, and a structure capable of taking high aerobatic loads. With its four machine guns, it was a fighting airplane flown by fighting pilots.

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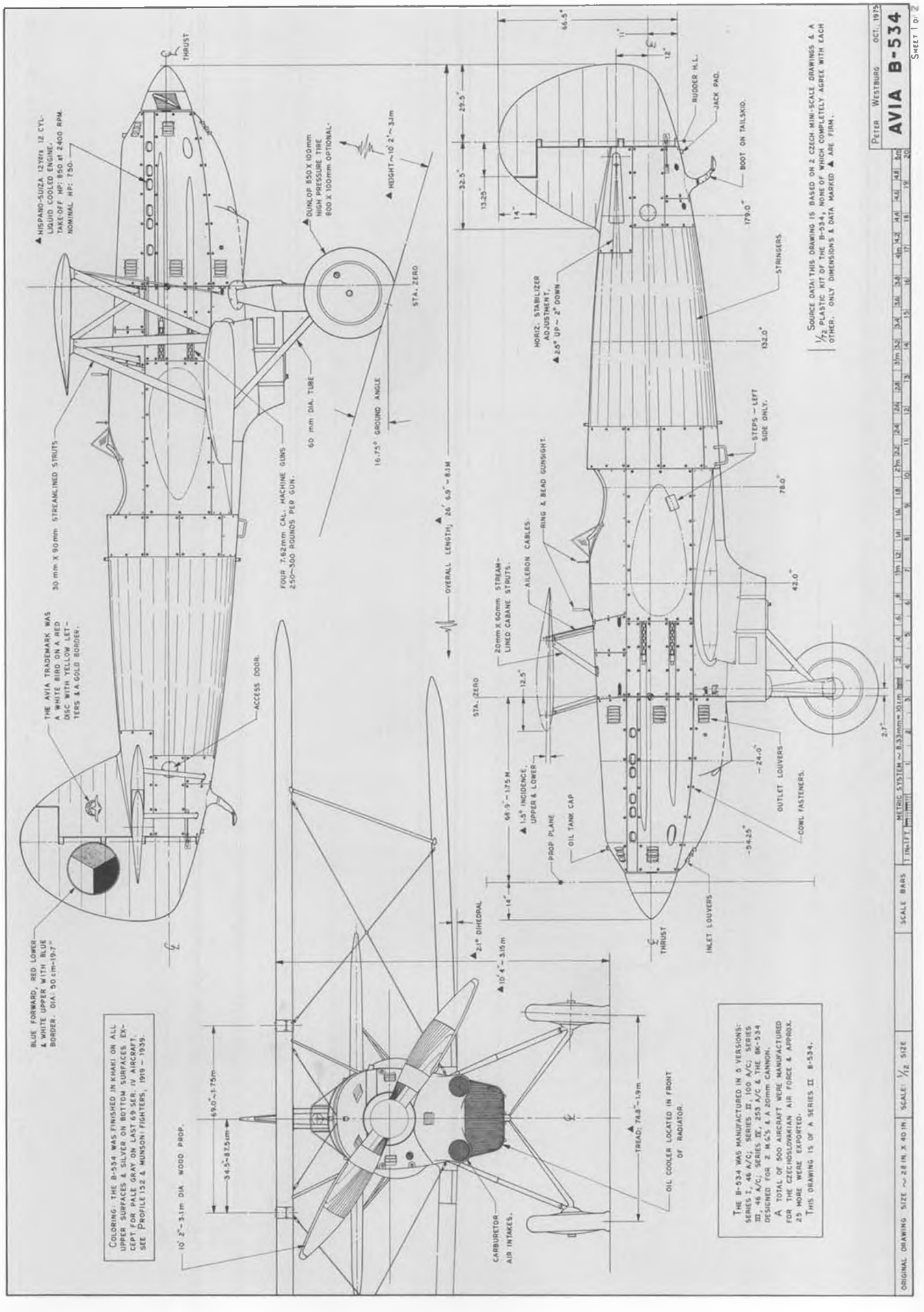
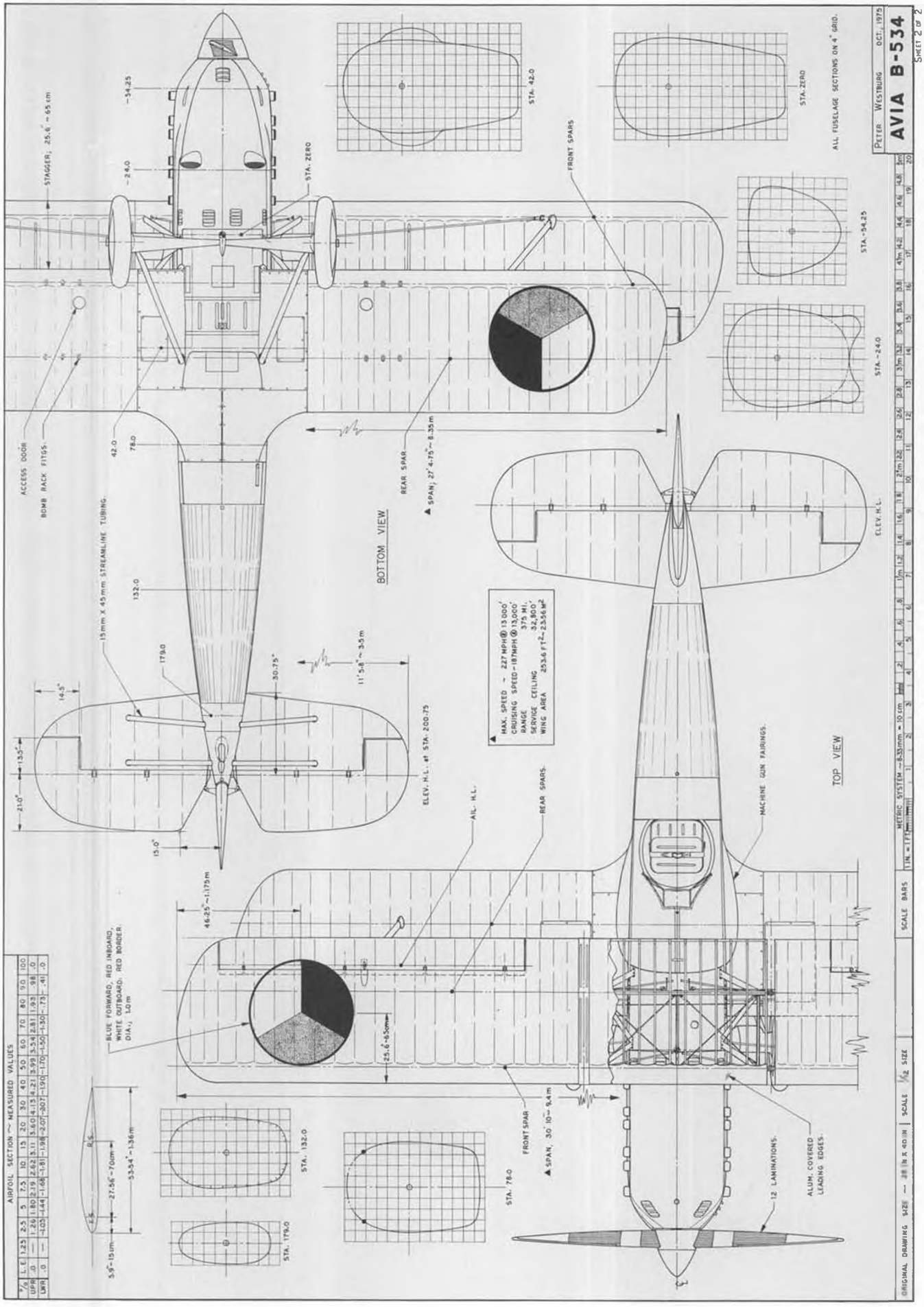
On June 6, 1975, the one and only Series IV Czech fighter was dedicated at Kbely Airport, near Prague. It is now in the National Technical Museum. MiG and Me-109 in background.

Powered by a 750 hp Hisso, the Avia B-534 was fast and tough. It fought well into WW II, and even tried to tackle some USAAF B-24's! Blister on fuselage covers machine gun breeches.





%	L.E.	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	100
UPR	.0	—	1.26	1.80	2.19	2.52	3.11	3.60	4.15	4.21	3.99	3.54	2.81	1.93	.98	.0
LWR	.0	—	-1.05	-1.44	-1.66	-1.81	-1.98	-2.07	-2.07	-1.90	-1.70	-1.50	-1.30	-.73	-.41	.0

A LOOK AT *MODEL ROCKETRY*

By DOUGLAS PRATT . . .

The eleventh annual Pittsburgh Spring Model Rocket Convention was held recently, and was a large success in spite of the fact that your author attended. The Pittcon is the event that traditionally hails the beginning of the contest year, with the chance to dust off your contest and display models and fly them in the cold March breezes. The convention features discussion groups on everything from aerial photography to newsletter-publishing, a National Association of Rocketry business meeting, manufacturer's displays, and space films and lectures. This year there was a swap session, in which collectors of model rocket memorabilia traded to build up their collections ("I'll give you two of these Czeck Adast engines for that old Coaster kit!") Some of the spectators were surprised by the popularity of this event; they hadn't thought that model rocketry was old enough to have memorabilia. There were also several film and song sessions, since model rocketeers like to compose both of these to immortalize other people's mistakes. In short, an excellent time was had by all.

Several interesting news notes came out of this year's Pittcon. Most interesting is a proposal by the NAR's Membership Committee, in cooperation with several model rocket manufacturers. In an effort to increase and maintain the membership of the NAR, most of the manufacturers have agreed to help implement a benefit system for NAR members. This proposal means that when you first join the NAR, you receive coupons good for a 10% discount on your first mail order from Flight Systems, Inc., Competition Model Rockets, Kopter Rockets, and Aerospace Vehicles, Inc. When you renew your membership, you receive coupons for a 15% discount, and you get these coupons each time you renew. Family memberships also receive a one-time discount, and sanctioned rocket clubs get in on the action. By the time you read this, the experimental program should be in effect; it was approved by the Trustees at the Convention. Of course, the standard NAR benefits are still there; the million-dollar flight insurance policy, the NAR Technical Services offers, and the subscription to the monthly Model Rocketeer magazine. You can get more information by writing to the National Association of Rocketry, Box 725, New Providence, N.J. 07974. Mention that you read about it here, please.

All of the model rocket manufacturers had representatives at Pittcon, and there's lots of neat news from them. Centuri Engineering showed up with its new "Fighter Fleet," a line of 3 semi-scale jet models designed for vertical rocket flight. Some small scale details have been sacrificed for a stable flight; they don't detract from the models at all. Construction is mostly cardboard, with plastic nose cones and a clear plastic cockpit. Very pretty, and

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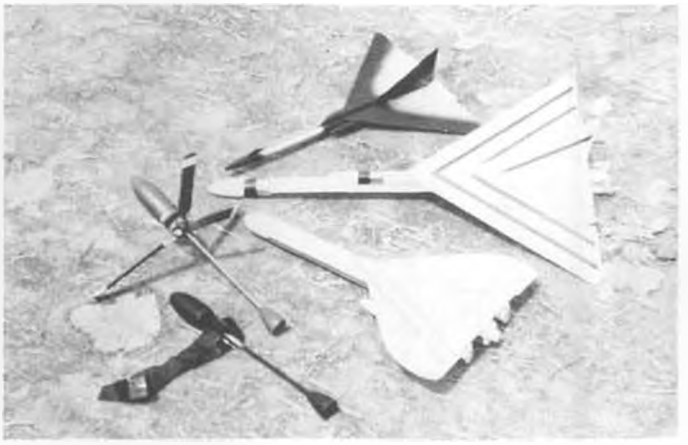
FSI scale Black Brant II kit, in Canadian color pattern. Flies with F100 Loadlifter engines, as used in model of Goddard's rocket for NASA.

Kopter kit, showing the ejectable rotor unit. Rotor spins free on a shaft between nose cone and end plug. No wadding needed. See text.



Three Kopter glider kits. Delta wing helps insure recovery. Bottom glider is Jet-I-Son, fires either rotor or streamer from boost to glide.

Action at the 1975 Ft. Wayne "Flying Circuits" pylon races (l to r): Frank Morosky starting engine, Frank Jr. helping, Dave Kane helping, Dan Santich, pilot, Bob Silwanicz, helper, Dennis O'Brien pilot, Brent Bowen, starter, Jimmy Katz, pilot, Greg Doe, helper.

PYLON

JIM GAGER brings R/C racing back to the pages of MODEL BUILDER.

Something old, something new, something borrowed, and hopefully, nothing blue!

This column comes about after my talking with Bill Northrop at the Toledo Conference Show about the need for MODEL BUILDER to renew its pylon column for the vast and growing contingent of racing enthusiasts. You're reading the outcome of that conversation.

It turns out that it is very tough for a writer to just sit down and write a column by relying on his personal experiences, and after several articles he either becomes stale or quits working altogether. So, unless you want to read about this writer's exploits here in the Mid-west, we need your help. Please send contest notices, black and white photos with identification of people, places, events, and ideas, or helpful kinks that pertain to racing, and we'll try to include them in this column. SOMETHING OLD . . .

The pictures are from the Fort Wayne Flying Circuits 1975 Formula I and Quarter-Midget Races. This major contest draws contestants from all corners of the U.S. There were flyers from nine different states competing in this event last year, some of which came from Florida, California, and Washington state.

You are all invited to attend this year's races, which will be held on July 10th and 11th. Quarter Midget will be flown on Saturday, July 10th, and Formula I on Sunday, July 11th. There will be a total of $500.00 cash paid out as prize money. Special arrangements and low room rental rates have been set up at the Howard Johnson Motor Lodge, 4606 Lincoln Highway 30 East, Fort Wayne, Indiana, 46803; phone 219-422-9511. You must mention that you are coming for the races to receive the special rates.

Hopefully, the Quarter-Midget engine controversy is over and can be relegated to the "something old" part of this column. With the release of the new Cox 15 engine at $59.95, and the rumored lowering of price to under $60.00 on the Rossi R/C 15, maybe peace will again reign in Quarter-Midget and we can get on with the business of racing.

It is this writer's opinion, though, that money will rear its ugly head again. As long as there is competition and there is an advantage to using the best available, regardless of cost, there will be problems of this type. Racing, by its nature, is neither cheap nor especially suited to the beginner. Not only can you not bring the event down to the level of the least experienced flyer, it's also not fair to the seasoned competitor or more advanced flyer to fly according to what is supposedly a national class contest under local rules which outlaw a particular engine solely on its cost. This type of action causes the racing enthusiast to either build two different airplanes to fit the various "legal" engines that conform to the local rules in areas which he may desire to compete, or to build only one airplane/engine combination and pass up races to which his equipment does not conform. It is diffi-

Caller Dennis Bielich stands by as Lynn Stevens checks out his plane prior to heat race.

Wheeling, West Va. pilot Bob Singer (with QM) and his father, who calls, return from heat.

Dan Kane, Chicago, Illinois, contemplates the situation as Starter Brent Kane enjoys a stogie.

K&B's John Brodbeck (Sr) and MAN's Jim Maki indulge in deep knee bends for the camera. Wonder who could hold it the longest?

The Bobby Smiths' latest scratch-built model. No, it's not 'Dara', the name is Carrie, and she's 6 weeks old . . . well, 11 weeks now.

cult enough to build, maintain, and repair one racing plane to fit a national class, without having to also build, maintain, and repair a plane to fit local rules. This increases the cost of competing by far more than just buying one fairly expensive, but high quality engine in the first place.

As an example of what happens when you try to make racing a beginners event, look where we are in Quarter-Midget. A good competitive airplane must weigh between two and one-half to two and three-quarter pounds, have an extremely strong and good idling engine, and a very competent pilot capable of flying the standard long course in approximately two minutes. Does it sound like a beginner can handle that? Now go back and look at what the event started out to be; something that you could build an airplane for that you could race and also just take out and fun-fly when not racing. The engines were then lucky to be able to turn a 7/5 prop at 15,000 rpms. Now show me a competitive racing plane that turns that same prop at less than 19,000 rpms and that its owner also uses for fun flying.

O.K., so now we have 1/2A racing. An ideal beginner's way to enter racing you say! Well, maybe to start with it was, but now that those engines are turning 25,000 rpms and the airplanes are becoming more sophisticated, it is rapidly moving out of the beginning racer's capabilities. And if you don't think it's becoming more involved just look at the cover of the June issue of "Model Aviation". Here we go again!

Ah, but dear reader, I am not one to simply crab about a situation without offering a solution. Let me explain how we can make an event competitive for everyone, leaving the outcome of the races to pilot skill and Lady Luck.

First we must select one particular airplane to be built, preferably from a

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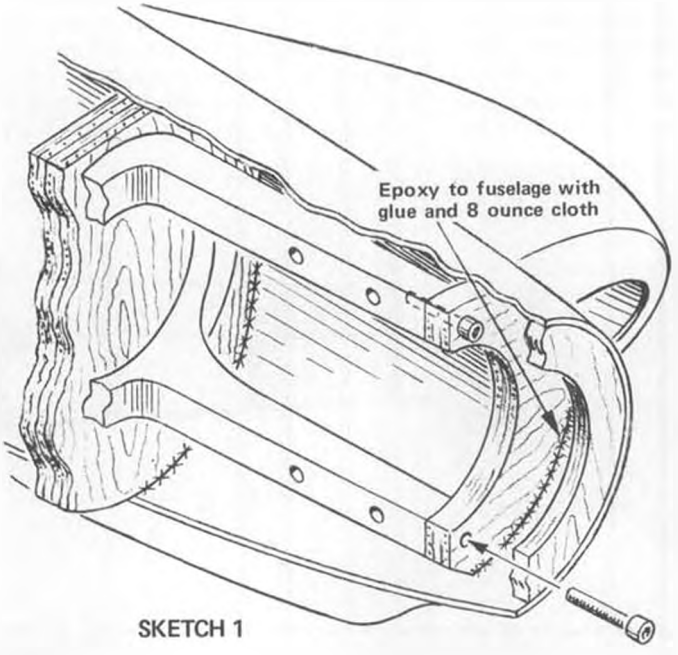
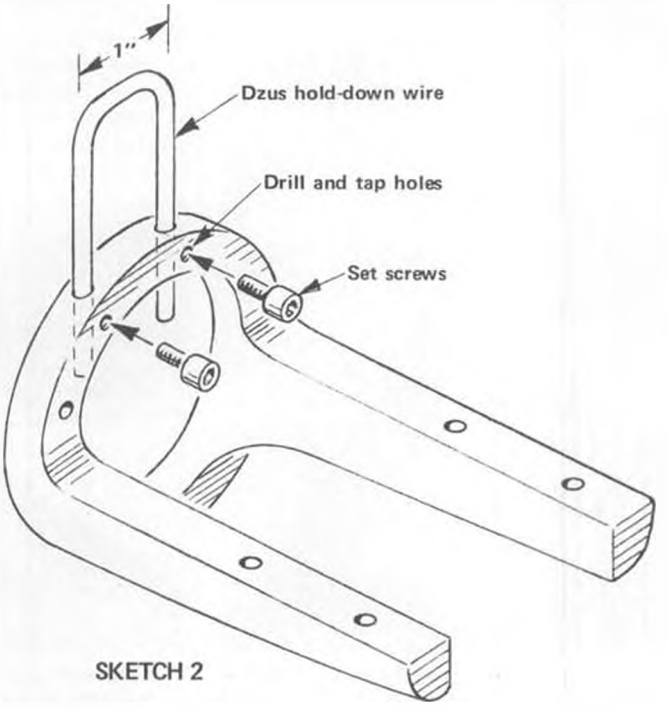
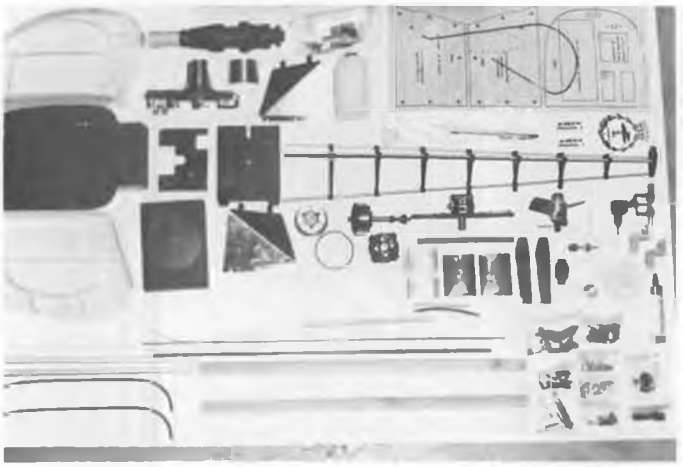
Ann Redwine, Bakersfield, Ca., with plates awarded her by the BARKS for her help in in many club sponsored contests.



SKETCH 1



SKETCH 2



Layout of kit parts for the Kavan Alouette 2 helicopter. This was first production kit. Assembly is quite rapid.

See? Here it is, finished already! Completed model weighs 6 pounds, power is a .40, main rotor diameter is 42 inches. Starts without belt.

CHOPPER CHATTER

By JOHN TUCKER

MAC SHOW AT ANAHEIM

In spite of the spectacular demonstration flights of helicopters at their best, the writer was a little disappointed at the obvious lack of helicopter displays and associated new products at the MAC Trade Show, held at the Anaheim Convention Center on May 1 & 2, 1976. The static displays consisted of seven beautiful helicopters, including a Bell 222, UH1E, 2 Rev-olutions, a YAH-64, a Hughes 500, the Gilbert electric chopper, and the trophy winner, a full scale Focke-Achgelis 61 built by Skip and Ruff of Taft, California.

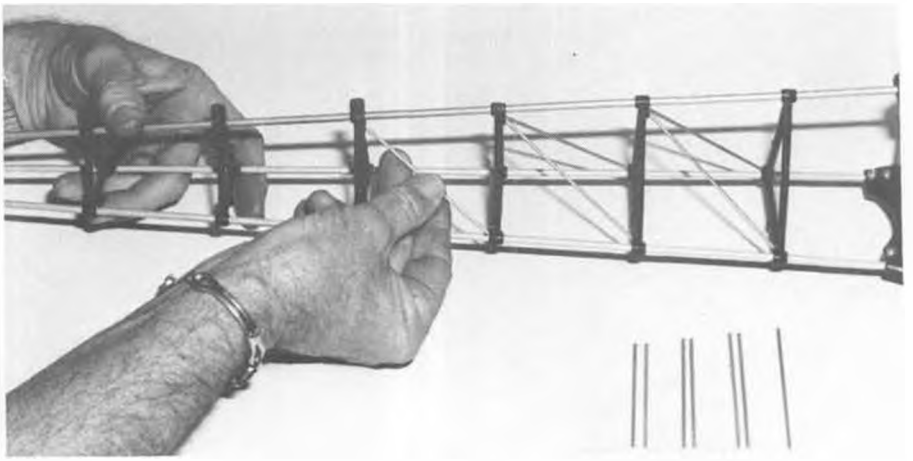
Exhibition flights in the parking lot were conducted approximately every other hour by John Simone Jr., with his new Rev-olution helicopter, and Ernie Huber, with the old-standby, Kavan Jet Ranger and the Alouette 2, which incidentally has just been released to the hobby shops in the U.S.A. If you haven't yet had the opportunity of watching helicopter aerobatics, you should have made this show. On Saturday, Ernie warmed up with a few loops, but on Sunday he did consecutive loops, a couple of split-s maneuvers, and slow rolls thrown in for good measure. The pace was so fast and furious, it was difficult to keep up, but I think he managed to get in an Immelman turn as well. And the slow rolls were really S-L-O-W!

John Simone Jr., was plagued with crashes on both days and Ernie lost the Alouette 2 on one of the demos. We suspect frequency interferrence as the cause . . . an automobile accident, within view of the flying area resulted in several police vehicles, ambulances, etc. showing up at the scene and radio communications must have been the order of the day. All R/C flying was halted immediately after the incidents, just to make sure.

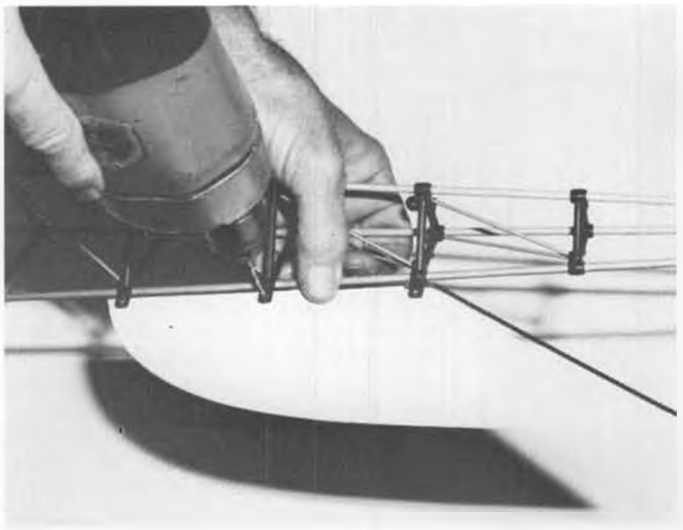
KAVAN ALOUETTE 2 REVIEW

If you'll remember the M.A.C. Trade Show last year, Mr. Franz Kavan introduced the prototype Alouette 2 helicopter, which he intended to market in kit form as soon as it proved satisfactory. Well, after a year of flight testing and numerous modifications, the kit is currently in production and will have appeared on the dealer's shelves by the time you read this article. I was priviledged to receive the first production kit right after this year's M.A.C. Show and have spent an enjoyable week putting it together and flying it in calm and windy weather. The construction is basically an assembly routine that provides the modeler with a scale model of the famous French helicopter used by the military, police, and customs officers throughout Europe. The patented Kavan

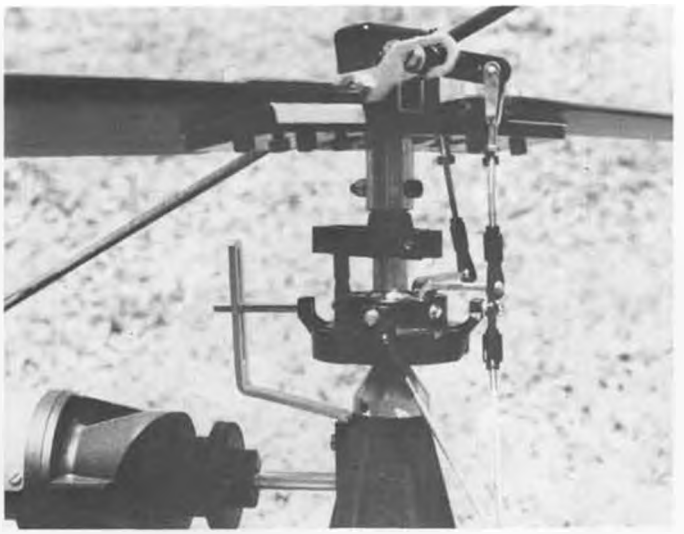
No, it's not an oil derrick! Proper alignment is important for free running tail rotor drive shaft.



Aluminum wire diagonals are epoxied into sockets in the molded frame bulkheads. The usual modeling epoxies don't hold as well here as Stabilit Express, a powder and liquid epoxy glue.



The fin is held in place while drilling holes, using the tab holes as guides. Complete assembly took John one day.



Main rotor head of the Kavan Alouette 2 helicopter, essentially the same principle as the Jet Ranger. Blade tracking is easily adjusted.

control system operates with a four channel radio control unit and provides unlimited performance capability, including rolls and loops. Mine was built on Saturday, painted the same evening, radio gear installed Sunday AM, and test flown by noon of the second day. Its specifications are as follows: weight 6 lbs., engine .40 cu. in., main rotor diameter 42 inches, scale 1:10, and it features easy starting without belts, pulleys, etc.

Its flying characteristics and performance are outstanding, and can best be described by saying, "It flys just about like its big brother, the Kavan Jet Ranger." Of course, it doesn't have collective pitch control, but surprisingly enough, I didn't seem to notice it was missing during the test flights. Perhaps this is due to the fact that engine torque during acceleration is compensated by a mixing lever input to the tail rotor collective pitch. Another possible contribution is the unusually flexible main rotor assembly which permits an infinite number of coning angles to be assumed during changes in rpm and loading of the main rotor blades. Anyway, the system really does work and I can attest to the smoothness and stability of flight. Its value as a trainer will become immediately appearant as soon as it begins to show up at the local flying fields.

As I mentioned, the kit is basically a series of pre-assembled modules that only need to be bolted together, so I won't dwell on this phase of construction . . . rather, I'll pass on some of the more obscure details of building that you rarely find mentioned in the instructions for any kit.

Assembly is commenced by making the servo cutouts, and marking the space for radio and battery on the plywood plate furnished in the kit, then cementing the plate into the body shell. While this is drying, the pre-assembled tail boom is fitted to the rear body bulkhead and clamped in place. This is the point at which you should be careful, since the alignment should be exact for the tail rotor drive shaft to run freely in its nylon bearings, between the main transmission and tail transmission. The use of a large right triangle is mandatory

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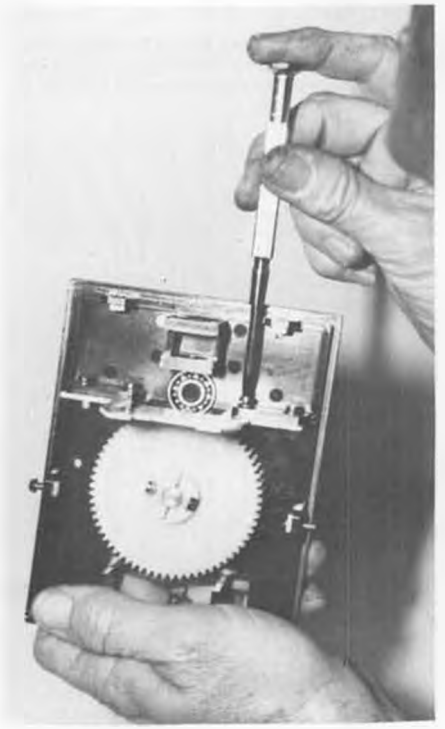


Assembly of the main transmission is very systematic. The main considerations are free movement and proper alignment.

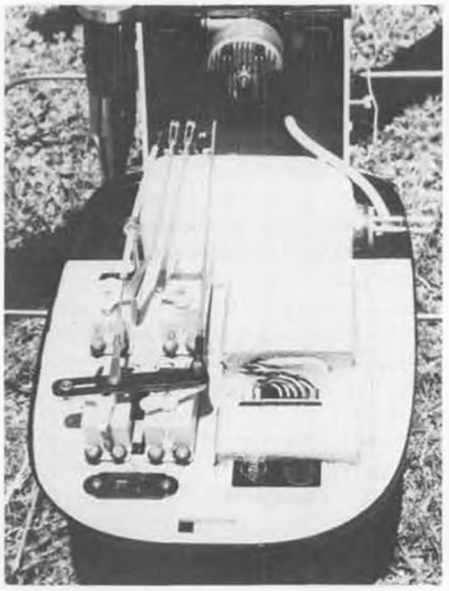
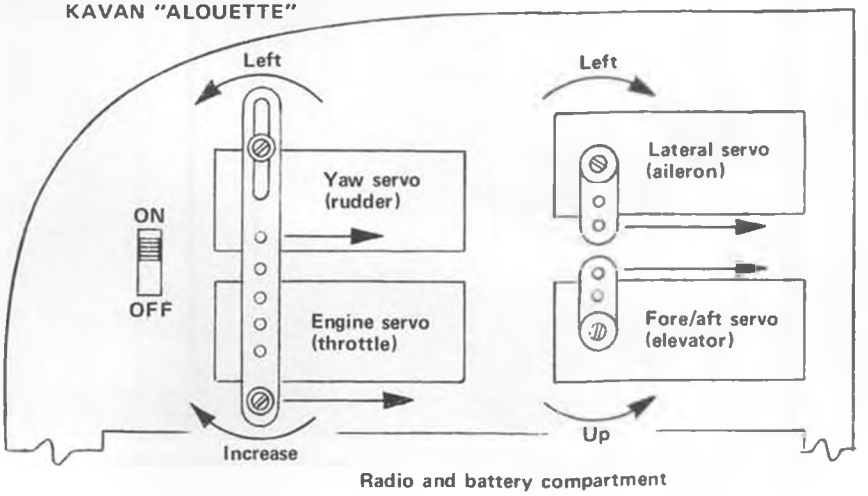


Photo of the radio layout in the cockpit. Proper arrangement is shown in diagram at right.

REQUIRED SERVO TRAVEL FOR THE KAVAN "ALOUETTE"



Radio and battery compartment

Photo by "Butler Eagle" photographer, John Bowman.
Background information by Cora Stevick, Mars, Pa.

Pat, wife of Butler Area Radio Flying Society (BARFS) member Mike Krapf, was selected Miss SAM Champs 1976 by SAM Prexy, Joe Beshar. Mother of 3 girls, Pat is involved . . . a Playboy Sr. is on the way, similar to the OS Wankel powered one belonging to Mike, which she's holding.

PLUG SPARKS

By JOHN POND

Old Timer R.O.W. Models? Well, that's not new, as the SCAMPS have been staging an R.O.W. meet at Elsinore for the last three years. Old Timer R.O.W. radio assist models? No, this is not new either, as WCN and quite a few of the boys at Lake Elsinore have been doing it. But a club dedicated strictly to flying seaplanes, particularly O/T R.O.W. radio assist models, this is something new!!

The South Bay Seaplaners have been in existence for over ten years and have never grown much in membership. The membership is always around 15; the most dedicated seaplane addicts you would ever hope to see. Headed up by President Bob Von Konsky, the membership includes such fellows as Bob Holland, Tex Newman, Bob McBride, the writer, Gerry Wolfram, Bob Lee, and a few other dedicated R.O.W. stalwarts.

An annual fun-fly is staged at the Calero Dam reservoir every year around August or September. This meet draws extremely well, as fellows like Irwin Ohlsson, Art Synder, et al, make the annual trek from the southland. Almost like the days when they used to come up for the Sacramento State Fair!

The contest (?) is so low keyed that at times the spectator is wondering who and what is doing the winning. However, this does not detract from the spectacle of seeing many graceful looking hydro models flying about in various attitudes.

With the formation of SAM 21, a club primarily interested in O/T F/F radio assist models, it is hard to tell the difference between clubs as the members are practically interchangeable! In all fairness, it must be pointed out that the land versions of O/T are more popular, as the SAM 21 membership is now 50. As Bob McBride noted, "We gotta siphon some of the members away to hydro flying!"

The main purpose in the writeup of this club is to point out to the rest of the O/T modeling fraternity that there is another form of old timer flying that bears watching. Last month, we talked about electric flying old timers. Well, there's another facet of fun in this rapidly proliferating old timer game. If you haven't tried old timers on floats, you are really missing something!

Before wrapping up this subject and to avoid numerous questions on floats, there are a considerable number of plans available that show the construction and installation of floats on old timer models.

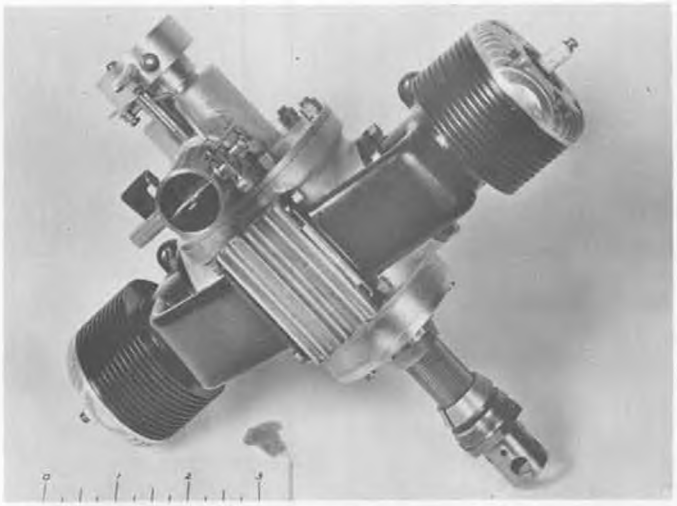
Among the more popular are the Comet floats used on the Comet Clipper, the Gondolier floats by Berkeley in various sizes (20, 30 and 40 inch) which are employed on models varying from the Musketeer 42 to the big Taibi Powerhouse. In addition, Megow produced two size Edo floats that were popularly used on their Cadet and Commander designs. Probably the best and easiest floats to construct and install are the Bunch Gull floats consisting of three floats. These get off everytime! Now don't say we didn't tell you!

ENGINE OF THE MONTH

This writer is pleased that he has one avid reader of his column, as he received a mailing tube made of Coors aluminum beer cans from Irwin G. Ohlsson, no less! Inside were a lovely set of blueprints with complete three-views and bill of materials for the Ohlsson Twin used in model studies by Consolidated-Vultee. A complete writeup was made in the July 1946 issue of Air Trails showing the application of Ohlsson's engines, hence only a small portion will be repeated.

E. G. Stout, head of the Hydrodynamics Group of Consolidated-Vultee had been fostering a series of studies in dynamically similar models of proposed full size aircraft. With radio control becoming feasible, he decided to build a 1/8 scale size twin engine flying boat known as the XP4Y-1. It was then that the Ohlsson and Rice firm was invited to build a twin cylinder engine

Hugo Lung (SCAMPS) built this Ohlsson 60 powered version of the Super Quaker. A real dark horse!



The Ohlsson Twin, built for the Consolidated Vultee Model P4Y radio free flight (!) experimental radio controlled model.

Ernest G. Stout, manager of Advanced Transportation Systems at Vultee, fitting special three-bladed prop on Ohlsson engine.

to specifications to simulate the 2,000 h.p. R-3350 engines in scale horsepower and r.p.m.

Ohlsson responded with an engine that was highly successful for the purpose required, using two bladed propellers (instead of the scale three bladed types in full scale) that gave static scale thrust at scale r.p.m. Rated at 1.6 brake horsepower, these engines swung a 24 inch prop (1/8 scale of 16 ft) at 4,200 r.p.m. So successful was the initial twin engine flying boat model, a four engine version was modeled thereafter, using the same engines.

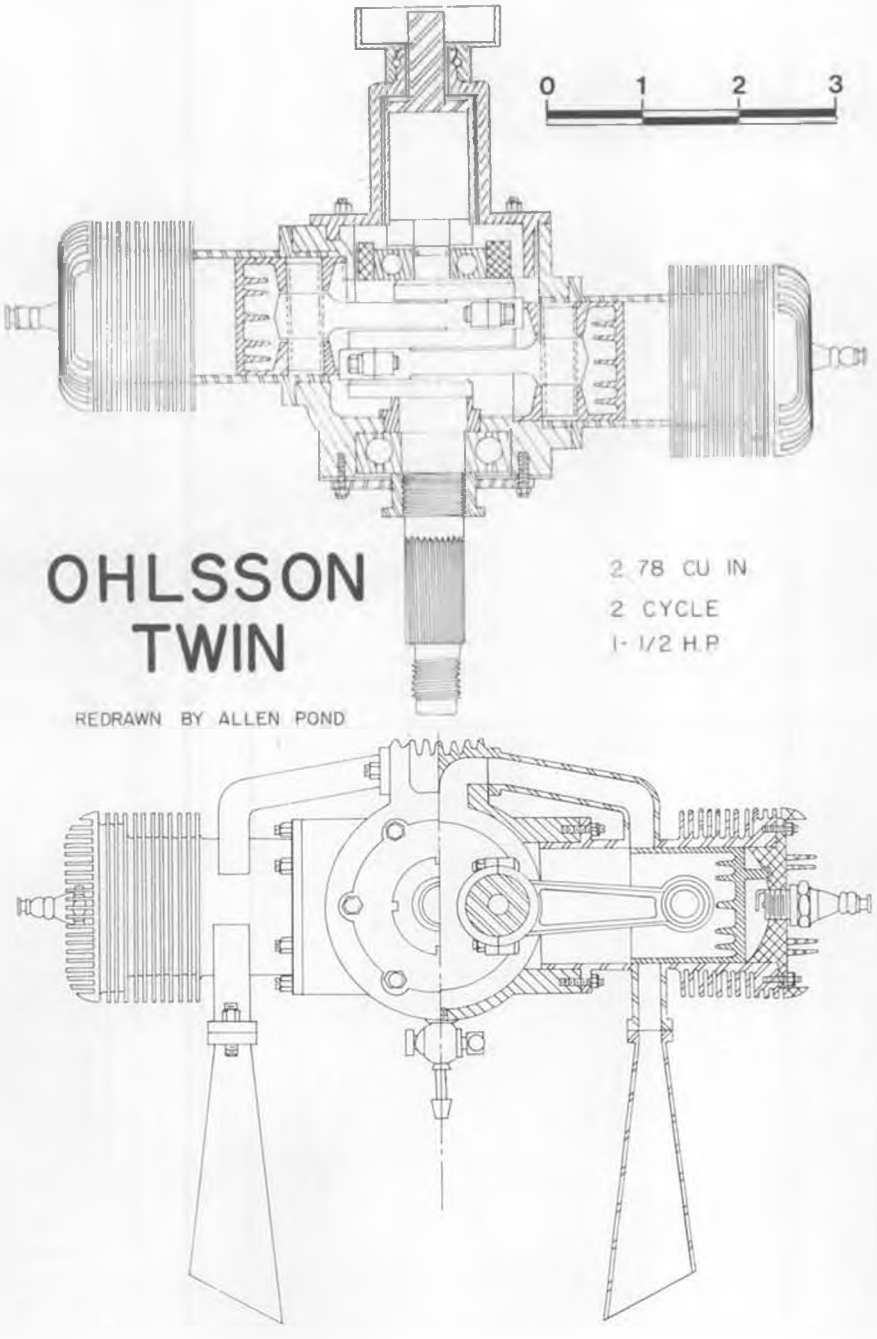
In all, Ohlsson states there were only 26 engines manufactured. Thanks to the historical digging by Bob Von Konsky, who was collecting Ohlsson engines exclusively, several of the engines are now in the Jack Passey collection. Von Konsky tracked down E. G. Stout, living in West Hollywood at the time, and was able to obtain several of the engines still around the old Consolidated plant. From an engine collector's standpoint, this was an outstanding piece of research and best of all, finding a few of the original engines employed in these experimental models.

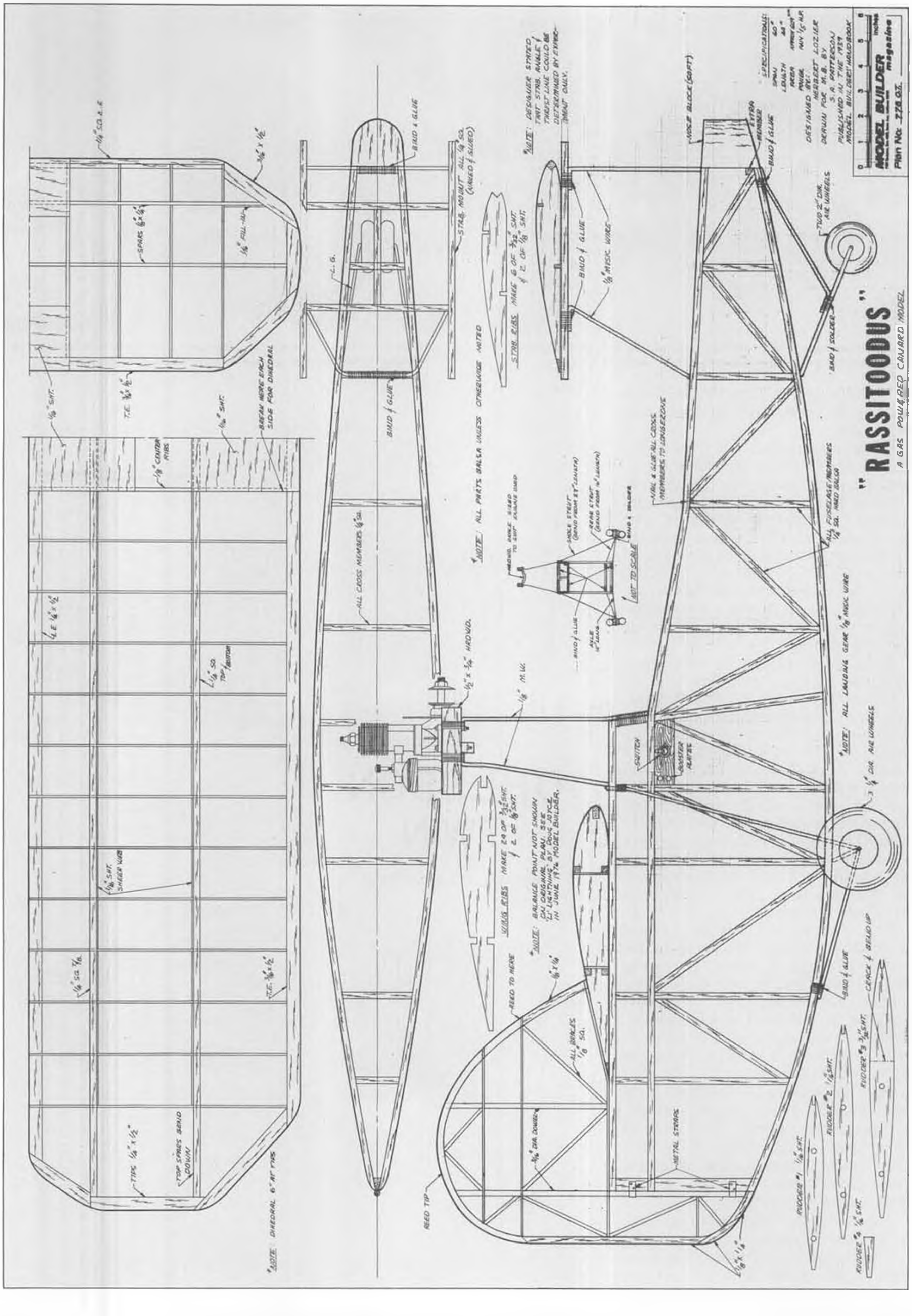
The drawings that have been traced by Allen Pond were originally in the custody of Doc J. P. Young. In running over his old files, he found the blueprints he had received from Irwin and in less time than it takes to tell about it, returned them to Irv who in turn forwarded them to SAM/01. You, the reader, are the winner!

For the technically minded, Irwin supplies the following statistics: weight, approx. 3 lbs.; rating, 1-1/2 H.P. @ 4200 r.p.m., static thrust 21 pounds; fuel, standard gasoline and oil at the regular three to one ratio.

BEER CANS FOREVER!

Ever since the compressed air beer can tank article appeared in this column, that fun guy, Irwin Ohlsson, has been plaguing the writer with all sorts of beer can tubes. Surprisingly, as reported





"RASSITOODUS"
A GAS POWERED CANARD MODEL
MODEL BUILDER magazine
SPECIFICATIONS
DESIGNED BY: HERBERT LOZIER
DRAWN FOR M.B. BY S.A. PATTERSON
PUBLISHED IN THE 1939 MODEL BUILDERS HANDBOOK
NOTE: ALL PARTS BALSA UNLESS OTHERWISE NOTED
NOTE: ALL LANDING GEAR 1/8" MUSIC WIRE
NOTE: DIHEDRAL 6" AT TIPS
WING RIBS
STAB. RIBS
ALL CROSS MEMBERS 1/8 SQ.
ALL FUSELAGE MEMBERS 1/8 SQ. HARD BALSA
BIND & GLUE
BIND & SOLDER
METAL STRAPS
REED TIP
RUDDER #1
RUDDER #2
RUDDER #3
NOT TO SCALE
SWITCH

Bjorn Andersson's old Wakefield design was a potent flyer for Orjan Gahn at Swedish O.T. Wakefield Nats.

Don Bekin's Playboy on floats is a great flier. This is a fun way to enjoy old timers.

previously, the cans can be simply taped together and they do arrive in good shape. Best part of it all is that the postage cost is the nicest surprise.

Irwin has also sent in regular Coors cans containing photographs, plans, brochures, and letters. Matter of fact, Irwin has been so successful in inventing other uses for the aluminum beer can, that he wrote the Coors Brewery in Golden, Colorado. This company has a sense of humor too as they promptly sent Irwin an aluminum ash tray made from re-cycled aluminum. As Irwin remarks, "You have to be nuts to be a model builder."

ENGINES, ENGINES!

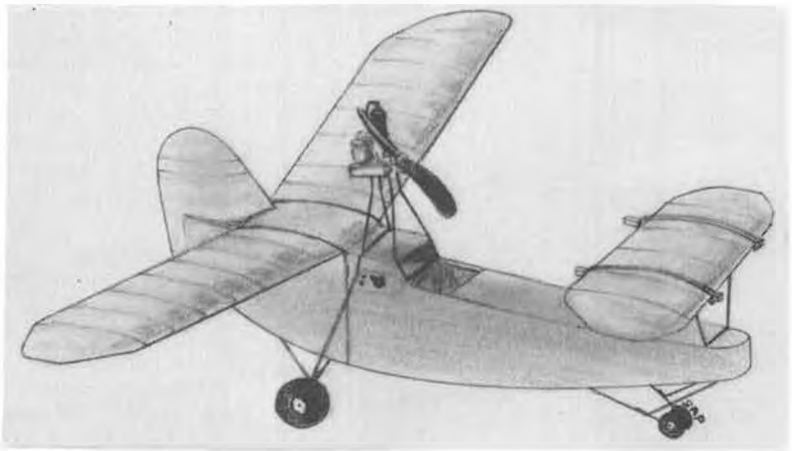
Just received the latest sheets from Mark Fechner announcing the production of Genie .29 and Thor .29 engines. These are the original engines except for the Fechner enclosed timer and tank. The Genie will sell for $24.95 plus $1.50

Continued on page 81

Nick Nicholau, Marysville, California, built this beautiful R/C Super Buccaneer. A SAM 21 Black Point Texaco Event winner.

Transparent red Spook 48 by Chris Christenson. Seen at Ocie Randall Memorial.

"RASSITOODUS"



OLD TIMER Model of the Month

Designed by: Herb Lozier

Text by: Bill Northrop

Redrawn by: Al Patterson

• What this unique design lacks in competition style, it surely makes up in its novel appearance. The plans were printed in the "Model Builder's Handbook", a Fawcett publication released in 1939. The plans are reproduced unmodified, so that the imaginative builder can originate his own changes.

The "Rassitoodus" would certainly make an attention-getting r/c model, and has to offer no excuses if it doesn't win the weekly 20 second engine run event.

We suspect that the model may need more lateral area up front, and dihedral in the canard wing. As usual, the balance point information is lacking. We suggest studying the drawing on Doug Joyce's "Li' Lightning" in June 1976 MB. A scale profile glider could probably eliminate a lot of guesswork.

According to the area rule, the main wing is just a hair undersize for a 29 engine. However, if you hold out for the argument that a canard has fore and aft *wings*, a .29 should be allowed.

Heck, who's going to argue with an airplane that flies backwards, anyway! •

The series of photos across the top of these two pages were taken by Doug Barry, and show an intersting sequence. The scene is a pond in Newark, Delaware (MB editor's old home town!) and the Trident belongs to, and is being sailed by Henry Morris. In the first photo,

STRICTLY SAIL

By ROD CARR

• The editor's recent article in these pages about the TRIDENT trimaran has apparently struck a responsive note. I have gotten a number of inquiries about multi-hull craft and it seems reasonable to explore the subject. The TRIDENT, by virtue of being the only domestic multi-hull being raced in AMYA competition, is the one with which we have the most experience. My spies tell me that under the right wind and weather conditions, it is scaring the daylights out of other 36/600 class skippers. So much so that a move is afoot to split the class into mono-hull and multi-hull divisions.

Our lead set of pictures shows No. 274, skippered by Henry Morris, slicing down wind in a 30 knot puff. As the first picture shows, there is excessive twist in the mainsail, caused by complete lack of vang tension. By picture 2, the jib apparently gybed, and now, shadowed by the mainsail, it is luffing. The top half of the mainsail is pushing the bow down and to port. The port outrigger digs in and as the hull decelerates it pitches down and rolls to starboard, burying the starboard outrigger, resulting in a pitchpole egged on by the mainsail which is still pushing like crazy. The boat winds up in picture 3 with her main hull in the air and pushed by the wind to the condition seen in picture 4. This is what Apollo astronauts call "Stable II", upside down and with no tendency to right.

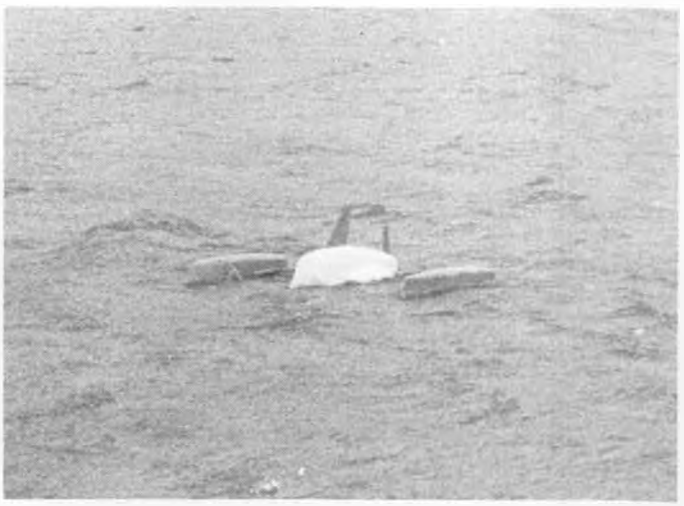
From the series we learn that taking a multi-hull downwind can be made safer by reaching on one side or the other of the mean wind, and by eliminating twist in the sail using hard vangs, as well as not sheeting all the way out. It is the fast shutter of Doug Barry to which we are indebted for this most revealing set of photos. He has also sent a series which we will present in a future column, which shows an entire weather leg in a light air heat just chock full of opportunities for Monday morning quarterbacking.

Jack Holcomb's Hobie Cat model has five foot hull length, uses extra ballast for stabilization.

The primary problem with multi-hulls is one of stability. Their speed results from their large sail area and their small wetted surface, and light weight. The TRIDENT chose to add a third hull to prevent capsizing. Other models, such as the Hobie Cat by Jack Holcomb, have relied on extra ballast internal in both hulls, taking the vessel somewhat below her design LWL. Figure 1 shows the righting moment for a catamaran with all weight on the centerline. Notice that the righting lever increases dramatically up to a heel angle of 11°, then decreases until capsizing occurs at about 50° heel angle. The other plot is for a catamaran with crewmen on a trapeze. Righting lever is much larger, though reaching a maximum of 11° and staving off capsizing until a 57° heel angle is reached. The benefit of movable ballast is obvious. Application of such ballast to a model now seems within our grasp.

I propose a no-holds-barred multi-hull class of 50 inch maximum LOA and 800 sq. in. max. sail area with no roach restriction. This size will allow immediate comparison with the hot 50/800 mono hulls, in order that multi-hull progress be assessed easily. Meassured sail area should be the same as for the 50/800 class, but prohibitions on movable ballast would be deleted. Either two or three hulls would be allowed, I suppose any number is OK, but LOA limit will keep hull speed under control.

Figure 2 is my best guess at the current time for a winning arrangement. The trick is in coming up with a transmitter configuration which will allow easy control over helm, winch and ballast. That project is still rattling around in my head. A proportional winch with fast rotation will be put in charge of the ballast. The transmitter will be rigged so that the stick remains centered and the ballast will always return to the centerline of the boat when the skipper removes his finger from the stick. The



the Trident is headed down wind, wing-and-wing. Next, the jib is gybed, and luffs in the shadow of the main. In the 3rd photo, the hulls yaw to port, decelerate, bury, and trip over starboard outrigger. Finally, "Stable II" is attained. No damage, no water inside. See text.

ballast itself should be made thin and capable of easy change to meet varying wind conditions. The pivoting method chosen will help to move the center of gravity aft and keep the leeward hull from burying its bows when pressed. Depending on the speed of the ballast winch, it might be possible to extend the ballast farther outboard than is shown in the figure. I would try a somewhat conservative approach in the first attempt to avoid fouling sheets and so on when learning to sail such a beast.

Addendum: If we now install a pair of mercury switches in the wires to the sail control unit, we may contrive for the sails to automatically slack themselves when a critical heel angle (say 40°) is reached. When the boat comes upright, the sails would return to their original setting. Careful set up of such a system would permit you to sail a cat to weather with one hull flying as it monitored its own heel angle and sheeted accordingly with the movable ballast cranked up to the weather side. What a sight!

It seems to me that this is something with which the experimenters might really have a good time. For the first couple of years, I would imagine that reliability might win races, while all the intricacies of the vehicles are explored.

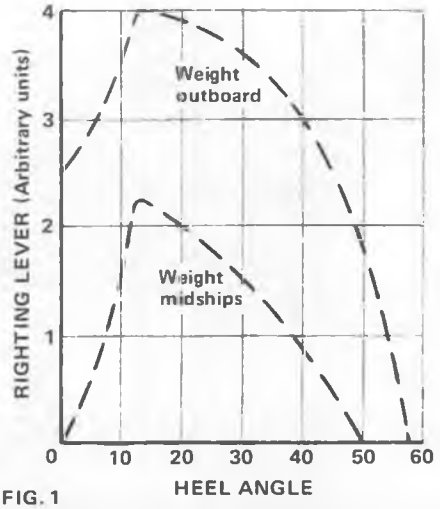


FIG. 1
RESISTANCE TO HEEL FOR CATAMARAN HULLS AS FUNCTION OF ANGLE OF HEEL

Certainly fully battened sails would make an early appearance as would the previously-mentioned modified transmitter configurations. Having a pair of standard hulls available might make it easier for class members to get started, and in such a case one might opt for use of those hulls, rather than establishing an arbitrary LOA measurement as I have suggested. Any of you potential manufacturers want to get in on the ground floor?

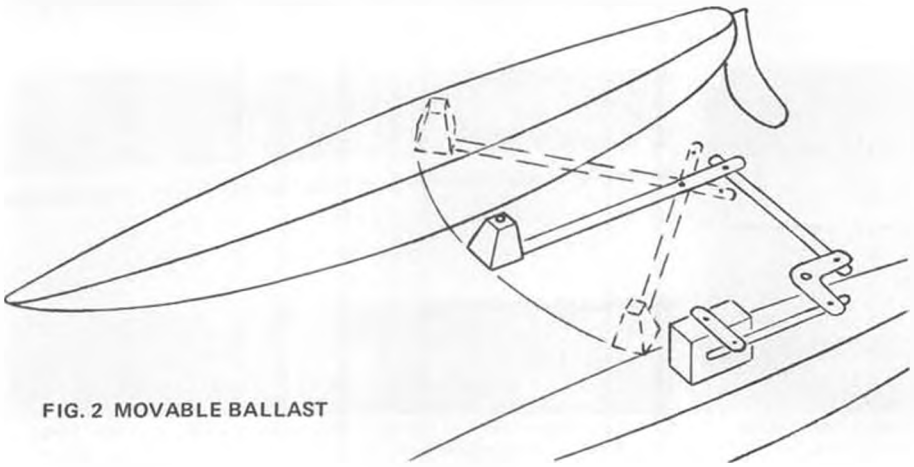


FIG. 2 MOVABLE BALLAST

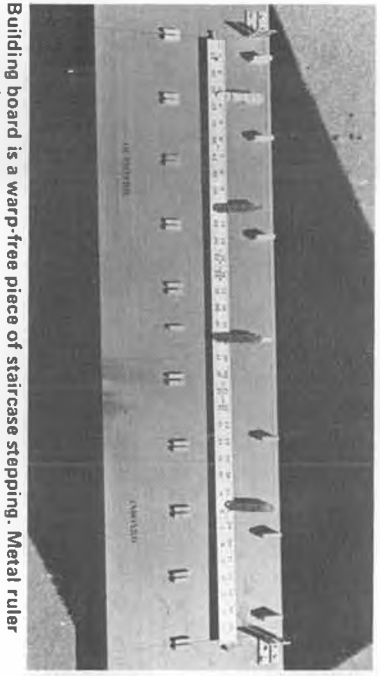
MARK 27

9 FREQUENCIES - A to I
Yachts 1 - 2 - 3 each on single frequency, ie, A_1, A_2, A_3; B_1, B_2, B_3, etc.

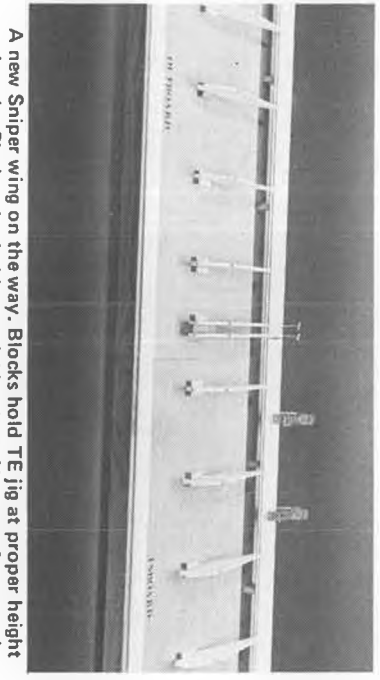
Heat No.	A	B	C	D	E	F	G	H	I
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	1	2	3	1	2	3	1	2	3
5	2	3	1	2	3	1	2	3	1
6	3	1	2	3	1	2	3	1	2
7	1	3	2	1	3	2	1	3	2
8	2	1	3	2	1	3	2	1	3
9	3	2	1	3	2	1	3	2	1
10	1	2	3	2	3	1	3	1	2
11	2	3	1	3	1	2	1	2	3
12	3	1	2	1	2	3	2	3	1
13	1	3	2	3	2	1	2	1	3
14	3	2	1	2	1	3	1	3	2
15	2	1	3	1	3	2	3	2	1
16	1	1	1	2	2	2	3	3	3
17	2	2	2	3	3	3	1	1	1
18	3	3	3	1	1	1	2	2	2

Missing from the April column was a figure that should have outlined the structure and heat assignments of the MARK 30 heat list. Since that writing, AMYA Treasurer Dick Hein has come out with a much improved heat list which eliminates some of the biases which were left in the MARK 30. Dick's list accommodates 27 boats, three per frequency, for a total of 18 heats. One nice feature is that each boat sails once in each set of three heats, meaning that a regatta can consist of any even multiple of 3 heats. My hat is off to Dick for an important contribution to our sport. I am asking everybody, everywhere, to junk their old MARK 30 and use the new MARK 27;

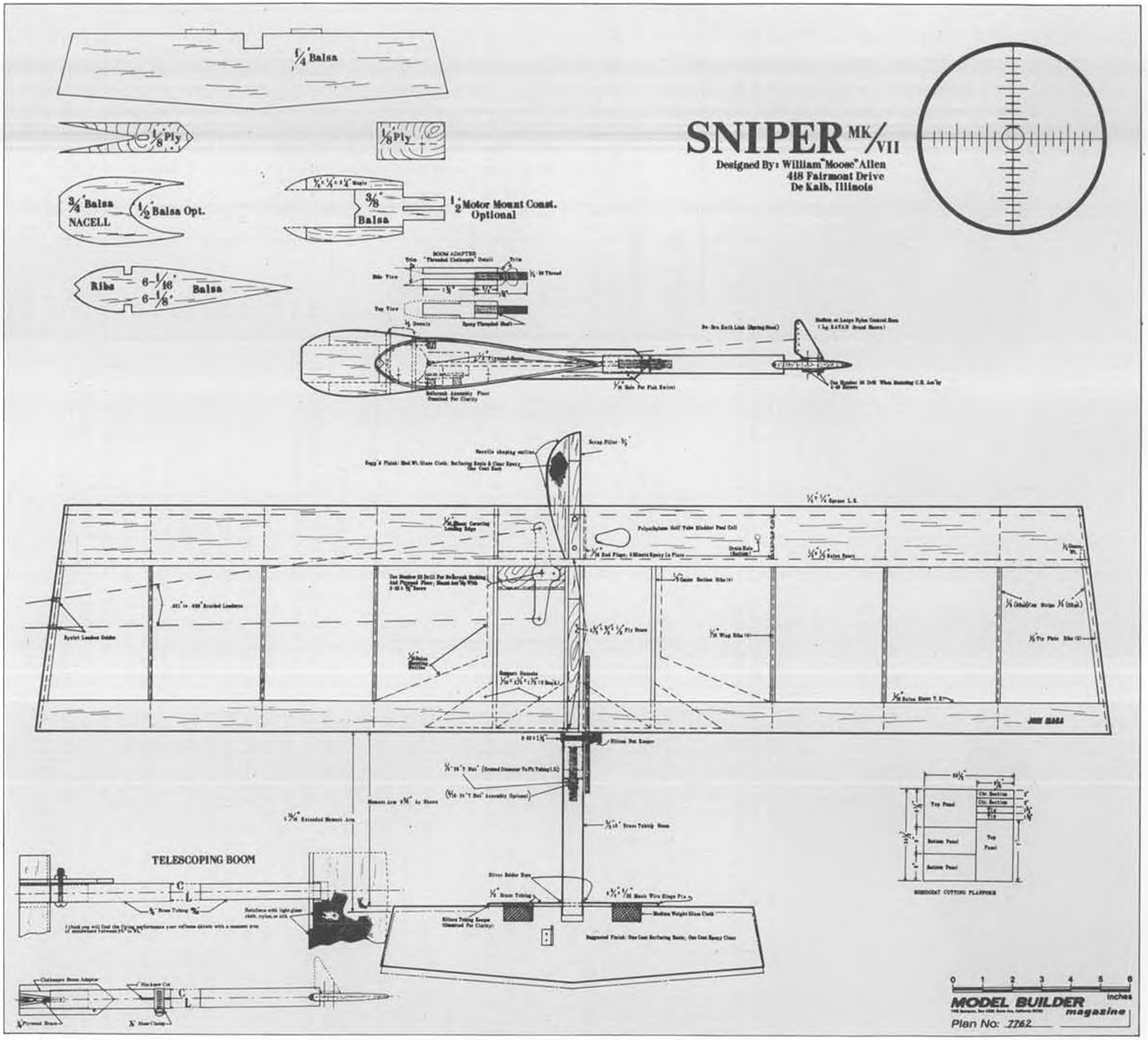
Continued on page 84



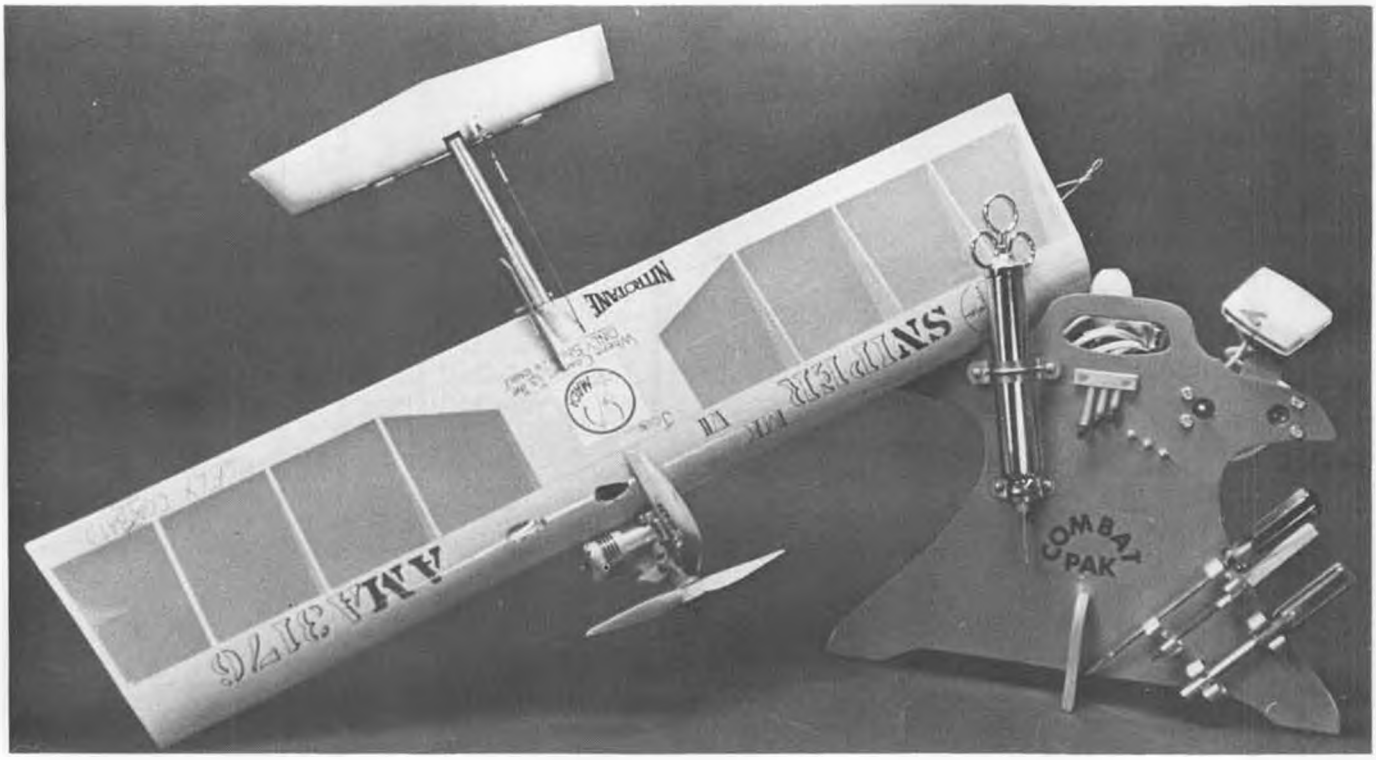
Building board is a warp-free piece of staircase stepping. Metal ruler acts as adjustable trailing edge jig. Tacked blocks locate ribs.



A new Sniper wing on the way. Blocks hold TE jig at proper height and angle. Clothespins hold material in place. No room for errors!



FULL SIZE PLANS AVAILABLE — SEE PAGE 96



THE SNIPER MK/VII

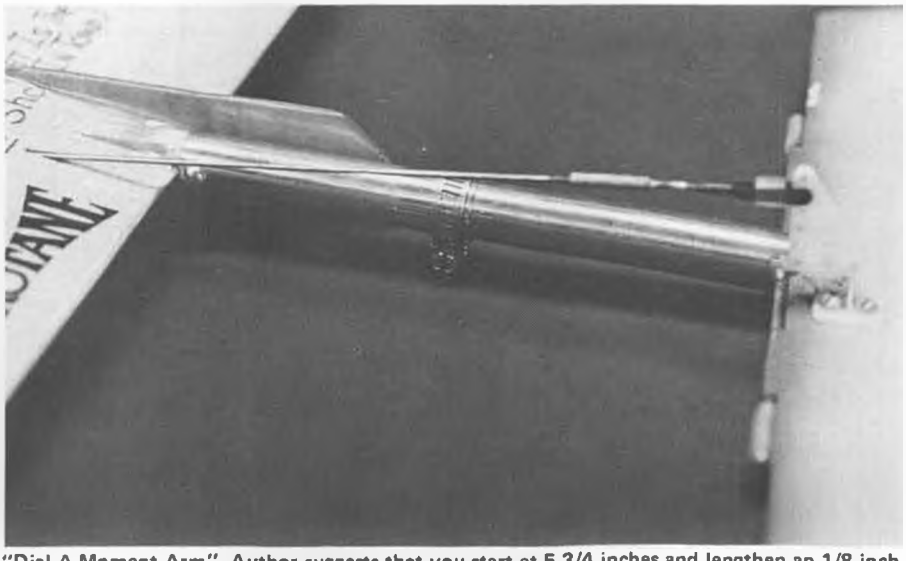
By WILLIAM "MOOSE" ALLEN . . . Something a little different in combat models . . . the tail moment is adjustable to your reflexes, and many parts may be cannibalized after breaking the ground barrier.

• Combat is the No. 1 spectator event at any control line contest. The action of the mid-airs and ground pounding pit stops in head-to-head competition lures everybody in sight. Just think, all that for a little piece of crepe paper! Out of my twenty years of model competition, the actual airplane's vulnerability has never changed. The fast combat event still places the fate of the competition machine in the hands of the flyer. Its ability to stay together under extreme conditions is of utmost importance. The SNIPER is a product of those year's of successes and failures, and presents a whole new approach to design application and some model engineering.

Simply stated, a combat ship should be inexpensive, build fast, and maneuver TO MEET THE FLIER'S REFLEXES. Since the introduction of the "sidewinder" mount, as designed by Riley Wooten in 1959, very little has been changed in the basic makeup of a combat ship. His "VOODOO" is still widely accepted and used today and is still very competitive . . . with a few changes. Here, fifteen years later, comes the "SNIPER." It features:

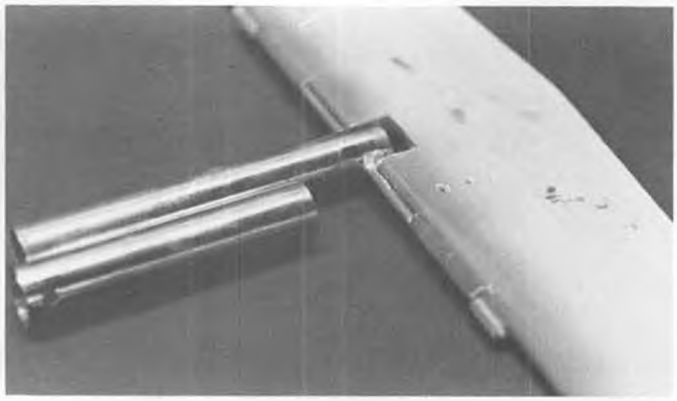
Extendable tubing boom which allows for adjusting the plane's flying sensitivity to each individual flier's reflexes.

The author, his weapon, and the support facilities. Note one-dimensional "Combat Pak."



"Dial-A-Moment-Arm". Author suggests that you start at 5-3/4 inches and lengthen an 1/8 inch at a time until the length matches your reflexes. How about 10 inches for "the morning after?"

With airframe mounted in a vise, both hands are free to twist any stubborn worps out of it. Rubber bands hold LE while glue sets up.



Stabilator hinge is silver soldered to end of inner boom tube. Everything on the plane can be replaced or scavenged, handy in combat!

Allows for any engine/prop/tank set-up to be "tuned-in" to the airframe's finished weight and mass distribution.

Boom/Stabilator are replaceable. This integral feature allows for a savings of time and expense.

Trimming the plane's flying ability takes only two minor adjustments.

Design eliminates the need for wingtips and saves time in construction and covering.

"ROCK-STABLE" flight characteristics.

The basic makeup of the SNIPER is simple, straightforward and easily cannibalized. This is an added plus when the need arises, during the contest, or the night before, when your pride and joy plugs itself into old mother earth unannounced!

BUILDING JIG

Frankly, this is a must for the serious builder/competitor. The one I use is simply constructed and will accomodate many other combat wing design on the contest circuit today.

Begin with a 48 x 11 inch piece of staircase stepping. Staircase stepping is available at any lumber yard. The use of this material is important because the grain is vertical, which guards against warps and twists. In its selection, I suggest that you check it for those warps and twists with a metal straight edge, lengthwise and from corner to corner.

Two pairs of 2 x 2 metal right-angles (strapping type) are positioned along the radiused edge of the stepping, spaced 37 inches apart (18½ inches from each side of a center-line located on the board surface). At each end, the right angles are spaced apart just enough so as to act as a channel for the pivot screws attached to a 36 inch metal ruler. I suggest that 8–32 (1¼ inch) spade bolts be soldered at each of the ruler ends . . . although an 8–32 nut could be soldered to the ruler end through which the bolt will pass. Mounted in the channel, the ruler will act as a trailing edge support which will pivot to the angle that each airfoil dictates. Balsa jig blocks, cut to the correct angle, will act as supports for the ruler. I recommend that a coat of gloss resin, varnish or some form of clear protective

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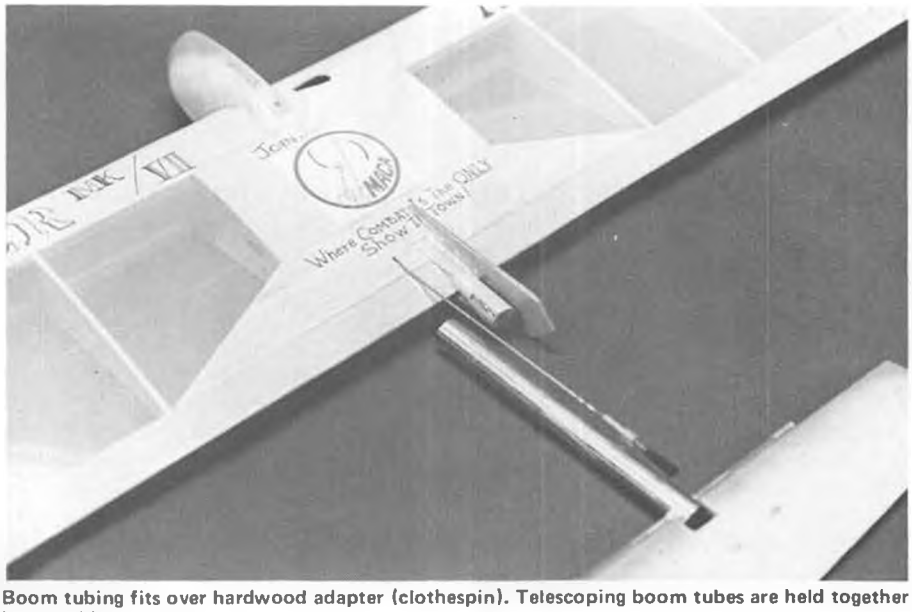
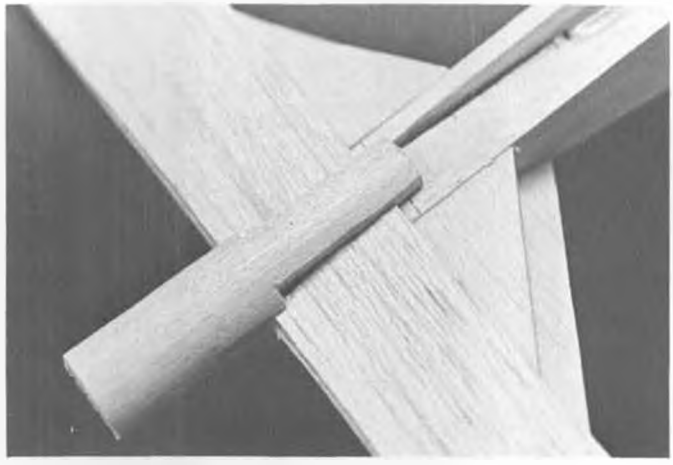
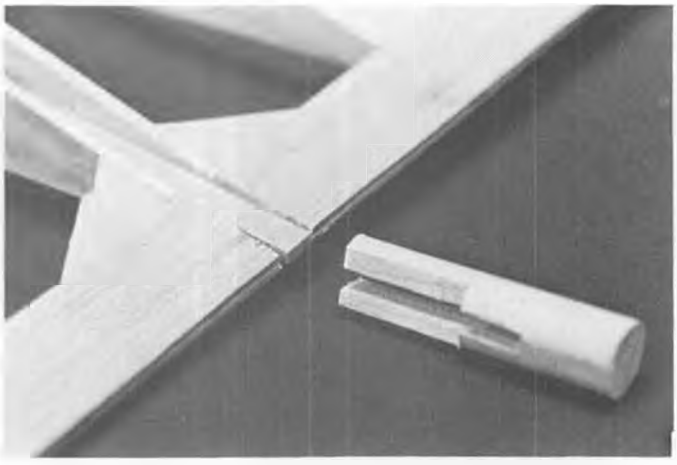


Boom tubing fits over hardwood adapter (clothespin). Telescoping boom tubes are held together by metal hose clamp.



Gussets reinforce trailing edge in area where maximum strength is required.



Plywood brace between center ribs is the backbone of the Sniper. It also determines alignment between wing, stab, and thrust line.

Howard Rush photo.

Mike Heard holding the remains after Ron McNally cut him at '75 Eastern States Champs.

Don Marti, transplant from England, and untried Sig P-51 Stunter. Rich Lopez photo.

Bob Burch, Polish Pit Crew, warding off vampires with shiny, new Fox 4-way wrench.

control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY AUTHOR UNLESS NOTED

MACA 1975 TOP TWENTY

The crashin' and bashin' is all over for the '75 Combat season and here are the MACA members that won enough matches to make the Top Twenty.

1. Mike Guthamson - Kingsbury, Texas.
2. Howard Rush - Hampton, Virginia.
3. Charlie Johnson - San Diego, California.
4. Paul Smith - Wichita, Kansas.
5. Ross Melhuish - Etobicoke, Ontario, Canada.
6. Drew Lance - Saratoga, California.
7. Bob Burch - Cicero, Illinois.
8. Jay Morway - Detroit, Michigan.
9. Mike Strieter - Laurel, Maryland.
10. Victor Radisi - Houston, Texas.
11. Larry Driskill - Big Spring, Texas.
12. Jordan Segal - Niles, Illinois.
13. Chuck Rudner - Gainesville, Florida.
14. Jim Phillips - Oklahoma City, Oklahoma.
15. Mike Tallman - Wichita, Kansas.
16. Warren Sanders - College Park, Maryland.
17. Marvin Denny - Wichita, Kansas.
18. Ed Bridant - Petaluma, California.
19. Rich "von" Lopez - Daly City, California.
20. Lorna Samuel - San Diego, California.

Check that last name. A girl in the MACA Top Twenty! That's outrageous. I think Charlie Johnson owes us an explanation as to what's happening in So Cal!

By now, most of the Top Twenty should have their T-shirts. If you go to a Combat meet this year and see somebody wearing one of the shirts, rest assured he is a bad mother in the Combat circle . . . unless, of course, it's Lorna Samuel wearing the shirt!

Incidentally, Midwest paid for the Top Twenty T-shirts, after being sold on the idea by Rich "von" Lopez. Thanks to both Midwest and Rich for contributing to the promotion of Combat.

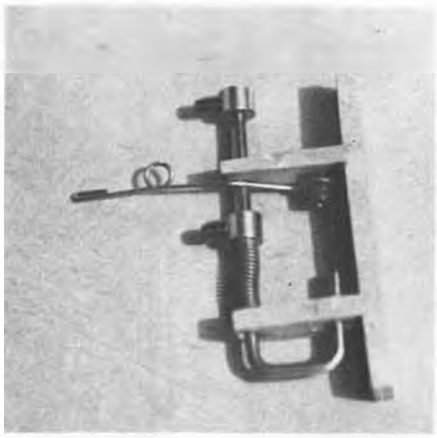
Congratulations, of course, to all the Top Twenty winners, but let's not forget the guy who tabulated all the contest results, number 9 in '75, Mike Strieter. Mike, I can't imagine trying to sort through a whole year's Combat contest results, separating MACA members from the non-members, etc., etc. Not content to simply list the Top Twenty winners, Mike has a detailed analysis of the winners, what they flew, how many times and just what it takes to make the Top Twenty. This analysis has already been published in a MACA newsletter. Makes for very interesting reading!

In looking back over a few of my previous columns, I see that most of the pics are of Combat planes, Combat fliers, Combat engines, etc. That's OK with me, Combat is my favorite event. But this is a C/L column, not a Combat column, so it would be nice to be able to feature pics of Carrier planes, Rats, Stunt ships etc. Don't get me wrong, I'm not begging for pictures, I still know how to use my camera. I'm just saying that the door is open to you to help promote your favorite event through this column and with good quality black and white pictures.

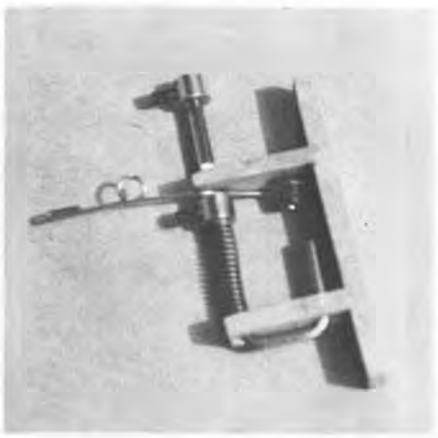
As I am slowly becoming hooked on Stunt flying, Stunt-related pics are especially welcome. PAMPA Prez, Keith Trostle, has offered some pics he took at the FAI try-outs, so they'll be featured shortly, but I can use more.

Any correspondence to me can be sent direct to MB, but it saves time and effort (and cuts down on MB's postal costs!) if you just send your letters direct to me at: 940 240th St. S.E. No. 1, Bothell, WA 98011. In an effort at wearing out the typer, I have managed to answer every single letter I've received, so you'll probably get an answer.

Last month, we got a pretty good start with Project Goodyear, but there is one thing that may have you wondering a little bit. In outlining my method for sanding down the ribs, prior to the installation of the top sheeting, I forgot to tell you that we aren't trying for a "normal" looking airfoil. In cross-



Goodyear shutoff by Kilsdonk, as seen from front. Down elevator trips it. Bolts to fuse.



Chomp! Same shutoff in closed position. The 1/32 wire is shoved out of notch, releases clamp.

Custom props by Kelly Products, Inc. Prop on left just out of mold. Carbon fiber prop, right.

section it looks like the upper half of a diamond airfoil, you know, where the top isn't curved but goes in a straight line from the LE to the high point and from the TE to the high point. I don't like the looks of this airfoil, either, but if Kilsdonk says it works, that's good enough for me.

OK, we've got a wing and a fuselage put together so far. The stab, elevator, fin and rudder are next. I just whack these pieces out of 1/8 inch bass wood. If you just have to use balsa, it is best to reinforce the LE of the elevator and the TE of the stab by gluing on a strip of spruce. I find the bass much easier to work with and it eliminates the need for reinforcement. Sewn hinges are used, so the holes for these are drilled now. Be sure they are lined up pretty well, so there won't be any misalignment between the elevator and stab when the hinges are added.

Most modelers probably regard sewn hinges as old-fashioned, but I like them as they give very smooth and free controls. Also, they can be installed after the plane is complete, allowing painting of the elevators separately, as they aren't permanently attached to the plane when it comes time to do your spray-gun thing.

The fin and rudder (no off-set in the rudder) are now glued to the fuse. Cut the slot for the stab now, but I find it easier to glass the fuse if the elevator is glued in later. Also notice that we haven't glued in the wing yet, for the same reason.

At this point, I temporarily slip the wing into the fuse, strap the engine, tank, landing gear, etc. on, and make sure everything is going to fit. The shut-off is installed now, in fact the plane is completely assembled, just to be sure I've got everything where I want it. If something isn't right, now is the time to fix it, not later when this beauty is glassed and painted.

Take everything apart and sand the fuse and wing to final shape, if you haven't already done so. This is the stage where you start on getting a good finish, not later when you're painting. Sand everything as smoothly as possible, fill in any dents with Dap spackling compound or Hobbypoxy Stuff. Double- and triple-check your sanding job, it's worth it in the long run.

Now we're ready to glass the fuse and wing. This is really easy, but I'm not sure that too many C/L folk know how to do it properly, so I'll describe the process in detail. Pics would have helped here, but I didn't take any. I mix resin pretty hot and don't have time to pose the plane for pics.

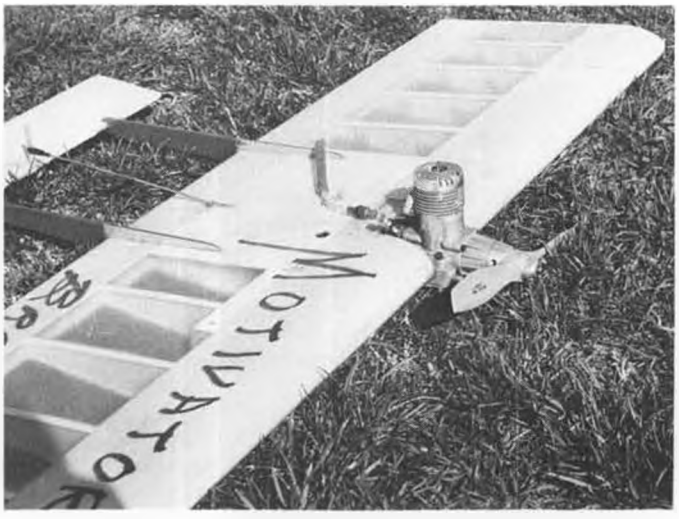
Let's gather up all the material first. I used K&B products exclusively in finishing my plane, though Hobbypoxy will do just as well for those who prefer the Pettit line of epoxy finishes. We'll need very light glass cloth (K&B's 3/4 oz. cloth is good), sanding resin, epoxy thinner, 1 inch wide soft brush (get a brush of good quality, you don't want a "shedder"), scissors, Uber Skiver knife with a fresh blade, small sanding block, 400 and 600 grit wet-or-dry sandpaper, resin mixing cups, and good ol' toilet paper. That's right, toilet paper! This is stupid, giving specs on T.P., but the best type is the one-ply stuff, at least for what we want.

We'll do the bottom surface of the wing first. Lay the wing on the glass cloth and cut one piece of cloth to fit. Allow several inches excess, to ease handling. It's best to block the wing up on something, rather than doing this trick with it laying flat on a table. Laying the wing across a small, cardboard box is adequate.

Lay the glass cloth on the wing and get it positioned pretty much the way you want it. Don't worry if the cloth won't lay flat. Mix up several ounces of resin. It's best to have too much.

Continued on page 69

Rich Ryon holds the remains of a bellcrank from Chuck Rudner's airplane, which Rich managed to mid-air.



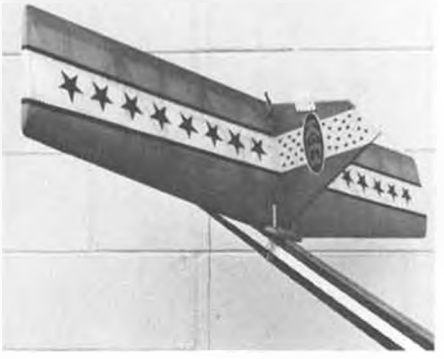
Rich Brasher's Motivator. Powered by a de-stroked K&B 6.5. Runs an easy 122-123 mph in full combat trim. Rich Lopez photo.

G.Y.S.O.B.

By ED BELLINGER . . . The newest Class C record holder is a man-sized hunk of model. If you can handle a Schneurle .40 at close quarters, you're ready for it . . .

• FAI Power, you say? They're OK if you like overweight hand launch gliders, but I'm talking about hairy-chested, two-horse-power, man-sized competition. In other words, Class "C", as flown in our large California annual contests. You say you want proof? OK, just check the results of the last U.S. Free Flight Champs. It took over 30 minutes just to place fifth in "C". Hey! You there with that Ravioli .15, you ever make over 30 minutes? I didn't think so.

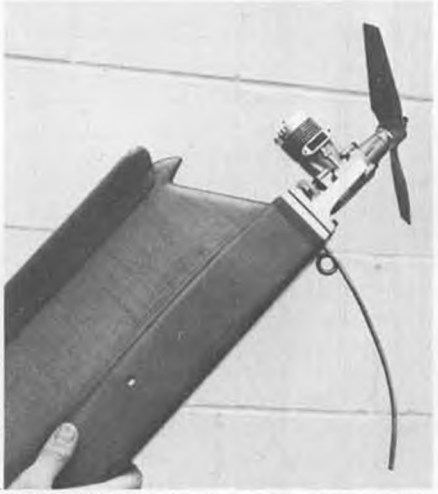
If you're still with me, perhaps I can interest you in a model that has proven itself in this type competition, in several series, since 1967. The name is "GYSOB", and if you don't have enough imagination to figure that out, go build an old timer. In the only two Nats I've attended, it placed second in "½A", and first in "B" (Yeah, I build little ones sometimes). It took back-to-back firsts in "C" at the old West Coast F.F. Champs, and back-to-back wins in "C" at the first two U.S. Free Flight Champs. It also took back-to-back wins for the Northern California-Class "C" Trophy. I certainly hope that there are no Freudian implications in all this back-to-back business.



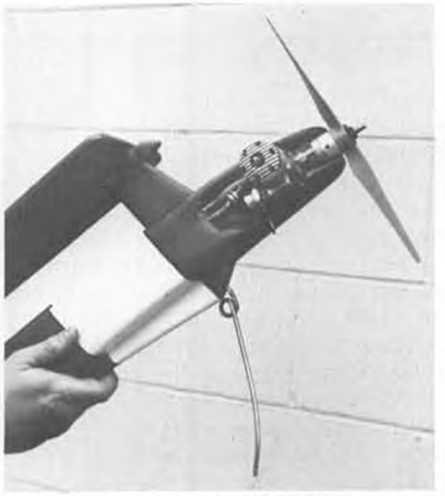
Tail surfaces of Hal Woods' GYSOB in DT position.

The model actually took shape while I was overseas in the middle sixties. We had little free flight activity, so I finally had time to fool around with various ideas. Up to that time, I had been a big stab freak. In fact, some of my models looked like they were flying backwards, and usually glided like an open foot-locker. I knew that there must be a better way, so I began reducing stab area. As I got below 30%, I started to note an exciting increase in total performance. All was not roses, however, because trim became different and somewhat more critical.

I found that the smaller stab models did not lend themselves to the right/left pattern I had been using, but required a right/right pattern to achieve full potential. All in all, I found that these compromises were well worth the increased time potential. After I settled in Sacramento, California, my brain-picking of Doug Galbreath, and a few

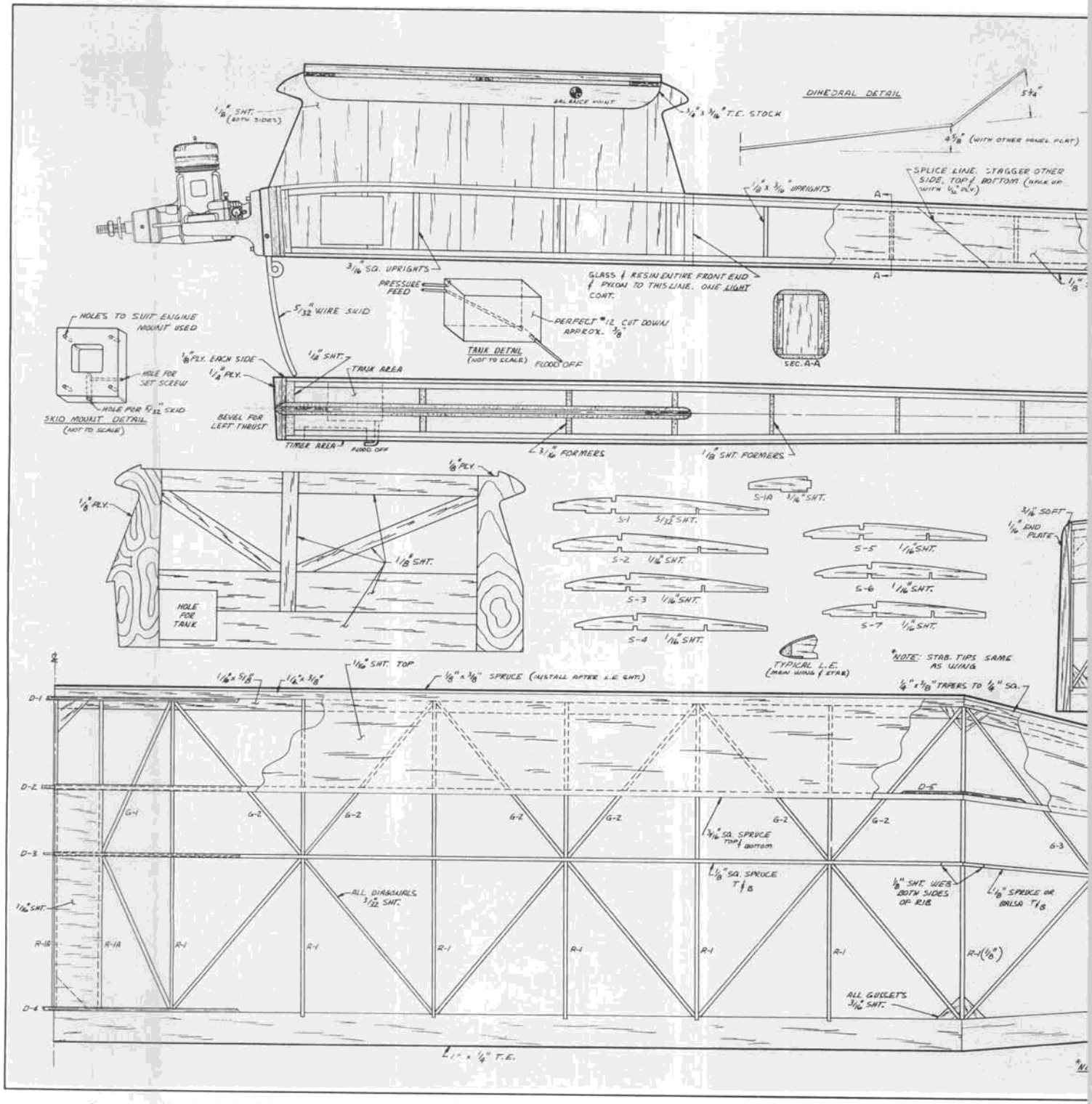


"Open Air" nose version, as shown on plans. Skid mounted in aluminum plate.



Timer side of cover model, with "Cosmetic" nose. A 1300 version is in the works for 'D'.

Engine side of Hal Woods' cowled version. Final version has shorter fore and aft moments.



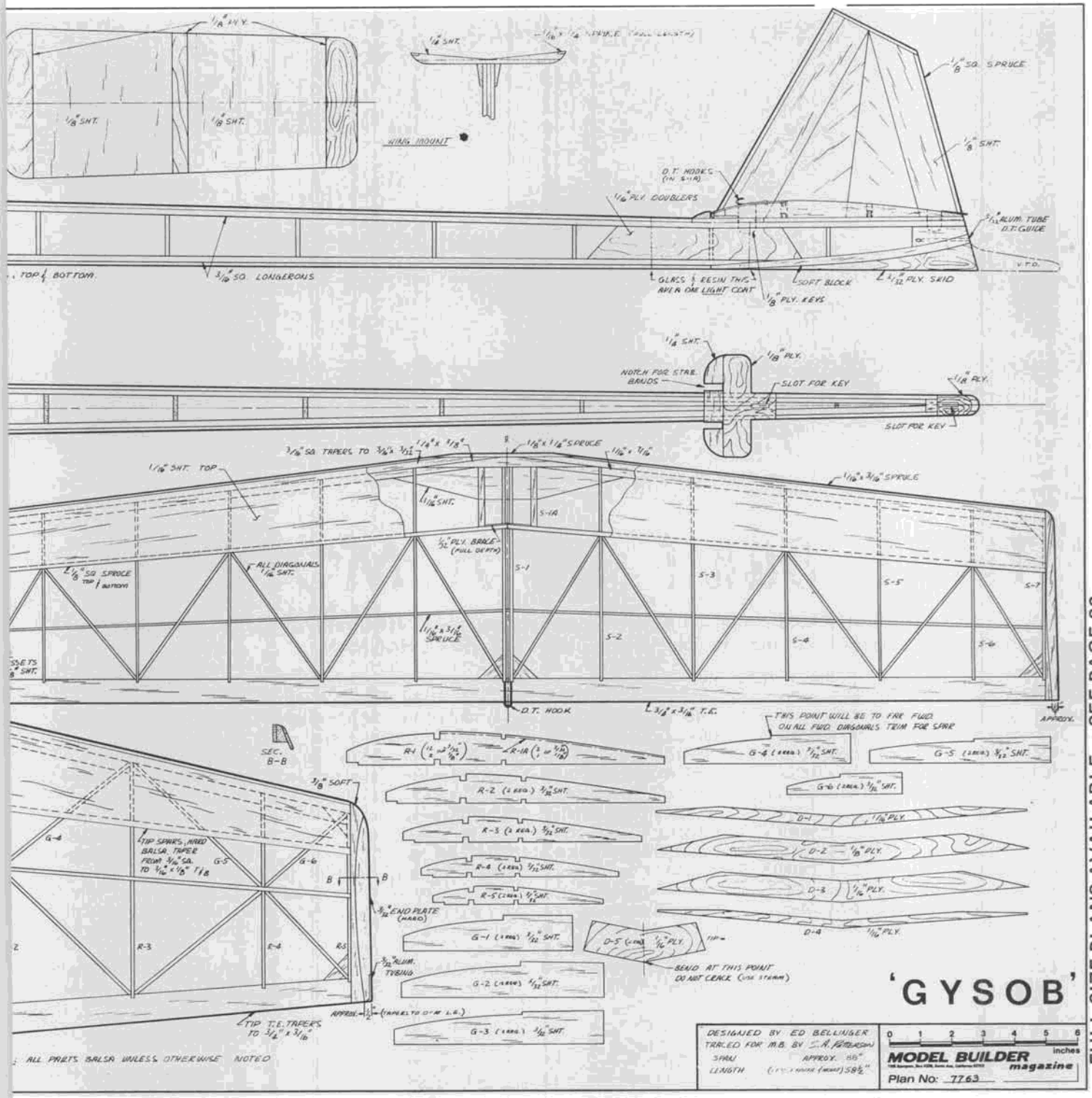
more changes, finally jelled into the present GYSOB.

Back in 1967, the 25% stab, really looked tiny on a "C" ship. The subsequent progression has been in that direction and now almost any really high performance model is of that general configuration. The GYSOB uses the old proven combination of left thrust, right tab and right glide to achieve its pattern and recovery without the use of gadgets. I don't know who originally came up with this trim method, but as far as I am concerned, it reached its final development in the "HI-FAIs" and "Orbiteers" of Galbreath and Cherny. I greatly profited from their acquaintance.

With this trim, the left thrust controls the initial climb, the right tab the final portion of the climb, with the two forces giving a good recovery down to even a five-second run. The left thrust may look excessive, but it is absolutely essential to a good recovery. Most recovery difficulties can be traced to a lack of left thrust.

There have been some recent GYSOBs built with auto-rudder, including a particularly impressive one by Doug Galbreath. I do not utilize one, because I am so used to the model and to the trim method I use. I will admit, however, that the auto-rudder makes for somewhat more flexibility of trim. If you do not have considerable experience, I would suggest that you consider the addition of auto-rudder. All you need do is add a tubing guide just forward to the stab platform and run the auto-rudder line over the top of the stab.

There also have been several aft-rudder versions flown, the most notable being John Warren's former record holder. With an aft-rudder, auto-rudder is necessary because you will lose all of the left thrust. If you go this route,



what the heck, let it all hang out and also add auto-stab as John Warren did. As for myself, I don't like the long fuselage demanded by an aft-rudder, and probably couldn't remember to hook up all that stuff.

The plans are quite comprehensive, and since you should have adequate experience before building a model of this type, I see no reason to go into a "Glue part A to part B" type article. I would rather utilize the space for trimming instructions, so my construction advice is to use good wood, and build the fuselage straight.

I do want to go into covering materials, first to warn you to avoid the heat-shrink plastics like the plague. I can guarantee continual trimming and adjustment problems with their use. I prefer silk, primarily for cosmetic reasons, but double tissue is every bit as satisfactory. Good silk is expensive and difficult to obtain, but regardless of what you may believe, *properly* sealed silk is *lighter* than double tissue or plastic.

The only problem is that there is only *one* way to seal silk to achieve maximum lightness and rigidity. I've used every method known to man: spray starch, upside down application, strong drink and prayer. *All* are unsatisfactory. The only way to go is to thin the dope approximately 80% (20% dope, 80% thinner), and use at least a one-inch brush. This thin solution will not run, but will film on the surface. After about four applications, you'll probably give up in disgust because you'll notice absolutely nothing happening. Go inside, read some spiritual literature and persevere. After a couple more applications, you will notice a thin film forming. Thicken the dope slightly and continue until it appears to be just about completely sealed. Now go to a

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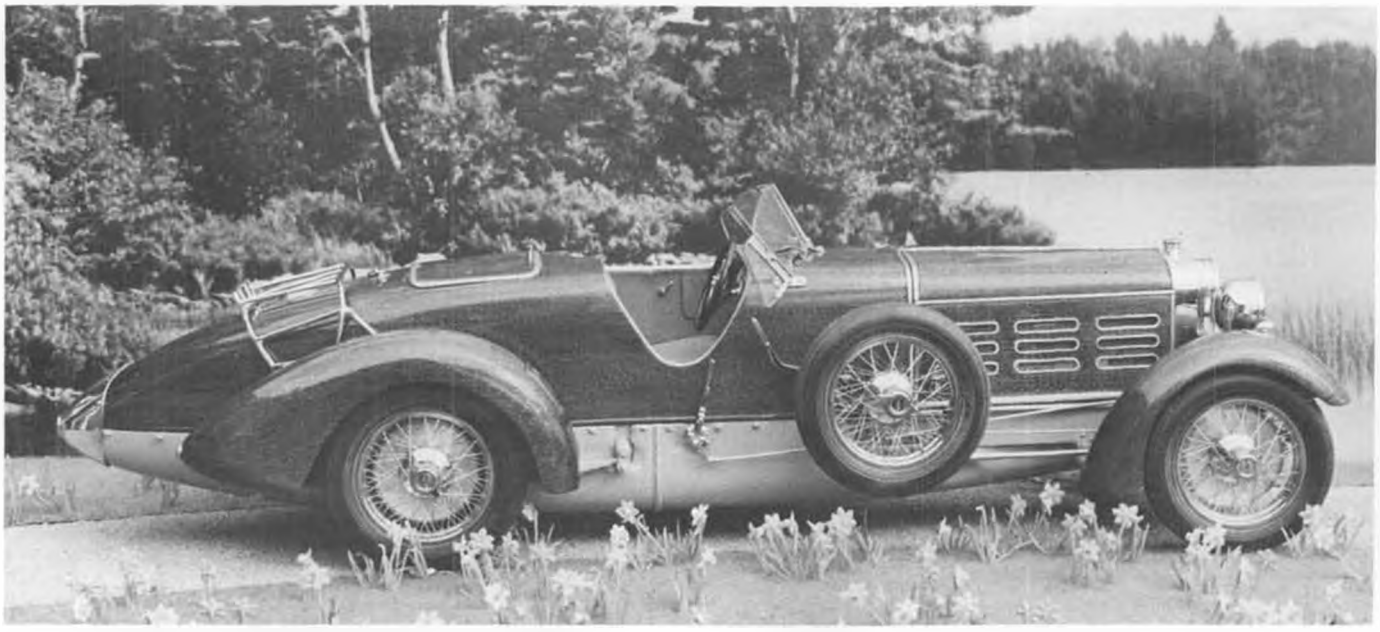


This 1/15 scale 1924 (Tulip wood) Hispano Suiza is fully planked and fitted with over 13,000 brass pins .012 " dia., also full engine detail. The doors open and the door latches operate.

"THAT *Can't* BE A MODEL!"

How do you distinguish a *hobby* modeler from a *professional* modeler? If you can't tell after a glance at the photographs, the custodian of our "Hangar" will explain . . . By BILL HANNAN.

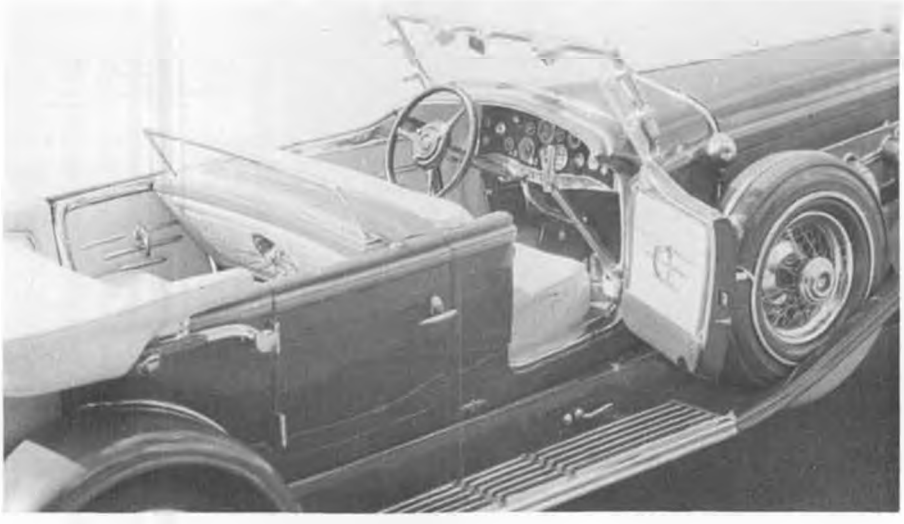
• The vast majority of the world's model builders are amateurs, who pursue their hobby strictly for personal pleasure, rather than monetary motivation. And, while many are quite dedicated and skillful, few would ever set out to earn a living by sale of their products.

Successful professional model builders are few and far between. Although examples of their work often appear in museums, little is published about the people who create them or their methods of operation. During a trip to England, your author and J.D. Gillies had the rare opportunity to interview a man who *does* earn his living building models, and has an enviable reputation internationally. Thanks to Ron Moulton, Editor of Scale Models magazine, an appointment was arranged to meet Gerald Wingrove, master modeler.

Arriving at Wingrove's home, we were escorted to the living room, where Mrs. Wingrove served delightful refreshments. After a brief discussion, we were ushered to the rear of the residence where the workshop is located. To my delight, I was invited to take a seat at the workbench . . . literally the master's chair! We were then shown dozens of model and components, and our many questions were freely answered.

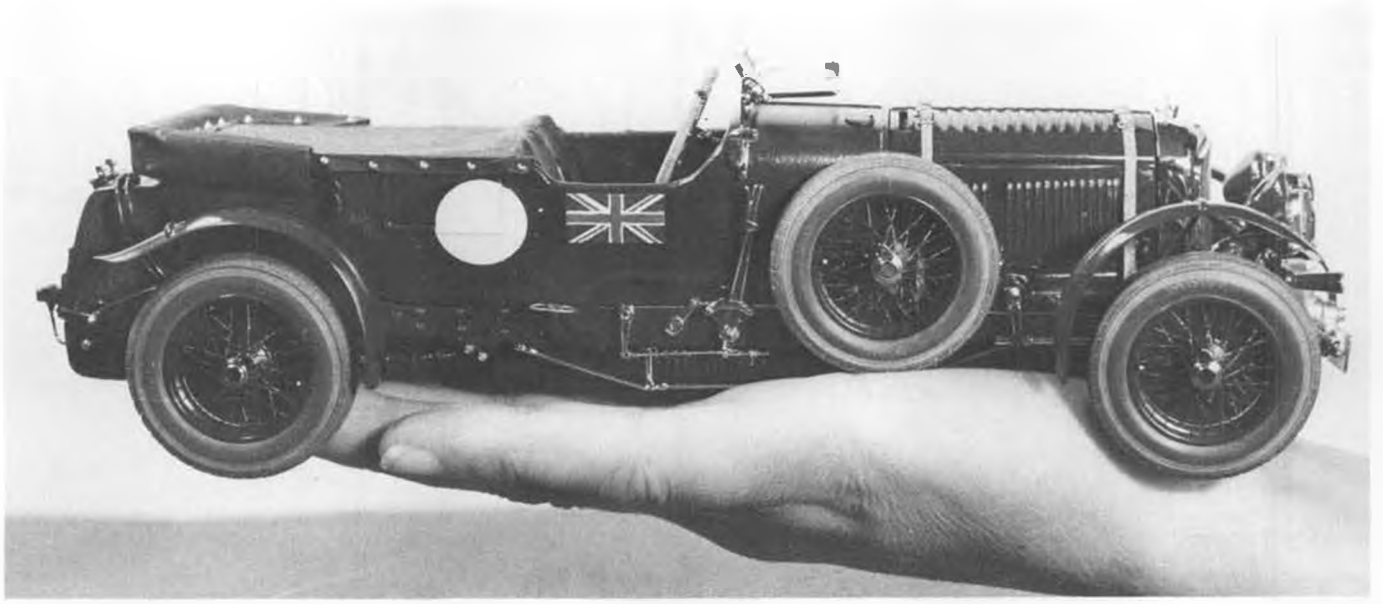
Wingrove describes himself as a Model Engineer, which seems quite an understatement. Perhaps "Genius at producing miniatures" would be more accurate terminology! Having spent many years as a machinist has developed a sense of analytical thinking and appreciation for precision in Wingrove that places him in an almost unique position. His approach to modeling differs in both obvious and subtle respects, compared to the average "razar-blade carpenter". First and foremost, he is a professional, and *must* think in terms of efficiency and absolutely top quality. He simply cannot afford the casual, just-for-fun attitude of most amateurs.

Wingrove has this basic philosophy: "If it has been made in the first place, it



Close-up of Duesenberg "J", showing uncanny realism and detail. Instruments can be read with a magnifying glass. Scale is 1/15.

With latches released, and hood raised you can see the detailed Hispano Suiza engine.



This 1/20 scale, 1929 Blower Bentley fits in the palm of the hand. With all that delicate detail, one wonders how it can be picked up! If you're a sports and classic car buff, you'll have no trouble guessing the color of this gem . . . BRG, of course!

can be made again." He feels size is a secondary factor, and given enough time, anything is possible. Having made that point, he went on to explain his modus operandi: "I reduce everything to basics. Cubes, spheres, and cones, for example. Almost everything can be reproduced on a lathe or milling machine. I analyze everything carefully, until it fits in a mental box "A", "B", "C" or "D". That is to say, every modeling problem has a simple solution. Answers to one model's challenges can be reapplied to subsequent models, but improved."

During this conversation, Wingrove underlined his thinking by showing us actual examples of hardware, including tiny steering boxes, cylinder heads, spoked wheels, etc. He even showed us the molds with which he produces his own rubber tires, accurate right down to the lettering on the sidewalls. Since the majority of his projects are turned out in quantities of several, it is possible to spread the time investment required for special molds, jigs, and fixtures. Then too, if any replacement parts or repairs are required by customers, he can readily reproduce the needed components.

Wingrove takes orders and delivers finished models in person, even when travel to distant foreign locations is involved. And, where possible, he conducts his own research on a first-hand basis. This often entails additional travel, in order to examine, measure, and photograph the full-size prototype. Following the gathering of information, he produces his own working drawings, and studies photographs in order to thoroughly absorb the character of every part, long before starting actual fabrication.

He relies quite heavily on the use of castings, which offers a logical way of producing more than one of each component, and helps assure uniformity. Thus, the creation of patterns is often the first stage in starting a new project, after research has been completed.

Wingrove prefers to fasten parts together mechanically when possible, rather than to rely upon adhesives, and in many cases, components are secured with threads in the manner of the full-size originals, and may be easily disassembled. The final finish on such parts is frequently plating, one of the few operations entrusted to an outside subcontractor firm.

Wingrove's products include miniature cars, ships, aircraft and dioramas . . . virtually the entire spectrum of modeling possibilities. One impressive example of miniturization was a horse and wagon which could perch neatly upon his wife's thumbnail! Doubtless

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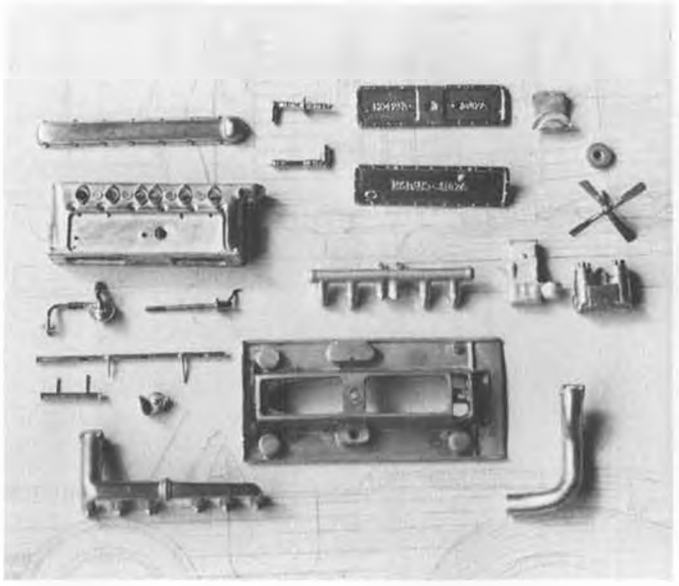
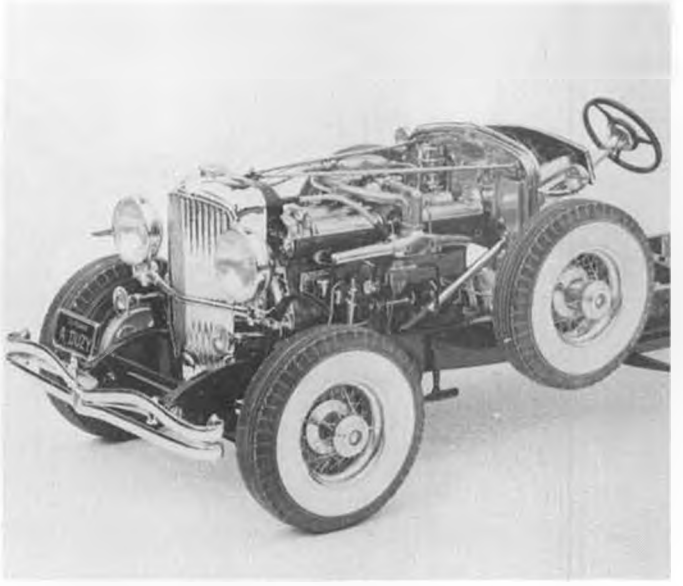


Some metal parts of the Hispano Suiza engine . Many parts are from castings, and where possible, are assembled mechanically, not glue.



Engine detail in this 1/15 scale 1933 SJ Duesenberg boggles the imagination! Note ecology-minded California license plate "A DUZY."

Beautiful rubber powered BFW Messerschmitt M23b, by Bill Noonan, San Diego, California. Span is 39 inches. This particular aircraft was flown by aerobatic champion Wily Stor, and equipped with an inverted Argus engine. Bill's plans will be published in a future MB.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• I want to thank all of you who have taken the time to write, send in pictures, and/or make helpful suggestions. These are all greatly appreciated, and I want to let you know that I will get around to answering your letters. I'm glad to see that there are numerous F/F scale modelers around the country.

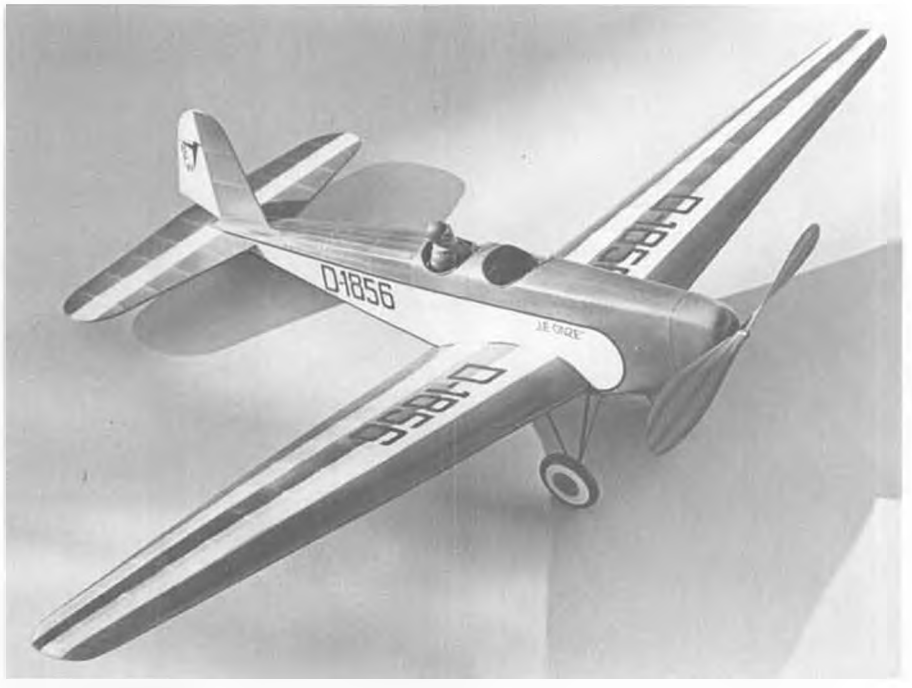
The Flightmasters held an all-electric contest during the last Sunday in April. It included both scale and non-scale F/F, R/C scale and pattern, and a special Jr. event for Mattel electric models. I have no intention of covering the contest per se, but rather to comment on some observations regarding electric powered models . . . scale in particular.

For motive power, there are basically two distinct choices a modeler can make. One is to use VL's planetary geared system, and the other is Astro Flight's non-geared 02 motor. At any rate, this is what is commonly found here in Southern California. Astro Flight's 02 motor swings a small propeller at very high RPM's, and most of the non-scale models used this set up. Incidently, most of the non-scale models were .020 replica old timers. About 70% of the scale models used VL motors, and with the gear set-up, they can swing a much larger prop. *(On the other hand, Bill Stroman's winning scale model, our construction feature last month, used an Astro 020. wcn)*

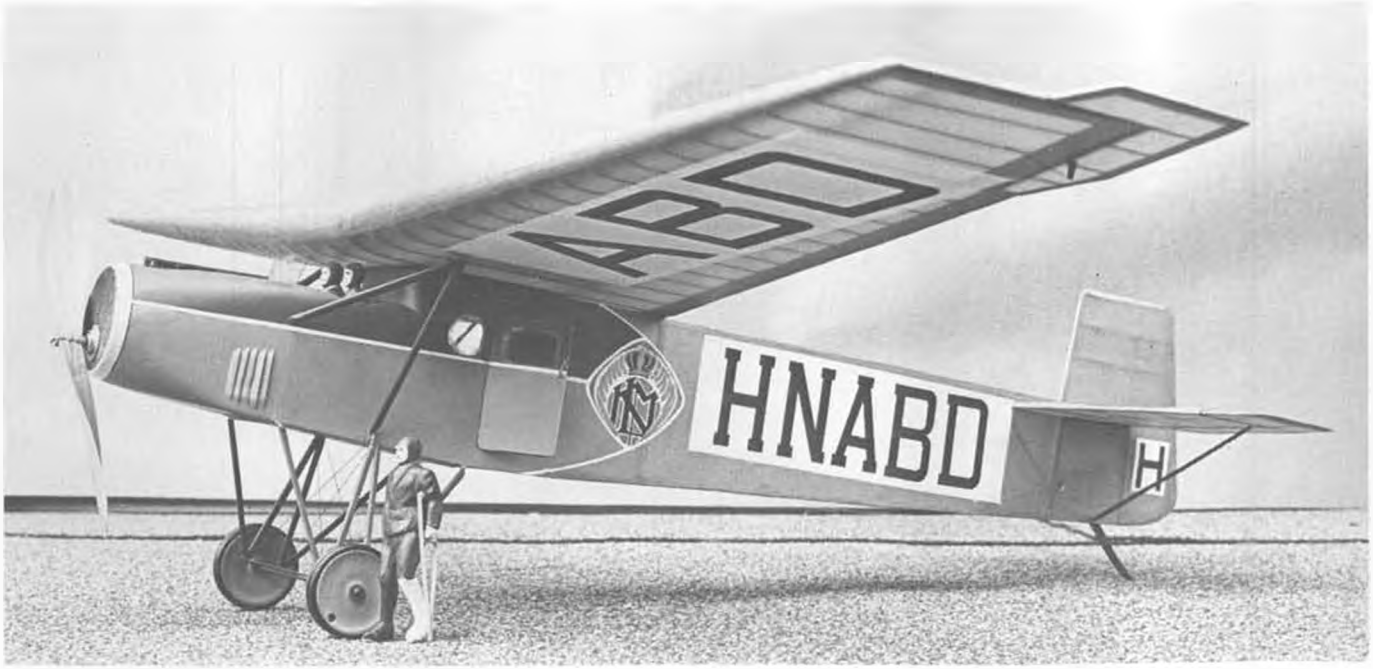
As I have reported in the past, the flight characteristics of electric powered scale models is still quite uncertain. Obviously, there are exceptions, but for the most part, the flight pattern for many of the models is still the same. That is, they will nearly always take-off in a most realistic manner then begin to circle in one direction. As the power begins to lessen (toward the end of the discharge), the model will then go into the opposite direction, usually resulting in a spiraling crash. Fortunately, the spiral is not too steep and very little damage is sustained to the model.

With the non-scale F/F's, a similar flight pattern occurs, but because the models are more stable than the scale models, the unwanted spiral does not occur. Instead, what happens is that under power, the model climbs like a conventional powered F/F into a climbing turn, then as the power diminishes, the motor goes into a sort of cruise, and during this portion of the flight, the model straightens out until the motor stops. At this point, the model goes into its normal gliding turns. Again, because of the extreme stability of the non-scale model (lots of dihedral or polyhedral, large stab, etc.), the cruise portion of the motor run has no real detrimental effect on the flight, other than to straighten it out. With a scale model, however, it's another story.

I have seen modelers trim their models to fly with the initial torque of the motor. The flight pattern under power is satisfactory, but as the motor goes into cruise, the flight becomes erratic. Therefore, one can see a rudder getting tweaked, or a wing tipped being washed in or out, and other little adjustments, all trying to solve the mystery of electric scale flight. It would appear that trimming the model to fly in the same direction both under power and in the glide would be a possible solution. For some reason this doesn't always work out. How come? Gene Wallock, who won the non-scale event flying an .020 Ranger, talked about a possible solution to the inconsistency of the flight



Another view of the M23b Messerschmitt. It has excellent proportions for modeling. Bill Noonan has just recently come out of retirement from model building after 25 years!



Another Bill Noonan creation, this 35 inch span Fokker F-II, in KLM colors. In a pattern similar to many real modelers, Bill started with an available "O" ring size for the wheels, and scaled the airplane from that. All Noonan model photos taken by ace cameraman, John Oldenkamp.

pattern, that would occur with either power combination. The cruise portion of the powered flight could be eliminated, then perhaps the rest of the flight could be adjusted in the same manner one would do for a regular gas powered model. That is, adjust for the engine run and for the glide. So, perhaps it can then be assumed that by eliminating the cruise portion of the power run, the flight pattern will be more consistent.

There are two possible approaches to solving this problem. (There are possibly more, but we only discussed these two.) One is to use a timer with a micro switch which could cut the current to the motor. The biggest drawback that I see with this arrangement is that the battery discharge rate varies from flight to flight, regardless of charge time and rate. The reason is that when the batteries are repeatedly charged, they become very hot. This causes resistance, the results being that a longer motor run will occur with considerably less torque. Having interchangeable batteries would be nice, but expensive.

Close-up of Fokker reveals double-truck wheels, also "laminated" Peck-Polymers propeller. Radiator is brass filter screen, struts are hollow 3-ply Strathmore paper. Pilot is former skier!

Therefore, it may be difficult to set the timing to correspond to the peak RPM's of the electric motor as precisely as with a gas model. The best approach, in my opinion, is to use some kind of free-wheeling device similar to what which is being used for rubber powered models. There are several different free wheelers to choose from, but it has to be such that the prop will disengage when the peak power of the motor run is over.

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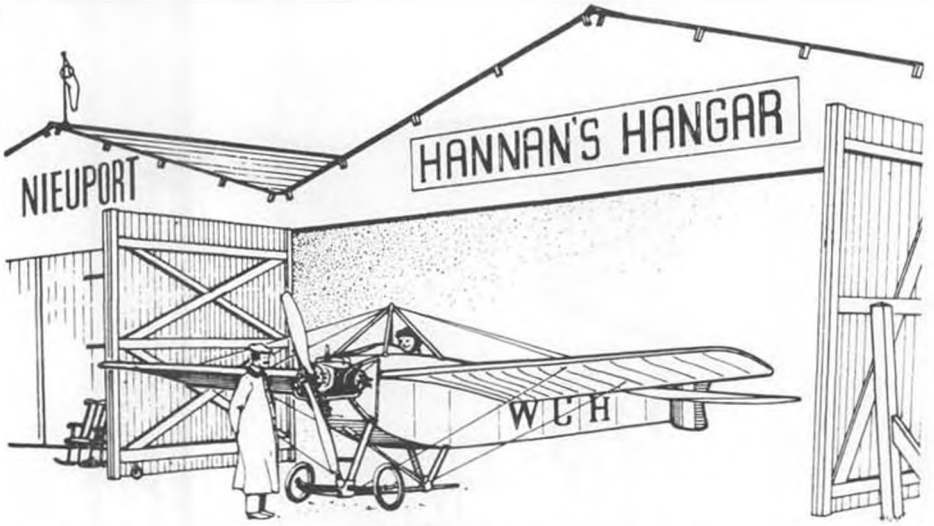
BE-2c powered by Mills 1.3 diesel, built by Dee Mathews, Greensburg, Kansas. Drawings from "Fighter Aircraft of 1914-1918 War."

George James built this Curtiss Navy Page Racer for Thompson Trophy races held by the Flightmasters.



"The toughest type of climbing is getting out of a rut."

Under the hat is Las Vegas modeler Bob Haight with his 18" span Breguet Laboratory Eiffle.

• Our lead-in line this month is another gem from the calendar of J.D. Gillies, and certainly applies to most of us. Getting into the mood to build, for example, involves overcoming a surprising amount of inertia. As a suggestion, attend a model contest! Even as a spectator, you will likely absorb enough enthusiasm (it's contagious) to start you on that new project.

ERRATA DEPARTMENT

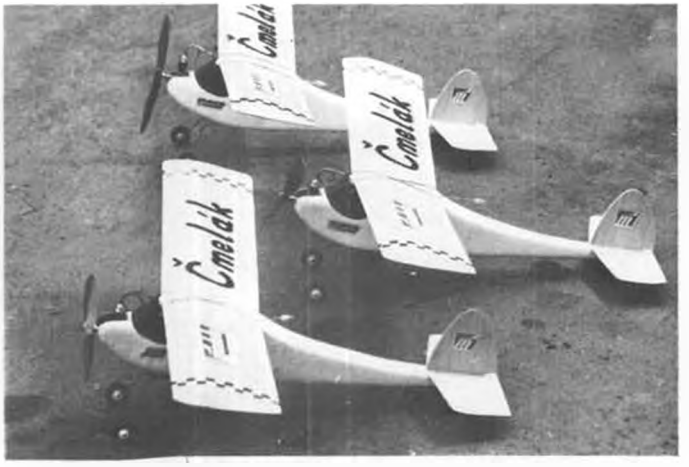
Seems that some gremlins, possibly surplus from WW II, found their way into our May column, and we'd like to try evicting them before we forget! First off, the Otto Lilienthal quote should have been credited to Taylor Collins, who unearthed it for us. Next, in the "PROLIFERATING PEANUTS" blurb, the sentence should have said: "And MODEL BUILDER centerfolds apparently are receiving recognition with similar enthusiasm *as* those of certain other X-rated publications." Makes a difference, doesn't it?

But most important, in our "SO YOU THINK YOU'VE GOT PROBLEMS?" sign-off paragraph, it turned out to be our "preef rooders" who had the difficulties, and we really owe Gloria Steinem an apology. A very important word was left on the cutting-room floor, totally altering the meaning of the quote. The correct quote is: "P.S. It

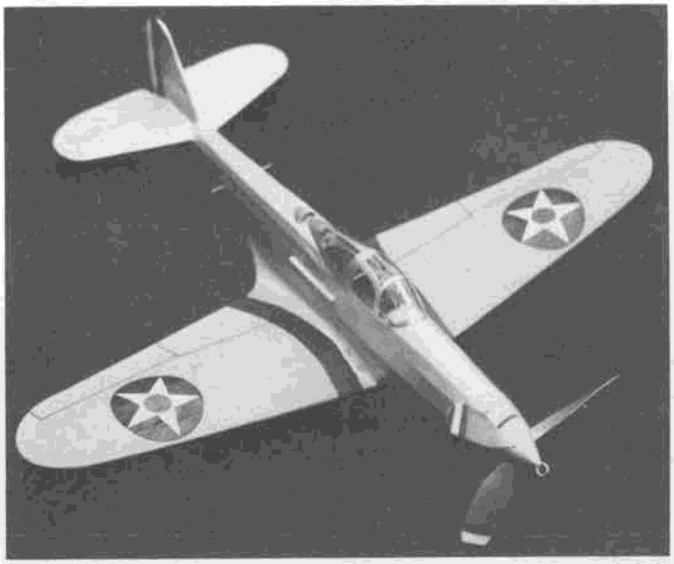
Continued on page 89

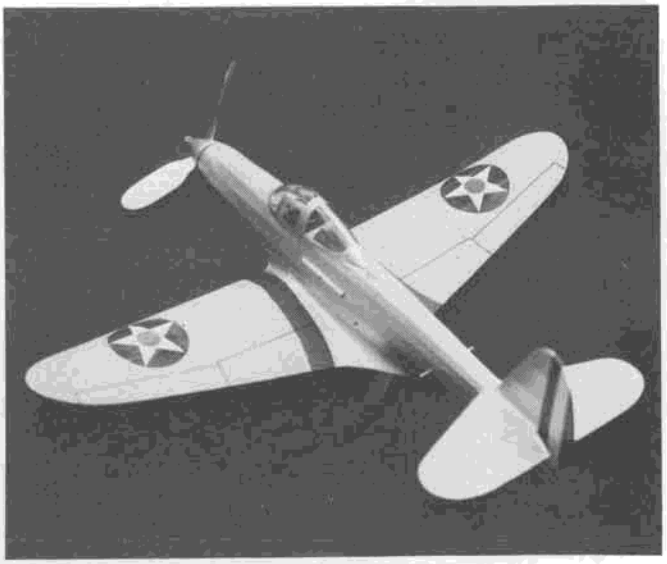
(l to r): Russ Barrera, Warren Shipp, Art Scholl (top aerobatic flier and former C/Ler), Bob Wisniewski, Bill Hannan, and co-pilot Granger Williams. Art's Lockheed to be used in movie about Amelia Earhart. Gang had just landed at Rialto Airport. Photo by Don McCawley.

Santos-Dumont 14 bis Peanut, by Fulton Hungerford. Has flown 59 secs. Similar model by Dr. John Martin has flown longer.



First photo of Czech "Bumble Bee" CO_2 powered models. Styrofoam fuse, balsa wing and tail. Span 27", Czech engine. Milan Kacha photo.





Peanut BELL XFL-1 AIRABONITA

By WALT MOONEY . . . One of the prettiest Peanuts ever presented, not only for the colorful markings, but also for its classic lines, made famous by its Air Force brother, the P-39 Airacobra.

• The XFL-1 Airabonita was developed along with the P-39 Airacobra to be the Navy version of the Army Air Corps XP-39 fighter. Because at that time, it was felt the tricycle landing gear was not suitable for operation from Navy carriers, the XFL-1 was fitted with two main wheels and a tail wheel. However, it failed its carrier qualification trials, because of landing gear troubles, and only one airplane was built.

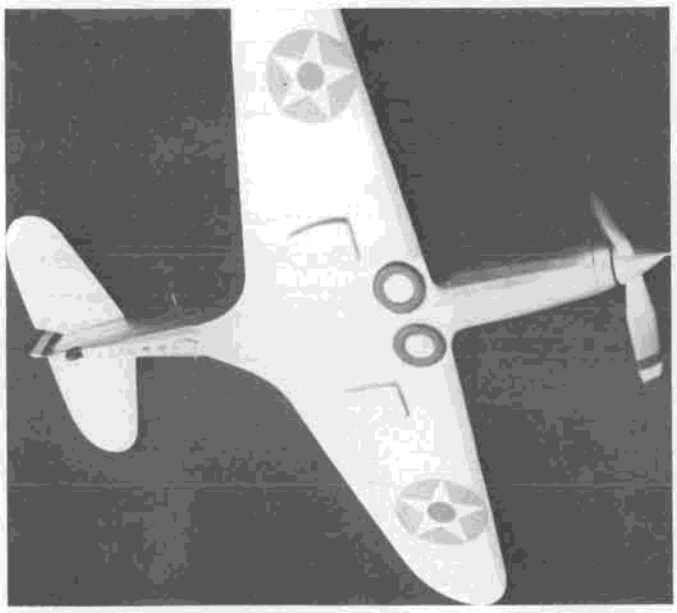
The XFL-1 is a very colorful WW-II aircraft for modeling. The upper surface and leading edges of the wings were yellow, with large red, white and blue U.S.A. insignia on top and bottom of each wing. The rudder had vertical blue, white, and red stripes, with the blue stripe nearest the hingeline. The rest of the airplane was finished with silver lacquer. The propeller had red, white, and blue stripes on its tips, red outermost. The graceful shape of the XFL-1 resembles the production P-39, except that the canopy is deeper (the same depth as the original XP-39). The air intake behind the canopy is smaller, and the radiators were not mounted in the leading edges, where the landing gear retracted, but under each wing. The vertical tail was redesigned and is a taller, higher aspect ratio surface on the Airabonita.

The model shown in the photos was built with the landing gear retracted and looks great in flight. The long nose enables it to carry a longer rubber motor. The wheels, when retracted, were uncovered, and could therefore be seen. The original model was tail heavy, and required nose ballast for flight. Therefore, although the plans don't show it, if desired, you can fill in between the stringers for the first two bays of the nose with little penalty.

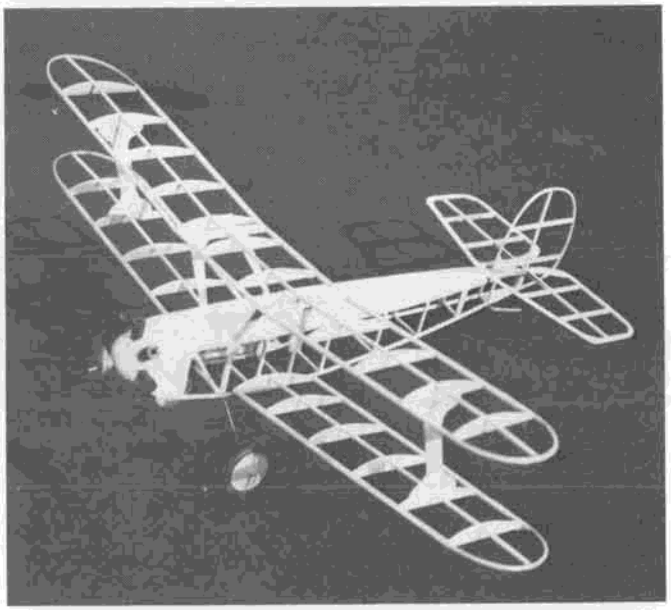
The method used to build this model is the keel and former method, and is used because of the elliptical cross-section of the fuselage. The wing uses sliced ribs and an internal main spar. However, because this size model sometimes suffers from laminar airflow separation and requires turbulation, three upper surface spars made from .020 by one-sixteenth basswood were used. No notches were made in the ribs, the turbulator spars were just added on top.

The tail can be built flat and left that way if desired, or upper and lower

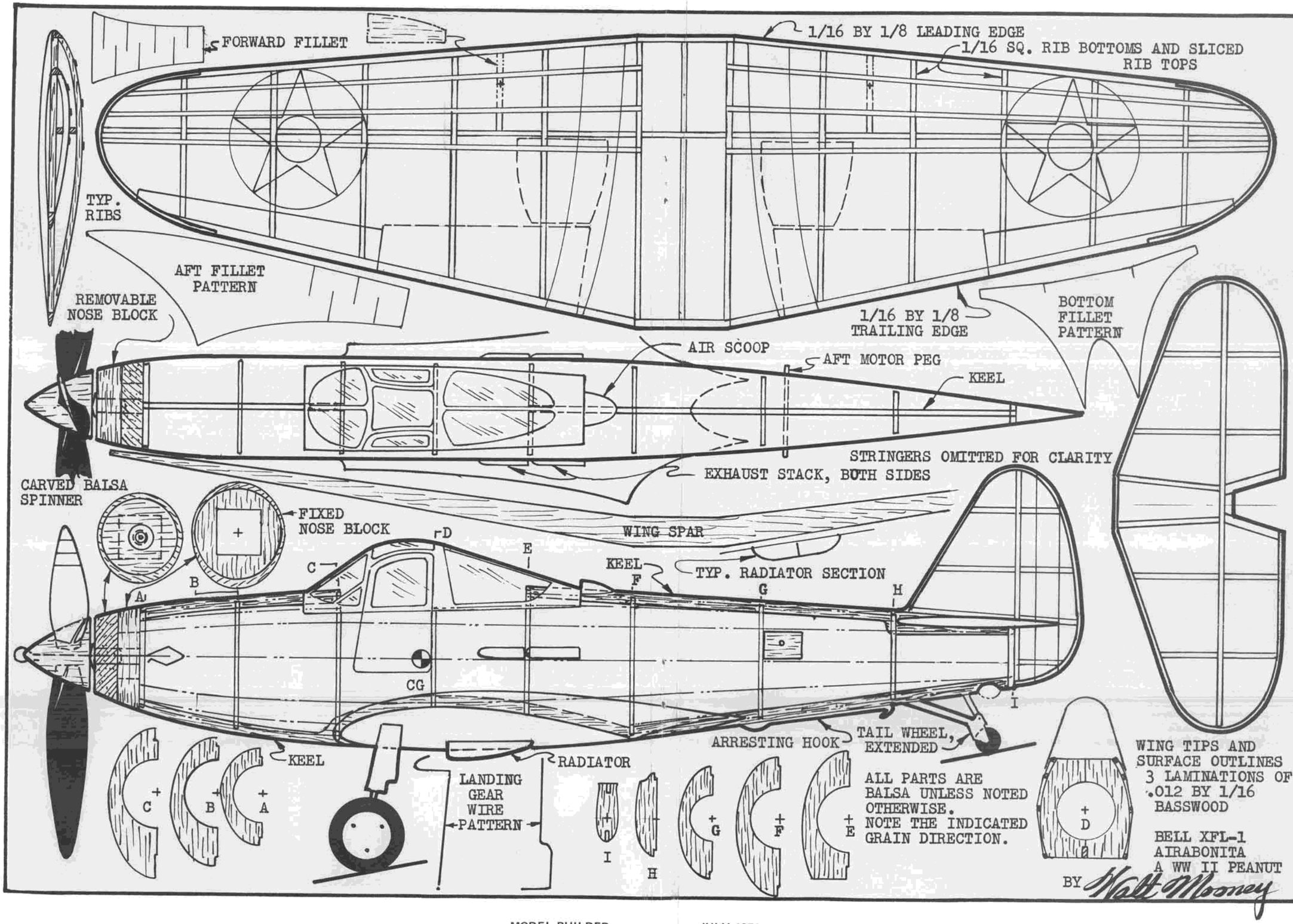
Continued on page 62



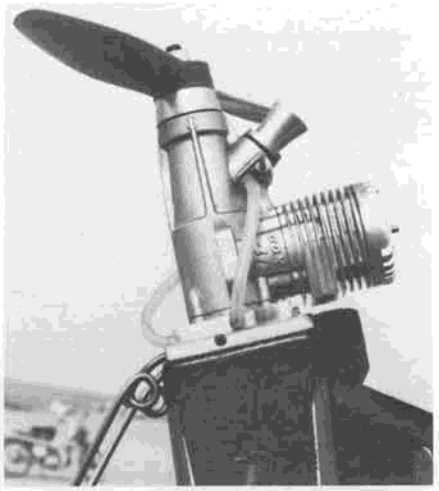
Ship was built in wheels-up configuration in order to improve flight characteristics. It did 18 seconds in 25 ft. ceiling gym. Very smooth.



A future Peanut project, Ernst Udet's Flamingo. Scaled up to R/C size, this should make an excellent Sport Biplane competitor.


FORWARD FILLET
1/16 BY 1/8 LEADING EDGE
1/16 SQ. RIB BOTTOMS AND SLICED RIB TOPS
TYP. RIBS
AFT FILLET PATTERN
REMOVABLE NOSE BLOCK
1/16 BY 1/8 TRAILING EDGE
BOTTOM FILLET PATTERN
AIR SCOOP
AFT MOTOR PEG
KEEL
STRINGERS OMITTED FOR CLARITY
EXHAUST STACK, BOTH SIDES
CARVED BALSA SPINNER
FIXED NOSE BLOCK
WING SPAR
TYP. RADIATOR SECTION
CG
ARRESTING HOOK
TAIL WHEEL, EXTENDED
KEEL
RADIATOR
LANDING GEAR WIRE PATTERN
ALL PARTS ARE BALSA UNLESS NOTED OTHERWISE.
NOTE THE INDICATED GRAIN DIRECTION.
WING TIPS AND SURFACE OUTLINES
3 LAMINATIONS OF .012 BY 1/16 BASSWOOD
BELL XFL-1
AIRABONITA
A WW II PEANUT
BY Walt Mooney

Doug Galbreath launches his GYSOB for the next-to-last of a string of maxes that netted a new Class C record, not counting first 3 that were VTO. Cox 40 power. Ken Oliver times at '76 NFFC.



The Cox .40 in Galbreath's record setting GYSOB (see page 39). Note exhaust deflector.

FREE FLIGHT

By BOB STALICK

• I can tell it's summer! The birds are chirping. The hay fever victims are sneezing. Modelers are out in the fields testing their latest creations . . . well some of them are. Not me! I'm sitting in the house on this fine Saturday afternoon finishing up the July column for good ol' Bill. Such dedication. Such professionalism! *(Hmmm. Only ONE Saturday a month? wcn)* These are comments which might come to your mind. Some others might also appear there, such as: how stupid, but let's not get into that. Instead, let's get into what's happening in Free Flight.

MYSTERY MODEL

After springing a few patsies on you in the past several months, I thought it apropos to come out with another obscure one. After all, I really didn't expect to trap too many with Blanchard's "Gawn" or Reich's Wakefield. Too simple. This month is different. It's a ½A model . . . so it can't be too old can it? It's no spring chicken either.

If you've got an inkling . . . or even the right answer, send it off to Bill Northrop, c/o MODEL BUILDER.

DARNED GOOD AIRFOIL—Davis A

The Davis is one quite often overlooked in this era of "Twiggy" style sections. It is, after all, quite thick, but it has a couple of good features which should be looked at. For one, it has a rounded leading edge, which serves it well when or if it is ever upset. Stall recovery characteristics are good with this one. For another, it has . . . because of thickness . . . more room to place spars and other supportive kinds of structure, which in turn makes it more resistant to warpage. It can be built more sturdily.

So, if you are looking for a good section for all weather characteristics, where wing strength could otherwise be a problem, try the Davis. A/1 and low A/R A/2 gliders come to mind as possibilities. Cargo or similar events needing high-lift airfoils would also be worthwhile considerations.

THREE VIEW FOR JULY—FASTROD

This ½A model design is submitted to illustrate the article which appears elsewhere in this column entitled, "Design your own Gas Model." The "Fast Rod" is a basic ½A contest machine designed to build fast and fly fast. Since the basic outline and moment arms are swiped directly from Ron St.Jean's "Ram Rod" of two decades ago, it was necessary to pay some homage to this lineage.

All construction is basic. Rectangular wing and stab, using multispars, provides adequate strength with lightness. False ribs along the leading edge maintain the airfoil section, which is a 9% Ram Rod (flatbottom). The stab has been thinned down to a 6.5% thick airfoil to make it less critical. The fuselage is built Starduster style . . . on the work bench with the engine mounted on a plywood crutch that is epoxied to the spruce (1/8 x 1/4) leading edge of the pylon. The latter is built-up and sheeted on each side with 1/16 contest balsa. The front of the fuselage has 3/16 doublers on either side back to the pylon mid-point, so that the timer can be mounted and a ½ oz. perfect rectank can be installed. The tank has been modified to take engine pressure from the Kustom Kraftsmanship modified T.D. 049. The wing mount on top of the pylon is of 1/16 plywood bent to the shape of the dihedral. A matching 1/16 balsa sheet is glued into the wing center section on the bottom just behind the leading edge.

At 6 oz., the model is light and very fast. Using the wash-in in the right wing panel, it corkscrews up very high in the 9 seconds we now have for Cat. II contests. Glide is excellent due to the weight, and this model, like its Ram Rod ancestors, seems to have an instinctive way of gliding into lift.

If you've run out of contest ships for ½A, the Fast Rod can be built in less than a week of evenings, including Japanese tissue covering and 5 coats of clear . . . provided you use Hot Stuff or similar kinds of fast-curing adhesives. It may not be pretty or very esoteric, but

"Uncle Sal's Flying Circus" took the team trophy at the NFFC in Taft. (l to r): Sal Taibi, Bob White, and Lee Hines, of the team, and Contest Manager, Jim Scarborough.

From out of the past! Ed Lidgard, at the big Taft bash, with gadget maker Jim Crocket.

when it's over head, circling in a fast thermal, who cares!

LETTERS

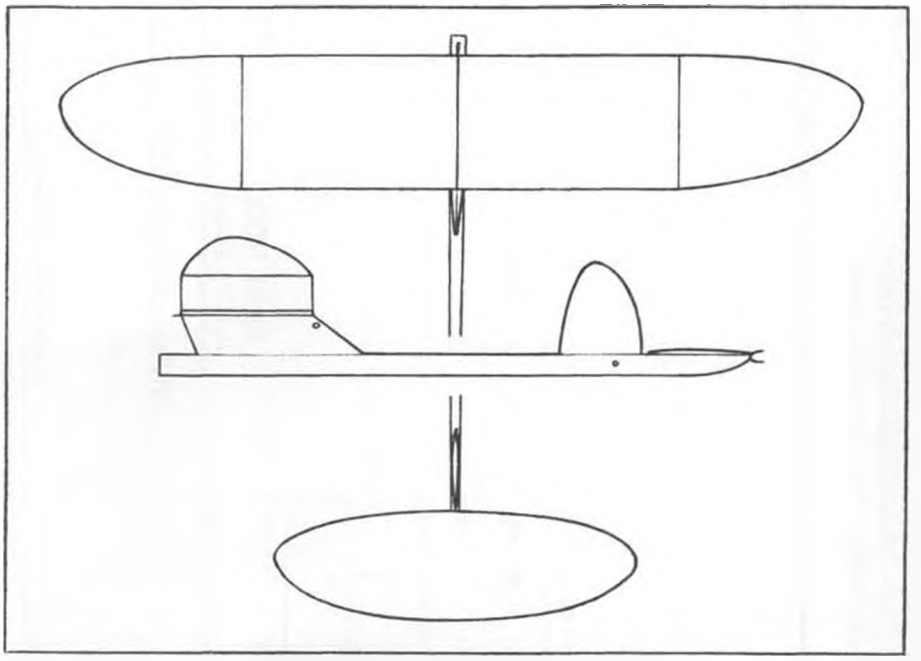
Got a nice missive from Bill Chennault, designer of the Mini-Pearl, just a few days ago, and Bill says, "I'm going to shorten my fuselage, put the rudder on top of the stab, try a few different airfoils, and have some fun."

He continues, "Ever heard of a short beer? Well, my Mini-Pearl was named after Texas Pearl beer, so I guess this try will be a Short Pearl. Sorry, it will probably look like a TEX-ASSN. design. There is also a Lite Pearl beer here . . . so it may be called 'Short Lite Pearl,' or how about one that's now kitted and called the Hydrostar."

Bill is a man who enjoys many things in life . . . including naming model airplanes, but among those things he enjoys is the building of simple and excellent flying models. There is not much arguing with the success of the entire Pearl series.

GOOD TIPS . . . Engine Cleaner

From the pages of the SCIFS "Flightplug," editor "Brick" Brickner, comes news that for cleaning engines, Strip-Sol, is hard to beat. It is a solvent engineered to remove inorganic materials from most any surface. It comes in a 16 oz. spray can and will remove the hardest varnish and crud from any engine. It was discovered in a Standard Brands paint store and will work on any material except plastics. Just spray it on, let it set for 3 to 10 minutes, and rinse off with water. Before reassembling the engine, spray parts liberally with WD-40 to prevent rust on steel parts. It really shines aluminum and brass and spray helps to reach those corners and inside spots that are impossible to scrape. Made by Surfonic Engineers, 785 S. 950 W. Woods Cross, Utah. 84087. It sells for $2.79 per can.



MYSTERY MODEL FOR JULY

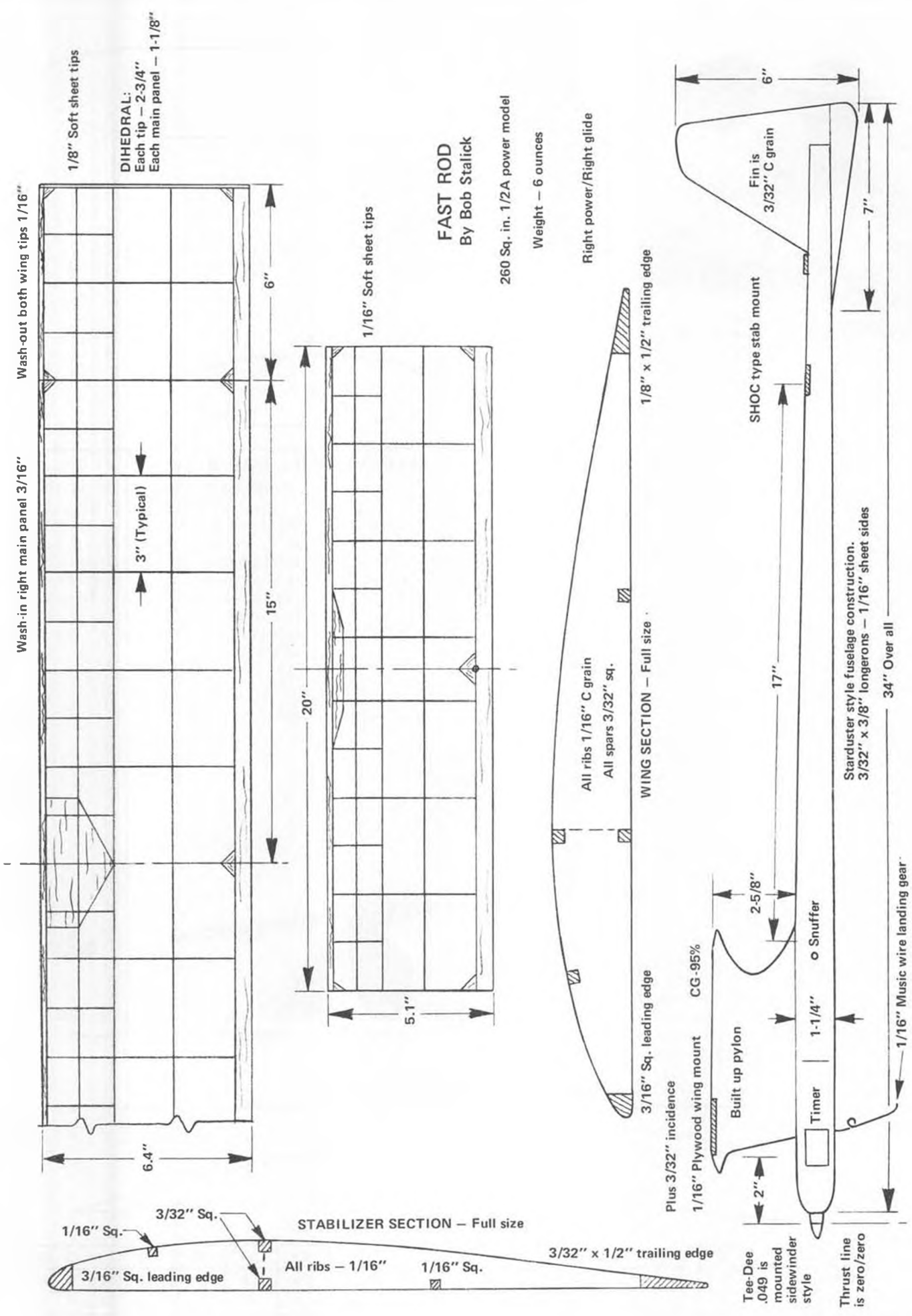
UPCOMING CONTESTS OF NOTE

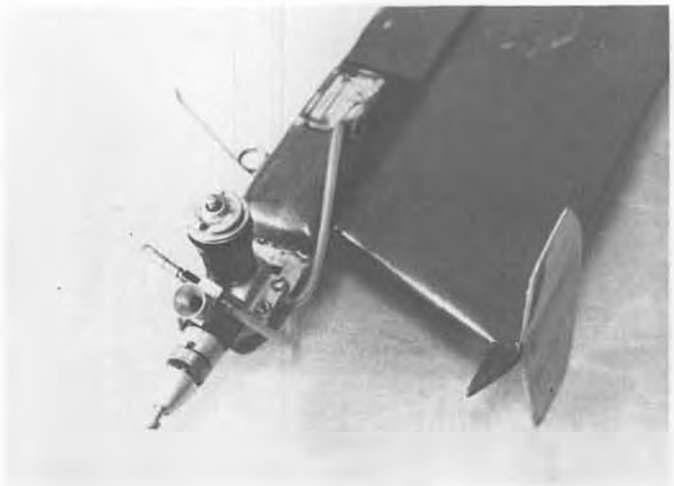
With the USFFC now history, and the Nats a month away, it is time to promote the Bicentennial edition of the Boeing Management Association's Annual Scholarship Contest for modelers not yet 19 years of age. Some changes have been made in the events to be offered this year, but generally, it's the same as in years past.

Photo sent in by Dave Linstrum of his Union Jack Rabbit design. This one built by Alex Cameron, of England.

DARNED GOOD AIRFOIL – DAVIS A

STATION	0	1.25	2.5	5	10	20	30	40	50	60	70	80	90	100
UPPER	0	2.1	3	4.5	6.3	8.7	10	10.3	9.9	8.8	7.4	5.5	2.9	0
LOWER	0	-0.7	-0.8	-0.9	-0.8	0	0.8	1.4	1.8	2	1.9	1.5	0.9	0


FAST ROD
By Bob Stalick
260 Sq. in. 1/2A power model
Weight – 6 ounces
Right power/Right glide
1/8" Soft sheet tips
DIHEDRAL:
Each tip – 2-3/4"
Each main panel – 1-1/8"
Wash-out both wing tips 1/16"
Wash-in right main panel 3/16"
3" (Typical)
15"
6"
6.4"
1/16" Soft sheet tips
20"
5.1"
All ribs 1/16" C grain
All spars 3/32" sq.
WING SECTION – Full size
1/8" x 1/2" trailing edge
3/16" Sq. leading edge
Plus 3/32" incidence
1/16" Plywood wing mount
CG-95%
Built up pylon
2-5/8"
17"
o Snuffer
Timer
1-1/4"
SHOC type stab mount
Fin is
3/32" C grain
6"
7"
Starduster style fuselage construction.
3/32" x 3/8" longerons – 1/16" sheet sides
34" Over all
1/16" Music wire landing gear
2"
Tee-Dee
.049 is
mounted
sidewinder
style
Thrust line
is zero/zero
STABILIZER SECTION – Full size
1/16" Sq.
3/32" Sq.
3/16" Sq. leading edge
All ribs – 1/16"
1/16" Sq.
3/32" x 1/2" trailing edge



Side view of Fast Rod, showing pressure tap from mounting lug of .049 Tee Dee, as described in text. It's an easy one to make!

"Other" side of Fast Rod, showing timer installation and wing mount.

Event Schedule:
Free Flight:
- ½A Gas
- Unlimited Rubber
- Hand Launch Glider
- Outdoor Peanut Scale
- Towline Glider
- Indoor Easy B
- Indoor Hand Launch Glider

Control Line:
- 1/2A Profile Proto Speed
- Control Line Scale Racing
- Stunt
- Profile Navy Carrier
- Slow Combat

Specialty:
- Rocket Streamer Duration No. 1
- Rocket Parachute Duration No. 1
- Rocket Sparrow Boost Glider
- Design Craftsmanship

The contest is scheduled for July 10 and 11, at the Kent Space Center in Kent, Washington. There are four prizes beginning with a $1500 first place scholarship, $1000 second, $500 for third, and $250 for fourth.

The BMA will even provide a weekend away from home for young modelers who do not have their parents coming to the meet with them. Additional information can be obtained by writing to Ted Caputo, ORGN 4-1830, c/o The Boeing Management Assn., P.O. Box 3707, Seattle, Wash. 98124.

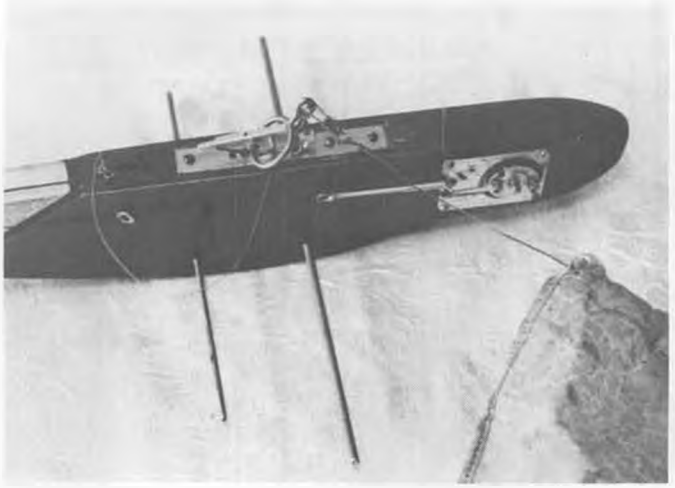
ADDING CIRCLE TOW TO THE SIMPLEX A/2

In the May issue of MODEL BUILDER, a construction feature appeared about the Simplex A/2 glider. Since the article was submitted, another Simplex has been completed with the installation of a Hatschek-style circle towhook. The hook was ordered from Jim Crockett Replicas, 1442 N. Fruit Ave., Fresno, CA. 93728. The installation was very smooth and the functioning of the hook is excellent. See the pictures accompanying this article showing how the hook is mounted. The only interior modifications were to move the front fuselage upright (the one directly in front of the towhook) further forward and to build a weight box in the fuselage center section directly above the hook location. The auto-rudder set up is almost identical to the directions which come with the towhook.

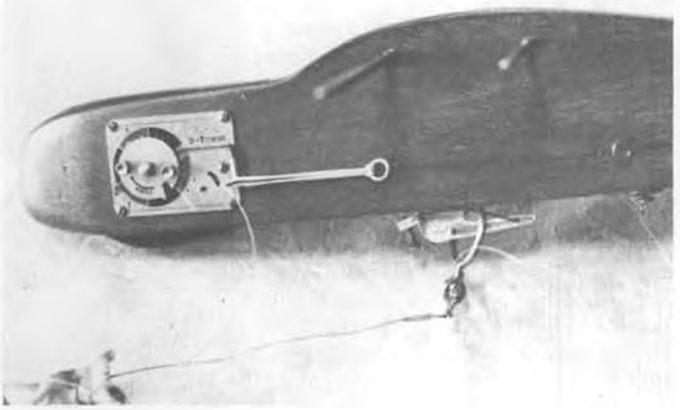
One important note: Be certain that the wing has the spar doublers installed, and as an extra precaution, it would not hurt to put 1/16 sheet webs between the upper and lower main

Continued on page 76

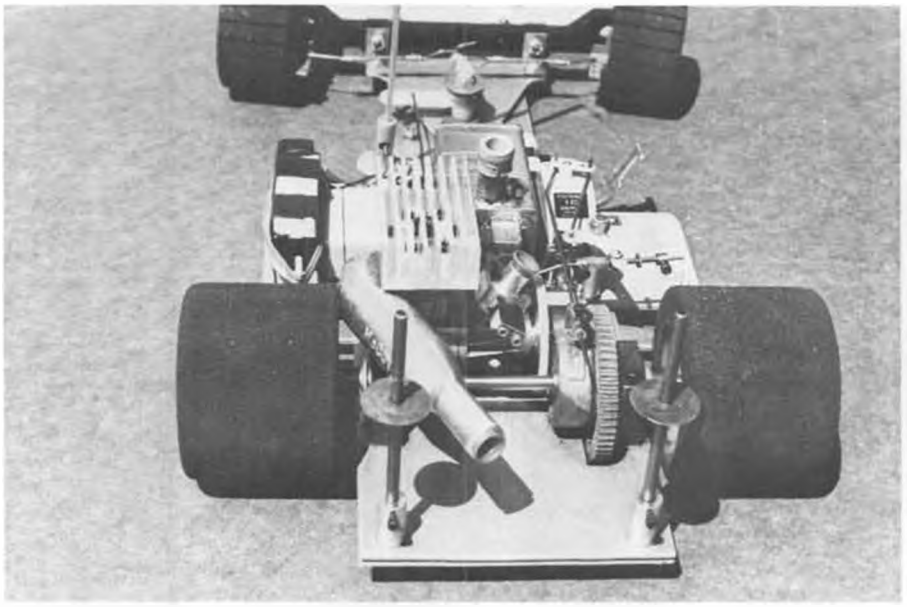
When a "twister" hits the famous Kitty Litter plant at Taft, its shape is well depicted!



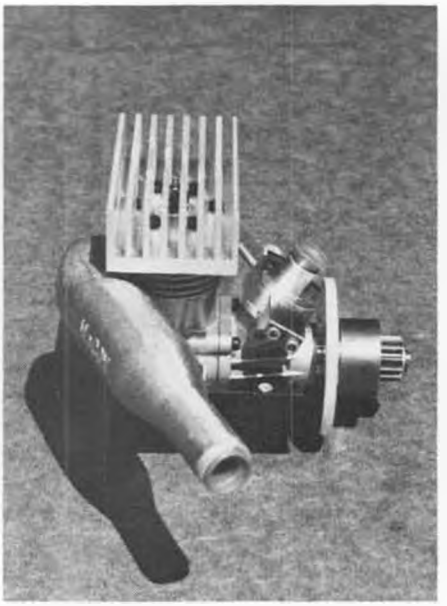
Bottom view of A/2 with Circle Towhook installed. Model is the Simplex (MB, May 1976 issue).



Simplex with Hatschek style Circle Towhook. Note separate lines to timer and to auto-rudder pin.



The new K&B 3.5 cc engine mounted on chassis. Narrowed flywheel compensates for longer engine and rear muffler.



K&B engine with Associated head, McCoy muffler (and wrist pin), Thorp carb, LRE engine mount, and narrowed flywheel.

R/C AUTO NEWS

By CHUCK HALLUM

• As with any car adjustment, there are two schools of thought on the clutch and how it should work. The two schools are the slipping clutch and the no-slip clutch. In general, the slipping clutch enthusiasts are concentrated in the west (U.S.A.) and the no-slip clutch enthusiasts are in the east (probably mid-west to most people). The advantage of the slipping clutch is that low speed power delivery is limited (reduced) so that low speed power oversteer is controlled to a great extent by the car. The advantage of the no (or low) slip clutch is that more of the developed horsepower is available at the rear wheels. These advantages become disadvantages with different types of track conditions and driver abilities.

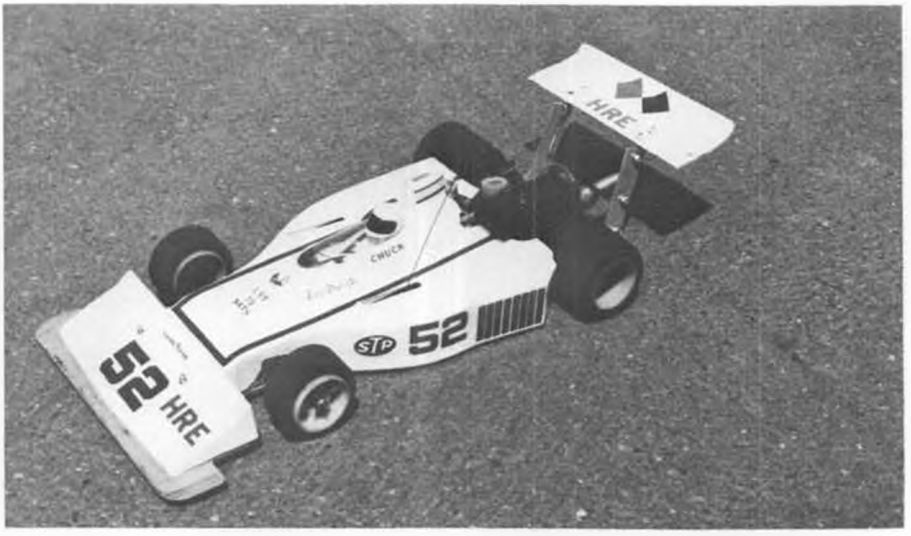
Which school do you belong to? Why? Have you tried both ways so you have a feel for both approaches? If you haven't tried both ways, do! But try it when the conditions are favorable for the new one you're going to try. In the following paragraphs I will try to explain when each approach is a little more favorable and what you have to do to the clutch. Since I'm not familiar with all types of clutches, many of the things I say should be considered as generalities. The exact things you do, see, or feel, may be different, but in general they will follow the same trend.

The reason that clutches are the topic this month is that the K&B 3.5 cc Schneurle ported engine has been introduced. The engine appears to be very strong, powerwise, and will again bring up power delivery problems during acceleration. The new K&B engine has lots of low speed power, and top revs of about 27,000 rpm. Low speed power oversteer will be quite a problem again, and the clutch engagement and/or discrete power application becomes very critical.

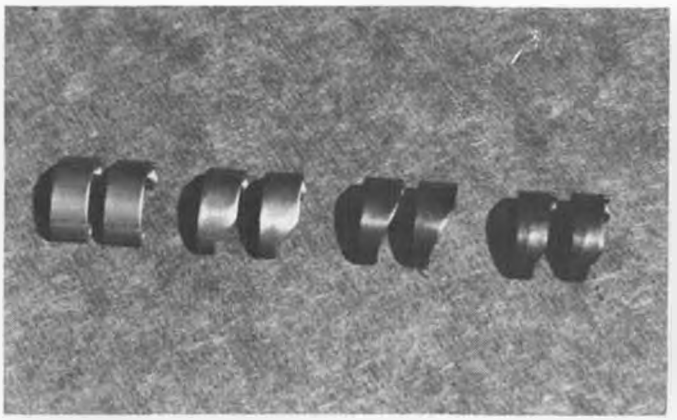
Most of my comments here are based on first-hand experience with the small diameter clutches used in HRE, Associated, MRP, Norkar and Marker cars (and the old Taurus too). Comments on larger diameter clutches, used in Delta and Scorpion cars, are second hand, since I don't run the big clutches. But all the trends and effects of these clutches should be similar. I can't really tell you much about the belt drive clutching in the Thorp car, since I have no experience whatsoever with that one. I'd appreciate any comments on belt drive clutching, or the others for that matter, which you readers might have.

Back in '73 and '74, the small diameter clutches were quite a problem when the Veco-McCoys first became popular. This was primarily because the slipping clutch enthusiasts used them. The common practice was to use aluminum clutch shoes and line the clutch bell with asbestos. With the additional power and the clutch still slipping, there became a terrific wear problem. The asbestos liner would last only one hour . . . maybe two or three if you were lucky to get the right combination.

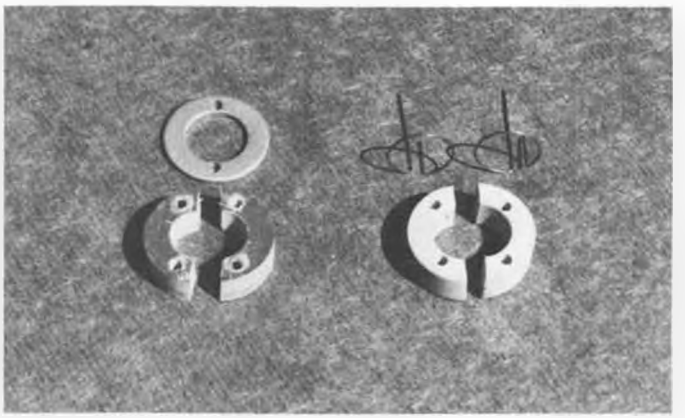
About this time a friend of mine, Chuck Kimbrough, made me some steel clutch shoes and several types of insert liners for the clutch bell. None of them seemed to be consistent or good. But Chuck continued thinking and looking



Author's formula car made Long Beach GP main with superstock engine, won April Orange Co. race with .40 carb. Will switch to new K&B engine for Nats.



Steel clutch shoes trimmed for variable clutch slip. Stock shoes, left, slippery narrow shoes, fight. Light and heavy springs give variety.



Plastic clutch shoes (Stone left, MRP right). Shoe weight and contact area varied to adjust slip. No liner required for all shoes pictured.

into the problem. Because of go-kart experience with steel shoes running directly on steel bells, Chuck started experimenting with that combination. Within a short period of time he discovered the proper width and thickness of steel to make formed clutch shoes. Jay Kimbrough, Chuck's son, used these in his cars as well, and used them when he won the Amateur Oval main event at the 1974 ROAR Nats. Shortly after that, a manufacturer got together with Chuck Kimbrough, and no more information came to me on the formed steel clutch shoe progress.

During the end of the '74 season and all of 1975, I ran steel shim stock lined clutch shoes. The steel lined shoes ran well, but only lasted about 2 to 3 months, and it still seemed like I was always fixing clutches. Formed steel clutch shoes are now produced by Associated, and are available through them or HRE.

At the same time Ed Felty, Mike Reedy, Jim Cade and others, were experimenting (again) with phenolic clutch shoes. The results were pretty good in their cars, but I had problems with consistent clutch slip with these, possibly because of my gearing and high clutch slip. But a great number of racers swear by them. The phenolic shoes are now made by Glenn Stone and available through Canoga Raceway, 21511 Sherman Way, Canoga Park, California 91303.

New filled plastic shoes that are good for high temperature use are now available from MRP. They went through several compounds before finding one that would work properly. The shoes are fabricated by normal machining. Break-in of the shoes is required to get the shoe shape to conform to the clutch bell. I understand that rapid break-in is possible by running the car against a wall (nose first) and punching the throttle to wear the clutch shoes. One should realize that all shoes require some break-in to get the shoe contact surface to conform to the clutch bell inside diameter. The steel shoes require a break-in period of about 1-2 tankfuls of gas and normal running and I'm sure the phenolic shoes also take at least that much normal running time.

Meanwhile back at the farm, Delta country that is, the large diameter clutch people have been doing some work too. Larger diameter clutches inherently engage a little quicker (than small diameter clutches) because the centrifugal forces are larger, and the slip velocities higher. Clutch wear was not a problem with semi-no-slip clutches, but with more low end power, some slip is advisable. When slip was attempted with the big diameter clutches, the shoes and the springs became a problem. To slip, very high force springs had to be used to restrain the high centrifugal forces. Springs popped and sometimes shoes snapped. But new materials seemed to have solved that problem. Now a newer, smaller diameter clutch is made by Delta, and is available through them or Scorpion.

Now, on to the problem of clutch slip. Clutch slip is advisable whenever there is a problem with power oversteer. Power oversteer is the condition in which, as throttle is applied, the rear wheels begin to slip, rear traction is lost, or decreased, and the car turns more rapidly than it should, or the car spins out. Power oversteer occurs most often when the engine has super low end power or the track is slippery. When the track conditions are good, and the rear end of the car will not break loose, or the engine does not have super torque (possibly like the Superstock engine class) then only a small amount of clutch slip is the way to go. If you are a super-driver and can control your throttle finger (plus lots of will power to take it easy like some people I know), then you can lean toward the less clutch slip side. Most people, including myself, tend to use too much throttle, too fast . . . especially in competition, and should use clutch slip to control power oversteer. One other thing that can be done is to slow down the throttle motion and use all the servo motion available to get more controlable small throttle openings.

To get more clutch slip, there are three things you can do on either the small diameter or larger diameter clutches: 1) less shoe weight, 2) less shoe contact area, or 3) more shoe spring retaining force. I use all three. A sketch shows how the clutch shoes are normally installed. Usually the shoe pivot pin is located on the leading edge (rotation wise) of the shoe and the shoe itself is trailing . . . so it is called a trailing shoe. As the engine accelerates, the shoe centrifugal forces move the shoe into contact with the clutch bell and engagement begins. Further increases in engine, and clutch shoe speed, increase the centrifugal force exerting drag on the clutch bell and accelerate the car. At some engine and car speeds, the centrifugal forces are large enough to fully engage the clutch and there is

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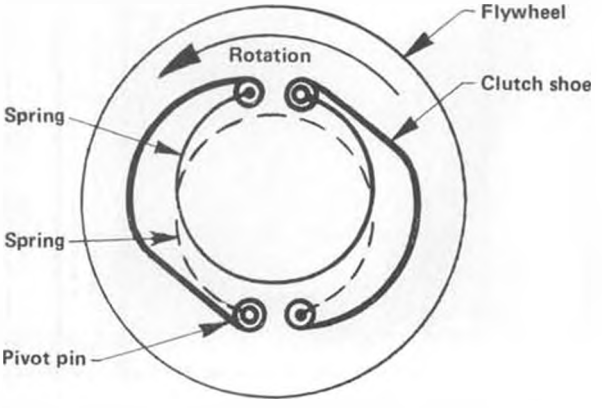


R/C Profiles over the cliffs of Torrey Pines. If you get bored, land on the beach and go wading with the nudies!

R/C SOARING

MODEL BUILDER's longest running column continues under a new by-line . . . National Soaring Society's Treasurer, DR. LARRY FOGEL.

• Last Sunday I witnessed an unfortunate incident. There he was, at the cliff, with his just-finished Windfree. Anxious to fly, he asked if there was anything he should know before his first launch. I mentioned the rotor (turbulent downwash some 20 feet in from the edge), the importance of launching from the very edge on a test flight, then asked if his plane was properly balanced. He let me use my index fingers under the wings. I checked the direction of control movement, the comparative wing incidence, and washout.

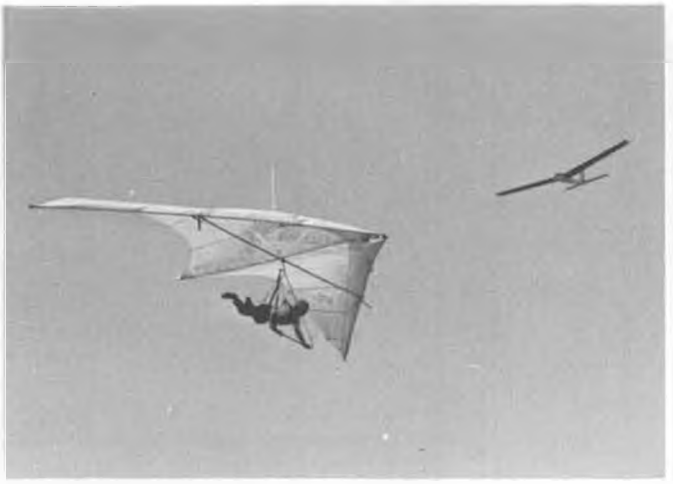
An ounce of lead later, the plane seemed ready to fly. I suggested a test glide and, perhaps, allowing a more experienced hand on the controls until this new pilot had some "air time" for himself. He preferred to "be his own man", and so we watched the test glide end with a broken wing.

All this set me to thinking about the many tricks of the trade that everyone should know. Perhaps repeating some of these might save other "unfortunate incidents."

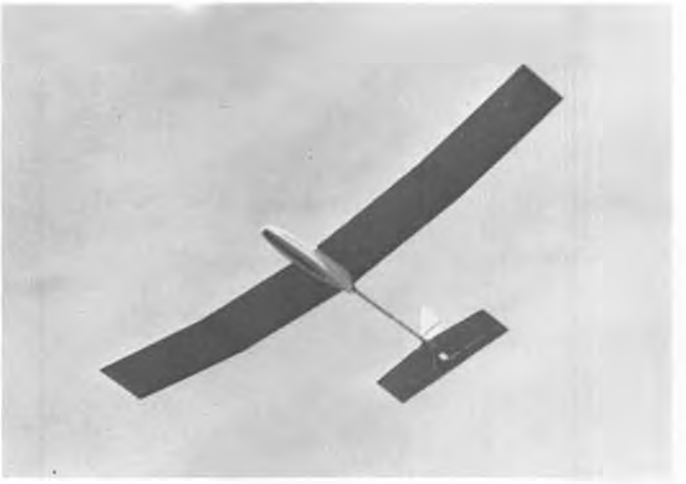
The launch should be into the wind, not simply perpendicular to the slope. Watch for turbulence when there is a cross-wind. It may be windy but that doesn't prove there's sufficient lift. If possible, watch the behavior of other aircraft before you launch. Let an experienced pilot put your first ship into the air.

Bob Simon, about to catch his Acquila. This technique saves the finish, sharpens your flying.

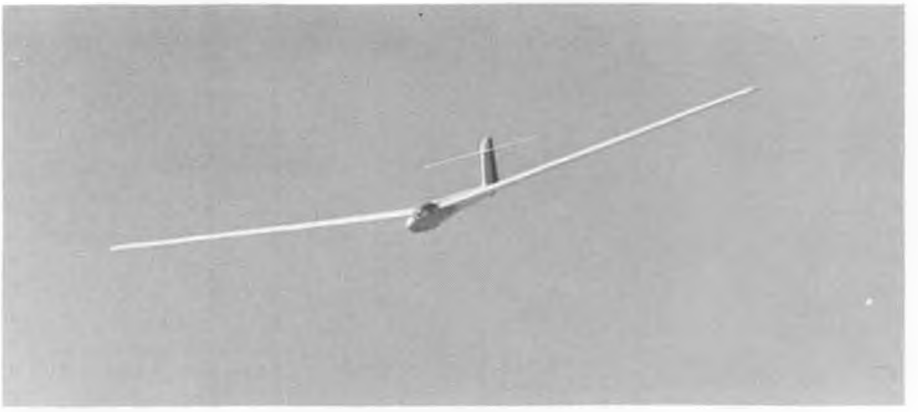
Roger Taylor launching Mark's Models Wanderer. Randy Warner "holds" winch in place.



R/C sailplane and hang glider share the air at Torrey Pines.



The author's Zaic "Scout" in flight. Dismantles into small carrying box.



The author's Todi. This is an excellent sailplane, which comes with two wing sizes and trimmable flaperons. Will go fast, slow, and do aerobatics.

At the slope, it's best to hold your plane in front of the center of gravity (CG) and launch in neutral trim. Holding it aft of the CG makes the plane less stable, so that turbulence can more strongly affect the initial flight path. Launching into the lift may cause the nose to rise sharply, thus inducing a stall. I've seen a number of planes splattered on the ground near the pilot, within seconds after launch, for this very reason. Be ready to add some "down" to prevent such "ballooning" (especially with a light aircraft and into a strong wind).

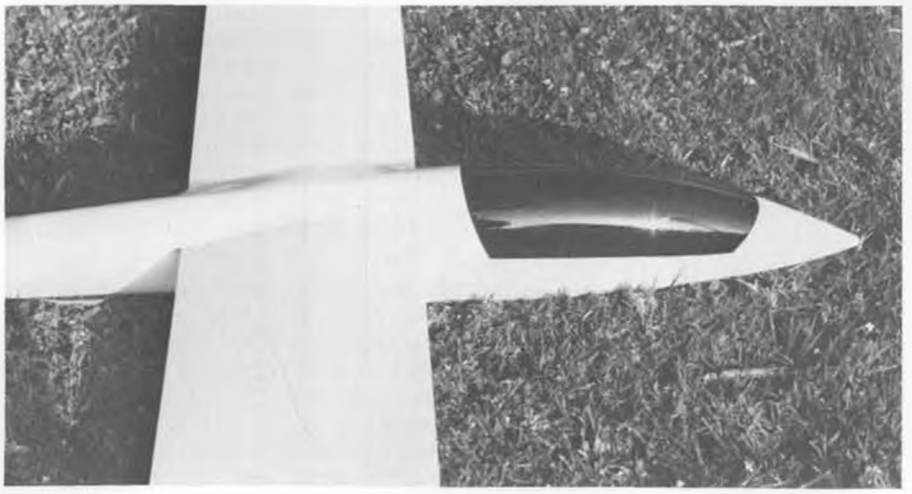
I've also seen planes crash because the pilot looked away from the sky for a moment, then started to "control" another plane until it was too late to correct his mistake. When the wind is strong, you fly much faster downwind than into the wind. Therefore, when you need time to look away, as for example, when walking back to a landing site, it's well to head into the wind. That way it's much easier to keep track of your sailplane.

On turning downwind, it's wise to pitch down. This maintains sufficient speed to protect against the sloppy handling quality which accompanies near-stall conditions (and the danger of downwind stalling at low altitude).

With sufficient altitutde, you can make several "practice landings" overhead. This repetition of the landing pattern sets you up for the final touchdown. Considerable rudder throw is useful for maneuvering, but this can also induce stall during a slow final approach. You slow down the ship, then hard over control to line up with the desired touch-down point. The extra drag of that skewed rudder can make the difference between a smooth landing on an undesired spot and a crash (on an equally undesired spot). As they say, the three most important rules of safe flight are, (1) maintain your airspeed, (2) maintain your airspeed and (3) maintain your airspeed. (It's also a good idea to maintain your airspeed! wcn)

With a heavier aircraft, it's good to make a long, low final approach after proper line-up into the wind. At that altitude, there is less turbulence, more ground-effect to "stretch" your landing, and less distance to fall if you should stall. If you have sufficient airspeed, you can pitch up at the last second, then catch the aircraft in your right hand just before it stalls. That trick is worth trying with light aircraft but becomes dangerous with heavy, acrobatic, and large thermal ships. A misplaced hand can grab (and crush) a wing, allowing the nose to take revenge by hitting you in the chest. Still, it's a good trick when it comes off.

Don't "pulse" the stick. Move the control smoothly and watch the plane respond to each command. The less you move the stick, the less energy lost, and the better your maneuver. In slow flight, improve your turns by diving slightly as you enter the bank. This increases your airspeed and your lift . . . and provides "tighter control". A slight up command will still be need-



Fine finish on Scotty Jenkins' new W-21 speed plane is difficult to show in photograph.

ed to compensate for the loss of lift due to the bank angle. As a first cut, remember that you enter turns with rudder and/or ailerons, but maintain that turn with elevator.

Some aircraft can be flown inverted (provided there is sufficient stabilizer throw). You can make this easier by trimming down all the way as you enter your inverted flight.

Some planes can perform an outside loop (most acrobatic gliders and even the conventional-appearing 100 inch wingspan Todi). Here, the trick is to hold the dive long enough to gain sufficient speed before the hard down control which leads the plane through inverted flight and back up again to the original altitude. The heavier the aircraft, the greater the speed, and the easier the follow-through.

There are other maneuvers well worth your attention. Can you make your sailplane roll (even without ailerons)? Spin? Perform a tailslide? Here you dive a bit, then bring the nose up sharply so that the stall occurs when the aircraft is vertical. If properly performed, it will settle on its tail for a few feet before snapping into a downward attitude. Tricky!

Launching in neutral trim is even more important when using a Hi-Start (rubber tubing stretched by pulling on the attached nylon cord which hooks to the plane through a collapsed parachute). Here you hold the plane under some five to ten pounds of pull, stretch your arm back, lean backwards (making sure that the wings are level with respect to the ground) and throw the aircraft upward. Note that there is a strong tendency for right-handed pilots to tilt the right wing down when the plane is held behind their heads.

This can produce a sharp and unexpected right turn, which must be corrected before disaster strikes. In launching, you want to have a long-arm throw, as fast as you can, so that the plane leaves your hand in excess of stall speed. The best angle of throw corresponds with the climb angle. A 60^{o} launch angle is safe for most aircraf. Too low an angle can cause excessive speed, a sharp rotation which can crack spars, a stall, and even folded wings. Too great an angle can lead to a stall condition which results in a similar disaster.

The angle of ascent depends on both the tension in the line and the amount of wind. The greater the wind, the steeper the climb. Under high wind conditions (20 knots or more), you need more tension to produce a vertical climb. Insufficient tension will cause the aircraft to climb backward over your head(as the wind kites the aircraft while stretching the line). Such flight can still be fully controlled, but the surprise may cause the pilot to take an inappropriate control action. You also need extra tension to gain altitude in low-wind or no-wind situations. The trick is to stretch the Hi-Start to near, but not beyond, its elastic limit. Beyond that point your future launches will suffer.

As your sailplane climbs, it's tempting to add an increasing amount of back-stick to better the climb. For some aircraft this is most useful (as, for example, the Legionair). For others, such increase in the angle of attack greatly reduces the efficiency of the airfoil and can even induce tip stalls (wherein one wingtip stalls and causes the plane to fall off sharply on that side). Best performance of the Grand Esprit is achieved without back-stick. If you do experience a tip-stall, it's well to guard against over-control. Apply some rudder quickly, but too much can whip the plane to the other side. In one instance I even saw . . . In any case, the larger thermal machines tip-stall more slowly, thus making it easier to compensate for the stall even as it begins to occur.

To release your sailplane from the tow line, just drop the nose. The increased speed and reduced tension in the line should allow the craft to slip off the tow line. It's well to make this maneuver quite definite until you've had considerable experience. Usually a sudden down will separate the plane from the line, even with a "sticky" tow

hook. If the plane doesn't release, fly away from the tether point of the line, thus putting a tension on the line and try again with pitch down. If this doesn't work and you've lost considerable altitude, assume a wide circle maneuver that will land you into the wind with the line dragging behind. I've witnessed this one, too.

Properly used, an electric winch places less stress on your aircraft and generally yields a higher point of aircraft release. But this introduces new problems of coordination between foot tapping and hand throw. Make sure you have sufficient line tension before reaching that "moment of truth" . . . but remember that waiting too long can break the line.

Spoilers are essential on large sailplanes. Note that they do just that . . . spoil the lift. They provide some drag and do not significantly reduce your forward speed. In fact, on some planes, "popping the spoilers" produces a downward pitch, and this increases your speed! Use your spoilers to descend into a suitable final approach, then retract them so that the last few feet are at a much lower rate of descent. The spoilers can be actuated again as you touch the ground, thus shortening the skid and reducing the possibility of ground loop or chaffing your wings.

There are many more "tricks of the trade," but perhaps it's well to leave these for future discussion. Please suggest others that you feel would help those who are new to R/C soaring.

I've often admired Scotty Jenken's sailplanes . . . not only for his design and artistic good taste, but for their glass-like exterior. So I asked, "How can I achieve such a finish?"

"First, rough up your present surface with 220 sandpaper. Put on rubber gloves, mix K&B primer one-to-one as instructed, and spray on to fill the low spots and produce an even coat. This dries quickly, but it's well to leave it a day so that it's completely dry before you use a small sanding block (1 x 2 inches or so) and 400 Wet-or-Dry sandpaper, with lots of elbow grease. It's better to use it dry, with good lighting, so that the low spots show up. Use 45° strokes to the longitudinal axis in sanding flat surfaces of the plane. You can also use the sandpaper over rods and other shaped blocks in order to take care of curved surfaces. If you use your hand to back the sandpaper, be careful of developing ripples or waves in the surface.

Apply another coat of primer and repeat the sanding operation the next day. After three or four coats the surface should be essentially smooth . . . ready for that final coat of paint."

Scotty recommends using K&B epoxy paint in a one-to-one mix, but with one additional part of thinner added. This helps smooth the flow over the surface. He suggests using a Binks diaphragm-type compressor, which feeds about 30 lbs./sq. inch air to their size B air brush with adjustable nozzle. For most of the work, you can use this brush with the nozzle wide open. It is well to place a water trap before the nozzle. This protects against water condensed from the air destroying the smoothness of your surface. Dust spray the paint over the surface. Then proceed to apply the coat by moving to about eight inches from the surface, with close, even strokes of the air brush. Let this coat dry for at least six . . . better still . . . twenty-four hours. According to Scotty, this technique never fails. I can personally testify to the perfection of his finishes.

Has the time come for a major step forward in airborne batteries? A considerable amount of development has taken place on Lithium-based cells in Penlight size (AA). These weigh about 15 grams each and carry 1.5 amp-hours above 3 volts. The 200 gram DD size carry 25 amp-hours above 3 volts. These start at 3.5 volts but drop sharply toward the end of their life. Unfortunately, such cells are not rechargeable. They have excellent storage life, and cost about $1.00 per amp-hour. But that cost will come down. It won't be long before you can choose to throw away you airborne pack charger. You can get further information on these cells from GTE Laboratories, Waltham, Massachusetts, Mallory of Tarrytown,

New York; or Power Conversion, Inc. of Mt. Vernon, New York.

By now you're well aware of the pressure to eliminate our 27 mHz frequencies. In practice, it might be best for us to leave this band in a hurry . . . before we are blasted off by some ten million CBers (the expected number by mid-year).

The AMA is trying to obtain new frequency assignments from the FCC. Both these agencies are now studying certain frequencies in the 30 to 40 mHz band . . . frequencies which are in little use and might easily be assigned for radio control. Conversion of our equipment from the 27 mHz band to these new frequencies would be relatively easy. Our use of the 72 mHz frequencies seems to go unchallenged. •

Power Boats . . *Continued from page 15*

ings on the finished product. But even more important, the drawings are clear to the beginner, and coupled with the instruction sheet, the kit is a joy to build.

Decking and other skin surfaces are a good, three-ply aircraft grade plywood. The parts punch out fairly clean and only require the normal sanding. I started by getting all the parts cleaned up and then proceeded with Step 1 on the plans. You could punch out the parts as you need them, but I find that it is easier to have them all ready from the start, as this enables the builder to work on various sub-assemblies if he happens to mix too much epoxy glue. With glue being expensive, it's a shame to mix too much for one assembly and then have to throw some away.

The building jig is very important in obtaining an accurate alignment and a warp-free bottom. The dimensions for the jig are completely accurate. You will notice that once you tack the sponson insides to the jig and dry-fit the bulkheads in place, the pieces should fit snugly but not so tight as to bind or distort. This to me is the sign of a good kit, and is important for the beginner.

Before you glue the bulkheads in place, it is a good idea to lighten the boat as follows: (1) cut small circular cutouts in each bulkhead. The easiest way to make a neat cutout is to drill a starter hole and then slip in the saw blade of your Dremel jig saw and carefully make the desired cutout. It is a tedious process, but well worth the final result. (2) also, you may want to cut out the cockpit walls as shown in the photo. Your "Pay'n Pak" will not only be lighter and perform better, but you will be able to drain water out of the hull. The plans do not call for these cutouts and you might feel that water can never get inside, but no matter how well you seal the hull, water will still seep in.

In all, the construction of the hull goes very smoothly. One change that I made was to lower the engine mount via a ¼ inch "belly pan", so that the stuffing box would exit the hull farther forward from the transom. I was thus able to mount the radio box tray farther forward than normal. This will help the C.G.

The cowling is built over the bulkheads that extend above the deck line. It is a very easy building procedure. Be sure not to let any glue from the cowling sides touch the deck. I found a good way to feather the cowling to the deck line by using an epoxy glue and micro-balloon mixture. Put a strip of cellophane tape on the deck where the cowling rests. Be sure to overlap inside the engine and radio compartments. With your cowling secured in place, next apply a mixture of micro balloons and epoxy glue to the cowling. Smooth the mixture in evenly with your finger between the tape on the deck and the cowling. Be sure to smooth the filler with your finger dipped in epoxy thinner. Once dry, remove the cowling and sand as necessary.

The wing, which made the big unlimited famous, is mounted with epoxy glue. I decided to make light aluminum brackets and mount them to the wing. It is now ajustable and should be functional in performance. I will discuss its function a little later.

Once the hull is finished, you will want to build some sort of a stand. Make sure your design allows the front of the hull to be lower than the transom. Due to the design of the hull, your engine will flood if it is sitting in the stand in a level position. The front section of the hull sweeps upward at about eight degrees.

As for the running hardware, I used most of the hardware recommended by Dumas. I did use a different rudder bracket. A parallel Marine Specialties strut, held in place by two cap screws, makes an excellent rudder bracket. I have even used this same setup on my 1/8 scale unlimited "Lincoln Thrift" with good success.

The radio used is a Kraft two channel brick. Its small size and good reliability is a must for this boat. Completely enclosed in a G & M Models waterproof box, the Kraft is ready to provide many hours of racing fun.

FINISHING YOUR "PAY'N PAK"

To obtain the best finish on your boat, you will want to spray on an epoxy paint. I used Petitt's undercoater white as a primer. Be sure to wet-sand between coats, as epoxy paint must be sprayed on a sanded surface.

After three coats of primer, I gave my "Pay'n Pak" two coats of gloss white. The finish was quite smooth and glossy.

The next step is the hardest. Since you are building a scale hydro, you will want to give it the final touch of

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lettering and markings. At first, I was going to mask and spray the lettering; however, after finishing my "Lincoln Thrift" U-55 in that manner, I wanted something that would be a little quicker. The solution proved very successful. I ordered 4½ x 11 inch solid color decal sheets from Sig Manufacturing. These come in a variety of colors. For this boat, you will need three packages of orange and three packages of black. Using the letter outline on the Dumas plans, I was then able to cut out accurate letters. I must confess that my wife was recruited for this task. But after all, isn't model boating a family project?

Once the lettering and striping was in place, I sprayed the entire boat with clear epoxy. Two very important points: (1) Be sure to wet-sand the boat before you apply the decals so that the clear epoxy will adhere. (2) Thin the clear epoxy (two parts thinner to one part paint) so that it does not dissolve the decals. Spray the first coat very light.

Once finished, the "Pay'n Pak" looks like the real unlimited. I also plan to add cockpit details and a driver for extra realism.

TEST RUNNING

Well, after hours of building it was time to test our project. We picked an average April day in Chicago (25 - 30 mph winds). It really didn't matter though, because I wanted to give it a try. I tried a de-lifted 2.2 prop for the first run. We started up the K & B .40 and my brother, Gary, launched the "Pay'n Pak". I ran the boat at about half throttle. It was running about 25 to 30 mph. It was planing very well and handling the chop nicely. The turns were beautiful.

On the shoreline side I opened it up, as the water was a little more bearable. The boat really accelerated. I have no doubts at all that the boat will do 55 mph. I ran the boat several more times and found the 2.2 prop to be just right. The wing was very functional at higher speeds as it pulled the front end down on the water.

I plan to race the "Pay'n Pak" in the D hydro class. I am sure it will be competitive with the hot outriggers.

So, if you are looking for a new competitive hydro, whether beginner or expert, I strongly recommend the Dumas "Pay'n Pak" for great racing. HAPPY BOATING! •

Peanut . . . . . *Continued from page 47*

rib caps can be added and sanded to an airfoil section.

The entire tail outlines and the wing tips are made of a lamination of 3 pieces of .012 by one-sixteenth basswood. Put a piece of waxed paper over the plans, insert straight pins into the workboard every quarter inch along the inside of the tip to make a bending pattern. Bend 3 layers of basswood around the outline and use "Hot Stuff" or "Zap" (cyanoackrylate bonding agent) to bond the laminations together. The foregoing is the quickest way to make the outlines. Thinned white glue can also be used as adhesive, but will take longer to dry.

The fuselage is started by cutting out the formers. A left and a right half must be made of each former. Then cut out the centerline keels and pin them down on the plans. Take all the left hand formers and cement them in place on the keels. The location of the stringers are shown by phantom lines (double dotted dash lines) on the side view. Cement in place the stringer that goes along the thrust line on the formers. There are no stringer notches. The stringers are simply attached to the outside of the formers, except for the former at the extreme aft end. The stringer fits flush with the aft former.

When the left side assembly, with the one thrust-line stringer, is completely dry, remove it from the plan. Now, cement the right half formers in place on the keel pieces and add the thrust line stringer on the right side. Make sure that the assembly at this point is straight in the plan view. When this assembly is dry, add the rest of the stringers in left and right pairs. The stringers get closer and closer together towards the tail so that they may have to be fitted at the aft former.

Insert a small rectangle of sheet balsa on each side to support the rear motor peg.

The wing is built over the plan by laying down the leading and trailing edges, cementing the tips in place, and cementing the rib bottom members in place. Note that the side view is drawn as if the wing had no dihedral, for clarity. The necessary dihedral is automatically obtained by cutting the main spar according to the plan. The scale airfoil is not flat on the underside, but for simplicity, the model in the photos was built with a flat bottomed airfoil, except on the center line, where a flat bottom would ruin the fuselage lines.

Cement the left side of the spar to the left wing rib bottoms. Cut the trailing and leading edges for the dihedral break. Now, add the sliced rib tops. To slice the rib tops, make a cardboard pattern to match the shape of the center rib. Then slice the rib tops one after another by slipping the pattern down one sixteenth of an inch for each slice. To match the wing taper, cut off the aft end of each rib slice. Cement the left rib tops in place. When this is

dry, separate it from the plan, cement the spar down on the right side rib bottoms and add the right side rib tops. When dry remove from the plan and your basic wing assembly will have the correct dihedral.

Add the centerline rib bottom. Then add the upper turbulator stringers.

The nose block is made from quarter inch thick sheet balsa. The fixed part, with a square hole in it, is cemented to the front of the fuselage stringer structure. The removable part has a square back-piece that fits in the hole in the fixed piece. It has a Peck-Polymer thrust bearing inserted in a one eighth diameter through-hole. When making this hole, about 3 degrees of side thrust and down thrust can be put in. (The original Model needed down and right thrust.) The spinner is carved from balsa.

Before covering the model, carefully sand all the structure to insure it has the proper contour and no rough spots, or unwanted bumps. Then cover the model with Japanese tissue and water-shrink it.

Assemble the component parts and then give the model a couple of coats of thinned clear dope. Make up bond paper fillets and fit them in place between the fuselage and the wing. The bottom one should be fitted in place first then fit the others. Be very sparing with the cement to prevent shrinking and warping later.

On the model shown, the canopy was made from a small commercially available canopy, or one can be made by carving a wooden form and vacuum forming one from thin plastic.

The air intake, two radiator inlets, and the exhaust stacks are carved from block balsa and added at this point. Also make an arresting hook and hook mount fairing. The fairing was balsa, and the hook was cut from thin plastic, on this model.

If your landing gear is to be in the retracted position, make two outer quarters of the wheel from one-sixteenth balsa, and cement these in place on the bottom of the wing. The tail wheel then need only be a small part of the wheel that sticks out with the tail wheel retracted.

If you want the gear extended, make a left and right main gear wire and cement this in place on the wing leading edge. The tail wheel can be cut from hard balsa or thin sheet plywood.

The three-bladed propeller was made by taking two "Sleek Streek" plastic propellers to supply the blades. Cut the blades off the hubs. Shape the blades to an elliptical tip shape. Sharpen the root ends to a wedge and insert them into the spinner at the angle shown in the top view. Use Hot Stuff, or epoxy to bond the blades in place. The prop hook follows fairly standard practice. Shown is a winding loop at the front of the spinner. This is not absolutely necessary if it offends you by being out of scale. It does simplify winding, however.

Finishing the model from this point is a matter of painting it. The method used on the model in the photos was one suggested by Fernando Ramos in his articles in MODEL BUILDER. Floquil model railroad paint was used, mixed with nitrate dope. Commercial decals were used for the US stars on the wings. The tail stripes and prop stripes were painted, using plastic model enamel.

This model, especially with its gear in the retracted position, is very aerodynamically clean. A single loop of one eighth Pirelli rubber will be a good outdoor motor. The model tends to turn left under power and flys fairly fast for a Peanut. Make sure the CG is not further aft than that shown. Ballast the nose of the model with clay if required. Make your test flights over deep grass if possible.

The wings of the model in the photo had about an eighth of an inch of washout. Because of the tapered wing, this is important to the flight characteristics. If your model does not have washout, it is recommended that you warp it in.

Have fun flying your Bell XFL-1.

A three view, and photos of the XFL-1 can be found in "War Planes of the Second World War" by William Green. Volume IV, Fighters, pages 13 and 14. •

GYSOB ..... *Continued from page 41*

50/50 mixture and complete the doping. Finish off with a spray coat of 50% thinned clear epoxy paint. Now stand back and admire your beautiful and *light* wing. That is, if you can bear the pain from the partial paralysis of your right arm. So I'm crazy! Go ahead and double-tissue the thing. Single tissue on the stab, please.

Now if you'll stop fondling your completed GYSOB, I'll help you trim it. Set it up with at least as much left thrust as shown, CG as shown (right on, not close), rudder keyed absolutely straight (no left), rudder tab straight, approximately 1/4 to 3/8 inch wash-in of the right main wing panel, and some right stab tilt. The left main wing panel should be flat. The tips will probably wash-out a little, so make certain that they are even. Use some sort of quick D.T. system that will pop approximately three seconds after engine cut. I use nothing but Selig timers and consider anything else "Mickey Mouse"; among other things, the Selig timer makes quick D.T. simple. On the first flight, make a quick run through the Beads, use near full power, approximately two- to three-second engine run, and a steep launch. If it doesn't attack you or do something silly, proceed from there.

On the first short runs, the climb should be steep and relatively straight. If it turns excessively and everything eyeballs straight, adjust turn with thrust adjustments. As you increase the engine run, a right pattern should begin to develop. If it goes into a loose right

turn and keeps the right wing up, you got it made. All you should have to do is play with the rudder tab to make the final pattern adjustment.

You probably won't luck out, however, because most people do not throw a "C" ship hard enough on the test glides, and shim in excessive incidence (quit nit-pickin' this term, you know what I mean). In this case, the model will most likely start out steep, go into the right pattern, and appear to drop the right wing as the turn steepens. Re-eyeball the wing to insure that you have adequate wash-in. If you do, this tendency almost always indicates excessive incidence. Shim the front of the stab and try again. As you continue to remove incidence, you should notice the climb speed begin to increase, and the right wing start to stay up. It is safe to continue with this adjustment as long as you are certain that you have enough wash-in, and as long as the climb does not begin to flatten out.

If an experienced right/left trimmer happens by in his '37 Studebaker, he will probably advise you to add left rudder and incidence. Stick with me, and let him go back to his modified Civy Boy. *Never* add left rudder.

At this stage, five to eight seconds, adjust primarily with thrust and incidence, but you can sneak in a little right tab now, if necessary. As you approach maximum runs, if the model straightens out and starts to roll to the left, evaluate the attitude carefully. If the climb flattened out as the turn straightened, then you obviously need to add incidence. If the climb remained steep and you can't make it behave with rudder tab, you probably have one or a combination of the following: Excessive wash-in, built-in left rudder, excessive left thrust. You'll just have to eyeball it all again (get some help) and decide. The model should make about one turn in ten seconds, and fly right into the recovery. Since incidence was determined by the climb requirements, only CG and stab tilt are used to adjust the glide.

Check the plans and you'll note that the fuselage droops down below the datum line. I did this to get as much rudder area below the thrust line as possible for a very strong right power tendency. For this reason, the proper glide attitude sometimes looks a little tail low. Keep this in mind, and if the glide does not appear responsive, move the CG aft.

There you have my GYSOB. Perhaps it can help you win. Just remember one thing . . . most of it is up to you and not the model. The winners will win no matter what they're flying. All the GYSOB can do is give you a little better chance of picking good air.

One final word of caution. If you want to build this thing, you better hurry. AMA just presented the F.F. Contest Board with Oscars for their supporting roles in, "One VTO'ed Over the Cuckoo's Nest." There's no telling what heights the annual absurdities will reach next year. Anyone for a separate competition organization? OK, but just remember that I'll be the first to tell you, "I told you so." •

F/F Scale . . . . *Continued from page 45*

I hope you understand that all this is strictly speculation on my part. As yet, I have not had the time to experiment and pass along anything that can help the rest of us.

By contrast, it was an experience watching the youngsters fly their Mattel Super Stars and Hi Risers . . . each type flying as if there were no tomorrow. Both designs fly very well, with the Super Star, in my opinion, having the edge. If any of you have ever assembled the Super Star you quickly realize that the power-to-weight ratio is pretty darn good. With a vacuum formed fuselage and foam wings and tail, there's simply no weight, and add to this generous dihedral, clean design . . . a combination for an excellent flyer. Incidentally, the winning Junior, Tony Whitney had a near average of 1:38 flight score.

What can be done to change some of the inconsistencies of electric powered F/F Scale? First and foremost, I feel that the proper design is very essential. I believe that it has to be a very clean design. One with as little drag as possible. Biplanes, with all of the extra bracing and inherent drag designed into them should not even be considered. (Humph! wcn.) You know I have to be serious when I say that, if you realize how much I love biplanes. But a fact is a fact! Designs incorporating cantilever wings should be contemplated. Perhaps race plane designs should be looked into. Since we have been flying Thompson Racers, and have come to realize what excellent flyers these models are, then serious thought should be given to this type of design. Somewhat increased in size, and built lightly, they should be a tough contender. Remember, this is not an endurance event.

Short-nosed designs can also be looked into, providing they are low in drag. With the extra weight of the batteries stuffed into the nose, most likely no additional ballast would be required. Keeping the overall weight

of the model down should be another prize consideration. It wouldn't help a whole lot to have a super-clean design, that is so heavy that it wouldn't perform well. Choose your materials carefully. The time you spend here will pay off later. Construction for an electric model should be sturdier than a rubber type model, but yet be less so than a gas powered one.

Regardless of which electric motor you prefer to use, geared or nongeared, keep in mind a clean design, holding the weight down, and think about the possible use of a free-wheeling propeller. Scale electric is still in the elementary stage, and a great deal of experimenting needs to be done, at least in my opinion. This is one major reason that the Flightmasters sponsor an electric contest. Many modelers get some rather interesting ideas from watching others. In this way, further development can occur, making it easier for those just starting into this great hobby of ours. So, again, I hope that many of you will try some of these suggestions and pass along any results that will help our modeling become easier and more enjoyable.

I have some bad news and I have some good news. First the bad news. Seems that it is a common fact among Urologists and dye manufacturers that aniline dye is a possible cancer causing substance. I know that with everything seemingly falling into this category, no one will be surprised. At any rate, people who work in dye factories are checked once a year. I bring this up because I mentioned several months ago that Dr. Martin dye is a great way to finish rubber scale models. These are aniline dyes. The average modeler would have no problem using the stuff, but it can't hurt being aware of the possible danger. Apparently, it is absorbed into the body via the skin. So, obviously, keep it off of your hands!

Now the good news! Gene Thomas suggests the use of Acrylic Polymer artist's colors, as being far superior to any dye one could use. There are several reasons he feels this way. First, it is water-soluble and can be sprayed with an airbrush, and when it dries, it is waterproof. It can be brushed on as a wash or an opaque and it will cover glue, Hot Stuff, Epoxy, metal, plastics, and balsa. Repairs can be made in a glued area, and are undetectable. You can paint over an assembled framework rather than stain the wood before assembly. (Some people find that Hot Stuff will not stick to a dyed surface.) Paint as applied from the tube will fill cracks and can be sanded. Both nitrate and butyrate dopes go over it with no problem. By mixing, you can have an infinite variety of colors. It is recommended that you buy a small starter set instead of the large expensive tubes.

There you have it. Another product with which to experiment. One thing for certain, scale modelers are definitely a creative bunch of individuals. It certainly is greatly appreciated when someone passes on valuable hints from which we can all benefit.

Now a couple of additional products found on the model railroad side of the hobby shop. There are a couple of cold chemical metal blackeners that are simply called Hobby Black No. 1, and Hobby Black No. 2. Hobby Black No. 1 produces a black/brown weathered appearance on brass, steel, copper and most zamac, when the material is either brushed or dipped into the solution. Hobby Black No. 2 produces a jet black new metal finish. The advantage of using these products is that very often, a modeler may want a naturally oxidized look, and paint doesn't really give this appearance. It really works great around dummy engine parts that are fabricated from brass.

Another product that I use quite often is a contact cement called Goo. As the name implies, it is definitely gooey. However, it does do an excellent job of holding things together whenever a contact cement is required. *(Longtime R/Cers will remember Walther's "Goo" as the one product that would prevent the brushes in Mighty Midget "Galloping Ghost" motors from working loose because of engine vibration. wcn).* ●

R/C Pylon . . . . *Continued from page 25*

kit, so there can be no advantage to some who have the skill to pick superior materials to scratch-build a better version; all planes must have the exact same dimensions, within plus or minus 1/16th of an inch, all covering materials must be from the same manufacturers, colors may vary; all planes must weigh within two ounces of the heaviest plane in any given race; all engines must be from the same manufacturer and be tuned to turn within 200 rpms of the lowest rpms of the worst performing engine entered, all using the same pitch and diameter prop form one manufacturer. Doesn't sound like much fun, does it? If someone does consider this as a viable racing format, please let me know as I'd like to meet the person who is talked into CD'ing it . . . before he actually does it!

SOMETHING NEW

Several things to cover here, so let's jump right in with the upcoming Nats. I had an opportunity to attend a monthly meeting of "DAMAC", which is the Dayton (Ohio) Association of Model Aircraft Clubs, and includes such diverse interests as Free-Flight, R/C, U-control, boating, and race cars. It was really interesting and heart-warming to see representatives of each of these activities working together to promote their

own interests and yet to be keeping the other groups' problems in mind and everybody trying to work out an agreeable solution.

After the meeting I had a chance to talk with Bill Hager, who will be heading up the Pylon events at the Nats. Bill intends to run the events strictly by the rule book, so I just want to pass along some of the things he touched on: size, placement and conformance of AMA numbers and racing numbers; safety inspection of airplanes; handicapping of Formula I aircraft, equal emphasis on workmanship, excellence of appearance, and scale fidelity (so if you have a "funny" or trick airplane don't expect to do well in the judging); Quarter-Midget racers using an exhaust extension had best make sure it has a slot cut along the length which will prevent it from being used as a tuned pipe . . . if you elect to build an exhaust outlet as part of the aircraft, make sure that it cannot be interpreted as causing a tuning effect or you may be asked to cut a slot in the airplane; remember, in Q-M, only one blade may have material removed to allow balancing; winners of heat races can expect to have their airplane weighed and inspected immediately after the race and before returning to the pit area.

I, for one, am glad to see Bill's firm stance on the rules, as it means we'll all be flying as equals.

Also, they can still use some workers to help run these events, so might I suggest that if you're only going to fly Quarter-Midget that you stay an extra day or three and help run the Formula I event, and if you're just coming to fly Formula I that you come a day or three early and lend a hand with Quarter-Midget. You can contact Bill Hager at 513-233-9018.

New aircraft on the market: Big Art's Models, 20620 Emmett, Taylor, Michigan, 48788, is currently producing three versions of the LR 1A; Formula I, Quarter-Midget, and 1/2A size. I have two of the Quarter-Midget versions, and the quality of workmanship is good and everything looks right, so it should do very well. Pro-Model Products, P.O. Box 5182, Fort Wayne, Indiana, 46805, is producing two Quarter-Midget airplanes. The LR 1A, and their newest kit the "lil Toni". I flew the LR 1A version last year and can vouch for its easy flying characteristics and its competitiveness. The "lil Toni" appears to closely follow the lines of the very successful Formula I version "lil Toni". It uses the same basic wing as the LR 1A they manufacture, with minor changes to make it conform to the "lil Toni" outlines. This is a very fast and successful wing design, and coupled with the reduction in frontal area of the new plane, it appears that this could be the plane to beat. We hope to have a how-to-build article and flight report in a later issue.

Bob Violet is contemplating making a limited production run of his newest design, the "Polecat". This is the updated version of the "Loki". It will be an epoxy fiberglass and foam basic kit, including a canopy and landing gear, but without the balsa wood. Bob will be selling these only on a first-come-first-served basis. Remember, only a limited number will be made. If you're interested in obtaining one, drop him a line at 25616 Aiken Drive, Clarksburg, Maryland, 20734, and when the kits are being produced Bob will contact those interested.

Another Q-M racer which is gaining popularity on the west coast, is being produced by Bob Root. For more info on this fiberglass and foam P-39, see the Classified Ads on page 95.

Just received a race report from Bob Reuther on races held in Nashville, Tenn., April 24th and 25th. They flew Quicky 500 on Saturday and in spite of the cool, windy and rainy weather, had fifteen entries turn out for five rounds of racing. First place was taken by Bob Reuther, second was O.B. Stewart, and in third was Tom Gardenhire. Weather was improved for Sunday's Quarter-Midget races, as even though it was still cool and quite windy, the rains had stopped. Contest Director Bill Waechter strictly enforced all safety rules and checked engine idles on the ground during various races. When the five rounds were over, first place was taken by Bill Weesner, who also had the best time of the day with a 1:44:3. This was on the long two mile, three-pylon course. Second place was taken by Dave Boyte, and in third was Bob Reuther.

Bob also confirmed that the list price his company, Hobby World, is charging on the Rossi 15 is $59.95. Now let's quit arguing and RACE!

SOMETHING BORROWED

Front motor mount hold-down; check the sketch and help your engine develop its full potential by stiffening the motor mounts and the front end of the airplane. This is especially effective on fiberglass fuselage aircraft. I suggest you use a hard wood, like maple, to make the tiedown blocks, as these will be less subject to crushing during removal and retightening of the bolts.

Adjustable Dzus cowl hold-down wire; check sketch for a visual picture of what the following will look like. Drill into the backplate of your motor mount on the side the removable cowl is mounted. Two holes, slightly oversize of the wire you're using, about one-half inch either side of the center line of the mount, seems to work best. Check your installation to make sure these dimensions will work, and modify

accordingly if they do not. Drill the holes as deep as you wish to make the wire adjustable. Now, on the front side of the backplate, drill two holes directly in line with the wire holes and tap for 4-40 set screws. Next, put the hold-down wire in the holes and put the cowl on. Put the Dzus fastener on. Then by pushing in slightly on the cowl while tightening down the set screws, your cowl will be held in slight tension against the fuselage. No more bending the wire by trial and error to fit under the bolts holding the motor mount to the firewall. I never liked that method anyway. Don't know where he got the idea, but it comes to us by way of Bob Onori, of Edwardsville, Illinois.

Can't remember where I learned it, but were you aware that Nitromethane is a solvent for the new "space age" glues such as "Hot Stuff"? I've tried it and it really works. Seems that the higher percentage the nitro content, the better and faster it works. The Quarter-Midget guys will just have to work harder to get the stuff off their fingers, or go visit their Formula I friends who have the 98% nitro stuff lying around. While on the subject of cyanoacrylate glues, a word of warning based on personal experience . . . It appears that the effect of breathing the fumes of these glues is both hazardous and accumulative, when used almost exclusively for building and in a closed area like a large garage, resulting in a condition similar to a severe case of asthma. Keep your work area well ventilated, as you do when painting . . . You do, don't you?

NOTHING BLUE

Just what it says, so let's hope it stays that way.

Remember, this column can only be as good as you make it, so let's have some input. You may contact me direct at 3727 Shepherd Lane, Fort Wayne, Indiana, 46815, or in care of MODEL BUILDER.

See you at the races! •

sections shown, and bevel the lower sides and bottom in preparation for application of the 1/2 inch sheet lower side pieces. Before gluing the latter in place, install the nose and main gears, and epoxy the 1/2 inch squares of hardwood under the landing gear plate.

Finally, soak and bend the lower 1/2 inch side plates in place, add the front and bottom nose blocks, and install the 1/4 inch hard balsa wing saddles. Shape and sand for final finish.

Build up fin, without sheeting, install a, b, and rib 7 in fuselage, and then slide fin into position. Run elevator pushrod through fin, staying to left of fin leading edge and then sheet *right* side of fin only. Build up stabilizer and elevator, sheet, and sand for final finish. Go back to fin and cut out area for stabilizer. Slide elevator through opening, hold it in proper location while sliding stab into place. Hinge elevator to stab and connect pushrod linkage to elevator control horn. Now finish fin sheeting on left side, and add fairing blocks. Build and install rudder.

The wing is standard rib and multi-spar construction, with 3/32 sheeting overall. It is best built on a hinged board with 2¼ inches dihedral in each panel at the tip rib. Most important of all is the built-in washout. You'll have an unstable aircraft without it! Position the 3/8 square jig strips as shown so that washout will exist, and be equal, in both panels. Install 3/32 webbing between upper and lower rear spars for additional rigidity. Remember, this wing carries two engines, a completely movable trailing edge, and has a high (9½ to 1) aspect ratio to boot!

Plans show the original fiberglass engine cowlings. We have also added suggested construction for those who wish to build them up from balsa sheet and blocks, and plywood. Another detail shows the outer flap/aileron section as developed by Dave Allen, of Ontario, Canada, in building his version

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Otter . . . . . *Continued from page 14*

1/8 ply nose gear mount, bulkhead 2, and the 1/2 inch sheet nose sides. Now bulkhead 1, and then all the cabin area blocks.

Next, install the main landing gear plywood plate, the anti-crush strips at the bottom of bulkhead 7, and then the top sheets and upper rear block. Water-soak 1/2 inch sheet balsa for the bottom of fuselage and then clamp in place with rubber bands and tape, using white glue for adhesive. If a joint must be used, should you not be able to obtain 5-foot wood stock, we'd suggest *two* joints at bulkheads where there are less bending forces involved, such as 4, 8, or 9.

Using a razor plane, shape the upper fuselage in accordance with the cross-

from the originals of these plans. Incicentally, he also chose to revise the tail surface hinge lines and the wing strut locations. Since we didn't have *accurate* dimensions on these items, we felt it best not to show them on the plans.

Want to make us feel bad? Write and tell us about building and flying *your* Twin Otter . . . we'll never get to it! ●

Choppers . . . . *Continued on page 27*

in aligning the tail boom at right angles to the rear bulkhead. Make sure it is "square" in all directions . . . it will probably be necessary to trim a slight amount from the lower aluminum longeron in order to do this. Later, after both transmissions are completed and installed, I would suggest coming back to this area and rechecking the alignment (for a smooth running tail rotor) prior to final clamping and painting. During initial engine runs, I found that the 2 top longerons were slowly working out of the clamps, so I spotted the tubes with a bit of "Hot Stuff" and really tightened down on the clamp screws . . . that solved the case of the "creeping longerons". Incidentally, do not use locktite on this plastic material as it isn't compatible. Hot Stuff or Hobby-Poxy works well, however.

The tail skid is pre-formed and is easily cemented into place, as is the plastic (rudder) fin. When installing the cross-tube for the horizontal stabilizers, it would be a good idea to roughen up the aluminum tubing so that the epoxy can get a good grip and prevent rotation. (Mine kept working loose until I drilled a very small hole through the tube and bracket and inserted a straight pin through the hole to lock it in place).

Next, the front body shell is fitted to the front bulkhead with 2 machine screws. Now you have a completed front end and a completed tail boom that need to be joined together by bolting the two plywood side panels between the front and rear bulkheads. Don't be misled by the photos accompanying this article, as I used two sheets of plexiglass for the side panels, to better illustrate the engine installation. The landing gear is next attached to the fuselage by clamping the steel wire struts in the clamp brackets molded into the body shell. Be sure to insert the little plastic triangles to prevent overtightening. It's interesting to note that the formed landing gear wire has almost the same dimension as 1/8 inch music wire which is available at your local hobby shop. Does that do anything for you?? To me, it meant that I could make another set of struts out of readily available stock and increase the width of the skids as desired for training gear purposes. I added 3 inches to the width and it worked fine.

Beginning now with the main transmission and engine, be sure to use lockwashers in all places per the instructions. I also recommend locktite for those metal screws into metal castings, etc. Assembly is very systematic, with few glitches. I did find it necessary to slightly trim the lower crancase web on my Webra Speed 40 engine in order to clear the clutch bell-housing . . . the tolerance here is very close. No matter how many different ways I tried, I couldn't get the timing belt to slip over both timing gears . . . there is no stretch or give in the belt. The answer was obvious; simply remove the cooling fan/timing gear with the neat "puller" provided in the kit, slip on the belt and reinstall the cooling fan. Actually, it doesn't take but a few seconds to do it this way, and it saves a lot of swearing and mental anguish, Ha!

The main rotor is pre-assembled except for installing the stabilizer bar and paddles. A little extra time spent in balancing the blades will pay off with a smooth running rotor. The blades themselves are finished except for light sanding and covering. The contact cover paper scraps were saved for use in the final balancing process.

When installing the main rotor head on the shaft, you will find a rubber sleeve which slips over the shaft, and the rotor hub slips over the sleeve. This might present a slight problem, but if you'll work the sleeve down over the shaft first (making sure the holes line-up), *then* use a little detergent or soapy water on the sleeve, the rotor hub will slip down easily.

By way of note, the main rotor control works on essentially the same principle as the Jet Ranger, that is, the Bell system for gyro stabilization and the Hiller servo paddles for greater control input. The net result is a chopper which has great stability and flys hands-off (well, almost), plus excellent control inputs for maneuverability. I might also add that with this particular control head, you no longer have to adjust the individual rotor blades for proper tracking . . . the control rod from the

swash plate to the rotor head mixing lever is simply adjusted in length until the blades track properly! Individual blade adjustment is still available by the use of the metal plate, but this is used mainly to increase or decrease overall blade pitch angle for high altitude performance.

The tail rotor is next on the list, and comes assembled except for the rotor blades. After installing the blades, check for balance in the usual manner to eliminate unwanted tail vibration. Slip the tail rotor transmission into the last former and clamp it in place with a single machine screw. You will note that the unit cannot be clamped too tightly because of two little bumps molded into the clamp bracket for just that purpose. You should, however, during your first test runs, watch out for changes in the tail rotor control as a result of the transmission slipping rearward and changing the effective push-rod length. To clamp it a little better, simply remove a very small amount from the clamp-bumps with fine sandpaper, thus permitting closing the gap a slight amount. A final word here is to use plenty of light machine oil (3-in-1) to lubricate the gears and bushings in the tail rotor prior to each flight. The rpm is very high and they really need lots of oil to prevent friction build-up.

The fuel tank installation is conventional, as is the cooling fan shroud. Just be sure the cooling shroud is trimmed enough to clear the clutch assembly, and is mounted firmly so as to clear the fan by 1/16 inch in all directions, otherwise the fan will contact the shroud and chew it up within seconds!

When installing the canopy, I found it wise to assemble it "in place" on the chopper, then spot-cement it with Hot-Stuff. Afterwards, it can be removed and the cementing completed with care. If it is not done in this fashion, you run the risk of having the aft end of the canopy not matching the curve of the body, and/or the cut-outs for holding it down will not fit the bulkhead attachments.

Attaching the scale engine per the instructions completes the project, except for the servo and radio installation. About the only caution here is that your throttle servo and rudder servo will probably rotate in the wrong direction and will have to be reversed in order to achieve the correct direction of rotation. I have made a sketch showing the correct directions, so if you'll follow it carefully, the mixing lever will do the rest and provide proper inputs to the tail rotor.

FINAL APPROACH

We've flown the Alouette for about a week now and have nothing but the best to report. She's easy to trim out, stable during lift-off, and in flight, exhibits no unusual characteristics. Even the landings are much softer than I had imagined they would be. I think Kavan has another winner, and for under $240.00. BCNU next month with more reports. ●

C/L . . . . . *Continued from page 38*

Running out of resin half-way through this job is a no-no! K&B says to add 8-10 drops of catalyst to each ounce of resin. I generally double this, so the resin sets up quickly. If you've never used sanding resin, I would suggest following the directions, you'll have plenty of time to do the job properly if you do.

Dipping the brush into the resin, be sure to load as much resin as possible onto it. Starting at one of the wingtips, simply brush the resin through the cloth and into the wood. Don't brush the resin out very much, or try to brush the resin with a "dry" brush. Always have the brush heavily-loaded with resin or the brush will hang-up on the cloth and pull wrinkles into it. At this stage, we aren't going to try to get the cloth to lay perfectly flat, but there is no need to put in any extra wrinkles. Keep brushing on resin until the whole bottom of the wing is covered. Put lots on, we don't want any dry spots.

At this stage, you'll be looking at a wing that is a bunch heavier, has all kinds of bumps and dips in it's finish and you'll be wishing you'd never started this job. Hang on, it's all gonna work out just fine. Double-check to be sure you covered the whole wing with resin. Now get out the toilet paper and wipe your, uh, wing with it. Actually, you don't wipe the resin off. Just roll the roll of T.P. along the wing, working from one tip to the other. Stick your fingers into the center of the roll of T.P. and play steam-roller with it. At the end of the first pass, you'll have a very well-soaked roll of T.P. in your hand. Peel off the resin-soaked layers and do it again. After a few passes, you should have most of the resin removed and the cloth should be laying perfectly flat. Keep going, we want to take off as much resin as possible. When done, the cloth should feel almost dry.

Let the resin cure and remove the excess cloth by sanding the edges of the wing with the small sanding block. I suppose you could cut off the excess with a knife, but it makes a much neater job if you sand it off.

Now that you know how to do it, go ahead and glass the other side of the wing and the complete fuselage. Might as well glass the stab and elevator, although I didn't.

When everything has one coat of resin, hit all surfaces with a little sandpaper. Use the 400 grit wet-or-dry, used wet. Don't do much sanding, just rough up the surface a little and clean up any areas (around the tips, for instance) where the cloth didn't lay down too well.

Now lay on the second coat of resin. Don't put too much on, we're not trying to build a lead-sled. Just put on enough resin to fill the weave in the glass cloth. Let the second coat of resin cure and then sand everything real well with the 400 paper. If you want a "Show-Biz" finish, I would suggest that you do all sanding with a sanding block. Using a sanding block, any low areas will show up quite well as they'll be shiny as opposed to the high spots which will be dulled by the sanding. If you come up with any low spots or "dry" areas (places where not enough resin was applied) simply add one more coat of resin to these areas and sand again.

The plane should now be looking pretty good, all surfaces are ready for primer, and ought to be as smooth as glass. If you're satisfied with everything so far, now's the time to glue the wing into the fuse. Do this very carefully, you want to get everything lined up properly. I prefer to tack-glue the wing in before socking the epoxy to it. On this plane, I did this by packing a small amount of K&B micro-balloons between the fuse and the upper surface of the wing at both the LE and the TE. I got the wing in square and put one single drop of Hot Stuff on the micro-balloons at each location. I was lucky and didn't have to break the wing loose for another try, but could have if necessary. Do the same thing at the stab. Go back and be sure everything is straight. You do want a good-flying plane, don't you?

I glued the wing and stab in permanently with 5 minute epoxy. Do this job fast and only one side at a time. You need a minute or so to force the glue into the joint, using your finger to push it in. Notice that a fairly loose wing cut-out is necessary. If it's too tight, there is no way to get in enough glue. Also do this job as neatly as possible. The fuse and wing surfaces are ready for priming, no reason to mess them up with excess epoxy.

Experienced builders will have noticed that we haven't installed the cowl yet. Prior to assembly, the cowl can be glued onto the fuse and glassed along with everything else, but that is a little difficult, as the cloth doesn't want to go around the compound curves very well. So I put the cowl on last, you can do whatever you want. I should mention, however, that the cowl was finished with resin prior to gluing it to the fuse/wing. Another item concerning the cowl is that the '76-'77 AMA rules specify that, unless the cowl is scale, it can't be more than 1/2 inch thick. If you can't understand the reason for this requirement, don't worry, I can't either. My old Goodyear was built to '73 rules and I put a non-scale, 1 inch thick cowl on it. This plane will be used as a back-up this year so, to be legal, I should change the cowl, but I don't plan on it. Here in the N.W., we're too busy building, flying and competing to worry about something as silly as a non-scale cowl on a profile model which is, in itself, very non-scale in the first place.

With the plane assembled, about all that's left to do is to put on some fillets before we get into painting the thing. The best fillet material is Epoxo-

lite from Sig. Follow the directions on the can, there's nothing to it. A good substitute for Epoxolite, assuming you can't find any, is micro-balloons mixed with epoxy (the slow curing kind, of course). Even better is micro-balloons mixed with sanding resin, but remember that sanding resin doesn't like to set up over epoxy, especially the 5 minute kind. A word to the wise . . . .

Back aways I left out one little tip that ought to make life easier for you. When glassing the wing, the lead-outs get in the way and it is easy to accidentally get resin into the leadout guides. As the leadout guides are 1/8 brass tubing, I just slide 3/32 tubing over the leadouts and into the 1/8 guides (the leadout ends aren't made up yet, natch). When the resin or whatever is almost set, a twist on the 3/32 tubes will break them loose and keep the guides from being fouled with resin.

I'm ready to knock off for this month, but let's get the plane ready for paint. We have a nice, smooth resined surface, and most will want to paint directly over it, but I feel it is worthwhile to lay on a coat or two of primer. K&B makes an excellent primer that is epoxy-based, dries fast, sands easily and fills very well. I regard the use of this primer as a necessity, especially if you want a "Show-Biz" finish. Be forewarned that Project Goodyear has a "Show-Biz" paint job! The primer should be sprayed, of course, and don't be afraid to use plenty . . . just be sure to sand most of it off. I spray on a heavy coat of primer and then sand with 400 paper, used wet. Almost all of the primer is removed and the plane is checked over very carefully for any "holidays" (read mistakes, such as low spots, dents, pin-holes, rough fillets, etc.). This is your last chance to fix anything that you don't want to show through when the plane is painted . . . better get it right. Now a medium coat of primer is sprayed on, being sure to get good coverage on any dark areas, the Epoxolite fillets, for instance. An advantage to using K&B primer is that the primer itself is white, which is a very good color to spray over. The primer will cover any dark areas, making coverage with the first color coat of paint much easier.

One more tip. When doing any wet-sanding, add a drop or two of liquid dish-washing soap to the water. Makes the paper slide easier when sanding.

That's enough Project Goodyear for this month. Next month we'll paint the thing and get it ready for some flying.

OLD-TIMER STUFF

Hope I'm not cuttin' in on John Pond's column, but I keep picking up bits of information about Old Timer C/L flying going on. I would like to hear about it, if anybody wants to take a few minutes to write to me about it.

Seems like I recall reading in Pond's column something about our AMA Prez, Johnny Clemens wanting to start an Old Timer C/L organization along the lines of SAM. This sounds interesting, and Johnny would be a guy who could put together such an organization.

I'm not too sure if I will be able to get too excited about Old Timer C/L planes, I really dig the modern ones, but I'm willing to try it. The Old Timer F/F planes are something that absolutely fascinate me, so maybe I would also like antiques-on-a-string.

To get things rolling with Old Timer C/L, here is a source of plans for you to check out. Fran Ptaszkiewicz, 23 Marlee Drive, Towanda, NY 14150 (Gawd, I hope I spelled his name right!), is offering plans for the deBolt "All-American", "Sportwing", "New Bipe", and the "Stuntwagon". The plans are $2.50 per set, are done in blue-line and include rib patterns. Sounds good; contact Fran "Alphabet" if you're interested.

The above was dug out of the Skyburners of SoCal n/1, as edited by "Mad Mike" Keville. Just today I got something else from Mad Mike, a contest flyer this time. I do very little reporting of contests, let alone publish a contest flyer, but this one is worth looking at.

"SKYBURNERS of Southern Cali-

fornia present a gala, double-elimination COMBAT contest . . .

"The 'complete' combat contest. Be forewarned, however, that we will surely disregard the 'Line Entanglement Rule' . . . the name of *this* game will be 'get up and fight'!

"Assuming that the grass will be mowed, and the CD sobered up, we can assure you of the best Combat meet you've ever seen. We'll have some nice trophies to award: also (assuming the manufacturers didn't throw out our pleading letters) we'll have some mighty fine merchandise prizes.

"If enough people are in the mood, we might meet (after the contest) at the local Shakey's for a beer-guzzling contest. Single elimination. (Did you see *that*, Dirty Dan?) Alibis will be heard at this time.

"Notwithstanding all the above baloney, we *will* pay strict adherance to AMA rules regarding (a) safety (b) line sizes (c) pull tests (d) correct engines (e) AMA numbers on upper-right wings, and all that official stuff. Then we'll get down in the alley and see who's the best Combat flyer in California (or anywhere for that matter, as the Texans . . . and other nationalities . . . are also invited to The Happening).

"This is probably the most boring contest announcement you've ever read. By now, you're asking yourself 'Where', 'When' . . . maybe even 'WHY' . . . well, we tried to keep it a secret so we could fly amongst ourselves, and name one of our own club members as West Coast Combat Champ, but in the true interest of the Sport, we decided to invite the modeling public (mainly, we need the money.).

"GAHR HIGH SCHOOL, CERRITOS, CALIF. SEPT. 12, 1976. FIRST MATCH AT 10:00 A.M. For more information, contact: Mad Mike Keville, 6618 Dashwood St., Lakewood, Calif. 90713.

"Oh yeah . . . the tab will be $3.00, as the prizes will be so outrageously beautiful, and the competition so intense, that anything less would be an insult to your integrity!"

CANADIAN NATS

Seems as if *everybody* is going to the U.S. this year. And all the other columnists are telling you about the U.S. NATS, so I'll try not to duplicate their efforts but, instead, will let you know about the Canadian Nats, if you're interested in going North. I've been in contact with Gordon Van Tighem, and he says that U.S. contestants are cordially invited and that they can expect a slightly more relaxed atmosphere, if they choose to go. Most all AMA events will be run, and if your equipment is legal here, it'll probably be OK in Canada, also. For more information contact: Gordon Van Tighem, 3703 - 19 Avenue S.W., Calgary T3E 062 Alberta, Canada. For pre-entry, contact: Harry Turnbull, 4223 Dalhart

Road N.W., Calgary, Alberta, Canada. The Canadian Nats will be held in Calgary, Alberta, August 3 - 8. Contact these guys if you're interested. Calgary is a really neat town in the summer!

We'll close with something for you to think about. Vince Caluori (look Vince, I spelled your name right!), a friend of mine, who most unfortunately flys R/C exclusively, was over a few nights back and we got to talking about Project Goodyear. I mentioned that we would probably be trying a megaphone and maybe even a full pipe on the GMA Rossi, but that I wasn't sold yet on megaphones and such, and that there is talk goin' round about banning any kind of exhaust extension. Naturally, I don't feel like going through the hassle of making a meg work, only to have them banned as soon as I get it sorted out. Vince said that any ban on extensions, megs, pipes, etc. would be a bad move, in the long run. I couldn't see how and told Vince so. He went on to give his opinion (golly gee, an R/Cer trying to tell Dirty Dan something new!).

Vince feels that the day is soon coming where every model engine will be required to have a muffler, both for competition flying and for sport flying. He feels (and I agree) that there are no mufflers presently available that are truly satisfactory. They rob power, make the engines run hot, lots of them don't muffle effectively, etc. OK, looking forward to the day when mufflers are mandatory, and realizing that today's mufflers just don't cut it, what are we gonna do?

Vince says that the C/L Racing and Speed guys ought to be allowed to use megs, pipes, etc., as they are the ones who can develop pipes to the point where they really work consistently, and without trouble. Then, when mufflers are mandatory, the entire sport of model flying can take advantage of what the C/L guys have learned and simply take their pipe formulas, build pipes for less-radical engines and simply slip a small (like a Kodak film can) muffler on the back of the pipe. This should give a muffler that will really muffle, yet give a boost in power besides.

Interesting, and I think that Vince could very well be right about this. As a past member of one of the other AMAs (the American Motorcycle Association) and an ex-motorcycle racer (cross-country only), I've already been through a muffler hassle, the dawning of the pipe, and the emergence of performance two-strokes as *the* way to go, if you want to go fast. At first, pipes were regarded as "magic" and nobody could really figure them out ("Gee, I dunno, it *feels* faster and it sure is loud!). Lots of development went into rpm pipes and torque pipes and cutting off the stinger 'till the engine ran like

you wanted it (not very scientific, but it worked; I used to take a hack-saw with me all the time just to cut guy's stingers down to the right length). Anyway, when the day came that we had to bolt on mufflers, enough people knew the secrets about pipes to allow the development of small mufflers that would simply clamp on to the stinger of the pipe. The designs of the pipes were changed to match the mufflers and vice versa, and pretty soon a muffler was no longer a disadvantage. It got to the point where I could even ride WFO behind the meanest, baddest cross-country bike around and not go deaf for a week or two.

Think about it, folks. Maybe we can learn from the bikers who have already wrestled with this muffler thing. We're going to have to do it someday, you know.

Well, take a look at this. Pylon Brand is going to bring out a line of C/L Stunt tanks. I haven't seen one yet, but the latest Pylon order form lists the tanks in eight different sizes. Sounds good!

Regardless of any "corrections" that you may have seen inserted into this column by a well-meaning editor, *(Sorry about that DD. We were acting on a supposedly reliable source of information, but apparently we were "had." wcn)*, the old Veco line of accessories was pretty hard to come by for awhile, wasn't it? Good news . . . Duke Fox has purchased the line and will be producing the line under the good ol' Fox label. I guess it's pretty obvious that Duke is serious about the C/L market, and I'm certainly glad to see *somebody* cater to us C/L fliers.

Another long column and other C/L editors have complained of the lack of material. Guess they didn't look very hard, did they? See ya next month. ●

Rocketry . . . . *Continued from page 23*

they fly well, too. A lot of talk was caused by Centuri's newest kit, a semi-scale Eagle Transport from the Space: 1999 TV series. Yes, it flies! The Eagle portion is plastic, and requires some assembly; for flight, you plug a tube with fins into the back of the Eagle. The two portions are recovered on separate parachutes. Centuri has released the kit in two packages: alone, and with their Powr-Pad launcher as a starter package. Judging from the popularity of Space: 1999, this can be counted on to attract a lot of new modelers to the hobby. Drop Centuri a line at Box 1988, Phoenix, AZ 85001, for a copy of its catalog; you might also ask for a copy of the "Rocket Times" newsletter.

The Flight Systems crew stopped in at the convention on their way to the Goddard Space Flight Center. It seems that they were invited out there for the fiftieth anniversary of Goddard's original flight, the world's first flight of a liquid-fueled rocket. NASA had commissioned FSI to power a scale replica of Goddard's rocket, to be flown in the ceremony. (They later flew it successfully four times, in the pouring rain . . . to be scale, it should have been snow!) The big eye-catcher in the display was a model that FSI may be releasing as a kit this summer: a scale Arcas sounding rocket. It's 2.25 inches in diameter, and almost six feet tall, which makes it 1:2 scale! The beast flies with the famous FSI F100-8 Loadlifter engine; and it is really an amazing sight to see. There is no definite word yet on when the kit will be released or what it'll cost, but we're encouraged that it will be, since FSI's scale Black Brant II kit has been such a popular item. Incidentally, the FSI crew went out to the flight demonstrations with a Black Brant powered by their special limited-production Thunderbolt engine, and pushed it over 5000 feet, causing whiplash in the necks of most of the spectators. You can get a catalog with complete information on all engines including the Loadlifter series (D20, E60 and F100) as well as their kits from Flight Systems, Inc., 9300 East 68th St., Raytown, MO 64133; the cost is 75¢.

Competition Model Rockets was (as usual) a favorite with the Convention crowd. CMR was also on its way to Goddard, since Col. Howard Kuhn, CMR's president, had built the models of Goddard's rocket that were used in the ceremony. The famous CMR egg capsule, which has become the standard in egglofting competition, is now available in a lengthened version for Dual Egglofting competition; there is also a new kit out that features the capsule, called the Double Eggle (no typo). They are also first on the market with a piston launching device, which is allowed in NAR competition. A piston launcher uses the gases generated by the ignition of the engine to impart added lift-off velocity to the model, and many different designs have shown up in the last few years. CMR's "Boom Tube" kit is a zero-volume piston, which has been shown to be the most efficient. A catalog with all kinds of info can be had from Competition Model Rockets, Box 7022. Alexandria, VA 22307; I believe it costs 25¢. CMR still produces the best model rocket telemetry transmitter, the Foxmitter, and a full line of sensor modules; we will be reviewing it in a future installment.

Estes Industries sent Dave Chapman and Gary Rosenfield out to the Convention, loaded down with catalogs and new kits. Noteworthy in the new Estes kits are the scale Nike-Ajax, which is extremely good looking; and the 2-stage Renegade. Estes is also releasing a flying semi-scale Space Shuttle model that generated a lot of excitement; the fuel tank and boosters will be parachute-

recovered as a unit, and the Orbiter will be trimmed for a gliding recovery! We have heard that production of the kit is running a bit behind, but they should be available when you read this. We hope to be able to review this exciting kit introduction in the near future. Meanwhile, you can get a catalog for 35¢ from Estes Industries, Penrose, Colo. 81240.

For the first kit review to come out of this year's Pittcon, we have something really different. For the past few years, a company in Pittsburgh has been producing rocket kits with an interesting difference; rather than ejecting parachutes, they release a unit which pops three rotor blades and spins down in a helicopter-like fashion. This was your author's first face-to-face encounter with the "Kopter" rockets, and we were very impressed indeed. According to Kopter president Walt Senoski, the Kopter rockets were designed out of frustration; it seems that prevailing winds carried away most parachute models, and models which used streamer recovery either landed in grass or broke fins. Walt says that the wind drift factor of a Kopter unit is very small, and he showed several models that have racked up an impressive number of flights. Kopter also produces a couple of big, impressive gliders that are real show-stoppers; they are trimmed for a fairly tight circle, and designed for a long life.

Walt kindly supplied us with one of his Kopter kits for testing, and also flew a couple for us at the Convention. The Kopter is designed around the ejectable rotor unit, and retails for $5.00. Fins and nose cone are pre-shaped balsa, and the engine mount supplied is designed for Estes and Centuri C6-5 engines. Construction of the rocket is standard, with the only interesting exception being the fact that the shock cord must be mounted at the rear of the main body. The rotor unit itself is balsa, with plywood for heavy-duty rotor blade shafts. It's important to follow the instructions closely when assembling the rotor, and it's really not difficult if you lay out all of the parts before yielding to temptation. Pay close attention to leveling the rotor blades in respect to each other; if they're assembled carefully rotation will be much better.

We made two modifications to the basic kit when we built it: we added an FSI C-60 engine mount in place of the one included with the kit; and we replaced the contest rubber shock cord with the FSI cloth-covered cord, since the FSI cord is flameproofed. When flying the Kopter, no recovery wadding is used; the rotor blades are folded around the shaft and inserted in the main body. On our first flight we found that the advice in the instructions concerning addition of weight to the engine mount should be taken to heart; the main body fell too slowly to allow the rotor to start spinning. We added clay trim weight around the engine mount and tried again. The second attempt used an FSI C4-4 engine, and worked very well, with an excellent straight boost and good rotor deployment. We get a real kick out of that rotor unit; it's the neatest thing we've seen in quite a while. Two more flights were made, using B3-4 and D6-4 engines; both were excellent.

The Kopter rocket is a grand one for demonstrations, with its pleasingly different recovery and quick turn-around time. All you have to do is pick it up, jerk out the old engine, install a new one, fold up the rotor blades, and you're ready to go. It really does fight the wind drift, too. We hope soon to be reviewing the Kopter Jet-I-Son Glider, which fires a rotor unit out of its nose as it switches from boost to glide trim. Sounds like a winner for Fourth-of-July demos! You can get a catalog of Kopter kits from Kopter Rotor Recovery Products, Box 98226, Pittsburgh, PA 15227. Tell 'em MB sent you. See . . . there *is* something new under the sun!

Bakersfield . . . *Continued from page 19*

to be made to establish the winners. This included a tie breaking race between Terry Prather and Kent Nogy for First Place in Expert, which developed

into as beautiful an exhibition of Formula One flying as most of us have ever seen. Terry was airborne first in a racehorse start, and the airplanes maintained that position and nearly the same separation for ten laps, almost as if glued together. Terry's winning time of 1:16.1 was only .2 seconds better than Kent's. The final standings were as follows:

Expert:
1. Terry Prather
2. Kent Nogy
3. Jim Jensen
4. Mike Atzei
5. Tom Tussing
6. Bobby Smith
7. Bob Violett
8. Steve Sica
9. Tom Cristopher
10. Jack Lee

Standard:
1. Ron Hadaway
2. Laird Owens
3. Dave Shadel
4. Scott Smithwisk
5. Chuck Brown
6. Russ Kime
7. Ray Floyd
8. Ron Baker
9. Sonny Meyers
10. Gary Farrish

Bob Violett wound up with a big problem at award time. He was the winner of the Glen Spickler trophy for fastest time at this year's race, with a 1:14.5 The problem? How to get a three foot, fifty pound trophy back to Virginia!

Another commendable thing that the BARKS do is hold a raffle for the workers during the contest. This year a number of goodies were distributed amongst the hot and thirsty, but willing multitude that it took to run an event of this size. The best of the lot went last; a Proline radio, won by no less than our able CD, Jim Hill. The tremendous applause must still be ringing in his ears. It was obvious that everyone felt he deserved it. Our sincere thanks to Jim, Anne, Glen, and the many others too numerous to mention. Well done, gang!

There are other races scheduled throughout the country for the rest of the racing season. And surely other sections have their equivalent contest at one time or another. But for the west coast, and a number of outsiders that grows larger every year, if you ask what the hell we are doing, the answer is simple: we are waiting for 1977 so we can go back to that fun place, the home of the BARKS, Bakersfield!

1976 NMPRA NATIONAL CHAMPIONSHIPS

We have just learned that the 1976 NMPRA Formula One National Championships will be hosted by the BARKS, and held at Bakersfield's Famoso Field, October 30th, and 31st. CD will be Wes Redwine, assisted by Glen Spickler as Co-CD.

Ron Schorr, NMPRA President, informed us that the eligible flyers will be the top ten from the NATS; the top 20% from each NMPRA district, and all NMPRA officials.

Further details will be available from the NMPRA Newsletter. •

F/F ..... *Continued from page 53*

spars to a point about 3 rib bays beyond the dihedral break.

PRESSURIZE YOUR T.D. 049

The T.D. 049 is a fantastic little engine, putting out a great deal of power. It is so good, that there are no real competitors for its number one position as the best competition ½A engine on the market, world-wide.

For free flight competition, the engine does run better if it uses a pressure fuel system. The easy way to do this is to use a pen bladder or pacifier tank, but these rot out and sometime . . . as happened to me recently . . . come apart, spraying everyone with exotic fuel.

In an attempt to get a more self-contained unit for pressurizing these little engines, I began experimenting with different systems. Kustom Kraftsmanship sells tapped back plates, and this would be one way of pressurizing the fuel system. Cox has incorporated a pressure nipple into the delrin body of the engine, but this, if you have ever tried it, is not very satisfactory. Then, in a moment of pure genius, it came to me. Why not tap the engine through the mounting lug? I had been doing this for years with my Super Tigres and Rossis, it should work with the T.D. . . It does.

The process is very simple. Take the engine apart until you have only the case left. Carefully, using a 1/16 drill bit, drill a hole through the mounting lug. The hole should be positioned so that it enters the inside of the crankcase at the connecting rod clearance groove, just ahead of the threads for the backplate. After the hole is drilled, clean up all of the shavings and thoroughly wash the case out with solvent. Take a piece of 1/16 O.D. brass or aluminum tubing about a ½ inch long, and push it into the hole. Leave at least a ¼ inch of the tubing extending from the lug. Apply one drop of Hot Stuff to the joint. Take a piece of 3/32 O.D. brass tubing and cut it to a length of about 1/8 inch. Slide this over the 1/16 tubing (as shown in the sketch). Hot Stuff in place, clean the engine, oil and reassemble.

After installation of the engine and tank in the model, you can connect the pressure line between this nipple and the pressure intake tube on the tank. I have also found that you need not use a flood-off with this kind of a system. A normal Tatone Pinch-off timer does the job very well. With pressure fuel, there is no more surging

engine runs and no more fading on hard launches. It's tough to beat it, it's inexpensive to do, and it takes almost no time at all!

DESIGN YOUR OWN GAS MODEL—Part I

During the next couple of issues, I would like to present some viewpoints about how you can design your own competition gas model. Since there are numerous theories about the best model types and the best methods, this series will not attempt to give you "bests" as much as it will attempt to give you practical considerations taken from one biased point of view.

My own theories tend toward the "Simpler-The-Better" approach, although I have built quite a few models which would belie this philosophy. Obviously, there are several excellent models available in kit form which are very competitive and have won everything from the Snider Swamp Annual to the AMA Nationals. If you have built several of these, and find yourself doing a bit of doodling here and there, you might be ready to take the giant leap into being a model designer. Each model you see flying, sports some originality of some sort. Perhaps, it may be as small a thing as tissue trim or as large a thing as a new fuselage for an old or modified wing or stab. In any case, the desire to do something just a bit different, even with kit models, is in each of us.

Get some kit models you have built in mind, and try to read as much as you can, as well as study the plans in the magazines . . . NFFS Digest, as well as other sources. Additionally, take the time to study a particularly appealing model at some upcoming contests. Then, you will have some ideas about what the "Dream-Ship" could look like. Try some experimenting. Get some graph or grid paper and sketch out a side view . . . to scale. Get a design that appeals to you. As a starter, try for ½A size . . . less time and less money involved in building it. After all, it could be a flop . . . couldn't it?

So, I'm going to leave you with a homework assignment for next month. It is to get some basic design features down on paper . . . or at least in your mind. Try some wild ideas. Next month I'll be back with some basic design parameters, weights, construction tips, etc. In the meantime, let your mind go!

THE HISTORY OF ½A POWER MODELS

Help! I am putting together an historical study of the ½A power model in the USA, and I need your help. Specifically, I need information about the early rules (from 1950 or 1951 to 1960) used by the AMA, and the names of Nationals winners and their models from the earliest days to the present. If any of you winners are out there or if anyone has pictures of the winners and their models, I would appreciate receiving a letter from you. I can offset the expenses incurred in reproducing any information which you can supply and will give proper credit to all who assist in the study. Write directly to Bob Stalick, 1120 Shady Lane, Albany, Oregon 97321. And my thanks to you in advance.

IN CLOSING

It seemed appropriate to close with a couple of "dillies" for the month, humorous, of course. (I am tempted to say, "dilly, dilly" but will offer the following from the Flightplug, instead): "Old age and treachery will triumph over youth and skill!"

It must be time to quit. See you next month. •

Sniper . . . . . *Continued from page 36*

finish be painted on the building board surfaces. This will prevent moisture from entering wood pores and also provides a surface for marking rib positions, which can be erased as needed.

The basic 36 inch airframe rectangle should be lined on to the board surface. This is easily done by finding the center of the board and placing a mark. From this center line, two end lines are marked . . . 18 inches each side of the center. These lines are marked with a square. Mark one of the end lines "inboard" and the other "outboard", referring to the basic makeup of the airframe. Since you are going to work on airframes from in front and in back of the building board, mistakes can happen without having these reminders constantly in view.

For the deluxe treatment of this building surface, a layer of cork could be applied for a better pinning surface. If you spend the time to build this right, it will work for you for many years.

I'm going to preface the construction of the airframe with specifics regarding some of the basic assemblies of the Sniper's integral parts.

MOTOR MOUNT

I use Titebond white glue throughout. The 1/8 inch dowel pins are an absolute MUST! The reason being to prevent splitting from vibration. The glass cloth/resin finish is added for durability and looks. Alignment of the maple engine bearers is very important. After the bearers are cemented to the spacer, a center line should be drawn horizontally which will ultimately be matched to a center line drawn on the two center ribs for true incidence. THIS IS ALSO AN ABSOLUTE MUST!!!!

Make a template of the mount outline and use this for a cutting template after the gluing is complete. An option to the mount design shown is the "BOSTA" or "NEMESIS" styled short mount. I decided on the mount shown so that if additional weight should ever be needed up front, the nacelle could accommodate it. It additionally serves as extra strength when the model breaks the ground barrier during the throes of combat.

PEN BLADDER FUEL CELL

I got tired of getting less than desired results from the usual BT-50/Toiletpaper tube construction. Ultimately I got to the use of a golf club polyethylene tube, which is light and fuelproof. I suggest the use of 5-minute epoxy in the application of the end plugs. Use the epoxy to coat the entire plug as it faces inward in the cell. Use white glue or model cement when gluing the completed fuel cell assembly into place. What you have here, then, is a total cell make-up which can be separated from the airframe when cannibalization is necessary. For reuse, scrape the ends to a somewhat smooth surface, and it's ready again. When the holes for the bladder and the drains are cut, I suggest their edges get a coat of 5-minute epoxy for total fuel proofing. The bladder compartment is ready to go and will easily accommodate the No. 24EL pen bladders I use and have available for sale.

THE CONTROLS

What always amazes me is why some people have tight-binding controls. There is simply no excuse for this! Use the following modifications for the Veco style large bellcrank: Substitute the mounting screw for an 8-32x3/4 inch screw. Drill out the bushing with a No. 22 drill; you will have to force the drill bit against the bushing walls to relieve it just a bit more. The reason for the substitution is that the screw supplied with the bellcrank is too small, and there is too much slop, thus creating a dead spot in sensitivity. For the lead-outs, I use braided flexible material. This is soldered with silver solder and wrapped with No. 28 soft copper wire. After the screw is placed, thread on a nut and tighten up against the ply floor. This is the surface on which the bellcrank bushing will ride. Add the bellcrank, and top off with another nut. After tightening this down against the bushing, thread on a piece of silicone fuel tubing about a 1/4 inch long. It will hold this top nut in place . . . and is vibration free.

THREADED BOOM CONSTRUCTION

There are two methods of construction of the adjustable tail section. The following will outline what is shown on the total plan format. Both give the same end-product, yet one takes less time in basic construction. The first time of construction will require a little getting use to, to get the hang of it. It's simple, yet different. This feature will allow the flier/builder to "dial" his own sensitivity into the plane's flying performance.

Much hot air has a way of finding a group of combat fliers . . . especially

when turning radius and air speed is the topic of discussion. Usually none of the glowing words of wisdom outline the flier's ability to handle his fire-breathing, streamer-eater. Lack of practice normally will indicate the inconsistant performance which will result.

At any rate, we start with a clothes pin . . . available in any major food store. Trim as per the plans for the mount dimensions that you decide on . . . 3/8 or 1/2 inch in width. Cut a 1/4-20 screw or threaded rod to length. Drill a 1/4 inch hole in the top of the clothespin . . . straight. This may take a couple or three until you get it right. The aid of a drilling jig or drill press will eliminate all the hassle. I use a hand drill, so it can be done.

Epoxy (5 minute) the threaded shaft into place. Take a 1/4-20 "T-Nut" (available at any hardware/lumber store) and grind the outer circumference to meet the inside diameter of the 5/8 inch brass tubing boom.

To do the grinding I thread the T-Nut on a 1/4-20 screw and tighten another nut up against it. This assembly is chucked into an electric drill, and with the use of a medium to coarse grinding stone, the T-Nut is ground down to fit. The T-Nut is silver-soldered into the tubing. Start by wrapping a small coil of siler solder around the neck of the T-Nut. It is then inserted into the tubing to the desired location with the aid of a threaded shaft. The length of this threaded shaft will be such that it can be chucked into a vise and allow the T-Nut silver solder wrap to locate itself in the position as shown on the plans. To insure that placement, the T-Nut should be the desired distance up on the shaft (1½ inches) so that when the tubing is slipped over the assembly, the top of the vise jaws act as a stop, locating the T-Nut automatically.

BE SURE THAT THE LENGTH OF THREADED SHAFT CHUCKED INTO THE VISE EXTENDS BELOW THE VISE JAWS.

You then use a torch and heat the shaft to a cherry red; the heat will travel up and heat the T-Nut to a temperature that will melt the solder. Be sure to use the proper flux. Find the center line of the tubing to locate the tubing hingeline and secondary boom tie-down point at the trailing edge of the airframe. Drilling for the 1/8 inch tubing hingeline at the stab, I use a 9/64 inch bit. This will give a somewhat sloppy fit, which will allow the tubing to be held in proper parallel alignment while the soldering is done. Remember, after this is complete, this portion of the SNIPER can be used over and over!

TELESCOPING BOOM

Begin by cutting two 4 inch pieces of brass tubing; one 5/8 inch dia., one 19/32 inch diameter. These are available from the K&S tubing display at your hobby shop. Locate and drill the hole for the tie-down bolt in the 5/8 inch tubing. At the other end, saw a 1 inch cut along the center line. Next, find the centerline of the 19/32 inch tubing. Locate and drill for the 1/8 inch tubing with a 9/64 bit. Solder the desired length of tubing (for hingeline) with silver solder. Assembly is simple, as one fits into the other. The 1/2 inch hose clamp is then tightened down to hold the two-piece assembly in place. Length adjustments are simple. More on that later.

THE STABILATOR

Use either 3/16 or 1/4 stock (quarter-grained if possible). To shape, I use a Stanley "Surform" wood file. This is available in any hardware store. It will help take care of the bulk of the shaping. The rest is up to the No. 220 sandpaper and you.

Draw a centerline along the LE. The 1/8 tubing is located along that line and glued into place with white glue. Since I finish with resin surfacer and epoxy paint, I wrap fiberglass over the tubing and extend it on to the wood surface. You might also want to reinforce in the area that the control horn is located. Use 1/32 ply on top and bottom of the stab to "sandwich" the balsa. Since this area will be covered by the glass cloth, I suggest it be done at the time the tubing is aligned and glued. By the way, to perfectly align the tubing along the hinge-

line, I suggest you slide in a length of 3/32 music wire until the glue is dry. Be careful not to let glue seep along the hinge pin. Again you have a removeable, reuseable part!

WING AIRFRAME CONSTRUCTION

The all-time enemy of the combat ship is the warp! It definitly affects flying characteristics and performance. Initially, most of the problem can be corrected while the airframe is in construction. The jig eliminates the major twists, while saving a great deal of time.

To start, mark the rib positions with a square. Tack-glue 1/4 x 1/4 balsa on each side of the rib lines so that the rib itself can be easily placed without leaning. These positioning "bosses" are located on the board surface just forward of the spar.

Be sure the alignment of the rib bosses is straight and true along the length of the span. For ease of marking rib positions, the TE balsa is butted against the rib bosses and a pen mark is then made. The marked TE, is positioned on the ruler support and held in place by means of spring-loaded clothespins. To insure that all ribs are properly aligned on the TE, mark a line parallel to, and 1/8 inch forward of, the aft edge of the TE.

Important: Be sure that you don't forget to mark a center line on the inside of the two center ribs . . . as this will be your only aid (outside of your eyeball) to aligning the horizontal angle of the motor mount.

The ribs are now glued into place. Next glue on the top TE piece and the top 1/4 inch spar. DO NOT glue the two center ribs to the spar at this time.

The airframe is removed from the jig and the other spar is glued in. While the glue is still fresh, the motor mount is glued and positioned between the two center ribs . . . matching the center lines drawn earlier. Here is where centerlining makes the job easy.

I use a "C" clamp to hold the mount while it is "sandwiched" into place. Gently balance the airframe on its TE and lean it up against something. While in the vertical position, the LE spruce spar is glued in place and held with rubber bands. Clamp the plane in a vise at the two center ribs which "sandwich" the motor mount.

Now that your hands are free, you can twist the wing structure to counteract any twists that have found their way into it. Do it while the glue is still wet and pliable. The rubber bands will allow for the necessary twisting action. After you feel things are as straight as they're going to get, leave the structure until dry. Should you feel more twists have yet to be eliminated, you can attack that problem while installing the LE planking.

Next to be added is the bellcrank system, as outlined earlier. I suggest the plywood flooring be pre-drilled prior to gluing in place. Install the balsa gussets which are the major supports at the TE. After the glue has dried, the TE is cut completely away between the two center motormount ribs. The plywood brace is glued into place as it is keyed into the motormount section. Use the centerlines on the inside of the motor mount ribs as your guide. It will be glued right over the line. Now use white glue to install the clothespin. You'll note there is some "play" in the fit of the clothespin. Shim with balsa.

Now for the LE planking. This is another point in the building schedule that will allow you to eliminate any warps or twists that have created themselves. To check for these (which you should do anyway . . . don't assume they don't exist) I suggest that you find two very straight quarter square spars, and place them on the airframe, spanning the cord from LE to TE, one on each wing rib near the tip. Back off from the structure about ten feet or so and check the two spars for alignment. If there is a twist you'll have no trouble seeing it! In the application of the LE planking, the twists can be corrected by counter-twisting the structure immediately after the planking is glued and pinned in place.

After the LE planking is complete, the center section can be planked and the cap strips put on.

Next, the nacelle is added. I suggest that just before it is glued into place, the blind-mounting nuts be packed with vaseline so that glue or resin doesn't seep into the threads. Shape with a model knife and No. 220 sandpaper. Add cloth and a coat of surface resin (Hobbypoxy or K&B).

Sand the entire structure with No. 220 and prepare the covering material of your choice per the cutting instructions on the plans. Covering is the last step in trying to stop any warpage or twists that still remain.

After covering is complete, the secondary boom is positioned and the mylar is marked so that it can be removed for the gluing of the boom. Again, 5-minute epoxy is used. Add the boom assembly and set it up for 6 inches of moment arm from the TE. This will give you good positioning whether you have a Tigre or Fox. Presently, with my Fox 36X, I use a moment of 6¼ inches. But that's me . . . my reflexes aren't what yours are. You'll have to experiment. That's the name of the game . . . consistency . . . and that comes from PRACTICE!

There you have it . . . your first SNIPER. Enjoy it . . . like potato chips, one leads to another. I'm interested in your experience with this design. As you can see, there has already been an addition to the plans and this will con-

tinue as ideas come in. On the boards at this time are the plans to produce this in kit form and also an FAI version. Your name will be carried on a list of the "SNIPER SOCIETY", and you will be updated as things develop. In the meantime if you haven't done so already, join MACA . . . a great organization for the advancement, betterment and promotion of control line combat. Keep in touch.

Plug Sparks . . . *Continued from page 31*

air mail. The Thor, which comes with the original papers, is the same deal as the Genie w/timer and tank, and costs $22.95 less plug. $1.50 extra for postage gets it to you.

Among his many parts and accessories, he also offers the 1934 Brown Jr. instruction sheets for 25¢. For further information on all these great goodies, write Mark Fechner at 112 Clinton Ave., Salt Lake City, Utah 84103. If you're in a hurry, call Mark at (801) 328-9973.

TEXACO F/F AND R/C

For years, this writer has been extolling the virtues of the Texaco Event as revived by the SCAMPS. In recent years, the "Dawn Patrol" Texas Event, as originated by Sal Taibi, has become so popular that all flying stops around nine or ten o'clock in the morning.

To bill out the day with Texaco type flying, SAM 21 has been staging O/T radio assist Texaco meets. This year was the first in conjunction with the original SCAMP Texaco Contest. The writer had a thoroughly enjoyable day flying, photographing, and C-Ding the SAM 21 portion.

The writer was lucky that it rained somewhat early in the morning, as the ignition switch in his car went haywire. It wasn't until 9:30 arrived that the car was hot-wired and made an appearance. Despite being late, there was still enough time to drag out the Miss Model Craftsman.

With considerable urging from F. L. Swaney (who volunteered to chase), the Brown Jr. was finally fired up, but, alas, the model was circling too tight with torque and gradually spiraled in. Everyone scattered except poor old F. L. on the motorcycle, waiting to chase. The model caused a nine stitch cut and a bruise the size of an ostrich egg on Swaney's leg. As Sal put it, "You r/c boys better learn to take your free flights a little further out from the crowd." True!

Anyway, to show people it still could be done, Gene Wallock dragged out his six year old Super Cycle powered Nimbus, and proceeded to win the contest with a 24-minute flight. Strangely enough, this was one of the lowest times to ever win a Texaco Event. The weather simply wasn't that great.

"Second place" Silva was still at it,

with 20:17 for the runner-up position. For the first time, Hugo Lung's huge Boehle Giant placed in the first three with a 17:30 flight. This model is absolutely fantastic for slow flight, but what a transportation problem when retrieving it. What the heck do you do with fourteen feet of wingspan on a motorcycle? (Use a car, dummy!)

A total of nineteen entered the event, and all but Phil McCary registered an official flight. The winner for the past two years, Jim Adams, was 17th this year! Even Pond, who was busy packing his model, up beat Jim. Haw! The old saying about a hero one day and a bum the next was never truer in this fun event.

Just about the time the weather started to get pretty good, the SAM 21 Texaco Contestants started putting up good flights. Almost before the contest really got started, C. W. Peterson put up a 33 minute flight for the boys to shoot at. Bob Longstreet, flying an identical model, a Comet Clipper, was in the same thermal, but only came in with 28:27 for second. SAM 21 Prexy, Tom Bristol, managed a third with 24:30, utilizing a new Merco 61 on ignition. Then to break the engine in properly, he entered the same model in the fuel allotment event (1/8 ounce of fuel per pound of model) and turned in the very creditable time of 15:24 for first place. That transistorized ignition system really works!

True to his promise, Pond showed up with two radio assist models for those who wanted to fly. The only one taking Pond up on his offer was Lee Norcross, who selected the Shereshaw Champion. For the first time, Lee managed an extremely good flight of 15 minutes, good for sixth place. Like the writer has been preaching, these big old turkeys are just the thing for learning R/C! Incidentally, the Dallaire sportster went begging. Where were you, Brickner?

As a side note, it now appears the Texaco R/C Assist Event is going to follow the same trend as the original early contests, i.e., first, no limit on fuel, then progressively from 1/4 ounce of fuel per pound of model to 1/8 to 1/16 ounce. With flights getting longer all the time, and only a limited number of frequencies, the writer can see a repeat. Times in the Fuel Allotment event abundantly prove the drop to 1/8 ounce will cut the times down somewhat. Falling a reduction in fuel, then some sort of cutoff time is going to have to be enforced. After all, you can't have one guy all day on one frequency!

OHLSSON 23 CONTEST

With more good ideas of old timer flying being generated like crazy, the latest idea by Bill Daniel is a winner. Bill proposes a contest strictly for Ohlsson 23 powered models in an attempt to get those old 23 engines out of moth balls.

As Bill notes, there were an awful bunch sold and many of them put away when higher powered engines became available. Bill will sponsor a contest for models powered by Ohlsson 23 engines. Incidentally, Cameron 23 engines will also be allowed as this engine was also in the same boat when they were lumped in the classification with the more powerful .29 cu. in. engines.

So mark your calendar for October 24 (same day as the SCAMP R.O.W. Contest) at Elsinore. Bill is offering trophies and an Ohlsson 23 as first prize! The contest will be for cabin designs only; a cabin being defined as a model that has windows in it similar to a man carrying aircraft. If in doubt, check the S.A.M. Rule Book (always available from the writer).

COX TEE DEE .020 SCARCITY

In response to the writer's letter inquiring about the rumored scarcity of Cox Tee Dee .020 engines, Bruce Paton, Engineering Manager for Cox Hobbies in a return letter sez succinctly, "Tain't So!"

The rumor gets started (according to Bruce) about this time of the year (every year) as Cox gets a little behind in their shipments. So rest assured men, Cox T-D .020 engines will be in plentiful supply to fly those popular small .020 Replica O/T models.

VAMPS VIBES

Just received the latest newsletter, "Short Circuits" from the Vegas Antique Model Plane Society and the results of their first VAMPS Annual. One thing for sure, this is the most hospitable club I have ever seen, allowing Sal Taibi and F. L. Swaney, both of the SCAMPS, to walk off with a total of six trophies! That's true southern hospitality!

All ribbing aside, the VAMPS were delighted that the coast boys could come up for their first Annual. Also noted at this meet were quite a few of the SLAM members from Salt Lake City. Mark and Nicki Fechner, along

with Jerry Sanford, came with twelve models in the station wagon. Wonder where the driver sat?

With the VAMPS now better than 15 in number, plans are being made for next year's annual. Class A, B, C, 30 second antique, and .020 Replica are the events to be duplicated next year. In addition, the VAMPS will sponsor a Flying Scale event next year. Try to get your date to this column a little earlier and we'll plug the meet for you!

1976 BI-CENTENNIAL .020 REPLICA POSTAL CONTEST

J & R Models, the successors to Cal-Aero Models, has announced a postal meet for F/F .020 Replica type models. This contest, being held to celebrate the inauguration of the new company, will be known as the "1976 Bi-Centennial .020 Replica Postal Contest."

The contest will have two categories; Junior and Senior. Juniors will be considered 16 years or younger; 17 and over are Seniors. Duplicate prizes for each category.

In addition to the regular first place merchandise prizes, if you happen to win using one of the J & R designs, you can be eligible to receive a $25.00 Savings Bond. For information and entry blanks, write to: Bi-Centennial Contest, J & R Models, 5021 W. Sheridan, Phoenix, Arizona 85035. You have until July 31st to enter, so don't waste time!

FILMS, O/T STYLE

Just got through viewing the 8mm films taken by Lin Haslan of the Utah State Aeromodellers (USA!) and heartily recommend these to anyone wishing to see some real great old timer flying on film. Lin would like to borrow other films as sort of an exchange deal, but is perfectly willing to send out the films with no strings. If interested, write to F. R. Haslin, at 3731 So. 5450 W., Salt Lake City, Utah, 84120.

SAM 7 HENRY STRUCK APPRECIATION MEET

As announced an issue or so ago, the idea of a contest devoted to Henry Struck designs is rapidly becoming a reality. Although not all rules have been firmed up, the contest is set for October 17 at Glastonbury, Conn. As reported before, proxy flying will be available to handle your mail entry. Just as soon as everything is firmed up, we'll let you know. If you are in a bigger hurry, try the SAM 7 Editor, Carmen Botticello, 30 Bluefield Drive, East Hartford, Conn. 06118. By the time this goes to press, all rules should be firm.

DANNER BUNCH MEMORIES

Another letter from Ken Hamilton is well worth sharing with the readers as Ken worked for Danner in the early days. Ken recalls that Bunch was a pilot and had a Wolseley Viper SE5A (!!) for a while, hangaring it at the Glendale Central Air Terminal. Danner claimed the SE5 was the sweetest flying airplane he ever handled, but with that excessive dihedral, the airplane was a real handful in a crosswind taxi. Later on, he bought a Taylor Cub and used the stunt of mounting a whole row of his Bunch engines on the leading edge to advertise the fact his engines were checked out for altitude. Whether they actually added to the forward speed of the airplane is problematical.

Ken also recalls that Danner put out Midget race car models, with Ralph Pickard doing most of the design work. These early Bunch cars looked like sports cars and were strictly for fun, utilizing a friction drive. Pickard later built a more sophisticated version, forming his own frame rails, and having a shaft and bevel gear drive to a cast aluminum rear axles, complete with leaf springs all around! Pickard made all of the items!

As a sidelight, when Ken first saw Bill Atwood flying a stick gas model in San Diego, he was amazed at the Baby Cyclone's economy. At the meet held at Camp Kearney Mesa, Atwood's engine was so miserly in fuel consumption, other modelers were accusing him of having a hidden gas tank!

THROTTLE EXTENSIONS

Sometime back we ran a picture of an ignition spitfire 65 with a tubular extension to mount a Perry carburetor on the end for idle control. This picture and the writeup indicating good results prompted Ray Hutchinson, of Edmonton, Alberta, to write of his experiences.

Ray sez, "When I was back in the old country (England), I converted a MKI Merco 61 the very same way." Ray's motor was mounted inverted in a post-WWI Flying Flea, known as the H.M. 290. To get a good fuel draw from a tank mounted low, he took a length of 3/8 inch O.D. aluminum tubing and bent it to a nice curve to place the carburetor some 4-1/2 inches away from the crankcase induction. This placed the carburetor about a 1/2 inch below the exhaust level and back on the firewall bulkhead.

Believe ir or not, the setup was superb. According to Ray, the motor ran better than ever with fantastic throttle response and idling. Starting was one of those "first flick" type of engine operations. The success of this system has prompted Ray to try systems employing flexible plastic tubing where the carburetor can be mounted in a more convenient location.

Ray concludes by saying this idea is nothing new as he got the idea from Trail Motorcycles, where the carburetor was mounted directly under the seat to keep from flooding out when driving hard through various water streams,

ponds, etc. Ray has suggested such a setup in a model plane that could be a remote servo-carb unit that would finally end the flying scale bugaboo of how to cowl that huge ugly engine. We'll bring you more on this as Ray keeps on with developments.

SAM 16 SUCCESS

Sears McCorrison reports that the first SAM 16 1976 Spring Meet came off real good despite rainy weather on Saturday. Of course, on Sunday, when the sun came out, there were "boomers" all over the place. Of the four O.O.S. flights, three were positively identified as having the tails popped (dethermalized) and the models were still going up!

Interesting to note that with George Moreland winning Toulene Glider with a Jasco Floater, William Wood took his rubber model and successfully towed it for a second place. Also noted was that hot R/C boy, Ted Patriola, flying .020 Replica free flight to a close second behind Richard Ivers. A fairly new event, O/T hand launched glider enjoyed a fair modicum of success, with Jerry Donehue winning this event, followed by Hank Hill and Tom Acciavatti. This new event for old timers could stand a little more pushing. The author is all for it!

SAM CHAMP FLASHES

According to Joe Beshar, SAM Prexy, he has been successful in promoting some rather good donations from the various modeling magazines. With all this dough, Joe promises this SAM Champs will be the most memorable in history for trophies, prizes, and fun. If you haven't signed up to fly at Wright-Patterson, July 31, Aug. 1, and 2, write to Bill Hale, 334 N. Remington Rd., Columbus, Ohio 43209.

BRAINBUSTER BUZZINGS

Not many modelers are aware that the famous Hampton, Virginia Brainbusters are still active. Following Joe Dodson's death, this columnist received a letter from Ed Sullivan, club secretary, who reports that fellows such as Joe Boyle, Hewitt Phillips, Harold Crane, Bob Platt, Bob Champine, Gene Hartmangruber, and Reid Hull are the real old timers of the club, and in most cases, still quite active.

Ed sez he is one of the dropouts who has come back into the fold lately because of the old timer kick. The Brainbusters total about 20 active members at present. All old former Brainbusters are invited to contact Sullivan at 19 Frederick Dr., Newport News, Va. 23601. This may be the start of a good old-fashioned reunion!

ANECDOTE TIME

Sal Taibi never tires of telling stories about the Nationals when it was held in Detroit at the Fort Shelby Hotel. The management of this hotel had to be the most dedicated to modeling to put up with the modeler's antics, sloppiness, and general disregard for house rules.

As usual, the hotel was a bedlam with firecrackers going off all the time. Leon Shulman, Jerry Brofman, and Sal Taibi were throwing firecrackers down the air shaft in the center of the hotel. Disappointed that the noise of the firecrackers didn't seem to get the desired reaction, Jerry Brofman threw a lamp down the shaft alley. That was a goodie. Jerry immediately left the room in search of another noise bomb.

Hearing a knock at the door, Sal said to Leon, "When I say so, open the door and I'll toss this lighted firecracker between Jerry's legs." On signal, Leon swung upon the door and Sal began his forward throw. Ye gads! It was the house detective! Sal was unable to stop his swing, the firecracker flew true to its mark and Leon dutifully closed the door.

A muffled explosion was heard, followed shortly by a sharp knock on the door. Sheepishly opening the door, Sal was greeted by the sight of the detective waggling his finger at him, saying, "Just one more time and out you go." Nobody could keep a straight face, but it did reduce the bedlam to a mere roar. Ah-h-h, those were the days!

Just think, if you are in this old timer kick, the fun is still going on. Amen to that, brother! •

Sailing . . . . . *Continued from page 33*

it is far superior and not too far from the ideal heat list that we are all looking for. The MARK 16 which I did for two boats per frequency continues to be the best lift for that situation. Remember that regatta announcements should warn skippers that the first three boats on a frequency based on postmark date will be accepted. This means limiting entrants somewhat, but I find sailing one race out of 4 is unacceptable, and support the limit of three boats to each frequency. Such limitations should make it abundantly clear to new skippers that multi-frequency radios are absolute-

ly necessary for successful registration in popular regattas in the larger classes. *(Pre-registration is a necessity, and has been used in R/C soaring for several years. After initial complaints, contestants soon learned its importance, and are willing to live with it. wcn)*

Remember to send in your AMYA dues to the Secretary, 3917 Sunnyside Ave., Brookfield, Ill. 60513. The $5.00 is worth the price of the newsletter alone. I will field questions in care of MODEL BUILDER or directly when accompanied with a stamped, self-addressed envelope, to 7608 Gresham St., Springfield, Va. 22151. •

Batteries . . . . . *Continued from page 17*

energy to chemical energy in a cell or battery.

Charge equalization: Bringing all of the cells in a battery to the same state of charge.

Charge voltage: The voltage applied to a cell during charge.

Constant current charge: A method of charging a cell by applying a non-varying current to the cell.

End of charge: The point at which the charge can be terminated.

Float charge: A method of maintaining the capacity of a cell by applying a constant voltage.

Overcharge: Charge put into a cell in excess of that needed to return full capacity to the cell.

Taper-current charge: A method of charging the cell by applying a current which is gradually reduced as the cell voltage increases during charge.

Trickle charge: A method of maintaining the capacity of the cell by applying a small, constant current to the cell.

State of Charge: The remaining capacity of a cell as compared to its rated capacity.

C/X RATE: The current which would be necessary to discharge or charge a cell of a given rated capacity (C) in X hours if the cell maintained the same rated capacity at all discharge rates. For example, a 2.5 amp hour cell, rated at the 10-hour rate, would provide 250 milliamps for 10 hours.

CYCLE: A charge plus a discharge

Cycle life: The number of cycles obtainable from a cell under given conditions.

DISCHARGE: The conversion of chemical energy to electrical energy in a cell or battery.

Depth of discharge: The percent of rated capacity removed from a cell during a discharge.

Discharge rate: See C/X rate. (C=rated capacity; X= hours of discharge.

Self-discharge: Conversion of the active materials in a cell from the charged to the discharged state on open circuit.

Self-discharge rate: The percent of capacity lost in a cell on open circuit over a specified period of time.

HERMATICALLY SEALED: Completely closed off from external surroundings.

INTERNAL RESISTANCE OR IMPEDENCE: The apparent change in voltage as a function of current caused by resistive and polarization effects.

MAINTENANCE FREE: A term used for a type of cell which may be operated without adding water to the electrolyte during its recommended life.

MEMORY EFFECT: A phenomenon in which a nickel-cadmium battery will deliver only the capacity demanded of it in previous cycles.

OUTGASSING: The release of gas from a cell during operation.

PLATE: An electrode.

THERMAL RUNAWAY: A condition in which a cell or battery on constant-voltage charge can destroy itself through internal heat generation.

UTILIZATION: The percent of rated capacity which can be obtained from a cell or battery during discharge under specified conditions.

VOLTAGE: Electro-motive force.

Float voltage: A constant voltage applied to a cell or battery to maintain its capacity.

Nominal voltage: The average voltage of a source.

Open-circuit voltage: The no-load voltage of a cell.

Over-voltage: The difference between the measured and the equilibrium voltage of a cell.

Voltage regulation: The relative percent change of voltage during discharge.

WATT HOURS: The capacity of a cell multiplied by its nominal voltage. The energy of a cell is expressed in watt hours. For example, a 6 volt battery with a rated capacity of 2.5 amp hours is capable of providing 15 watt hours.

Let us briefly compare the batteries in common use by the average flyer. First we have the well known lead acid battery, as in the family buggy, and the motor cycle type we use at the flying field. This battery is reliable, efficient, and inexpensive. It has a high voltage per cell, requiring less cells to reach a desired voltage, therefore lessening the chances of individual cell failure. However, this battery does not have some of the advantages of more modern batteries, is neither sealed nor maintenance free. The cells are flooded with liquid electrolyte, and left open to the air. This water can evaporate, much as any free standing water will; a condition aggravated as the battery is charged. This requires monitoring and occasional addition of water. Also, as the battery charges, it releases hydrogen and oxygen, a naturally explosive mixture, and under conditions of severe overcharge, sprays corrosive acids all over itself and its surroundings. This battery

cannot be used or charged except in an upright position.

Next we run into our old friend, the nickel cadmium rechargeable battery, or 'nicad' as we all call it. It is maintenance free, it does not normally gas, it can be used in any position. It is more expensive, and has lower cell voltage, requiring a greater number of cells to reach a desired voltage. We live with the higher price, and the makers of our products that use nickel cadmiums, design around easily obtainable voltages. Their other problems, such as occasional cell reversal and difficulty of determining state of charge, we live with or ignore, as their main advantage, low weight has made them king as power sources in the hobby.

Then comes the maintenance-free gelled electrolyte battery, which combines the better features of the automotive type lead acid batteries and the nickel cadmiums, and were developed to eliminate the need to add water to maintain cell capacity. This was done, as the name indicates, by using a gelled electrolyte instead of the more familiar liquid water/acid mixture, and by designing extra water into the system to permit some loss.

Other claimed features and advantages are:

Rechargeable: Capable of 100 up to 1000 cycles. Charged in less than 14 hours, depending on type of charger and depth of discharge.

No maintenance.

Sealed, unbreakable housings. Operates in any position.

Ease of shipment: Can apparently be mailed; other lead acid batteries cannot. One-way vents mean they would be safe to ship via air, in unpressurized cargo compartments in your tool box.

Broad operating temperature ranges: From way too cold to way too hot, -40F to +140F.

No permanent cell reversal.

Highest reliability: Claimed, as compared to other commercially available batteries.

No cell conditioning necessary.

Small and compact.

Low self discharge rates.

Disadvantages to the model builder:

Higher initial cost than motorcycle type wet cell batteries. More critical recharging, higher charger cost: The higher costs would seem to disappear with time, as claimed life far exceed the life expectancy of motorcycle lead acid batteries.

In order to acquaint ourselves and our readers with the advantage (if any) and disadvantage (if any) of gelled electrolyte batteries, we at MB contacted all the known manufacturers and suppliers of these batteries for literature. We've digested this as much as possible with the model flyer in mind; i.e., what can these batteries do for us and what must we do for them.

There appear to be some similarities within the various brands, as well as some differences. As one manufacturer states, "It is not yet possible to demonstrate the total calendar life of the (gelled electrolyte) cell. The cell has not yet existed for a sufficient time period for these tests to have been terminated." Thus there are still some unknowns.

Amongst the first differences that become apparent, other than the purely physical ones, is the fact that the batteries fall into two separate and distinct categories, as determined by their use. That being 'cyclic' and 'standby' operation. Cyclic operation is defined as that service in which the battery is repetively discharged and recharged, such as our use with electric starters, glow drivers, fuel pumps and other accessories we are in the habit of using.

Standby service is that which requires that the battery be kept ready in a fully charged condition, for intermittent emergency use, generally in case of power-line failure. Typical uses are emergency lighting, alarm systems, and communications systems which are really outside of our type of use. It is important to recognize this fact, however, as improper use, and charging, which will be covered later, seems to seriously shorten the useful life of these batteries more so than any others we have had more experience with.

It must be noted also that only one of the mentioned manufacturers catalogs and marks batteries as either for 'cyclic' or 'standby' use, supplying also the proper charger for each of these two uses. The others all list the specifications both for use and for recharging, as applicable to the two different uses, but the battery is not so identified.

It is not known if the manufacturers of the double duty battery simply have a better mousetrap, or if the manufacturer of two distinct batteries is convinced that the differences required or obtained warrant the obvious extra

expense involved. For our purpose it is only necessary that the battery we purchase is rated for cyclic use. If you purchase one from a non-modeling source, be sure to question the supplier on this point.

The next more important consideration is that of rating. For other than cost reasons alone, we don't want to lug around a 20 ampere hour rated battery that weighs almost 17 pounds, even if we only have to charge it once every six months. We can take the easy way out, and base our choice on previous experience with the wet cell motorcycle batteries. In almost all cases, we've been getting along with a five amp battery, so we should be able to continue with a five amp'er of the gelled electrolyte variety.

However, let us take a close look at this business of ratings. As noted in our glossary, the rated capacity is that which the maker specifies in ampere hours as may be obtained from a battery at a given discharge rate. These ratings are given at the 20 hour rate, and are generally stamped directly on the battery. For example, a battery rated as 4.5 amp hour will provide 225 ma for 20 hours. (20 X .225 amp equals 4.5)

Let us also take a look at just what we are expecting of our twelve volt battery, regardless of type. The heaviest use we are putting it to is that of powering our starter, so we will explore that.

In this case, we are looking at a number of variables; starting current and running current, plus load. The former is a matter of design of the electric motor itself, which you affect with the application of the load. The greater the load, the heavier both starring and running currents. The larger the engine you are starting, the heavier the load. A flooded engine also creates more of a load. These loads are variable, and constantly so. Therefore it is impossible to come up with an exact time at the end of which you can expect your battery to roll over and die, but Table I will give you an idea of approximate values which can be used as a rule of thumb. The starters used are those that were available to us, and will provide something of a cross section.

One thing is obvious: they all draw a lot of current. Due to the many variables mentioned, it is difficult to come up with an exact time or number of starts that any combination of battery, engine, and starter is good for. For most of us, the 4.5 or 6 amp hour battery will suffice.

Another measure of the quality of a battery in a specific use is its voltage regulation, i.e., its ability to maintain rated voltage under various loads. Table II shows what happened to the voltage under the conditions of our tests.

These tests were all made using the Sonic-Tronics starter, and point out that the nickel cadmium battery has somewhat better voltage regulation. However, higher cost does not warrant it's use in this application. All these batteries were freshly charged, hence the very close voltage readings throughout the tests. The lead acid battery would probably show lower voltages, under load after the same amount of discharge, than the gelled electrolyte battery, certainly much lower than the nicad.

For users of devices that light the glow plug from this type of battery through a dropping resistor, it must be remembered that the proper voltage at the plug is dependent on the existence of 12 volts at the source. In other words; freshly charged battery, no starter load, means 1.5 volts at the plug. If the battery voltage drops upon application of starter load, the plug voltage also drops. If it seems that your engine gets harder to start as the day goes on, your problem could well be insufficient battery capacity or poor voltage regulation.

CHARGING OF GELLED ELECTROLYTE BATTERIES

The life and performance of all maintenance-free lead-acid batteries is mostly a function of the charging system used. It is important therefore, that the battery and charger be compatible.

To recharge a battery, a DC voltage greater than the open circuit voltage of the battery must be applied. This applied voltage overcomes the back electromotive force of the battery and allows the charging current to flow. The amount of current flowing depends on the difference between the applied voltage and the state of charge of the battery. The back EMF (battery voltage) varies with the state of charge and tends to regulate the amount of current flowing into the battery. For every applied charging voltage value, a particular battery will have a particular charge current.

There are various charging methods available. It must be remembered that

the selection of a method involves tradeoffs between desired battery life, the amount of time available for recharge, the cost of the charging system, and the total system voltage. Remember also that the life of the battery ultimately is governed by the amount of overcharge. Therefore, the ideal choice of a charging system from the battery life standpoint is the one which gives the least amount of overcharge, yet completely charges the battery.

The ideal system, therefore, is one that applies the lowest constant voltage that will recharge the battery, and which is disconnected at that point, or which automatically is switched to a lower or 'float' voltage. The float voltage provides just enough current to keep the battery in a fully charged condition by overcoming any internal loss. Average figures for these two conditions seem to be 2.4 volts per cell for charge, 2.25 volts per cell for float.

The float type of charger is not of much interest to us, as it would be to the user of a battery in 'standby' applications. Therefore, we will limit our discussion more to the cyclic type of operation and charging.

During recharging, it is important that the initial charge current does not exceed 3 to 4 times the 20 hour rate. In other words, for a 4.5 amp battery with a 20 hour rate of 225 ma, the initial charging current must not exceed .675 to .900 amperes. This is the danger point. Most manufacturers recommend a charging rate of twice the above named battery, would be .450 amp.

Equally important is the end-of-charge rate. As the battery charges, its cell voltage rises, until it reaches a peak of 2.33 volts. However, this does not indicate a fully charged cell . . . the other factor in determining full charge is the current. A cell has not reached full charge until the current has dropped to approximately 10% of the 20 hour rate. The voltage must not be allowed to rise above 2.33 volts per cell; when the current drops to the indicated end of charge value, the charger must be disconnected.

There is much more to it than that. For those interested and able to pursue the subject further, we recommend asking the manufacturer of your particular battery for their charging manual. All the manufacturers seem to have a very comprehensive booklet on the subject, most of which is not of interest to us at the flying field. Suffice to say that you cannot mistreat these batteries. You cannot boil them dry, add water, and go fly. It is not delicate, merely asks to be used properly, not abused.

So let us look at our dealer's showcase and see what is available in the way of chargers for us non-engineers.

There are chargers designed specially for the 'standby' type of battery service, which we can disregard. Starting from the bottom up, we find the familiar molded wall-plug type of charger, which is the simplest and least expensive (under $10). Pay particular attention to the charge time as recommended with it for your particular battery. This charger has no safety features, and if forgotten, will drastically shorten the life of your battery due to over-charging. Make a rough estimate of what you take out in a day's use, or accumulative use, and put back no more than 140% of that value.

Next we find the electronically regulated type of charger in the $20 class. This charger is designed to charge the companion battery in a 12 to 16 hour period; but must be disconnected within 72 hours before that old villian "overcharge" shows his ugly face.

There are also a more complex and expensive (in the $30 class) dual 'float' and 'fast' charger. This charger will full charge the battery in 16 hours or less in the 'fast' mode, and 24 to 36 hours in the 'float' mode. In either position, approximately 75% charge is obtained within half that time. This latter figure is probably more than enough for a weekend of use for most of us.

For the absent minded, there are a number of timers, which would probably be an excellent investment and

could be used to cut the house current off after a preset period.

In summary, and after some six months of personal use, we feel that in spite of the higher initial cost, gelled electrolyte batteries are the way to go. The fact they are more critical of the charging methods is also lost in the face of the advantages. To charge, obtain the proper charger, and learn to use it. After all, we learned to charge nickel cadmium batteries, with which, at one time, we had no experience.

After all, you learned to fly! Didn't you? •

Hannan . . . . . *Continued from page 46*

is possible this letter came addressed to you as "Miss" or Mrs." If so, it is because this is the way your name appeared on a mailing list *not* (italics mine) compiled by us. If you prefer to be addressed as 'Ms.', or any other way when we send you magazines or renewal notices, please mark your correction on your reply card before you return it." Again, our apologies.

GIBSON'S HANDY HINTS

1. Dr. Martin's dyes, available from better art supply stores, are the greatest thing going. We cut a large hole in a sheet of corrugated cardboard, and paste a sheet of model tissue over the opening. Dr. Martin's dyes are mixed to the desired color, using water to subdue strong tones, and applied to the tissue. Dried with a hair-dryer and allowed to cool, the tissue is then cut away for application to light model structures. No further shrinking is done. The process is great for reproducing canvas colors and others. The "Japanese Imperial" paper, marketed by Oldtimer Models, works particularly well with this system.

2. The plastic meat trays and foam egg cartons from the supermarket can provide material for small toss gliders as well as lightweight scale details, wheels, etc. If cleaned with detergent, followed by a light sandpapering, the stuff will accept Dr. Martin's dyes.

3. To extend the life of razor blades used in making model aircraft, store them in a covered jar containing mineral oil. Hot water and a dry wipe makes them ready for use. Such storage will also lengthen the useful life of shaving blades.

QUOTE FROM THE COLONEL

Col. Bob Thacker, who just completed a magnificent award-winning R/C D.H.88 Comet, had this to say regarding construction techniques: "Some people build miniature airplanes; I build models!" Food for thought.

CREEPING COUGARISM?

Regardless of class category, some scale models always seem to have an "unfair" advantage, at least in the eyes of competitors flying against them. The Pilatus Turbo-Porter, for example, has Wakefield-like proportions. And the Volksplane has received more than its fair share of flak from some members of the R/C scale fraternity because of alleged simple construction advantages. In rubber-power Thompson Trophy races, the "Mr. Mulligan" holds such an apparent advantage that it has been outlawed from participation by the Connecticut-based Flying Aces Club. In the Peanut Scale spectrum, the Tailwind, Cougar, and Lacey M-10 occupy a similar status, and some have openly suggested a ban on their participation in contests. Others have implied that a separate duration prize be awarded to the best performing of the type, just to put them in a class by themselves.

However, some builders have taken a more tolerant viewpoint, and have instead devoted their energies to the search for suitable counter-weapons. Latest to beat the "unbeatables" at their own game is Dr. John Martin, of Florida, who did it the hard way with an antique pusher canard! Although we don't have a photo of Martin's model *(You will, it's entered in MB's 1976 pppp contest. wcn)*, we do have one of Fulton Hungerford's similar Santos-Dumont 14 bis. Both machines are capable of 59 seconds or more, and contain enough details to keep them competitive in the scale judging department. We applaud the efforts of these individuals, as our feeling is that variety is the real spice of Peanut life, and are delighted to see off-the-beaten-track subjects given a chance to prove themselves.

AND SPEAKING OF PEANUTS

We see by a reference in Tom Foxworth's fantastic new book, "The Speed Seekers" ($45 and worth it!), that flying General "Billy" Mitchell had a horse which was the cavalry's best jumper for 11 straight years. The horses' name? "PEANUTS!"

RACING PLANE DRAWINGS

Jim Vliet, of Red Bank, N.J., brought to our attention the availability of detailed 3-view drawings and photographs of "Golden Age" racing aircraft of particular interest to model builders. A complete list of subjects and prices may be obtained by sending a stamped, addressed envelope for return mail to:

American Air Racing Society
P.O. Box 121
South Euclid, Ohio 44121

STUFFING STICKS, ANYONE?

Many fellows are still leaving unsightly holes or uncovered bays beneath the rear rubber support pegs in their models. Not only is this esthetically offensive and aerodynamically inefficient, but certainly non-scale. With the aid of a good rubber motor inserting tool, there is no real need for such an eyesore. Jim Crocket Replicas, 1442 N. Fruit Ave., Fresno, Ca. 93728, has the answer, in the form of high-quality brass fittings. These may be attached to a suitable section of tubing to fit your particular

model. Or, if affixed to the end of a collapsible transistor radio antenna, you will have an easily adjustable stuffing tool that will occupy very little room in your field box.

A tiny size for Peanut models is priced at $1.00, while the larger Walnut/sport model version goes for $1.50, plus postage. Also offered is a neat cast-aluminum DT fuse holder, priced at $1.95. For more info on these and other unique products, send $1.00 for the CCC (Complete Crocket Catalogue). *(See also this month's "Over the Counter". wcn)*

CONCORDANCE

Sears McCorrison opines that the efforts to prevent entry of the Concord SST to the United States, smack of the laws passed during the early days of the automobile, which required a man with a red flag to walk in front of the car to warn of its approach!

GONE WEST

Another fine scale model builder and dedicated researcher has passed on. William N. Fleming, of Passaic, New Jersey, died on Easter Sunday, following an operation. Bill will be remembered for his many detailed scale drawings of historic aircraft, and meticulously constructed models, such as his Curtiss "June Bug" in the collection of the Smithsonian Institution. Some of Bill's comments appeared in last month's "Hannan's Hangar", and we are grateful for his contributions to the preservation of aviation history.

DON'T LET IT HAPPEN HERE

We were very disturbed and disappointed to learn that this year's British Nationals were cancelled. It's all too easy to take such long-standing traditions for granted, and assume that they will always be around. It behooves us all to support our model aircraft competitions, and ensure that they will still be extant for future generations of enthusiasts. If we don't, who will?

FANCIES OF FLIGHT

Andrew S. Daniel is the author of this curious small paperback, which certainly is different from the usual run of publications. In essence, Mr. Daniel questions the validity of most existing airfoil theory, and offers instead, speculations of his own. Among model builders as well as full-size aircraft constructors, there has always been quite a clear-cut bifurcation between the theorists and the practical types. There can be no doubt where Daniel stands in this regard, and his writing is almost guaranteed to outrage the aerodynamic traditionalists and slide-rule pushers. Try these quotes on for size: ". . . most theorists know as much about creative reasoning as a gopher does about Thursday".

"The mechanic only asks how it will work, and then builds it. If it doesn't work the scientist can say, 'I told you so.' If it works, he can wait five years and say, 'I told you so', anyway. Airplanes fly despite theories, not because of them."

After debunking all the established explanations of lift generation, Daniel puts forth his thoughts on the matter, and even introduces some new nomenclature to cover his innovations, such as "fudd", "snarf", and "farfle". The slim volume is illustrated with delightful line drawings, and features a number of designs for constructing paper test models.

A self-proclaimed punster and word-play addict, Daniel delivers his message in a light-hearted, entertaining manner, so that even if you disagree with his postulations, you may be amused by his delivery style. He even allows for those who may take strenuous exception to his words, by signing off with the following: ". . . you will be happy to know that the paper this is printed on has been carefully selected to ensure that it will burn with a goodly flame." Reputedly, only 400 copies of this item were produced, so you may already be too late to get yours. However, $6.00 to E. Tiegs, 402 Rushmore Lane, Madison, Wisconsin, 53711, will either bring you one or your check will be returned.

THE GRUMMAN STORY

Another book passed through the hangar library recently, courtesy of Russ Barerra. Written by Richard Thruelson, and published by Praeger of New York, it presents the history of Grumman in unusual perspective and insight, not only into the aircraft, but the personalities who created them.

Respectfully called the "Iron Works", by virtue of its super-strong products, Grumman turned out a remarkable and varied array of designs, covering the entire range of flying machines, from biplanes through space vehicles . . . And managed to keep the majority of their employees happy all through the years, in the process, an area in which most large companies fail miserably.

Having served as a mechanic in the U.S. Navy, I can personally vouch for the sturdy construction and easy maintainability of Grumman aircraft, especially as contrasted with another well-known brand of fighter.

In addition to accounts of activities of Grumman, including those outside the aircraft business (did you know they manufactured canoes?), hundreds of photographs are presented, along with specifications of all aircraft types produced. We found it interesting to ponder the weight increases over the years, which started with the VFF-1 (first U.S. Navy fighter with retractable landing gear) of 1931, which had a loaded weight of 4,008 pounds, and concluded with the F-14 Tomcat, which scales an incredible 60,000 pounds loaded!

PEANUTS IN PARIS

Georges Chaulet favored us with a report of a French indoor scale meet, the first he had ever attended, and we particularly enjoyed his reactions to the proceedings:

"I had last Sunday the great pleasure to attend at the Peanut contest organized by the Parisian club, which is named PAM (Paris Air Modele). I found it very exciting! It was held inside a gymnasium, which ceiling had some parts made of glass. And there was a bright sun outside. So, the inside of the place was looking like a Swedish bath! I am sure that everybody lost several pounds sweating!

"Nevertheless, the mood was extremely gay and joyful. I found that the modelers were here not (just) to compete, but to have a jolly time. Everybody was smiling. A very attractive and friendly mood! The recuperation of the models which had landed upon the ceiling beams (with a long pole) was, too, an occasion to laugh! Finally, the Peanuts appear to be a very fine entertainment!"

HOWZAT?

According to 'Pylonius', of Aeromodeller magazine, Louis Bleriot was happiest flying a lightweight single-channel job! •

R/C Auto . . . *Continued from page 55*

little or no slip, and the engine torque is essentially directly transmitted to the clutch bell/pinion gear and the rear axle.

A picture shows the formed steel clutch shoe for the small diameter clutch. The original shoe and ones trimmed for more clutch slip are shown. It is most beneficial to decrease weight at the free end of the shoe because this effects the centrifugal engagement forces the most. Lower engagement forces (at a given engine speed) mean less drag on the clutch bell, hence more clutch slip. Lower shoe contact area, particularly on the forward part of the shoe where leverage is acting, can decrease drag and therefore increase clutch slip also. Finally, the spring force can be increased, which acts in opposition to the shoe centrifugal forces, causing lowered engagement forces and more slip. As shown in the picture, there are four choices of shoe weight (and/or surface areas) and two spring forces. In reality there are three spring forces, a single small spring, dual small springs, and the heavy spring. So there are numerous combinations of clutch slip available.

All of the above general choices are available for the larger diameter clutch shoes, however, the bigger clutches normally use a teflon liner in the clutch. The clutch shoe/bell contact area can be decreased by using a small width bell liner rather than decreasing the shoe area. Another of the pictures shows the larger diameter clutch parts and a narrowed liner in the bell.

With all this dope, you should be able to come up with the clutch slip that is right for you, your car and the track conditions. If you haven't experimented with clutch slip . . . do. You will be amazed at how much more controllability you can build into the car. On the other hand, you may also decide you will have to (or should) change your clutch set-up for different tracks and conditions. More work, and things to adjust you probably don't need.

But . . . . . •

Remotely . . . . *Continued from page 16*

models have much more power than they would have to have to be dynamically similar. For example, I have a .61 powered Piper Cub that would be adequately powered as a dynamic model by a .35 displacement engine.

"For many years . . . 1939-1952, I was a preliminary design engineer at Convair. As my team would create new designs, we would frequently evaluate them, not only with wind tunnel models, but also with the dynamically similar models mentioned above."

Brad has indicated that he is preparing a more definitive article on the subject, and will offer it for presentation when completed.

The subject came up in our March "Workbench" in reference to the recognition of scale speed at the FAI Control Line Scale Championships, in Borlange, Sweden, this year. We commented then that if scale speed is to be considered in judging, we had darn well better establish proper methods of determining scale speeds for various sizes and types of model aircraft.

Brad's letter would seem to indicate that there may be two schools of thought on the matter. Our own feeling is that, although the speed of dynamic scale models used for research and development of full scale aircraft should, in order to provide accurate information, vary as the square root of the scale ratio, it is not in line with "scale appearance". As Brad says, "One is visual, and the other is dynamic." Isn't our primary concern "visual"? What do you think? •

Workbench . . . *Continued from page 6*

prevent draining the batteries in the event that the points are closed for any length of time. This will be of particular comfort to non-R/C users, who would otherwise have no means of remotely shutting off the ignition when the engine quits in the air.

FOR STRICTLY SAILORS

Rod Carr mentioned that plans would be available for sailboat hull

designs presented in MB. The A-Class MINI-MAXI was presented in the Jan. '76 issue, and the 50/800 WIND was published in the May '76 issue. Both of these have been drawn up to 1/2 scale and include a dimensioned sail layout. As boaters know, these are not detailed construction drawings . . . just hull lines, diagonals, and sections, plus the sail plan. Price is $1.00 each. See plans page for ordering instructions.

A FUNNY NOTE

Bill Baker, from Norman, Oklahoma, received plans for No. 91074-OT, Buhl Pup, instead of No. 91074, Lone Eagle, a inch scale rubber ship, that he had ordered. Bill stated in his letter, which accompanied the incorrect plan he returned, "not sure if the error was mine or yours, but I sure don't have enough rubber to fly an 8 foot Buhl Pup!"

SERIOUS NOTE

As reported in the Dallas R/C Club newsletter, edited by L. F. Randolph, Charlie Viosca, a long time member, and Nats R/C scale flier, is in the hospital for two or three weeks as the result of an accident that could happen to any of us.

Charlie was preparing his flight box, and in the process, shorted a one gallon can of fuel across his starter battery terminals. The can exploded, covering Charlie with burning fuel. He was able to get to the yard and roll in the grass to put the fire out, but not before he was burned severely on the hands, face, and legs. At last report, it is believed that he will suffer no vision impairment, but there will be a long recovery period.

This should serve as a warning to everyone who carries fuel in field boxes. Make sure it is isolated from any spark-producing contact. It's not the fuel itself, but the vapor, combining with oxygen, which forms a very explosive mixture, a good point in favor of plastic fuel containers.

THINGS TO DO

Ed Manulkin, president of Sterling Models, in Philadelphia, reports that the Delaware Valley Federation of Model Airplane Clubs will be running its 29th East Coast Contest, on August 22, at Warminster N.A.D.C., Johnsville, PA. That's 29 years without missing a single year, incidentally.

It'll be a busy one-day meet, with many free flight, control line, and r/c events. The U.S. Navy Airfield is located at the junctions of Pennsylvania routes 332 and 132, about 3 miles N.E. of the Pennsylvania Turnpike, Willow Grove Interchange.

For further info, contact Ed, who will put you in touch with the Contest Director.

* * *

While in the Philadelphia area for the Johnsville contest, you might want to take a tour of the Sterling Models Inc. facilities. Except for the week of June 28 through July 7, the company Model Ship and Air Museum will be open, and in addition guided tours of the plant will be scheduled three times a week. Call or write for further details; 3620 "G" Street, Philadelphia, PA. 19134, phone (215) 426-4100.

IN CLOSING

Recently we received a letter from a reader which, though it required no answer, was so well written that we could not quite discard it . . . in fact, we have found ourselves picking it up from time to time and reading it over again, enjoying the word picture it conveys, and particularly reflecting on the last paragraph. Mike Musick is a home designer and building contractor from Elbert, Colorado . . . he also knows how to write . . .

"Last evening I stopped to get my

mail, pleased to find my monthly copy of Model Builder, headed for home to a warm fire on a winter's night, and maybe a bourbon. After the onslaught of children and dog, I had a warm shower and dinner. Before starting on an evening of paper work waiting me, I sat down to your magazine.

"I was much saddened when I came upon the death of John Keller ("Plug Sparks," March '76 issue, wcn) I wandered back some twenty years to my youth in Tucson, Arizona. John and a small number of other fine modelers and human beings were members of a flying club there. I remember cool Sunday mornings when all of us would meet at the flying sight. First a few slow cups of coffee, some talk about the breeze from the north, and finally someone would drag out an old beat up Fu-Bar or El-N-Gone. My brothers and I never wanted for help from John and the others. Starting a stubborn engine, trimming for glide, or quick repairs of a smashed wing. We were using simpler materials and methods then, less efficient engines and enjoyed every second of it.

"I hope that there are more people today to carry on where John left off. People who not only love the art of flying models, but who share that, and life, with others. Every young person should have the chance to know what we did in Tucson in the fifties. May we preserve the stick-built, silkspan covered self-created masterpieces that this art came from. And we, the adults of this time, encourage youngsters in this fine pastime." •

Wingrove . . . . . *Continued from page 43*

automobiles are Gerald's personal favorites, with a leaning toward American classics, such as Duesenbergs.

While marveling at the variety, I couldn't resist examining one of the incredibly tiny radiator cap emblems under a magnifying glass (which Wingrove referred to as "cheating"!) and found it to be a superb reproduction. In fact, many of the individual model parts are so minutely detailed and exquisitely finished that they could easily stand alone as displays.

Gerald Wingrove and his models have been featured on television in addition to publications in several parts of the world. His work has found an honored place in private collections and museums, including Lord Montague's National Motor Museum, England, the Jamaica section of the Commonwealth Institute, and the Evolution Museum in Holland.

Needless to say, such standards of craftsmanship command well-deserved fees in the $1,000 and up range. Delivery requires considerable time, owing to a substantial backlog of orders, not to mention the many man-hours required in the execution of the masterpieces. In the event you are a connoisseur of such objects d'art, Gerald Wingrove may be contacted at: 40 Oakland Way, Flackwell Heath, Nr. High Wycombe, Bucks, England. •

Westburg . . . . *Continued from page 20*

More than 500 Avia B-534's were built in Series I, II, III, and IV models, and it was good enough to be ordered by the German Luftwaffe and several other European nations.

If you are looking for a different model to build, the B-534, with its many distinctive marking schemes, may be your meat. Most common finish was a dark green khaki overall except for aluminum finish on the undersides of the wings, the horizontal tail surfaces, and the fuselage. For excellent data on markings, see Profile No. 152. •

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

light enough for CO_2 and .010 and .020 powered aircraft, it will also handle Old Timers and Free Flight Return. Four channels in an .049 machine is now easily possible.

The airborne weights are:

1 - channel	2.5 oz.
2 - channels	3.1 oz. (block)
3 - channels	3.8 oz. (block)
4 - channels	4.5 oz. (block)

The individual weights and cubic sizes are:

Dual Servo/ Receiver Block	3 cu. in., 2 oz.
Single Servo	.86 cu. in., .7 oz.
Single Receiver	1.1 cu. in., .8 oz.
Battery(100 mah)	1.0 cu. in., 1.1 oz.

For complete information, check your local radio dealer, or write Cannon Electronics, 13400-26 Saticoy St. North Hollywood, CA 91605.

* * *

Windspiel Models announces a number of new items as being added to its already extensive line of glider kits and accessories. Included is the 'Fantasie', the latest in competition sailplanes. Designed for two or three channels, it uses an Eppler 392 F/b mod. airfoil, 1081 square inches of it. Wing span is 138 inches, stab span is 32.5 inches. All up flying weight is 4.5 lbs for a wing loading of 9.6 ounces. Complete kit is $112.50.

This is only one of many. No glider fan should be without the Windspiel catalog, write and tell them MB sent you. Windspiel Models, 835 Piner Road, Santa Rosa, CA 95401..

* * *

Du-Bro Products Inc. has announced some new items of interest for present and prospective owners of its helicopters.

The Shark .60 is an adaptation of the already well known Shark helicopter,

with redesigned engine mount so that you may use your favorite .60 in place of the O & R previously used. A 1-1/2 to 2 pound payload capability is claimed, supposedly enough for safe and smooth helicopter flight. A conversion kit is available for owners of the older O & R powered Sharks. Designated as Catalog No. 513, it is priced at $75. This kit will also convert the DuBro Hughes 300 to .60 engine operation.

Available also is a new training gear and tail fin combination for the pilot-in-training. Priced at only $29.95, it looks like an excellent insurance type of item that could save some costly damage.

For these and all new and old DuBro products, ask at your local shop or write them at 480 Bonner Rd., Wauconda, IL 60084.

* * *

Claimed to cut anything, including bone, the ADC MINI-SAW might be just what you need in case you get careless with your cyanoacrylate glue.

This has to be the handiest addition you could make to your tool collection. Designed with a receding nose that permits cutting clean in hard-to-reach places, its versatility is increased by a positive device that locks the blade in any one of six positions. The blades are fine tooth, as required for rapid cuts on thin wood, metal, plastics, and all other model construction materials. As demonstrated at the trade shows, it will cut 1/8 inch music wire over and over without having to be replaced. Ask for ADC No. 161 at your local hobby shop, or inquire from Applied Design Corp., 5531 Shoreview Dr., Rancho Palos Verdes, CA 90274.

* * *

Probar Design, Manufacturers of the well-known and proven Trident II Trimaran, now has available a complete line of sailboat hardware for the scratch builder and for replacement purposes. These are not adapted or modified fittings, but especially designed and manufactured with one purpose in life, that of increasing the reliability and hence the enjoyment of your R/C sailboat. All metal fittings are fabricated of stainless steel, insuring rich looks, easy maintenance, and freedom from corrosion. For a complete list, including description and prices, write Probar Design, PO Box 639, Escondido, CA 92025.

* * *

D & R Products, the home of precision plastic injection molding for the R/C flyer and manufacturer has available a large number of well engineered and produced items. The line covers such complex devices as a three-axis gimbal, but does not ignore the simpler necessities, such as servo trays.

Especially nice is the Bantam DS3P Servo Mechanics, available both to equipment manufacturers and as a conversion kit for owners of older style servos who are looking for a mechanically improved and better operating servo. The kit, complete with easy-to-follow instructions, includes everything except the electronics and motor from your old set. Like all of D & R's products, it is molded from virgin nylon, and replacement parts are readily available, should the need arise.

The Bantam is reputed to be ex-

CLASSIFIED ADS

Non-commercial (personal items): Rate is 25 cents per word, with a minimum of $3.00. Commercial: Rate is 40 cents per word, with a minimum of $5.00. No mail-order discount house ads knowingly accepted. No advertising agency discounts allowed.
All ads are payable with order, and may be for any consecutive insertion period specified. Name and address free, phone number counts as two words. Send ad and payment to: MODEL BUILDER Magazine, Classified Ads, 621 West 19th St., Costa Mesa, Ca. 92627.

IGNITION ENGINES: The entire O.S. Max line of fine engines is available converted to ignition engine operation. These engines are eligible for OLD TIMER competition and are the very finest obtainable anywhere. We also offer a complete line of ignition accessories, ie, coils, timers, condensers, etc. Send for free 1976 price list. 77 Products (Otto Bernhardt), 17119 So. Harvard Blvd., Gardena, California 90247.

ROSSI DIESEL R.V. 15. New in box, only $90.00. Supretigre .23's, one with spinner. Aldrich modified and run in with care, $45 each. Diesel Supertigre G 15RV new in box Kusik modified with extra backplate and venturi, $60.00. Rev-Up 14/6 props with 1/4" or 5/16" shaft size - $1.50 each. Guy Markham, 1006 N. Douty, Hanford, Calif. 93230.

FOR SALE: MODERNISTIC MODELS New info. Market value $302. Over 300 steady customers. 4 [illegible], 4 storage cabinets. After complete inventory and re-evaluation, now priced at $2350. Call (213)-766-5868.

SOLD!

WANTED – Will buy multi-cylinder model airplane engines. In particular, the older spark ignition and certain glow ignition. All letters answered. Russel Sprague, 8800 Green Lane, Randallstown, Md. 21133.

TANK FOR SALE: R/C 'Elefant' with dual, variable speed controls and battery charger. Cost over $400.00 - practically new. $150. cash - (503) 775-5850. E.L.Wayman, 6647 S.E. Woodstock Blvd. Portland, Or 97206.

CARBIDE KNIFE SHARPENER; Sharpens X-Acto, razor, knife blades quickly, easily, cleanly. $3.25 postpaid. Send S.A.S.E. for complete information. LDE Products, 2140 Crockett, Carrollton, Texas 75006.

FOR SALE OR TRADE: 1000 magazines. Model Builder, Flying Models, Model Airplane News, Air Trails, Aeromodeller. Send large SASE. Bob Sylvester, 2654 Oak Grove Rd., Howell, Mich. 48843.

"SAILPLANE DESIGNERS HANDBOOK." Easy, complete instructions. $5.96. Eric Lister, 953 Klockner, Trenton, N.J. 08619.

QUARTER MIDGET - Now available, the "Li'l Cobra" that is wiping them out in Southern California. Fiberglas, foam, machined balsa, all hardware, less wing skins. $50, postpaid, insured. Bob Root, 1601 Amherst, Tustin, Calif. 92680. (714) 838-4813.

QUALITY Stainless Steel Fasteners. Small quantities, reasonable prices. Catalog $.25. Caltronic Laboratory, P. O. Box 36356, Los Angeles, Ca. 90036.

HI-FLY ENTERPRISES. "Sparrowhawk." NEW, for unlimited rubber competition, flown by Bob DeShields, 1975 Calif. point champion, and Bob White, FAI champion. "CONDOR 800", B-C-D F/F, 3 HL gliders. Stamp for catalog. HOBBY FAIR, 7212 Vassar Ave., Canoga Park, Ca. 91303.

MODEL MOTOR OIL, SAE 70, (2) 8 oz. cans, $2.00 postpaid. T. Crouss, 100 Smyrna West Springfield, Mass. 01089.

FOR SALE: Machinery to manufacture model propellers. Excellent condition. For more information, send self-addressed envelope to: 525 S. Cloverdale Blvd., Cloverdale Ca 95425

MODEL BUILDER Mag. collection for sale: Volume 1, Number 1, thru Volume 5, Number 44 (Aug. '75) complete. Excellent condition - $60.00. Charles Fitzpatrick, 326 Swinton Ave., Throgs Neck, N.Y. 10465.

PEANUT PLANS $1.00: E-1, D-VIII, Gere Sport, many more, plus Jumbo/Walnut. Free catalog S.A.S.E. Aero Era c/o Tom Houle, 11333 N. Lake Shore Dr., Mequon, Wisc., 53092.

WANTED . . Flying Aces' Trail Blazers by Henry Struck. Plans and construction articles from magazine. Clear Xerox copies acceptable. Write details to: John Weller, P.O. Box 2208, Newport Beach, Ca. 92663.

INDEX TO ADVERTISERS

tremely rugged, and reliable. The gear train is designed to reduce friction and gear load, resulting in faster response that should put some life back into that old tired set of servos. Price is $5.95. Available at most hobby stores, or write D & R at 3407 W. MacArthur Blvd., Santa Ana, CA 92704.

* * *

If RC boating is your thing, and time is short, we recommend a close look at Ready to Run Boats, from Steve Muck's R/C Model Boats. Available immediately is the Dumas Deep Vee 40 CF, which needs only the engine, radio, and paint scheme of your choice. The all-fiberglas hull is 40 inches long, has a reinforced deck, and comes with engine and radio mounts installed. The outdrive with rudder, strut with cable, water lines, tanks, and deck mounting brackets are in place. For fun and competition; more information from Steve Muck's R/C Model Boats & Supplies, 3422 Greenwood Ave., Los Angeles, CA 90066.

* * *

Would you believe that the ancient Greeks believed the Tortoise to be a demon? Well, if Jennifer Dahne and her Tortoise show up at MB, don't bother to call an exorcist!

Jennifer is the beautifully packaged young lady . . . er, uh, the young lady who is holding the beautifully packaged Pro Line 3-Channel R/C System. It is available in two versions; the closed gimbal 'Challenger' series for sport flyers, and the open gimbal 'Competition' series. They both feature nickel cadmium batteries, and an extremely low drain (7 ma) receiver. Each system includes a transmitter and receiver, airborne battery, two servos, switch har-

ness, charger, servo trays, frequency flag, instructions, and tort . . . , no, it's a Pro Line shirt patch that is included.

No phone numbers or addresses, but more info on the radio is available from Jerry Bonzo at Pro Line Electronics, Inc., 10632 N. 21st Ave, Suite 11, Phoenix, AZ 85029.

* * *

For the beginner, and for the "I'll try one to see if I like it" newcomer, either one of Hobbyway Model Engineering's new controliners should fill the bill. Both are scale-like profiles; one of Darell Polen's SPECIAL II high performance home-built aircraft, the other patterned after Paul Mantz' Bendix Trophy P-51 racer.

Both are simple, realistic, and rugged, with excellent flight characteristics with a .049 or .051 engine. Easy enough for a beginner to handle, yet capable of full pattern performance in the hands of an expert. Both kits include precut balsa, plans, instructions, bellcrank, horns, hinges, pushrods, line guides, in short, all you will need except an engine and a set of 26 to 28 foot lines.

Available from your dealer, or from Hobby Hideaway, RR2 Box 19, Delavan, IL 61734. In England, these two fine airplanes can be obtained from Performance Kits.

* * *

Do M.E.N. give you a charge? Since that is rather personal, we'll drop the subject . . . unless you are looking for a charge for your gelled electrolyte battery, in which case you need the new M.E.N. C-25 Automatic Charger. Available as part of a full power package, which features all the advantages of this new battery, the charger is designed with the necessary features that assure maximum battery power and life.

The batteries themselves, designated as Model PB 660, consist of two 6 volt, 6 amp units, matching pins and plugs, specifications and warranty sheets; the latter being for 6 months when used in accordance with the furnished instructions.

At your local dealer, $26.95 for the battery, $14.95 for the charger, or inquire from Model Engineering of Norwalk, 54 Chestnut Hill, Norwalk CT 06851.

* * *

Crystal Products, 2118 Archdale Dr., Charlotte, NC 28210, announces availability of its 'Power Mate', in your choice of three models. Handsomely finished in yellow fuel-proof, with high visibility brown lettering, the power panel is designed to efficiently connect and provide proper voltages for all your battery powered field equipment. Using a 12 volt battery as the prime source, it furnishes 4, 6, or 12 volts as required for your fuel pump, and the proper glow plug voltage as determined by your favorite type. A chart is included, listing all available plugs, so that virtually no testing has to be done by you, simply hook up and go. Two models indicate plug condition on an easily read meter, the economy model does so with a red LED (light emitting diode). Priced from $15.95 to $24.95, see your dealer first.

* * *

Latest on the list of books for the modeling hobby by George Siposs, is his just released "RC Modeler's Handbook of Gliders & Sailplanes". Containing 196 pages of pictures, graphs and drawings, this book covers history, construction techniques, materials, tools, aerodynamics, flying techniques, R/C theory, and where to buy all your goodies. Claimed to be the first American book on the subject, it should be a real shortcut to the beginner's path towards that first solo. With color cover, priced at $5.35 (postpaid) from Universal Developments, PO Box 5253, Orange CA 92667.

* * *

Ground Glass? Well, we suppose it might do the job if fed to your mother-in-law, but it is really meant to help you bond firewalls, wing mounting blocks, servo mounting blocks, etc., in your fiberglas fuselage. This powdery substance is mixed with polyester resin or epoxy, and is claimed to solve forever the problem of things breaking loose. It can also be used to repair cracks in glass fuselages, though is not recommended for exterior use, being extremely hard to sand. Available from your dealer, or inquire from Precision Fibreglass Unlimited, 17951 Henningway St., Reseda, CA 91335. Naturally, they would like to know where you read about it.

* * *

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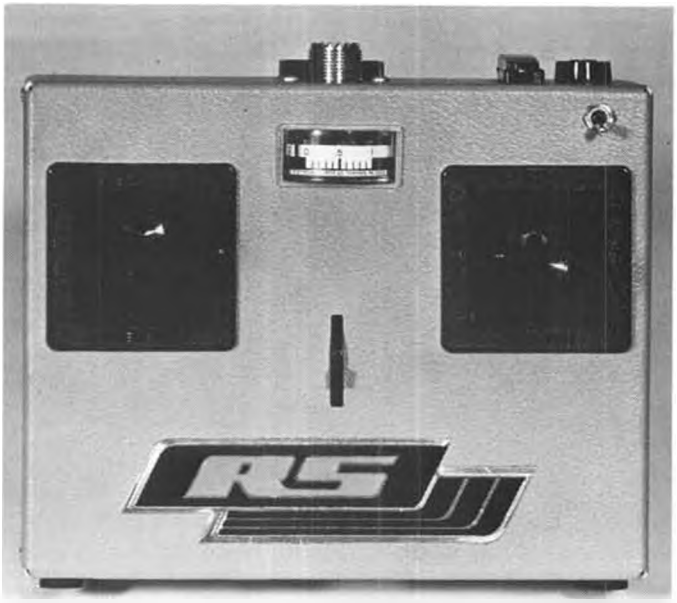

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And if the subject of Service Centers interests you from a technical standpoint, RS Systems has several geographic locations where we need highly qualified people to provide full service facilities for RS customers. Contact us for details.

NATS SPECIAL

During this year's Nats, RS Systems will maintain a Special Sales and Service Headquarters at Fairborn Hobby Center, Fairborn, Ohio. The service facility will be staffed by factory technicians, equipped with test and service instruments and repair parts to provide full maintenance and service capability.

Also, Fairborn Hobby Center will offer a complete selection of RS Systems and accessories for sale.

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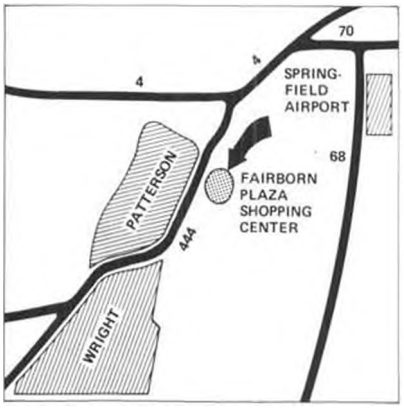

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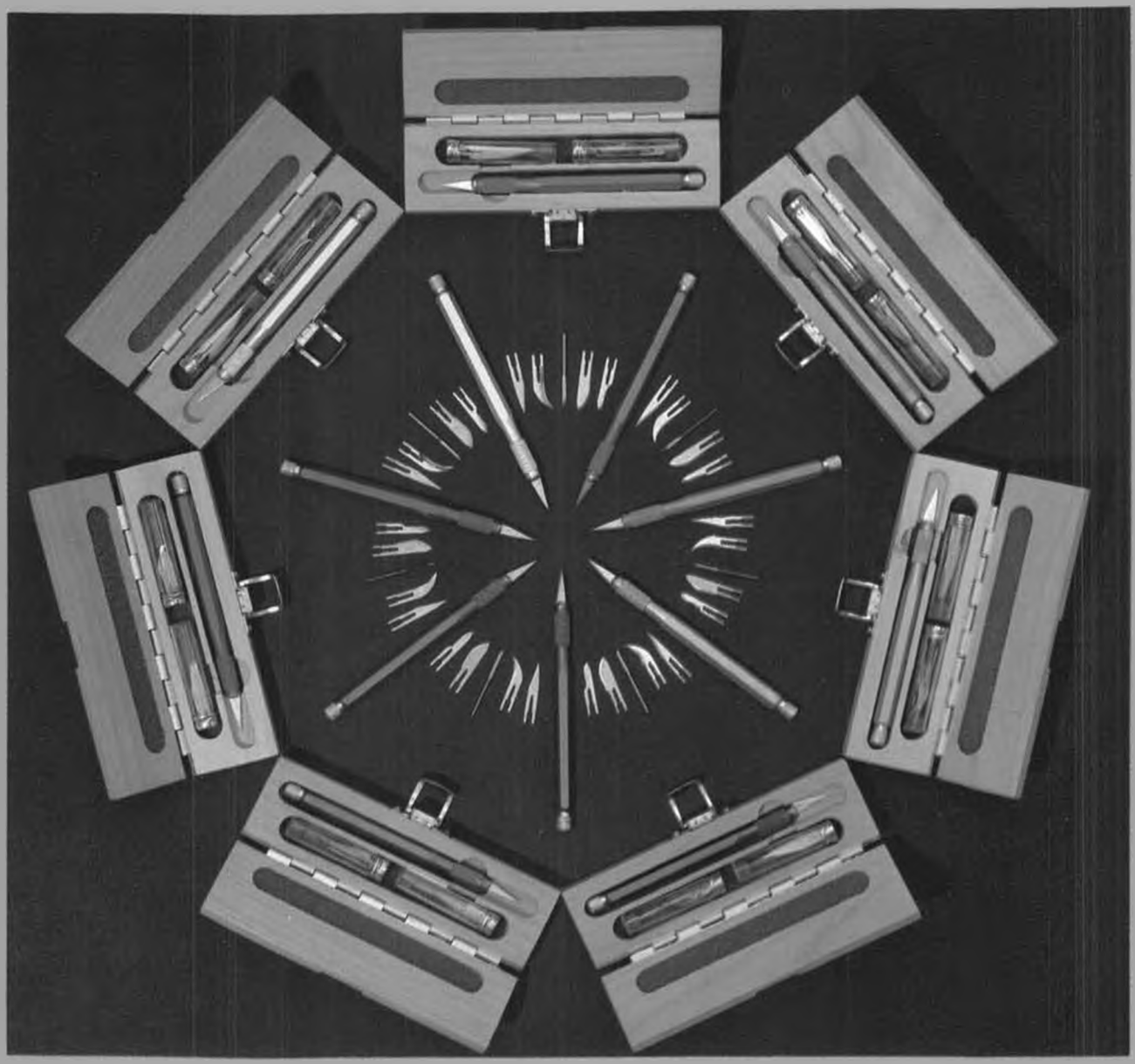

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