R/C MODEL BUILDER

RADIO CONTROL

volume 11, number 114 $2.50 JULY 1981

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TWO RADIOS YOU CAN GROW INTO BUT NOT OUT OF

Radios That Expand Your Capabilities.

We'd like to introduce you to two radios that you'll be able to appreciate for a lifetime of radio control flying. Radios that expand your capabilities, not limit them. The Kraft KP5X and KP6C.

Meticulously Engineered.

The purchase of a radio is an important investment. Kraft engineers understand this. So they created two radios that can be enjoyed by the beginner as well as the experienced competition flyer. Just right to start with, and plenty of radio to grow into, without ever growing out of. Meticulously engineered. Investments of the highest quality.

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KRAFT

K&B Measuring Mixing Cups NOW AVAILABLE in 4oz. & 8oz. sizes with LIDS! Graduated with milliliters and fluid ounces 4oz: 6 to a Box 8oz: 4 to a Box

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See it at your local Hobby Shop.
They serve you better . . . they can provide assistance, answers and service!

K&B "MATCHED FINISH SYSTEM"— A COMPLETELY CORRELATED FINISH SYSTEM

all ingredients required to:

✓	A	COVER	**K&B FIBERGLASS** — 3 weights — highest quality.
✓	B	SEAL	**K&B SUPER POXY RESIN** — easily workable — requires minimum of sanding — does not become brittle.
✓	C	PRIME	**K&B PRIMER/PRIMER CATALYST** — the last step before painting — can be brushed on or sprayed — fills every crack — sands extremely easily to a smooth finish.
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✓	E	REPAIR	**K&B MICRO-BALLOONS FILLER** — for damage repair or smoothing out surfaces.
✓	F	MIX	**K&B MIXING CUPS** — for your convenience — one ounce, unbreakable, plastic cups accurately graduated with milliliters and fluid ounces — ideal for mixing filler, resin, paint, etc., in small amounts.

K&B GLOW PLUGS

consistent peak performance

4 plugs — long reach, or short reach in standard or idle bar — (idle bar is a "must" for control from low idle to a constant maximum r.p.m.)

K&B FUEL

to meet ALL flying needs

7 blends . . . 4 with X2C oil, 3 with castor oil

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SUPER POWER PLANTS

powerful, dependable, durable — 12 model airplane engines . . . from .19 to .61 (standard and R/C); 4 model marine engines . . . 3 inboards 3.5 to 7.5R/C; 1 outboard 3.5R/C.

Here you have it all, everything you need to make your model plane, car, or boat tops in appearance and tops in performance, all from K&B, the leader in its field since 1946.

"THE CHOICE OF CHAMPIONS"

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

R/C MODEL BUILDER

JULY

1981

volume 11, number 114

Box 335, 621 West Nineteenth St., Costa Mesa, California 92627 Phone: (714) 645-8830

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FEATURES

SCALE VIEWS

CONSTRUCTION

Cover: Ernie Wrisley, Santee, California, built this Jumbo Scale, rubber powered Corbin "Super Ace". Built to the old (but we think, better) Jumbo rules, the span is 54 inches, area is 465 sq. in., and it weighs around 22 ounces. This captivating (and unposed) shot was taken by Ernie's son, Randy. Ernie also designed the "Mooney Bostonian" featured on page 60 of this issue. Several of Randy's designs have also been published in MB.

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WORLD CHAMPION

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HOT STUFF & SUPER 'T'
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"HOT STUFF AND **SUPER 'T',**
THE ONLY WAY TO BUILD
RADIO CONTROL MODELS."

FAI AEROBATIC WORLD CHAMPION WOLFGANG MATT AND HIS ALL HOT STUFF ARROW 81

Satellite City
P. O. Box 836
Simi, CA 93062
attn: Bill Hunter

WOLFGANG MATT
Zollstrasse 66
FL-9494 Schaan
Furstentum Liechtenstein
March 24, 1981

Dear Bill:

I have now completed 2 new airplanes using **"Hot Stuff"** and **Super 'T'** and I can tell you that I am very surprised and satisfied about the qualities of **strength, speed** and **especially lightness.** I think with this new method of building I am well prepared for the World Championship in Mexico.

Enclosed please find photos of my new ARROW 81 built with **"Hot Stuff"** and **Super 'T'.** My ARROW 81 is equipped with:

Power: Webra Racing 61
Prop: Variprop Landert (variable pitch prop)
Radio: Webra Expert 9
Cover: K & B
Adhesive: "Hot Stuff," Super 'T'

Thank you for an excellent product. **"Hot Stuff"** and **Super 'T'** are the only way to build radio control models.

Best Regards,
Wolfgang Matt

Wolfgang Matt

If your favorite dealer does not stock **"Hot Stuff"** and **Super 'T'** for you in the 2 ounce size, order direct. Add $1 packaging and postage inside the U.S.

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A WHOLE **NEW CONCEPT** IN TRAINERS

WITH MORE OF THE SUPER FEATURES YOU WANT

This combination of a **BASIC TRAINER** and an **ADVANCED TRAINER** all in one is a new and exciting concept from CRAFT-AIR. It's so simple and straightforward, one can't help but wonder why it's never been done before. **ONE AIRPLANE FOR TWO JOBS,** yet equal to the best at both tasks - and a heck of a lot less time and money needed.

- **COWBOY 1** — Flat bottom airfoil (easiest to fly.)
  — Flies rudder elevator, or full house.
- **COWBOY 2** — Semi-symmetrical airfoil (fully aerobatic.)
  — Uses same fuselage as **COWBOY 1.**

- Easiest to build. Fuselage uses preshaped plywood sides and only 3 formers. Similar simplicity employed throughout.

- Frame wing in one evening, tail surfaces in one evening, and fuselage in one evening. Fitting out takes one evening and covering another. Truly a "buy it on Monday, fly it on Sunday project."

- Easiest to learn to fly. The flat bottom airfoil, combined with the exceptionally light wing loading and the excellent ruggedness, makes **COWBOY 1** the easiest to fly, 20 to 40 size, full house trainer ever developed. The light wing loading makes it fly slower, giving you more time to plan, to steer, to correct. It's a lot easier to learn anything slowly, especially flying.

- **COWBOY 2** is made from your **COWBOY 1** by simply changing the wing to a semi-symmetrical airfoil. Although **COWBOY 1** is capable of many maneuvers, **COWBOY 2** will do all the pattern maneuvers and prepare you for the full pattern contest type ship.

- Premimum quality kit. Precision machine sanded ribs (no die crushing.) Preformed plywood fuselage sides, frames, wing braces, etc. Hardwood engine rails with plywood breakaway mount. Preformed nose gear. All gear hardware, control horns, clevises, aileron controls, etc. Quality second to none.

Cat. 203	**COWBOY 1**	$49.95
Cat. 204	**COWBOY 2**	$49.95
Cat. 203W	**COWBOY 1** Wing Kit	$19.95
Cat. 204W	**COWBOY 2** Wing Kit	$19.95

Wing Span	57¼ in.
Wing Cord	10½ in.
Wing Area	600 in.²
Ailerons	1" x 22"
Airfoil-**COWBOY 1**	Flat Bottom
Airfoil-**COWBOY 2**	NACA 2412

Wing Loading	12 to 14 oz./ft.
Engine	.19 to .40
Weight	3¼ lbs. to 3¾ lbs.
Fuselage	Plywood and Balsa
Landing Gear	Tricycle
Radio	4 channel

Craft-Air, Inc. **20115 NORDHOFF STREET • CHATSWORTH, CALIFORNIA 91311 (213) 998-3700**

LEARN TO FLY RC THE SIG WAY

STEP 1 - BASIC : START WITH A STABLE HIGH-WING MODEL

KADET JUNIOR

SIG KIT RC-46

BALSA RIB CONSTRUCTION WING
RUDDER CONTROL WITH UP TO 3 CHANNEL
Designed by CLAUDE McCULLOUGH

ACCESSORY KIT AK-246 - $11.75

ENGINES: .15 - .25 Cu. In.
WING SPAN: 48 In.

$39.95

KADET MARK I

BALSA RIB CONSTRUCTION WING
RUDDER CONTROL WITH UP TO 3 CHANNEL

SIG KIT RC-51

$49.95

Designed by CLAUDE McCULLOUGH

ACCESSORY KIT AK-231 - $12.95
AILERON KIT - RP-AK-331 - $3.98

ENGINES: .19 - .40 WING SPAN: 57 In.

KADET MARK II

ACCESSORY KIT AK-249 - 12.95

AILERON CONTROL WITH 4 CHANNEL
Designed by CLAUDE McCULLOUGH

BALSA RIB CONSTRUCTION WING

WING SPAN: 57-1/4 In.
ENGINES: .25 to .40 Cu. In.

SIG KIT RC-49

$54.95

Modelers often want to start in RC with a good-looking pattern or scale model that is complicated to build, has a high wing loading and flies fast. This is a mistake and never works out. First attempts with radio control should be with an inherently stable design having a flat-bottomed airfoil that gives the student time to think and develop automatic reactions. The Kadets, which will fly hands off, are ideal for this purpose. Many club instructors and hobby dealers have told us that two or three check-out flights on a Kadet are sufficient to allow a student to practice fly and learn without constant attention from an instructor. And we know of modelers in isolated areas, with no one to help them, who have taught themselves to fly with the Kadet.

The Kadet series of trainers are available in several versions to meet a variety of requirements. Intended for up to 3 channel radios and rudder control, the Mark I has been successfully soloed by many thousands of novice RC'ers. If you have 4 channel equipment, get the Mark II, newest development in the line, which has ailerons and can also be flown with rudder if desired. The Kadet Junior, using up to 3 channels, fills the need for a compact, economical trainer with a smaller displacement engine.

STEP 2 - INTERMEDIATE: PROGRESS TO FASTER SHOULDER WING DESIGNS

BALSA RIB CONSTRUCTION WING FEATURING BUILT-IN WASHOUT

SIG KIT RC-39

WING SPAN: 55-1/2"
ENGINE: .35 - .40
Designed by CLAUDE McCULLOUGH

KAVALIER $59.95

When the student pilot feels secure flying the Kadet and can handle it capably, he is ready to take the next step. The Kavalier has a special wing design, calculated to make this transition easier, with washout incorporated to help prevent tip stall.

LARGER SIZED MODEL - FOAM CORE WING WITH BUILT-IN WASHOUT

SIG KIT RC-32

Designed by CLAUDE McCULLOUGH

ENGINES: .40 - .50 Cu. In.
WING SPAN: 62 In.

$59.95 KOMANDER

Designed for novice R/C'ers who want to move up from simpler models or prefer to start with an aileron controlled airplane. The built-in stability, coupled with good maneuvering and aerobatic ability, allows rank amateurs and low-time fliers to do a creditable job.

STEP 3 - ADVANCED AEROBATICS

FOAM CORE WING WITH WASHOUT

SIG KIT RC-35

$59.95

Designed by CLAUDE McCULLOUGH

KOUGAR

ENGINE: .40 - .50
WING SPAN: 51 In.

After some flying time on the Kadet, Kavalier and Komander, the student pilot will be ready for this sleek stunter. The large area for its 51" span keeps wing loading low and washout in the tips helps flying characteristics. The choice of the AMA air show teams!

STEP 4 - EXPERT COMPETITION

FOAM CORE WING

Designed by MAXEY HESTER

SIG KIT RC-29

Balsa Skin **$69.95** Plywood Skin **$72.50**

ENGINES: .45 - .60 Cu. In.
WING SPAN: 67 In.

KOMET

In the Komet, Maxey Hester has created a pattern ship that meets the requirements of competition flying, yet is equally at home at a Sunday afternoon sport flying session. As in the Kougar, construction is speeded and looks improved by a formed plastic top.

SEE YOUR DEALER FIRST! TO ORDER DIRECT, ADD $1 PSTG. UNDER $10, PSTG. FREE OVER $10. NO C.O.D.
SEND $2.00 FOR LATEST CATALOG OF KITS, ACCESSORIES AND SUPPLIES BY SIG AND OTHER MAJOR COMPANIES
SIG MANUFACTURING CO., INC. . . . . MONTEZUMA, IA 50171

from Bill Northrop's workbench

Model Builder's crew at Toledo included (L to R) Kelli Vall, Anita Northrop, Bill Northrop, Amy Vall, and behind the camera, John Elliot.

IMS SWAP SHOP

By the time this appears, the California, New York, Toledo, and Dallas trade shows will be concluded. But for those who operate the shows, plans are already in the making for "next year." The IMS show in Pasadena, California, will again take place in early January 1982, January 9 and 10, to be exact. More and more of the large manufacturers are turning to this show in the Southern California area because of its similarity to the Toledo, Ohio and White Plains, New York shows, and because it offers a short respite from the ravages of the winter season for eastern exhibitors.

Tentative plans for the 1982 show again include indoor R/C scale as well as indoor R/C blimp competition. However, there will be a positive pre-registration deadline about two weeks prior to the show date, so that proper plans can be made for scheduling competition flights, IF enough pre-registrations are received. If competition does not appear practical, because of low pre-registration, there will still be live demonstrations of indoor R/C aircraft and blimps.

The major change in the IMS format for 1982 will be the inclusion of a Swap Shop. We have avoided this feature in the past primarily because of a manpower shortage. However, continued requests for this addition, plus the offer of total management of such a shop by someone experienced in swap meet operations, has convinced us to go ahead with it. So, as the saying goes, "One man's junk is another man's treasure." Save your trading material for January 1982. We'll see you there!

MISSING PERSON

Well, at least we can't find him. Several years ago, John Novak, Jr., Box 539, Chester, VA 23831, sent us a couple of photos dating back to WW-II. As sometimes happens, the photos got buried in one of the many hiding places at our office, and only surfaced recently. When we mailed the photos to the above address, our letter was returned with a "Not Deliverable As Addressed, Unable To Forward" sticker on the envelope. If anyone knows of John's current address, would they please drop us a note?

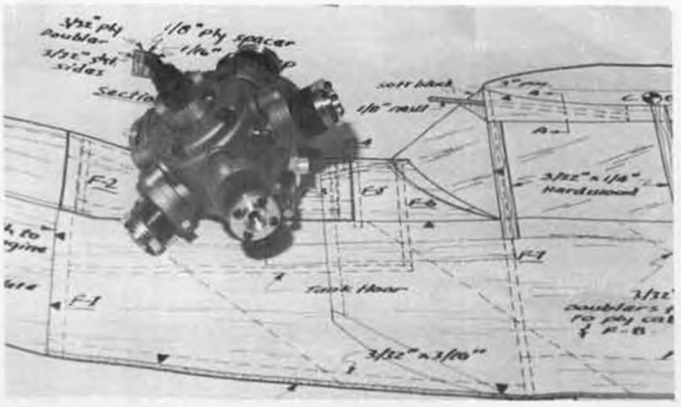
C.G. VS BALANCE

We'd like to point out an error of common expression that continues to be kept alive by those who either overlook the error, or simply don't understand what they're talking about. The unfortunate thing is that newcomers to modeling, especially those who are interested enough to want to know something about the aerodynamics involved, are being confused by this incorrect usage of terms. What we're talking about is good old "C.G.," alias "Center of Gravity."

The problem is that many modelers, and this even includes some who are very well-known designers . . . we're talking about designers in all three of the basic categories, too. F/F, C/L, and R/C . . . continue to refer to the point along the chord of the wing of a model where the model balances in a horizontal position, as the C.G., or Center of Gravity. Tain't so!

The C.G. of any object, whether it's a model airplane, car, or boat, a chair, the kitchen table, or "Magic" Johnson, is one single point. If you could suspend any given object at its C.G., that object would just sit there, like a statue, regardless of its attitude in space. Let's take a J-3 Cub, for instance, after all, 1981 may be the year when the number of different kits available for a J-3 Cub may surpass the number of kits available for the P-51!

Continued on page 98



Two of the MB Editor's hardly-ever-worked-on projects. Apprentice plans have been modified to accommodate the heavier G-Mark 5-Cylinder radial engine, and the Pacesetter ¼-scale sprint car is slowly coming together.

OVER THE COUNTER

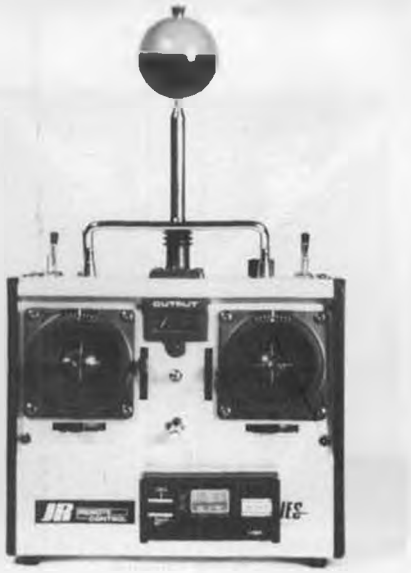
All material published in "Over the Counter" is quoted or paraphrased from press releases furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by R/CMB does not constitute an endorsement of that product, nor any assurance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

• Bridi Hobby Enterprises, now a subsidiary of Great Planes Model Distributors, announces the availability of the Bridi GLA 40. As Don Anderson of Great Planes says, "With a .30 to .35 size engine, 3-channel control and the control surface travel limited, it can be a docile trainer. But, install a .40, 4 channels and increase travel and you have a fine Sunday afternoon sport ship." Being somewhat larger (59-inch wingspan) than the average .40 powered trainer, with an advertised ready-to-fly weight of less than five pounds, the low wing loading makes for easy flying. A constant chord wing, sheet balsa tail surfaces, and machine cut and sanded parts all contribute to a fast building model. Formed dural landing gear, hardware, engine mount, canopy, plans and photo-illustrated instructions for the R/C newcomer are all included. For more information, contact Bridi Hobby/Great Planes, P.O. Box 457, Champaign, IL 61820; (217) 328-5160.

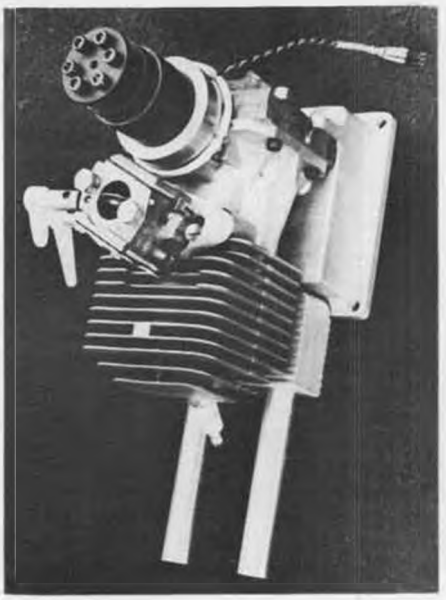
★ ★ ★

Vortac Mfg. Co. has solved the problem of how to safely choke the larger engines being utilized today in giant scale aircraft. Uncowled engines are dangerous enough, and cowled-in scale ships are virtually impossible, but the new 3-piece choke kit from Vortac eliminates these hazards. The ratchet

Top Flite's J-3 Cub, in Fabricote Yellow.



LCD Countdown timer by Electric Eagle mounted in snap-out base, fits on transmitter.



The Super Hustler Mk II, from EWH Specialties, Inc.

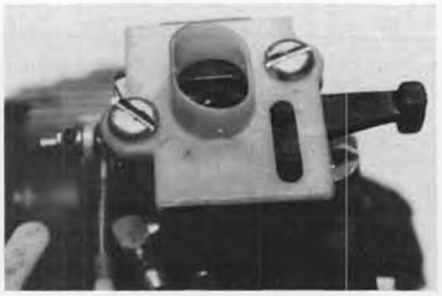
American Beauty River Towboat by Dumas Products, Inc.

Big, modern, offshore tug, "Mr. Darby", by Dumas Products, Inc.

Two new mounts for large engines, from Octura Models, Inc.

The "Challenger", by Electroline, electric powered control line with on-off control in handle.

The Wardcraft Offshore 44, for .65 to .90 size engines.

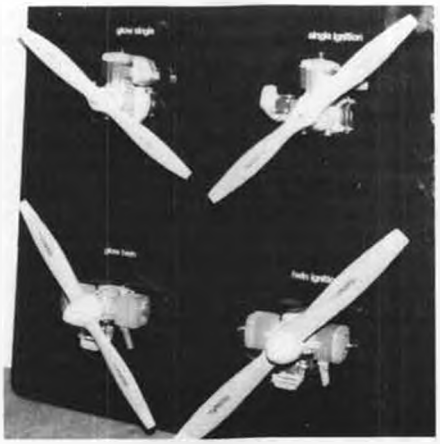


Big engine manual choke, by Vortac Mfg. Co.

and spring steel plate will hold the choke in any position, while the long operating arm allows manual operation in many cowlings. It can be attached in seconds to Walbro and Tillotson carburetors using existing mounting screws, and can be converted to R/C operation by following the instructions provided. Price is $5.95 at better hobby shops everywhere. Vortac Mfg. Co., P.O. Box 469, Oaklawn, IL 60453; (312) 425-5885.

★ ★ ★

Wardcraft Marine of Lynwood, Washington, is now producing a .21 and a .65-.90 sized offshore design, each with the hull available in two bottom configurations, deep vee or modified vee, incorporating a flat running pad. The Wardcraft offshore 44 or 44 FRP (flat running pad) is 44 inches overall with a beam of 13 inches, and is suitable for single or twin-engine installation. Molded of polyester fiberglass with reinforcements of aircraft grade ply glassed in, it is available as a kit for $129.95, or joined for



The big Tartan engine in single, or twin, glow or ignition, from World Engines.

$169.95.

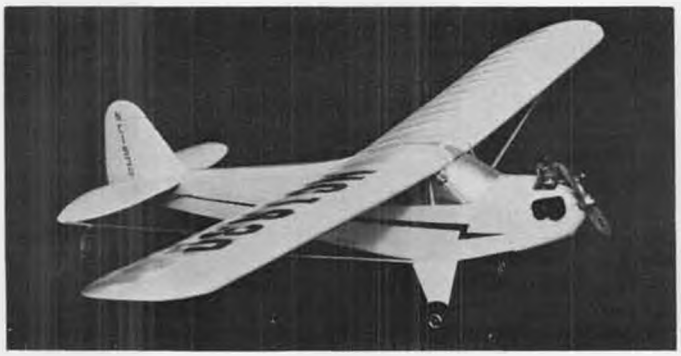
The Wardcraft offshore for .21 engines comes in two lengths: the 33-inch hull is of deep vee design, while the 31-inch hull incorporates the flat running pad bottom. At the present, either is available only as a kit for $89.95, plus shipping charges. Complete hardware kits are available, featuring strut and rudder, mounting brackets, ride plates, flex cable driveshaft, shaft housing and necessary mounting nuts and bolts. The 60/90 kit is $74.95 and the 21 kit is $49.95. Dealer and distributor inquiries are invited. Wardcraft Marine, 2212 199th St., S.W. Lynnwood, WA 98036; (206) 775-3969.

★ ★ ★

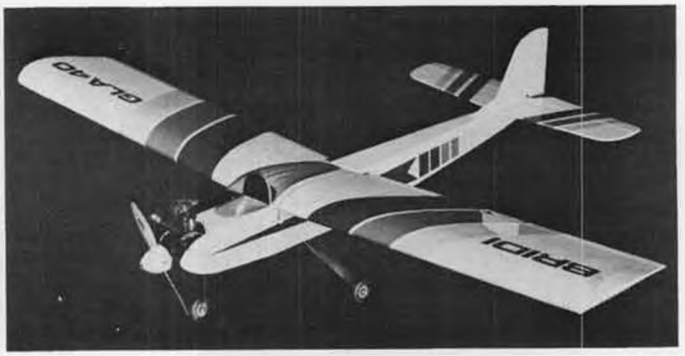
World Engines announces several additions to the Tartan line of engines for large aircraft. An ignition version of the single cylinder engine is to be offered, along with a new opposed twin to be available in either glo or ignition versions. For further information, contact World Engines, 8960 Rossah Ave., Cincinnati, OH 45236; (513) 793-5900.

★ ★ ★

For the indoor and outdoor rubber powered crowd, Sig Mfg. announces its



Still another J-3 Cub, this one of molded foam, from Midwest Products.



The GLA from Bridi Hobby/Great Plains.

The Deep Vee 67, by Offshore Enterprises, for single or twin Quadras, or .60 to .90.

Fast charger for Ni-Cd batteries in 4 or 6-cell packs, by Associated Electrics.

improved rubber winder. This new version, in a durable plastic case, features a 6:1 ratio, is smooth running, and winds either forward or reverse. The price is the same, low, $3.95. Sig Mfg. Co., Inc., 401 S. Front, Montezuma, IA 50171.

★ ★ ★

Octura Models announces two new items for class F or X R/C power boaters. The first is a motor mount, #6-90, designed to accommodate the OPS 90, Rossi 90, CMB 90, Webra 90, or OS Max 90. A modified version, #5-90 (5 inches wide) is also available. Length and flange mounting holes are the same.

The second item, a flex hex with a 10mm thread to fit the OPS 90 to a .250 diameter flex cable coupling, has a pilot to fit the stock OPS 90 flywheel. A companion flex hex with an 8mm thread is available for the Rossi 90 with pilot to fit the stock Rossi flywheel. Octura also has available a complete 14-page catalog (with price list) listing boat kits, competition proven struts and rudders, props, Kool Klamps, flywheels, universal joints, motor mounts, hardware, and their "ship shape" adjustable hull building fixuture. All this plus many tips on power boating for just 50¢. Write to Octura Models, Inc., 7351 N. Hamlin Ave., Skokie, IL 60076.

★ ★ ★

The Ni-Cd fast charger, #3772, from Associated Electrics is designed to charge or discharge 4 or 6-cell sub C Ni-Cd packs as used on the Associated R/C 12E, 1/12 scale race car and other brands of cars utilizing packs of 4, 5, or 6 cells designed for fast charging and arranged in series. A switch determines either discharge, or 4 or 6-cell charge condition. The timer switch will regulate charging up to 15 minutes with automatic shutoff, providing a trickle charge in the shutoff position. The ammeter indicates rates of charge or discharge up to 5 amps. The input cable is supplied with plier type battery clips, while the output cable is fitted with a 2-pin connector that matches the R/C 12E battery connector. A volt meter tap harness is available to plug into the output cable to allow monitoring of battery voltage. Charger #3772 is $34.

Continued on page 98

Quarter-scale SE-5A built from W.E. Technical Services (Bill Effinger) plans.

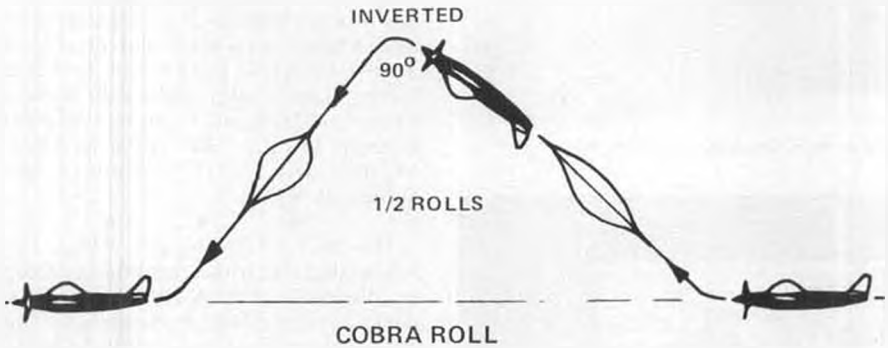
Flex hex coupling for larger engines and drives, by Octura Models, Inc.

Sig's rubber winder for small sport models.

Thundermarine offshore for Quadra, by J-5 Enterprises. Drive train with clutch also available.

Pattern Flying

By DICK HANSON . . . Part 14: The Cobra Roll and Triangular Rolling Loop.



COBRA ROLL

• This month we have picked the two triangular shaped maneuvers in the Masters flight schedule. Our first maneuver, the Cobra Roll, is simple *if* the model has good axial rolling habits. The real trick on the Cobra Roll, as well as the Rolling Loop, is to learn to fly a triangular or diamond shaped course. A friend who has a good eye for angles and an understanding nature can be very helpful.

As we have recommended in the past, the maneuver should be first broken into it's simplest elements, then practiced in complete form. The Cobra Roll is really a 45° angle, a 90° angle, and a final 45° angle. You get plenty of chances to find out if your model has a problem with lateral balance, because the heavy wing will "lag" on each turn. The more abrupt the turn, the worse the "lag" will be.

O.K. Let's go through a sorting out of this one. Establish some reference points to let you know when you are properly "framed." Your helper can stand behind you and call the angle corrections and frame centering. High speed is not required. At first, you simply need to find and recognize the 45° angles of flight (45° uphill and downhill). Try to use the entire frame when practicing, it will give you more time to see the angles.

Once you feel you can do the angles, add the 1/2-rolls as described in the rule book, centering each roll respectively. The 90° quarter-loop is now done during inverted flight, but it should be an easy transition from the upright attitude used during initial practicing.

You may have trouble holding the 45° flight path once each roll is completed. The usual causes are: (1) nose-heavy balance, (2) bad servo/linkage/transmitter pots, etc., (3)undersized stab/elevator, requiring large trim corrections from upright to inverted. (4) All of the above.

Do not try to slow-roll the half-rolls unless you want to risk heading changes. No bonus points (or penalty points) are called for when the roll is done slowly. One you get comfortable with the Cobra Roll, try for a balanced look by making the separate parts look similar in crispness, duration and speed.

THE TRIANGLE ROLLING LOOP

If you had trouble with the Cobra Roll, you will have great difficulty with this one. The rule book for one (1)-second legs climbing and diving. This stipulation has been dropped according to reliable sources on the contest rules committee. The maneuver can now be opened up to permit smooth flying.

Note the following points.

(1) The 135° turns require a lightly loaded airframe (or flaps) for smoothest results.

(2) The roll rate should be fairly quick to prevent wandering in high wind conditions.

(3) The inverted-to-inverted roll which is typically performed downwind, has a tendency to lose altitude and thereby ruin the position of the final 45° leg.

Practice the basic triangle shape in the same manner as described for the Cobra Roll. All of the previous notations concerning balance and trim apply double here.

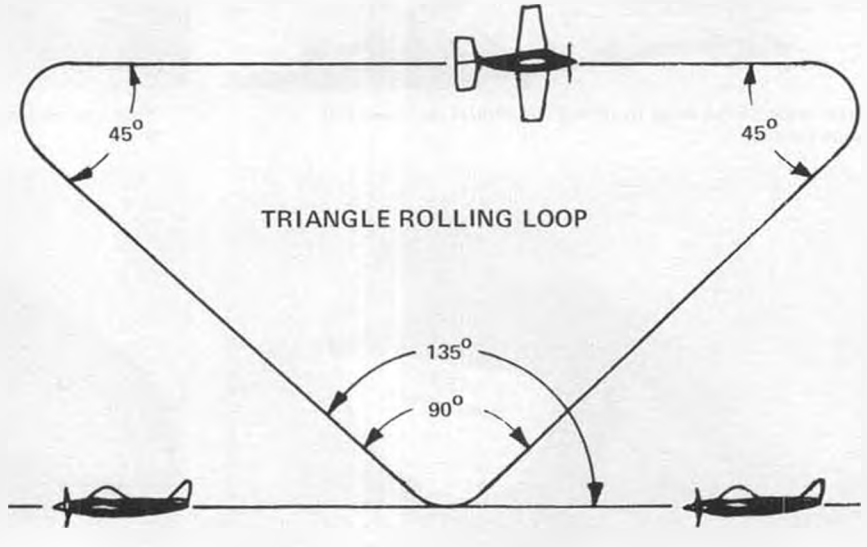
The square and triangle shapes which now exist in the Masters pattern are forcing some changes in old accepted airframes which are approximately 600 to 700 sq. inches. The typical 100 M.P.H. model will do the new maneuvers, but a larger frame is required in order to make the corners look relatively sharp. The resultant maneuver sizes become huge.

A lot of design work is being done on larger models in an effort to get smoother, more consistent performance. Some of these models suffer from wind drift as well as assorted other problems. On smaller designs, some gimmicks are being tried, such as combination spoiler/flaps, variable-pitch props, etc. These can be a real pain in the back to set up, and as well, present some potential (in our opinion) safety related problems. I for one, don't want someone accidently over-revving a plastic propeller and having blades as well as other parts flying in all directions.

Our findings are that the larger models can be made to perform at higher speeds (that's right) as well as very low speeds, as compared to the existing 700 sq. inch designs. The wing loadings of the larger planes offer a very flat flight attitude, giving potentially faster flight, quicker acceleration, sharper turning, and lower stall speeds. (The airfoils are also changing.)

Well now, if bigger is better, why

Continued on page 72



The "one second of flight attitude" requirement has been dropped (informally). Ref. pg. 47 of the rule book. Please check with judges at contests to avoid confusion and possible fights!

R/C WORLD AT TOLEDO '81

By JOHN ELLIOT

PHOTOS BY AUTHOR

Norm Cassella's ¼-scale Christen Eagle.

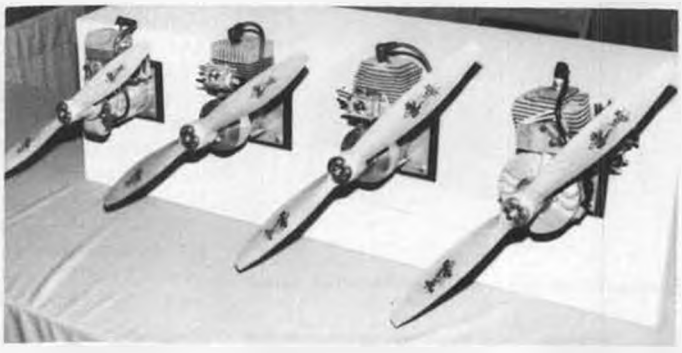
Gee Bee R-1 in Coverite booth.

Dick Barron's Stearman was a real crowd pleaser.

• The 27th Toledo R/C Exposition is now a thing of the past, and this one, like all the others, made history; some of it to be forgotten . . . the weather, for instance! This year, the weather was kinda like Texas weather . . . just wait a few moments and it will change. Sure enough, it did. The Weak Signals club, over the years, has moved "show time" from February, to March, and into April to minimize the possibilities of bad weather for exhibitor and show attendee alike. This year, blue skies on Thursday and Friday greeted one and all (a weather change), then very warm (!) and humid on Saturday (another change in climate), then overcast and chilly on Sunday. Intermittant showers included. Late Monday and Tuesday, very windy. (We won't mention the tornado watch!)

Over 185 exhibitors that included manufacturers new and old, various hobby organizations, the model press (even Editor Bill Burkinshaw from

Real useable trophies! Radio systems and AM/FM/Cassette tape portables.



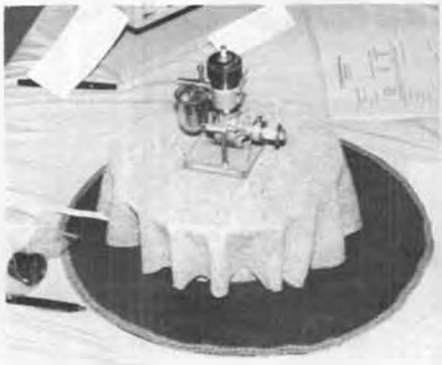
Four sizes of Kioritz engines shown by Roush Mfg.

Ted Stinson emptied his Laughing Whale drydock and brought 'em all to Toledo!

Byron Originals array of Beech options, all for direct-drive .60's.

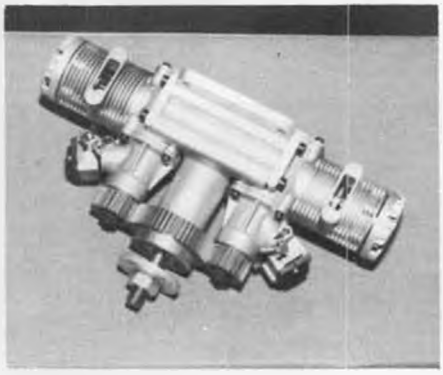
House of Balsa's quarter-scale Pietenpol.

Dynamic Models' 1/2-inch scale PT boat. Glass hull and plans available.

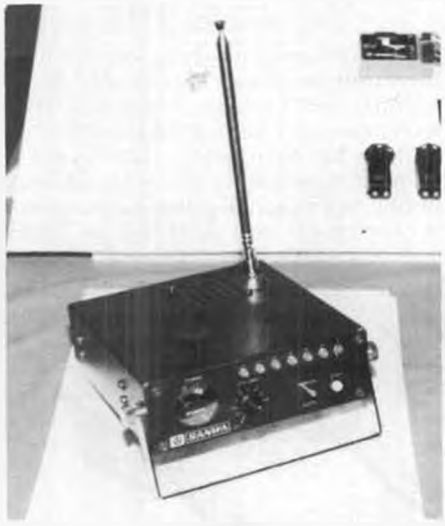


The "Commemorative" Ohlsson Gold Seal engine by Herb's (Wahl) Model Motors.

The new K & B .40 outboard, scheduled for availability in August 1981.



Twin-drive Webra using two .60's, first used by Prettner at Las Vegas.



Frequency scanner by Airtronics out of Sanwa.

RCM &E, of Great Britian), the usual display tables full of models, and a swap shop, were fitted (squeezed) into the Sports Arena complex. More space is sorely needed, as requests for booth space were being turned down late last fall. In spite of Mother Nature, the Weak Signals put quite a show together. Instead of trophys, plaques, or silverware for awards, as in the past, the Weak Signals awarded R/C systems, expensive AM/FM/cassette portable radios, and TV sets as prizes in the competitions for best model in the various categories.

Kit manufacturers, especially those into the scale scene, are constantly looking for "that airplane" to kit, one that will be a best seller. This was not the year of the P-51, insofar as many new kits were concerned. Circus Hobbies had a new ARF P-51, Sig's featured new markings, the Byron '51 was ever present, however, the year of the Eagle, Christen, that is, has arrived ... Higgins Aero/Comp. was showing its 30% scale Eagle, Cass Engineering's Norm Cassella, of Pulsar fame, was displaying his 1/4-size version, Hobby Shack with the Pilot rendition, Bob Dively had one, Tom Keeling of T & D Fiberglass has plans for a 1/4-size, and Byron Originals has a big one in the works! Birds of a feather...

With all this bipe talk, guess who shows up at Toledo after a vacation of several years but the Aeromaster Master man himself, Lou Andrews of AAMCO. Even had the Original Aeromaster on display. With over fifteen years behind her, the old girl still looked good.

Word has it that Byron is planning yet another big two-winger; this time it's Walter Beech's finest, the Staggerwing. Oy Vey!! No small amount of interest was shown towards Byron's brace of

Red Costlow knows the Ace Silver Seven transmitter so well he can explain it with eyes shut!

Circus Hobbies' Marty Barry has the JR radio explained to him by a passing spectator.

Tom Keeling, T & D Fiberglass Specialties, shows off his new fiberglass "Z" cups.

Buhl Bull Pup from 1936 M.A.N., built by LSF President Gordon Pearson. Plans available from R/CMB.

Yoshio Kondo visits with Art Leighton (left) and Ray Forbes, of Kraft Systems.

Craft-Air's Tom and Marie Williams hard at work promoting Cowboy trainer.

Glen Toma, Futaba's Service Manager says, "We've got your radio."

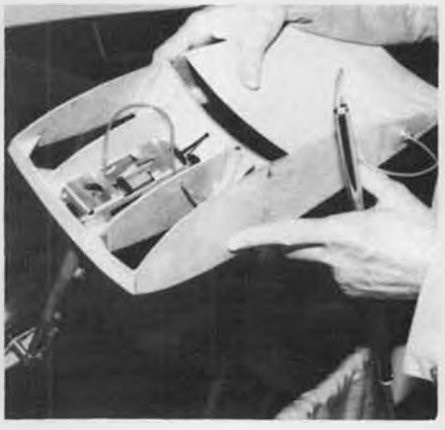
John Simone, Jr, and sister Kathy Davis of American R/C Helicopters.

Beeches; Bonanzas, 4 and 6 place, conventional and butterfly tails, and T-34's, conventional and turbo powered.

The Nelson .15 series of engines raised the blood pressure of the 1/4-midget pylon crowd, as did the new K&B 40 outboard for boaters, being displayed by Bobby Tom, Bill Wisniewski, and the crew from K&B. The line of H.P. Engines included some very interesting multiple-cylinder affairs, very well executed, especially the radial 4. . . Circus Hobbies had the Webra line on display, including an interested twin. Joe Martin, of Sherline, was showing a new variable venturi carb that looks "very interesting." The Super Pumper guys, Bart Fury and Bob Walker, of Robart, were showing a super carb of their own that's in the works . . . Bob had the scale types drooling a bit over a new, prototype retract gear for lovers of the Corsair, P-40, and Hellcat. (Art Johnson saw it, said it was just right for his P-40 in our June '81 issue.) The unit shown in a section of wing from a Ziroli Corsair sets one to dreaming. Fred Wallman, of Annco servo fame, had a large retract unit, shock absorbing with scissor links, along with a cast and machined aluminum wheel, plus scale molded tires for the P-51 types that would bring a nod of approval from R.A. "Bob" Hoover. Aeromarine displayed its Big Tract retract unit (see June O/C) and retract tail wheel. Many good items to select from. And several years ago, some casually mentioned that the "big airplane thing" would be a passing fad...

In R/C systems, more bells and whistles on the popular lines of radios; World Engines displayed the new Mark 4 with linear slide trims, and changeable RF sections for possible future frequencies and other options. Futuba, MRC, Airtronics, are adding extra chan-

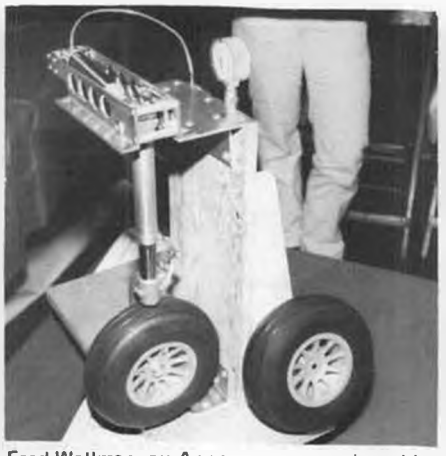
The motor that all quarter-midget pylon racers will want, the Nelson .15.



Robart's rotating retract for large Corsairs, P-40's, Hellcats, etc.

Stunning 1/4-scale Great Lakes Trainer displayed by Dave Platt.

Four-engined radial by HP, seen at Midwest Models booth.



Fred Wallman, ex-Annco servo man, is making this pretty P-51 retract gear.

Bob Nickels, Sid Axelrod, and Scott Christensen saying nice things about Fabricote.

Lou Andrews waves hello from his Aamco booth. Had original Aeromaster on display.

Larry Wolfe, Mr. Jet Hangar Hobbies with prototype A7 Corsair II.

RCM & E (England) was represented by Editor Bill Burkinshaw.

nels, dual rates, end point adjustments, and expo to whet the Sunday and serious sport flyer appetite. Kraft introduced its new, stylish 'K' Series systems, including a new pistol-grip car/boat system. What with inflation, et. al, the hobby person contemplating purchase of new R/C gear never had it so good. Cannon with the smallest systems going, World Engines with its brute S-16 servo, and Ace R/C with its kits, designed to be tailored for specialized use, or personal preference.

Midwest Products has entered the large model field with the introduction of its 1/3-size Wittman Tailwind. Dave Platt had his new 1/4-size (what happened to 1/5th?) Great Lakes and 1/5 Spitfire. Vito Tomeo with a Hawker Tempest. Don's Custom Models Piper Tomahawk, and, oh yes, Bud Nosen's giant 109-inch wingspan F4-U Corsair, all added to the impact of 'big is now.'

An S.E. 5A at 1/8-scale, 39.9 inch wingspan, was under protective glass cover, and no wonder. Actually a super-complete kit that will build into a museum quality show piece. To put covering material on this model by Minicraft/Hasegawa, would be a crime, as every part, bit of rigging, fittings, control systems, and aluminum panels, as on the real plane, are all there. Could be R/Ced, too. Truly, a scale model. Pica Products also touched the hearts of quite a few, showing a prototype of its forth-coming Aeronca.

Much work has been done in recent years with respect to muffler/exhaust systems, and this year is no exception, with Macs Mufflers, Quarter Headquarters, Semco, Condor Hobbies with its new Magic Muffler series, all showing more mufflers and pipes than a Scottish Band. Bob Davis, of Davis Diesel has expanded his conversion kits to encompass the larger (40 & 60) hobby engines (someday, a dieselized Quadra?). The

Larry Jenno and Joe Zingali, of J & Z, attempt to confuse some youngsters on the aerodynamics of propellers.

Stan Powell and Wally McAllister, doing their bit for ecology in the Noise department, with Macs Products.

Pica's newest item is this Aeronca, which like it says, is coming soon.

Bud Nosen's F4U Corsair, which flew at the last Las Vegas QSAA fly-in.

On display, but still in development, the Wittman "Bonzo", by J-5 Enterprises.

In vivid contrast to the generally big aircraft theme of Toledo '81, Micro-X shows some of its Peanut Scale models.

quantity and quality of power and scale boat hardware has to be seen to be appreciated. Offerings by Octura, Dumas, K&B, Hughey Boats, W-F Products, and others, for fuel and electric powered boats are almost endless.

H & M Aircraft Supply displayed its very interesting "Whirlwind Twin" set up for two .40 to .90 engines with a multiple vee-belt design concept and a double-ball-bearing equipped spindle driving the prop. This looks to be a very well thought out idea.

Larry 'El Lobo' Wolfe, of Jet Hangar Hobbies, enjoyed excellent response to his line of ducted fan kits, drive units, and accessories. Larry, along with Bob Violett, and the people at Midwest Products, have done much to develop and increase the interest and scope of ducted fan model aircraft.

Aerolite Products had an extensive line of materials for the scratch builder, from foam board, graphite materials, laminating tape, fiberglass cloth, a fuel tubing material suitable for all types of fuels, and Clark props for Quadra engines. Some very sharp looking scale instruments in 1-1/2, 2-inch, and 1/4-scale, in color are offered by Bowen Avion of Canada. Tatone Products is making its line of instruments available again. RAM Radio Controlled Models (Ralph Warner) displayed some neat battery system warning devices, plus a line of electronic speed controllers, throttles, switchers, and lighting systems, including flashing navigation lights, strobe, landing lights, and marine navigation lights. Will go a long way to add that final touch to a scale project. Put some on a simple sport aircraft and go night flying, it's easier than you think . . . (the author and several friends have indulged in night pylon racing, je). We will endeavor to let our picture story create a feeling of having been in Toledo. Everybody should go to Mecca, at least once. . . •

Cliff Raussin, Condor Hobbies, puts the evil eye on a spectator.

Mr. Kustom Kraftsmanship, and "Fuel Lines" editor himself, Joe Klause, with Nelson .15.

Colleen Napier assembles instrument panel from Bowen Avion, Canada. In photo 4-color.

A whole bunch of Product$, ready for U$e. The C & D Glow Driver and electric starter pack, with Sullivan starter mounted thereon, ready to crank up the Enya 45 with Slimline muffler. The JR transmitter is standing by to control the main subject of this report, the FB-100.

PRODUCT$ IN U$E

AIR CAPITAL MODELS' "FB-100", by BILL NORTHROP

• About 15 years ago, we coined the expression ARF, meaning "Almost Ready to Fly," probably when doing a product review article on one of the Lanier plastic R/C models that was being introduced at the time. Since then, the expression ARF has become standard throughout the world when someone is describing a kit that promises "instant airplane" to the purchaser. (It's fun to see "ARF" in the middle of some otherwise completely undecipherable copy in a foreign language magazine, knowing they're using *our* expression!)

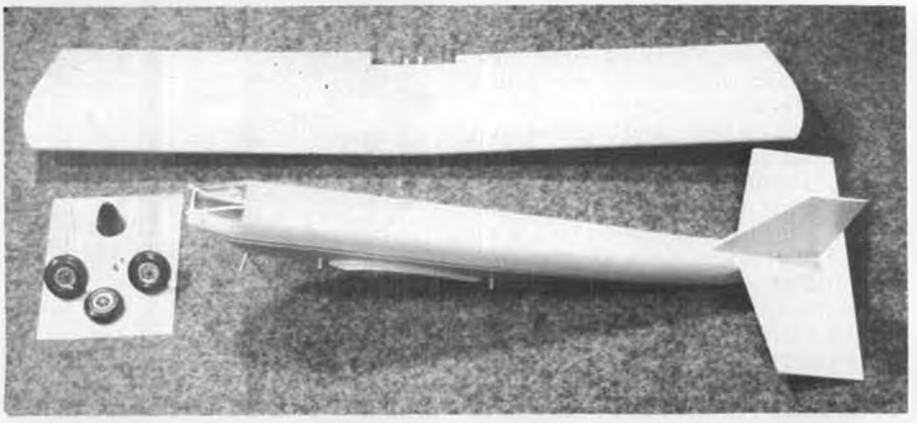
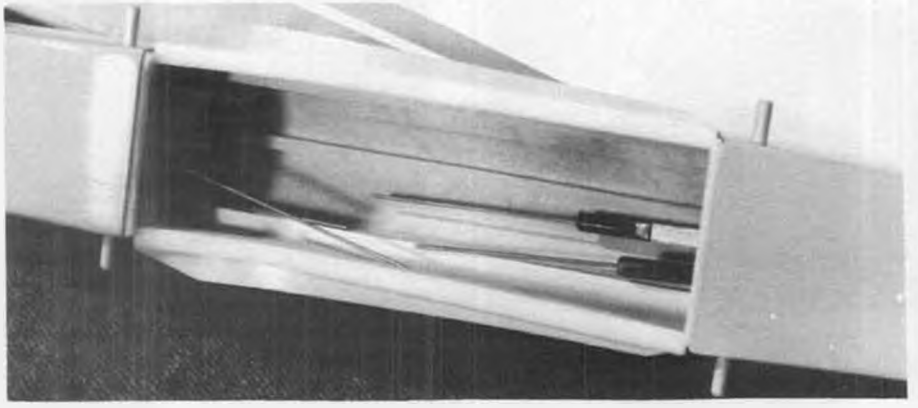


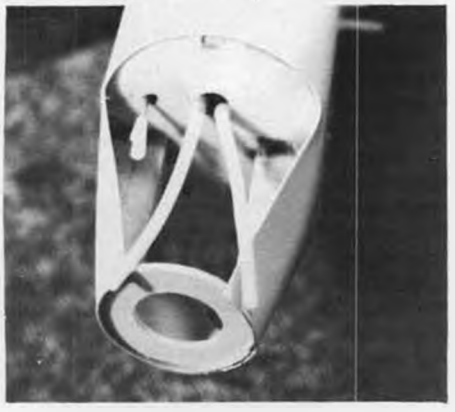
Photo taken 5 minutes after opening the shipping box. This is really instant airplane, and a darned nice one at that.

Actually, we coined *two* expressions in that article, the other being ERF, meaning "Entirely Ready to Fly." This one has had little use, because when you get right down to it, ERF implies that you take off the wrappings, grab your field box, and head for the flight strip. One example, though, is the Futaba "Silly Savage Trainer" (the guy who named that one is hiding from Anita Bryant), which comes complete with K&B 19 engine and Futaba 3FN radio installed. Except for charging the batteries and bolting on the landing gear, this one is ERF.

What all of this is leading up to is the fact that we have encountered an R/C model that bridges the gap between ARF and ERF, and though it's not as easy to pronounce, AERF, "Almost Entirely Ready to Fly" pretty much describes the



Rudder, elevator, throttle, and nosewheel pushrods are installed and ready for attachment to servos. Note foam rubber insulation around wing saddle, and 1/32 ply wing fillets.



"Rolled" ply fuselage comes with bulkheads and bearers in place. Maple mounts and rails.

Bob Upton shoots a touch-and-go for the camera (auto-winders are great!). Flight tests conducted at Mile Square Park in Fountain Valley, California, about 10 minutes from MB's office. FB-100 (FB for Fun Bird) flew "out of the box", only needed a twitch of right rudder trim . . . period!

Enya 45 with Slimline muffler makes a perfect power combination for the FB-100, which will handle .40 to .60 size engines. Modern 60's are really more than enough. Top Flite 11x6.

arrival condition of Air Capital Models' FB100. Air Capital Models (Jim Finley) is located at 6540 E. Central, Wichita, KS 67206, phone (316) 683-4221. Price of the model, plus minimal trucking charges is $139.95, a price that is reasonable for a kit, let alone a completely finished model

When you remove the airplane from the large, triangular box, you have just that, a finished airplane! However, the FB-100 breaks tradition with the usual ARF . . . there ain't no plastic! Well . . . the wing is of foam core construction, but so are many non-ARF models.

The FB-100 fuselage is made of rolled birch plywood reinforced with balsa doublers, triplers, and plywood bulkheads. By "rolled," we mean that a precut sheet of 1/32 ply is bent lengthwise over a mold, forming a U-shaped section. This forms the top and sides of the fuselage. The bottom is flat sheet balsa. During the shaping process, the balsa and plywood reinforcing is glued into place, along with firewall and maple motor mount beams and servo rails. From the firewall forward, the fuselage skin is further rolled until it meets itself on a ply nose-ring, blending the fuselage perfectly into a 2-1/4 inch spinner (included).

Not stopping here, Air Capital installs the plastic fuel tank, steerable nosegear, and all pushrods. The sheet balsa tail surfaces are properly aligned and glued in place, with horns and pushrods attached. The whole schmere is nicely finished with enamel, in basic white, with your choice of several trim colors.

Next out of the box is the finished wing, complete with two birch plywood spars, a .012 thick skin over the foam, slotted landing gear rails in place, balsa strip ailerons hinged on, and wire horns ready for linkages. The full-symmetrical airfoil is nice and fat, with fully rounded leading edge, providing excellent flight characteristics in addition to slow, gentle landings. Of course, the wing is also finished in white with color trim.

The last things to come out of the shipping box include a plastic bag containing the main landing gears, wheels, spinner, wheel collars, and instruction sheet . . . just like in the picture.

OK, so what's to do? We chose to add some permanence to the engine compartment by coating the entire inside area with Hobbypoxy 2, the thinner, slow curing type, which can be brushed on.

That's it! The Enya .45 engine dropped in with only a little cutting away of the ply skin and opening up the nose ring.

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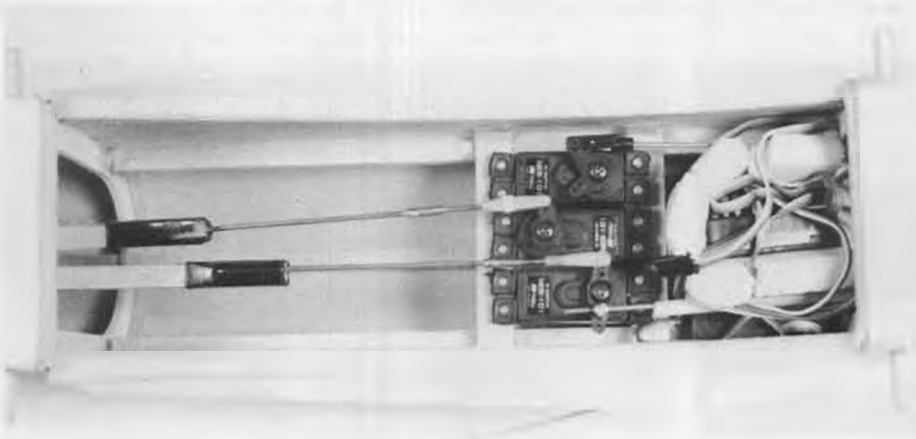
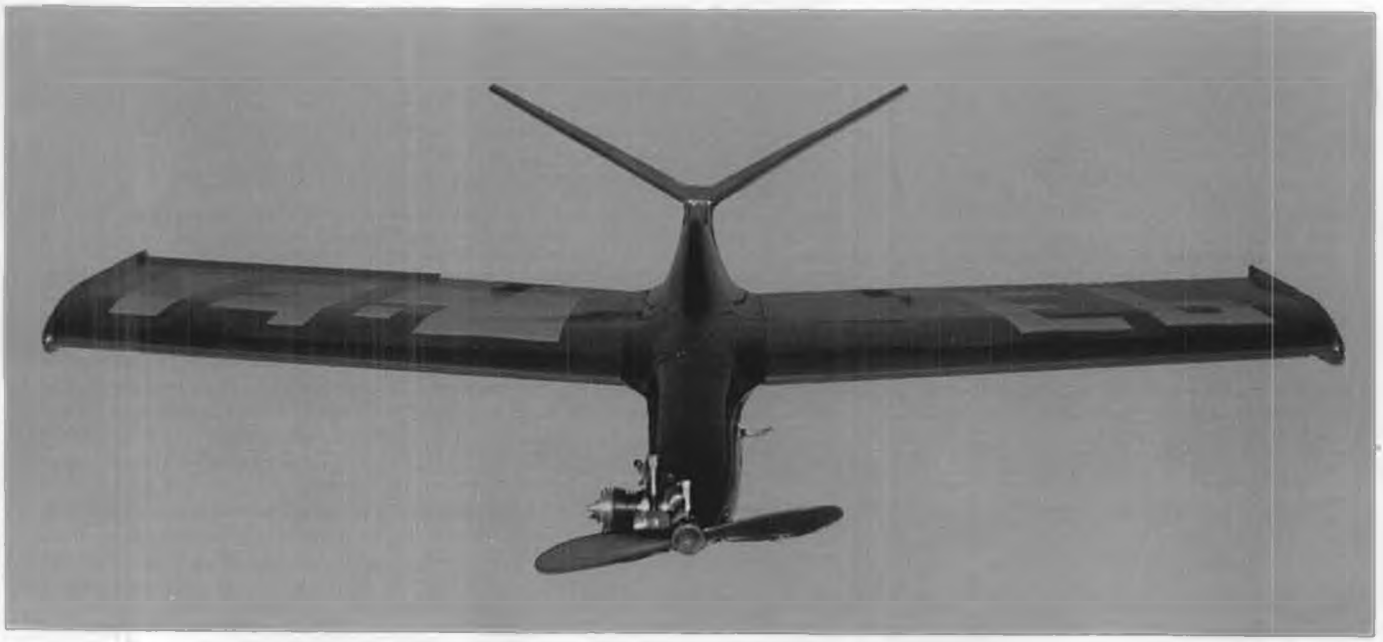


Hefty square rubber grommets shield servos from vibrations. JR receiver loosely wrapped in foam rubber. Nylon tubing on nosewheel pushrod prevents it from dragging against foam.

MB's editor, with the FB-100, on a "chilly February morning" at Mile Square after flying session.



SPINE-TAILED SWIFT

By JIM GILGENBACH . . . Much of this design came from a computor graphics system, and it bears the name of the fastest bird (in level flight) on this planet. A combination of old and new that can't lose!

1/2A PYLON RACING — WILLI RULES

Several years ago, the MARCS, from Madison, Wisconsin, organized a 1/2A Pylon racing circuit with the following objectives in mind:

1. The intent of this event is to establish and maintain a racing contest designed for participation by the average sport R/C flyer.

2. This is not intended to be a contest to see who can design the fastest 1/2A Pylon racer.

3. The intent is to encourage new participation from the ranks of average sport flyers and to discourage the creation of another expert type event where the newest and most specialized equipment is required to be competitive.

4. The engine restrictions are intended to anable the average sport flyer to obtain an average production engine from a retail outlet and use it without resorting to the purchase of additional modified parts and resorting to special rework.

5. The fuselage restrictions are intended to minimize any special advantage which could accrue by using the newest and smallest radio systems.

After racing for two years under the WILLI rules, however, I have identified several concepts which appear to be universally true:

1. The human being is basically competitive in nature.

2. The person who is more skilled and spends more time and effort to attain a goal, usually wins.

3. When any rules are established for a competitive event, they will be pushed to the limit in order to gain any advantage, no matter how small.

4. The most successful competitors, because of their success, usually acquire the power through their "expert identity" to establish and change the rules governing the event they compete in. Just check and see how the AMA racing events have become more specialized and less restrictive over the last few years.

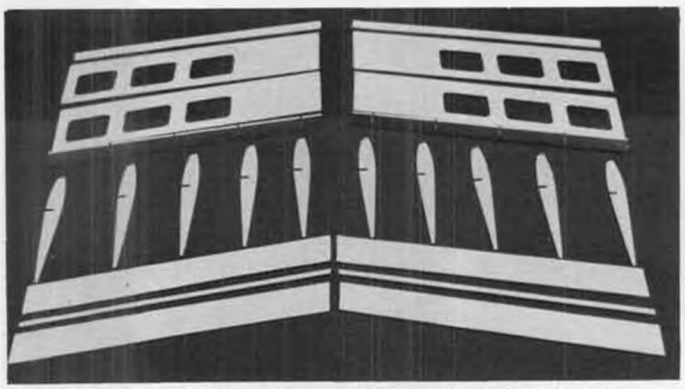
The WILLI rules have eliminated one big fault which the AMA rules have, ie: allowing the experts to adjust the event to suit their tastes and skills. This alone is encouraging to the would-be new competitor and therefore promotes more participation. But a new competitor coming into a maturing event needs help in getting started. They need to know the "tricks of the trade," the "magic formula."

WHAT IT TAKES TO WIN

There is a magic formula for winning on the WILLI circuit. The problem is most flyers follow only a portion of the formula and rely on luck for the rest. The secrets for winning are as follows:

1. ENGINE

a. You must have a strong COX .049/.051 engine capable of turning a COX 5-4 black plastic prop at least 21,000 RPM on the ground. No one has come up with a better prop than that COX 5-4 black prop and therefore this is the prop



Wing parts prefabbed before assembly begins. Just waiting for the bell.

See? That didn't take long, especially if you use Hot Stuff, as the designer did.

to use.

No engine modifications are allowed other than lapping the piston to the cylinder and crankshaft to the crankcase, but with care, you can get a stock engine to rev about 21,000 RPM without too much trouble.

b. The engine must run reliably. This can be accomplished by using a Kustom Kraftmanship or ACE needle valve or by removing the spring retainer from the standard needle valve and sliding a piece of silicone tubing over the needle valve and carb boss to eliminate air leakage past the needle valve threads.

The fuel tank location is very important. Keep the centerline of the tank at 0 to 1/8 inch below the fuel intake of the carb. The best way to accomplish this is to mount the engine with the cylinder horizontal.

2. PSYCHOLOGICAL REQUIREMENTS

Ignore all snide remarks made by fellow competitors about your equipment, flying skills, wife, or mother.

3. FLYING STRATEGY

a. Fly smoothly.

b. Fly as close to the pylons as possible but:

1. don't cut
2. don't cut
3. don't cut

4. AIRCRAFT

a. Fly an aircraft that is stable and predictable. The *worst* possible situation is trying to win a race with a squirrelly airplane.

b. Fly a clean airplane. By having an aircraft with lots of drag, you can lose up to 10% in speed, based upon the plane designs presently being used.

c. Fly an aircraft that is structurally sound to survive the high G turns and rough landings. If you severely damage your plane on landing, you're done for the day.

Item 1 is self-explanatory. I can't help you out with Items 2 and 3, but I have developed an aircraft which fulfills the criteria of Item 4. This aircraft is called the Spine-Tailed Swift, and for good reason; the Spine-Tailed Swift is the fastest bird (in level flight) on this planet.

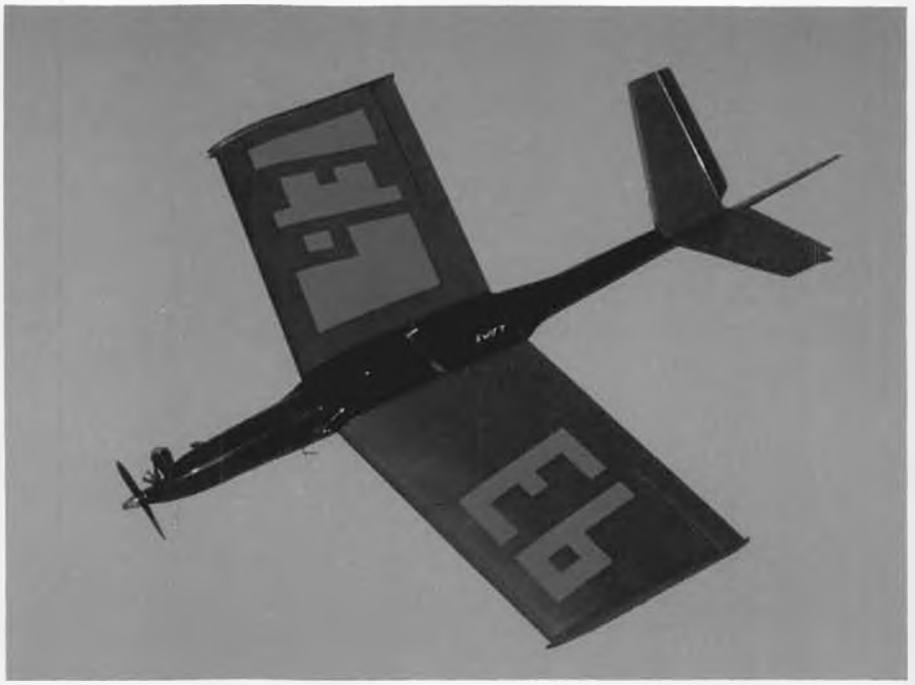
SPINE-TAILED SWIFT DESIGN CRITERIA

The Spine-Tailed Swift (STS) aircraft was designed with the following criteria in mind:

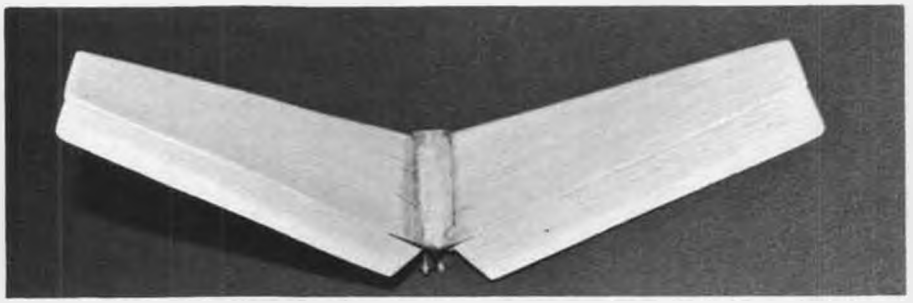
1. It has to be fast. This meant using the 2-inch wide x 4-inch high fuselage rule at its minimal limit. In other words, design an airframe with the smallest frontal area possible. It also meant adding fillets where ever necessary to minimize drag. Utilization of a fiberglass fuselage was the only way to optimize streamlining.

2. It has to be stable not only in flight but also on the launch. I have seen many racers go into the ground at launch for no apparent reason, other than bad design and/or poor building accuracies. Having wing tip plates and two ailerons help to maintain stability. The CG location is also very important.

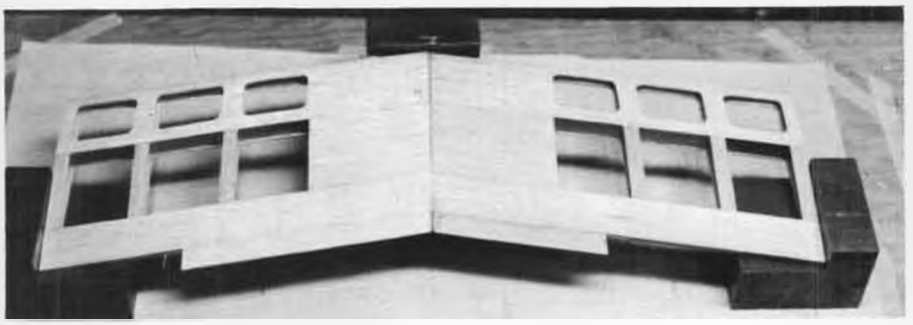
3. It has to be light. The WILLI rules state that the aircraft must be less than 20 ounces or more than 32 ounces. The STS



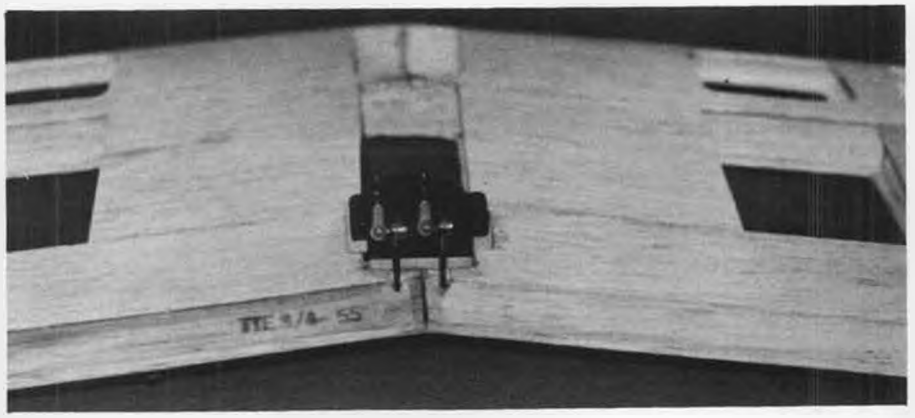
We don't know if this is the real Spine-tailed Swift's coloring, but it sure stands out!



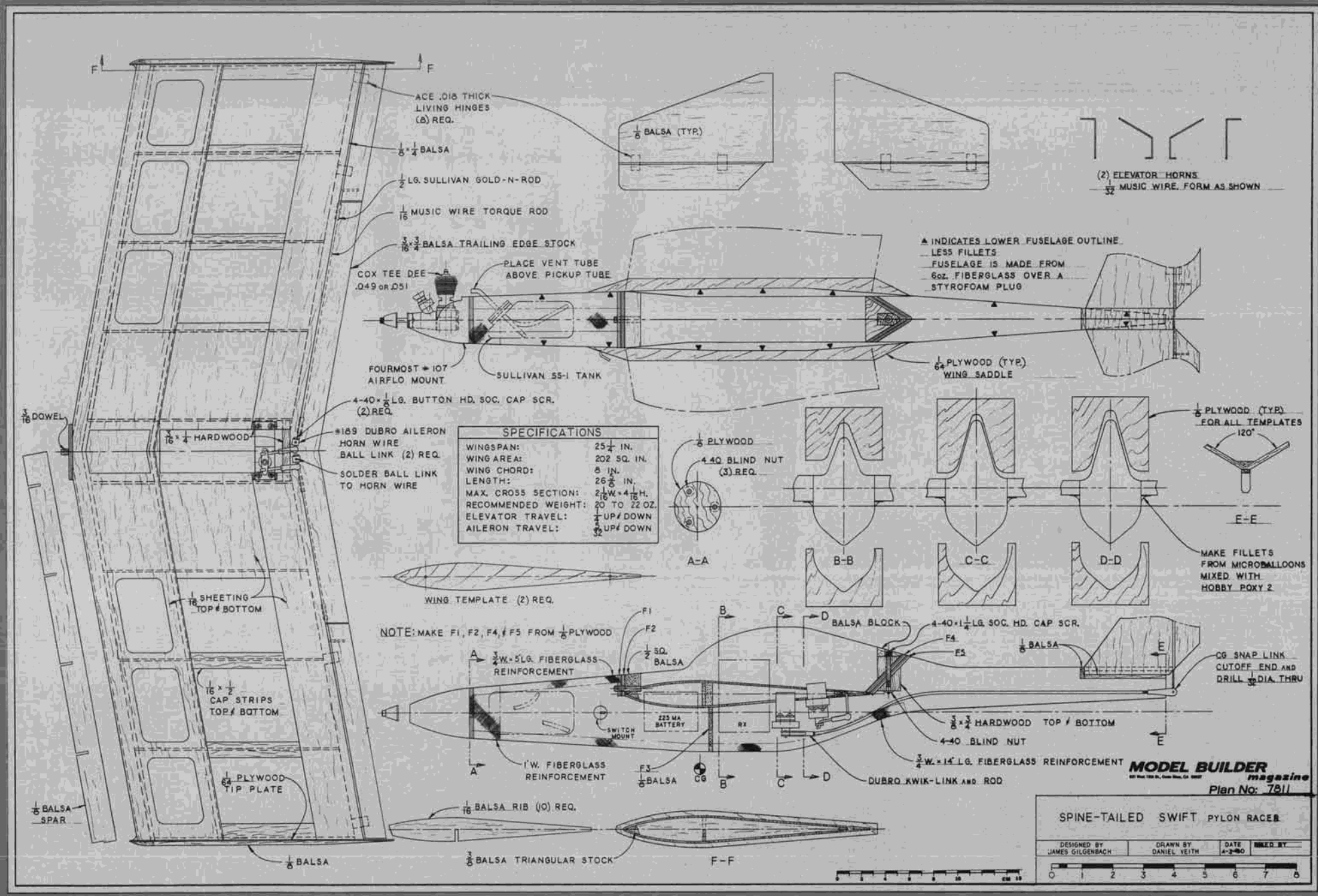
V-tail all set for attachment to fuselage . . . and to pushrods.



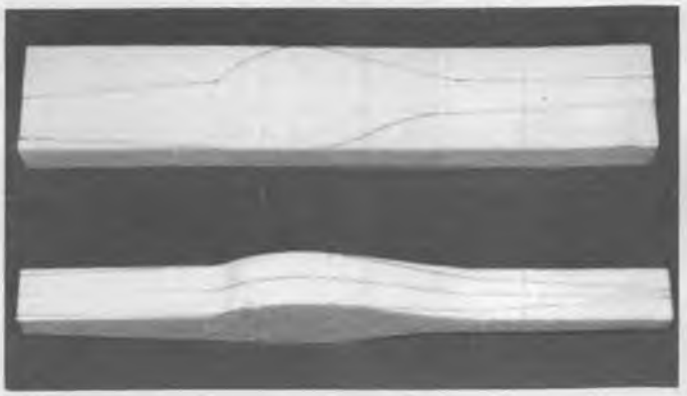
Not much chance for misalignment in these wing jigs!

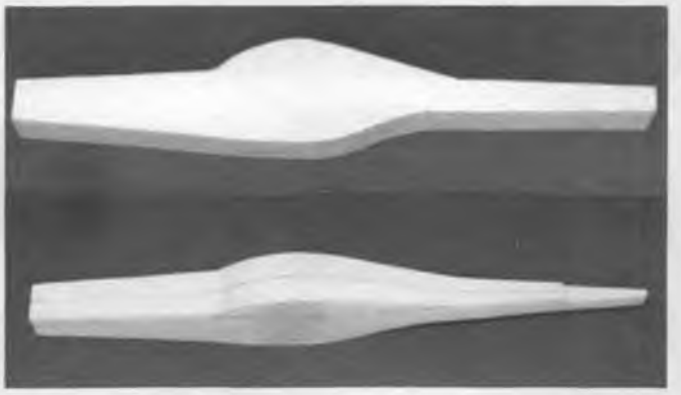


DuBro ball links connect aileron horns to servo pushrods.



FULL SIZE PLANS AVAILABLE — SEE PAGE 100





Four steps in carving foam fuselage core. (Anybody here remember carving solid models?) Top left: Draw profile on block. Top right: Cut out profile. Bottom left: Draw top view on block. Bottom right: Cut out top view.

weighs 20-1/4 ounces. Because of the basic formula, acceleration=force/mass, acceleration out of the turns will improve as the mass decreases.

4. It had to be durable. It must survive minor midair collisions or occasional bad landings. Again, the fiberglass fuselage is a definite advantage in this category.

CONSTRUCTION

1. WING

The wing design is unique only with respect to the slotted main spar concept.

STEP 1: Cut out all the ribs. I always make a plywood template for laying out the ribs on the balsa sheets. Stack all the ribs and pin together, then sand to the desired final contour. While they are pinned together, saw the slot for the main spar. For best alignment results, number the ribs as they are stacked so that later you can place them in sequence on the main spar.

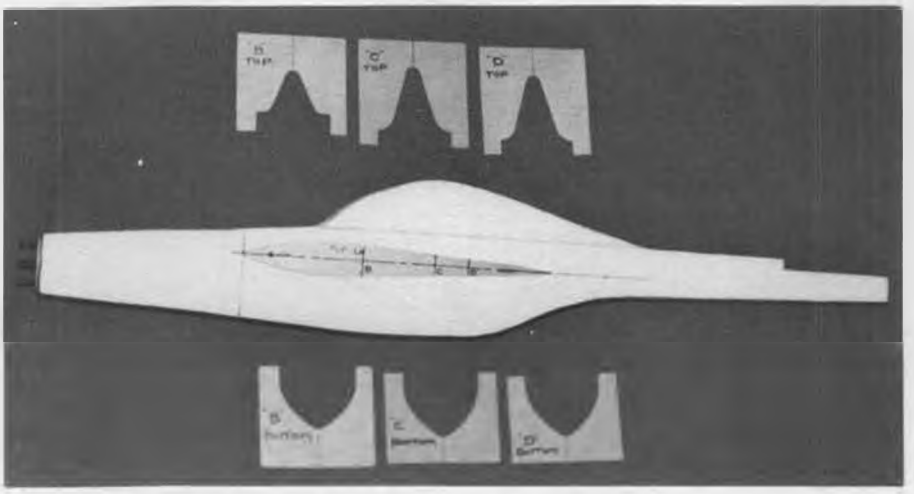
STEP 2: Cut out the main spar RH and LH sections, stack, then sand them to size (measure frequently to maintain a minimum width of .750-inch to meet WILLI's 7/8-inch minimum wing thickness rule), and saw in the slots for the ribs.

STEP 3: Cut out the (4) 1/16 thick sheets used just ahead of the trailing edge. Lay down (2) of these pieces (one RH and one LH) onto a flat building surface and add the 3/32 x 1/4 rear edge strips, making sure you keep these parts flat.

STEP 4: Cut the (4) 1/16 leading edge sheets to size (leaving the width at 3 inches) and cut out the lightening holes. Also cut the leading edge triangular stock to length.

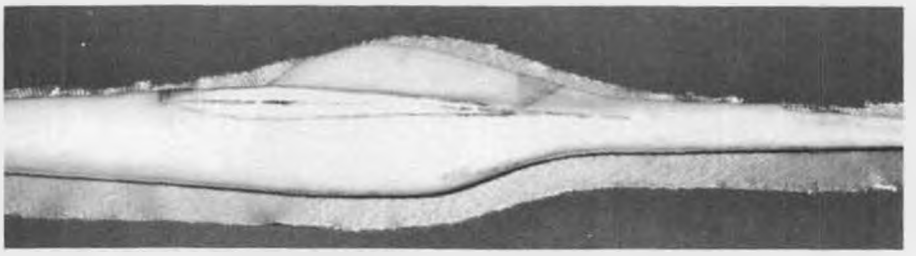
STEP 5: Form the (2) 1/16 music wire torque rods, making sure you add the bushings (made from a yellow inner GOLD-N-ROD) before you have both ends bent. Add the ball link control horns and solder to the torque rods.

STEP 6: Cut out the trailing edge. Cut the grooves to accept the torque rods and bushings. Make sure the rods do not extend beyond the front edge of the trailing edge. Put "VASELINE" on the torque rods where the bushings will be located, slide the bushings into location and "HOT STUFF" the bushings to the trailing edge using a little bit of baking soda as a filler. Notch the trailing edge area to allow adequate movement of the control horn.



With nose ring and wing root in place, we're ready to start carving. Cross section pieces will guide the process and keep things even.

Separation bulkheads installed after fuselage shaping is completed.

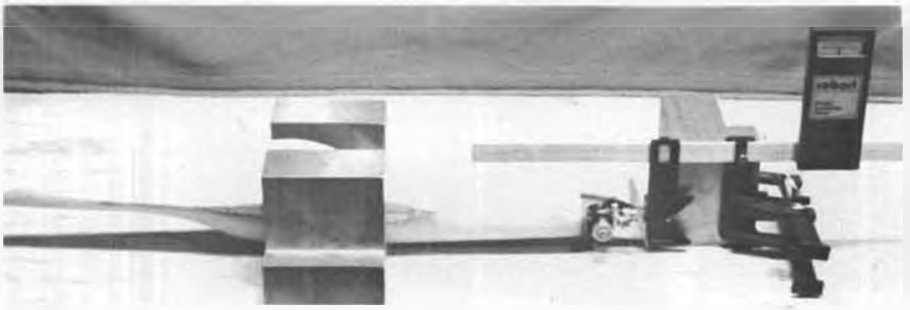


Glass cloth being applied. After completion, foam will be dug out, leaving fiberglass shell.

STEP 7: Tape the wing plan down on a flat working surface and cover with waxed paper. Note that the wing plan is the *bottom view*. This was done to allow building right over the plan without worrying about where to stick the control horns when installing the trailing edges. (Unless you want to drill (2) holes through your building table.)

STEP 8: Position the top rear wing sheeting (with the 3/32 x 1/4 strip on) and the top leading edge sheeting for one wing half onto the plan and pin in place. Carefully place the two end ribs onto the rear wing sheeting and glue in place. (Note: I do most of my building with "Hot Stuff" so as to eliminate a lot of pinning of components in place.) Position the remaining ribs onto the main spar and then place this main spar onto the end rib and glue in place.

STEP 9: Hot Stuff the leading edge to the two end ribs. Now align and glue the remaining ribs to the main spar, rear



Continual alignment checks afford perfect relationships between wing, stab, and engine thrust line.

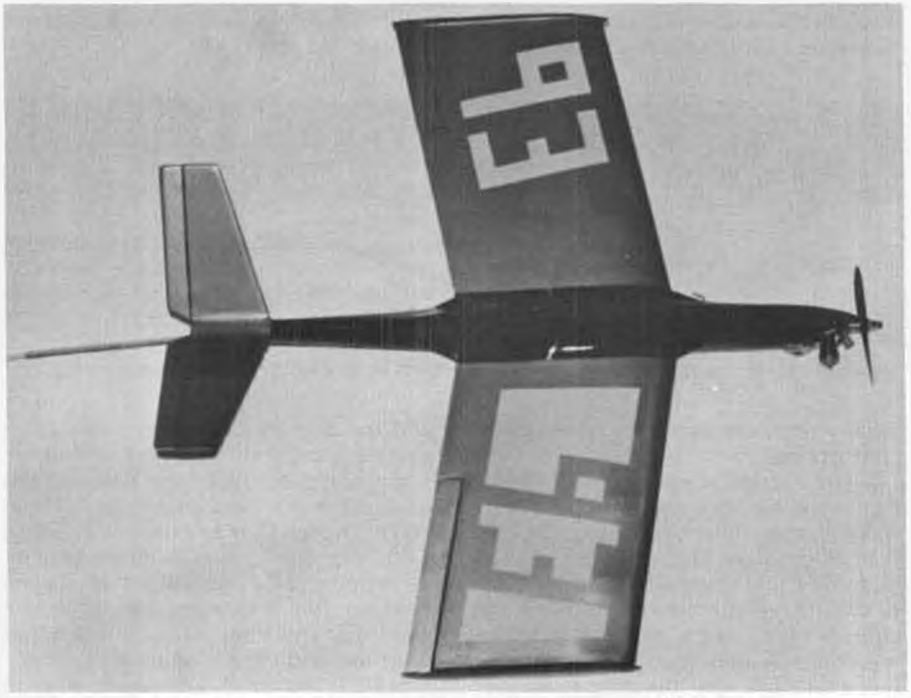
Profile of completed STS shows there is nothing supurfluous. It just looks fast!

Frontal area is a critical factor in attaining the most speed from a given number of fixed requirements. There certainly is a minimum of area here!

wing sheeting and leading edge.

STEP 10: Glue the main spar to the top leading edge sheeting (remember that we are building the wing upside down, so the top wing sheeting is actually at the bottom of your assembly at this point). Pin the top leading edge sheeting to the building board at the main spar location only, then bend the sheeting up to the ribs and leading edge and glue in place. Trim off the excessive stock at the leading edge.

STEP 11: Position the trailing edge up to the back of the wing assembly. Mark and cut the notches in the wing for the torque rod bushings. You will notice that there is still a gap on the side facing you. This is due to the fact that the commercial leading edge stock is cut to fit a flat bottom, not a symmetrical wing. Sand the front of the trailing edge to get a good flush fit and then glue to the wing, making sure that the TE lies flat on the building surface. Use 5-minute epoxy, but make sure you have vaseline on the rod to prevent binding.



Note larger aileron on right wing. Extra drag when deflected in turn helps keep nose up, and that's kinda nice.

STEP 12: Now glue the bottom rear wing sheet in place.

STEP 13: Remove the wing from the building board and sand the leading edge sheeting. Turn the wing over, position the bottom leading edge sheeting to the main spar and glue the sheeting to the main spar. Using the building board as a flat surface, roll the sheeting up to the leveling edge and "Hot Stuff" the sheeting to the ribs and the leading edge.

STEP 14: Add the cap strips and the center sheeting on the top and bottom.

STEP 15: Repeat steps 1 thru 13 on the second wing half.

STEP 16: Join the wing halves together, with the halves laying on their bottom surface. To do this, it will be necessary to block up the wing halves to allow clearance for the control horns. I used three machined steel squaring blocks of equal height for alignment and blocking up. Make sure the blocks you use are the same height and parallel otherwise you will build a twist into your wing assembly. On a 1/2A Pylon racer, this is probably the worst condition you can have. A twisted wing will cause a rolling condition that cannot be compensated for with the ailerons when flying at slow speed (especially true during launch) and the result will be "instant crash." I spend a lot of time checking the wing with an incidence meter to be sure I have alignment within a 1/2 degree from wing tip to wing tip. If for some reason, the two halves are not within this tolerance, I will cut the halves apart and re-glue. When the halves are joined per the above instructions, there will be a slight dihedral.

STEP 17: Cut out the clearance holes in the center sheets portion. Add the gussets to the wing joint.

STEP 18: Cut and sand the ailerons to size.

STEP 19: Sand the wing, making sure you maintain the .875 minimum thickness requirement.

STEP 20: Cut out the wing tips and install. For fillets between wing and tip with Hobby Poxy Formula 2 mixed with micro-balloons.

2. FUSELAGE

The fuselage is made by first forming a styrofoam plug then covering the plug with fiberglass and removing the styrofoam, leaving the fiberglass shell. The important thing to remember is that the fuselage is only as accurate as the plug, therefore the plug should be formed and marked with extreme care.

STEP 1: The first step is to cut out a piece of styrofoam to 4 inches wide x 22-1/2 inches long, and lay out the profile of the fuselage side onto the

Continued on page 101

Seen at the annual Brimfield (Massachusetts) Hydro Contest, John Nicalaci's 40 pound PBM. It spans 13 feet, is powered by two St .71s with Eastcraft starters. Basic structure is foam. Has been around over 5 years, appeared on M.A.N.'s cover.

1 TO 1 SCALE

By BOB UNDERWOOD

PHOTOS BY AUTHOR

• I heard you weren't doing anything during June, so why not jump across the big pond? The Model Aviation Foundation of Finland is organizing its fourth Stand-Off Scale competition in Rayskala. The competition will run from June 26 to 28, 1981. The site is 100 kilometers north of Helsinki and offers about 22 hours of daylight during June and July. The temperature is in the mid-twenties (celcius). FAI rules will be used. Contact Matti Jyllila by phone: Finland 0-876 3820 after 17:00 GMT. Write to Kyosti Karhila: 00701 Helsinki.

Now that we have taken care of your activities for the end of June, what other little things are around? Ah, ha! You say you're going to be at the Nats and you want to try out for the team in Stand-off. Why not? Consider a few details. The team will consist of the first three winners (plus alternates). Check your entry form for amounts for FAI team selection fees. In view of the fact that there may not be a Stand-off in 1982 if the competition is in USSR, the team selection funds will be held until such time it is determined whether there will or will not be a competition. Should there not be one, the entry fees will be returned. In addition to the FAI selection fees, remember you must have the FAI stamp on your AMA license.

The critical aspect you must bear in mind is that your model must meet FAI specifications. These are given in the FAI section of your AMA rule book. Basically, they include a 6 kilogram weight limit for all classes and model types. A single engine model may use a maximum of .61 cubic inches, while a twin may go to .90 and a tri-motor to 1.20 cubic inches. The rule that can catch many models is the 100 grams per square decimeter wing loading limit. This is about 32 ounces/square foot. Calculating this figure is difficult with some models, since elliptical or tapered wings cause problems. The area includes the total area of the wing and horizontal stab. Check the specifications carefully, since there will be a stewart present at the Nats to process *all* models, Precision (F4C) or Stand-off, entered in the selec-

Continued on page 90

Gee Bee Line's Don Foster with his kitted Tiger Moth, on Gee Bee floats, natch. Power is an Enya .29. A fun combination!

Bob McKenno put Gee Bee floats on his Sterling Waco SRE. Flies it with an old Merco .49. A pretty combination.

Don Harris's original Half-Breed fumigates the flying field by running its smoke system on the ground. This took only 6 seconds of running! Tom Mahon holds as Ken Runestrand watches.

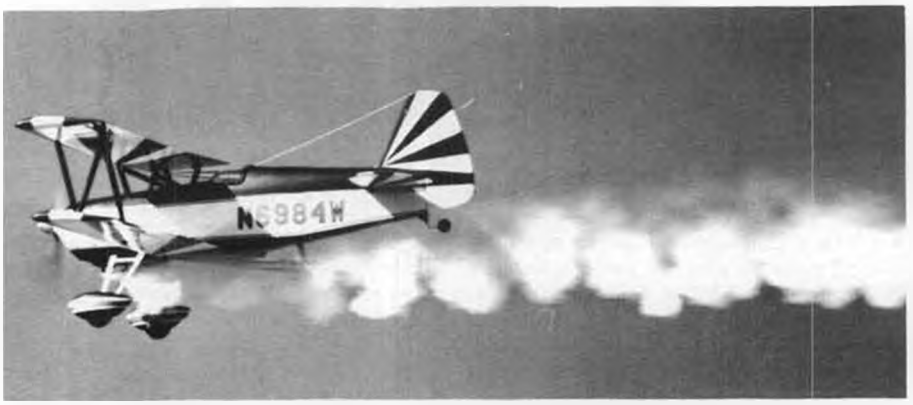
GIANT SCALE FLIGHT LINE

By LEE TAYLOR

• Last column, I spent my entire alloted space drooling at the mouth over all the fun that two friends and I had making the first test flights of their models on floats. I frankly felt pretty guilty about taking up so much space rubbing in how much fun I had, but apparently I hit a few soft spots, as I had more response saying how much you had enjoyed that column than I have had with all the others combined! I guess you guys really do like flying better than just about anything else, huh? Anyway, since that one was so well received, I will do similar pieces in the future.

This month, however, I have three goodies that just flat have to be presented to you, items that I feel will revolutionize our hobby, and in one case, dramatically increase the reliability of our radios. That item is George Steiner's Battery Comparitor System; the other two are a magnificent servo from World Engines, and a smoke system that works!

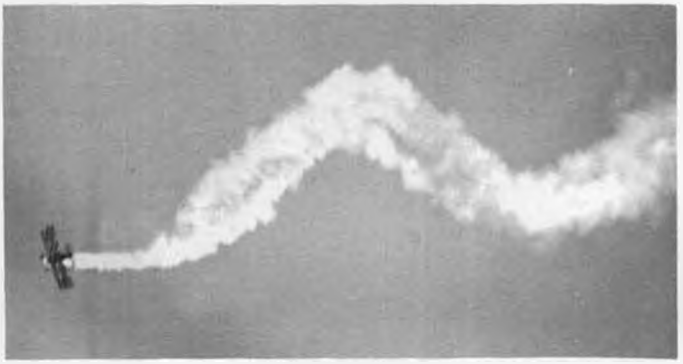
HOW WOULD YOU LIKE TO CARRY *TWO* BATTERY PACKS IN YOUR PLANE . . . in a system that allows *either* pack to take over completely supplying power to your radio should the other fail? Now that your interest is piqued. . .

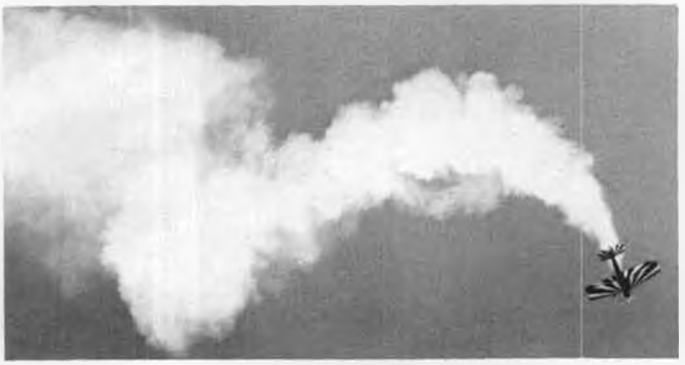


It's just as good in the air! Roper 3.7 engine with Harris modifications, 27 pounds. Smoke system explained in text.

In April of last year, I directed a Giant Model Meet here in Sacramento. At that meet, I planned on flying (for the 173rd time), Jim Folline's magnificent 9-foot PT-19. After charging everything up prior to the meet, I discovered that my main receiver battery had turned up its toes. I took the battery out of another radio, put it on charge, and went off to the meet. The next morning, I took the battery, put it in the plane, and checked it with an ESV. I didn't have time to run a full discharge check, but it checked good with the best of the momentary check equipment available. It had also performed flawlessly for about a year in the equipment it had been used in. Sunday morning I prepared to fly.

Seven minutes into the first flight of the day, I attempted a loop. When I got to where I needed full up-elevator to





Obviously a heck of a lot more smoke than ever seen before, from a model or full size aircraft. Keeping the diesel fuel in the muffler chamber for a longer heating period completely vaporizes it, rather than spitting out raw fluid. Muffler available from Harris.

Chris Evans' version of the Hobby Lobby Grumman Tiger, modified by Chris to break down completely to fit into a small car. Six months old when this photo was taken, it died 10 minutes later from interference! Quadra powered, 24 pounds.

pull on past vertical, I instantly noticed that I was not getting full control application, and immediately realized that the battery was going dead. There had been no problems at all to this point; the plane had stopped all flightline activity as usual. This was a spectacularly beautiful flying bird.

I immediately set up for a landing. On downwind, I lost throttle control with the engine at about 3/4. Turning final, the ailerons failed momentarily, then recovered enough so that I could get leveled out on final approach. After leveling out on final, planning for a high-speed touchdown (remember, I could no longer control the engine), and about fifteen seconds to go before successful save, the radio died completely at about 50 feet. The PT slowly peeled off on its left wing, and went virtually straight in at full throttle. We had to get a small shovel to dig out the motor. The entire battery life had been almost exactly seven minutes (the entire flight was on videotape, hence the accurate timing), and there had been less than 45 second warning that the battery was dying.

This was the fourth time in my flying career that a failed battery had destroyed one of my planes in flight. I've had broken wires, one instance where a battery in a pack suddenly reversed polarity (same effect as shutting off the switch), and in this particular instance, it happened just as I entered an outside loop. Five UNWANTED loops later, the plane plowed in. One time a battery shifted, and unplugged itself! Over a twenty-five year flying period, I consider myself to be one of the luckier ones as far as batteries are concerned.

The PT-19, however, was too much. George Steiner is an excellent R/C electronics designer here in my area, and his shoulder got very wet when I spent an extended period crying loudly on it, and *begging* him to design a *back-up battery system*, one whereby the plane would carry two battery packs and should the main pack fail, the system would immediately switch over to the backup pack, thereby preventing another PT-19 episode. To get me off his back, George promised to do so. He was so anxious to get rid of me he promised to sweep aside five or six other projects he was working on at the time. (No one likes to see a grown man cry!)

As George delved into the problem, he became more and more excited with the possibilities of this system. To make the story slightly shorter, six months and several prototypes later, George finalized what I feel is just about the greatest advance in radio design since the invention of proportional. George's system is no longer just a battery backup system. It is a fully functional Dual Battery System that has been exhaustively designed and tested to optimize the benefits of the idea.

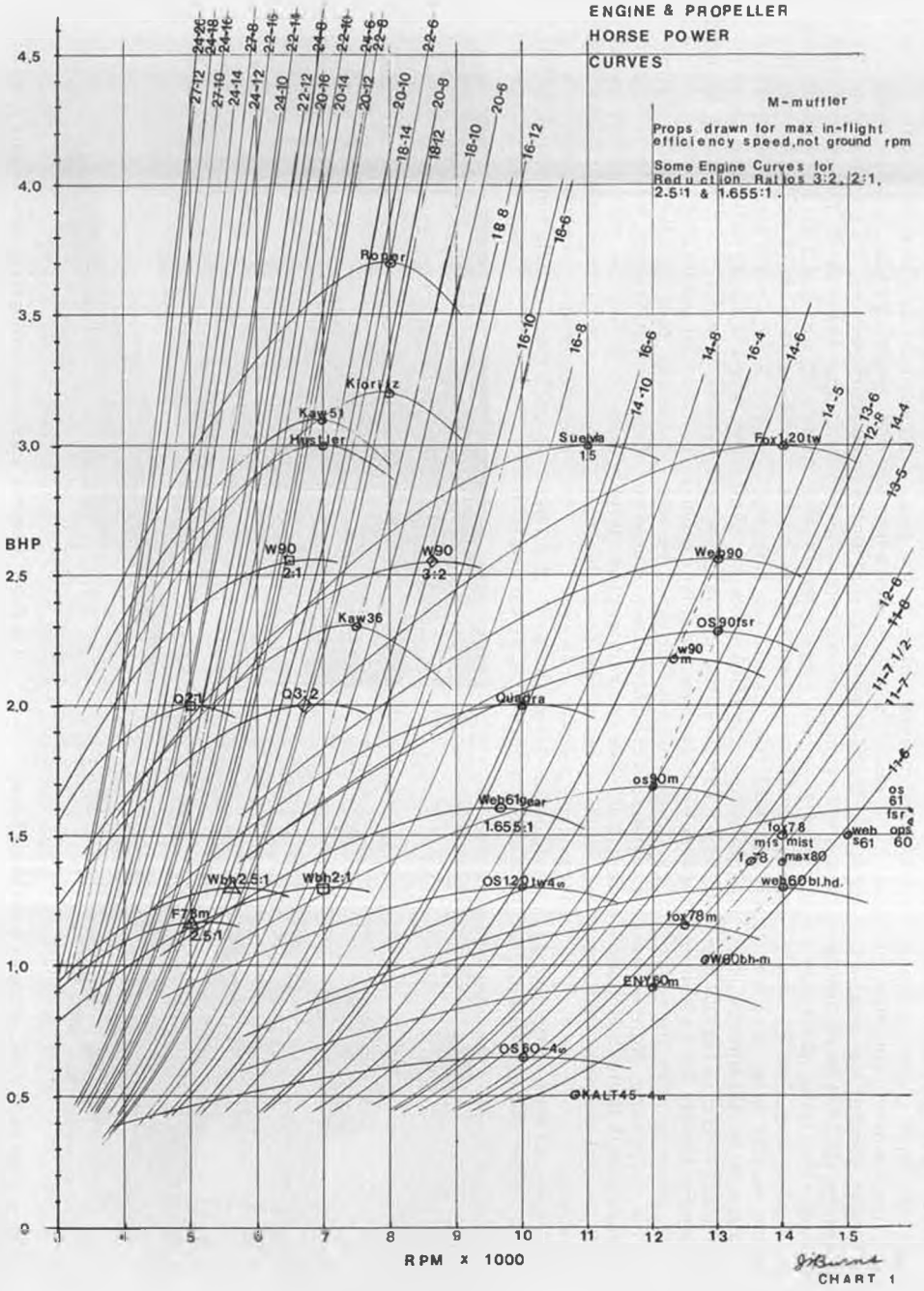
Because George has commitments to another magazine for a full construction article on this system, I can't go completely into details on his design. *(Hope they appreciate the advance publicity! wcn)* However, I can give you the principal features of the system, and since it was built as a result of my sobbing (any kind of act to get my way . . .), I'm kind of proud of my part in this, and my ability to tell you about his system here for the first time in any commercial publication.

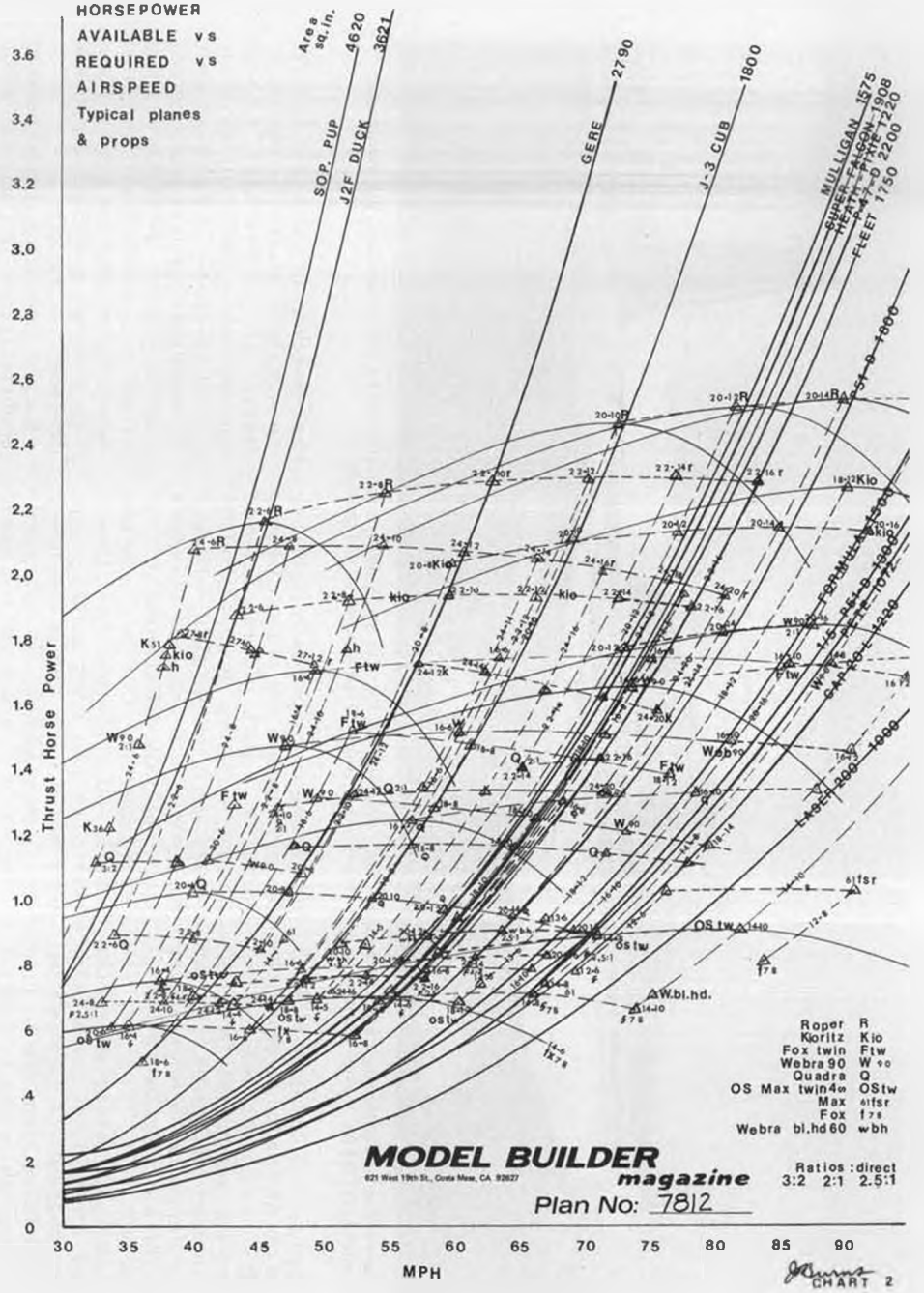
George calls his invention a Battery Comparitor System, because what it does is to couple two battery packs together, and continuously COMPARE the performance of each pack. As long as each pack is fully functional, BOTH

Continued on page 93

Elaine Hostetler and her dad's P-6E, sitting on some kinda funny white stuff frequently seen back east in the winter.

Les Davis, Australia, apparently taxiing his original Quadra powered Cherokee Babe in a parade! Span 102 inches, weight 20 pounds.





FULL SIZE CHARTS AVAILABLE – SEE PAGE 100

BIG BIRDS, BIG ENGINES
* * BIG PROPELLERS

By JOHN BURNS . . . What you need to know about big props for big engines on big birds, whether you're afraid to ask or not!

• Quarter Scale, Mammoth Scale, or Big Birds are here, with kits and plans for these miniature aircraft, several large engines to power them, propellers up to 24 inches in diameter, and even reduction drives to handle the large props. Isn't it time for you to scale your favorite plane to 8 foot span or more and join the fun?

The author's experience with a few big birds, plus a few dark rumors that some big models may not have been performing up to expectations, led him down a long trail through the old aerodynamics books and jillions of key strokes on a very smart calculator, to sort out the criteria for propeller selection.

Normally, you select a propeller by: a) asking the other guys what prop they use; b) asking your friendly hobby shop proprietor who has dozens of props to sell you; c) reading the instructions that came with your engine and learning other good things about that beautiful piece of machinery; or d) hanging in there with the rest of this article, study the charts, and get some guidelines to picking out props for these big model planes.

No, we are not going to drown you in the many formulas involved, because most of you don't really want to know (the first loud sigh of relief is from the Editor!).

This propeller selection method evolved from the way props are selected for full-size planes: a) determine the horsepower requirements for the airplane and plot the curve on a chart; b) select the engine and determine the brake horsepower available; c) determine the propeller that will deliver the most thrust horsepower at maximum speed with the chosen engine. The point where the airplane and propeller curves intersect gives the answer (Chart #2).

In order to do this for our large models, we need information on engines, propellers and the aircraft. There are two charts to help us.

Chart #1 shows the brake horsepower curves for many current engines: Roper, Kioritz, Kawasaki TA 51 and TA 36, Hustler, Suevia 1.5 cu. in., Fox 1.20 Twin, Webra and OS Max .90s, Quadra, geared Webra .61, typical Schneurle .61s, Fox .78 with muffler, Webra Black Head .60, OS Max 1.20 Twin four-cycle (sigh), OS .60 four-cycle, and certain reduction ratios applied to some power curves. Some of these power curves are based on advertised values and some are from the excellent data provided by Peter Chinn in *Model Airplane News* for many years. In fact, the engine curves are "normalized," based on averaging data from several of Chinn's engine curves.

Reduction ratios were applied by dividing the peak rpm by the ratio and plotting the new point at peak bhp. For example, a Quadra is rated at 2.0 bhp at 10,000 rpm. At 2:1, 10,000 divided by two is 5,000 rpm. The new point is plotted at 5,000 rpm and 2.0 bhp, and the new curve drawn.

The vertical lines on Chart #1 are propeller horsepower required or absorbed. The power absorbed by a propeller depends on rpm, diameter and propeller characteristics, like shape, blade area, pitch ratio (pitch/diameter), etc. Of course, you knew that. We won't go into how these curves were developed, but they represent a composite value. Wider or narrower props would have their curves left or right of these lines. Most importantly, these curves are drawn for the *in-flight* condition at maximum propeller efficiency, *not* the ground or static test condition, which curves would be to the left of these in-flight curves.

On Chart #1, at the points where propeller curves intersect the engine lines to the *left* of the engine peaks, the prop is exactly absorbing the engine power at that rpm and bhp. Since these points represent full throttle operation, it is obvious how a larger diameter prop puts a load on the engine, controlling rpm and bhp.

Great; then the prop nearest the engine peak point is the one to use. Yeah, but . . . we still have to match the engine/prop combination to the airplane at the best airspeed condition, and there are a few other things to consider.

First, don't select a prop to the *right* of the engine peak point because it isn't enough prop to fully absorb the engine power, and engine overspeeding could occur in the air, if not also on the ground.

Aside from the fact that the large engines require big props, there are a few other reasons why a large prop should/may be used. The first, and not necessarily most scientific, is to use a scale size prop. On most models, this may be a bigger prop than is really needed, but if that is your thing, go ahead.

The Nosen P-51D (1800 sq. in.) illustrates another condition with its six-inch diameter spinner; any prop smaller than 18 inches has effective blade area blocked by that spinner, with a resultant loss of effectiveness. Thus, at least an 18-inch prop is suggested for this situation.

Mr. Mulligan has a typical scale airplane condition . . . a cowling about 14 inches in diameter and a fuselage at least that wide. A 16-inch prop could lose 23% of its working efficiency with that large cowl/fuselage behind it. Can you imagine a 14-6 prop peaking out a Webra 90 in front of that 14-inch cowl? Obviously, a much larger prop is required, and on any engine other than Roper, Kioritz, Kawasaki, or Hustler, gearing is indicated to swing the large prop.

So, let's discuss reduction drives. On many full sized engines, the propeller shaft is geared down or turns at a slower rpm than the engine crankshaft to keep the propeller tip speed below the speed of sound (1159 fps @ 59°F). This helps reduce noise, improves efficiency, and *requires* a larger diameter propeller to absorb the power at a lower rpm. The disadvantages are mechanical complication and weight, friction loss and a need for a longer landing gear to clear the larger prop. Now you know why the F4U Corsair had that inverted gull wing configuration.

On the other hand, gearing and larger props are not necessarily required on many large planes. The author's Porter (90 inch span, 15.5 lbs. with two R/C parachutists) flew three years with a muffled Fox .78 and 13 and 14-inch props. We flew the big J-3 Cub with the same engine and 14-6 props, and a friend's Aeronca C-3 did very nicely with the OS Gemini (sigh) on 14 and 16-inch props. Our Pober Pixie (89.5 inch, 10 lbs.) does well with the Fox .78 and a 14-6 prop and probably would do fine with a 60/61. We have watched biplanes such as D.H. Moth, Jenny, and D.H.8, fly nicely on "smaller" engines (60s ?). So it can be done on many planes without using the very large engines, big propellers, and reduction drives.

At this point we must caution that this approach to propeller selection is the first of this kind we have seen. It is based partly on the full size theory for propellers and on much data extracted from Chinn's articles, which permitted the development of the propeller coefficients and prop curves. Until more data is developed on the large propellers (i.e. Beckman & Crawford, etc.) use these charts as a guide, and do your own "fine tuning."

Now to Chart #2. This has the power required curves for 15 large model aircraft, a few of which you may never have heard about. This data is largely based on advertised area and weight, and a few slight-of-hand tricks to estimate drag coefficients. If the advertised info was wrong, don't blame me! The planes do not necessarily fall on the chart according to wing areas because of differences in wing loadings, weights, and drag characteristics. Obviously, the largest plane, the Sopwith PUP, is much slower than the relatively smaller CAP 20L and the Laser 200.

Since this is where we determine where the propeller thrust horsepower curves cross the airplane power re-

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FUEL LINES

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

• The lead-in for the February column quoted a few one-liners appropriate to our hobby. Since most everyone enjoys one-liners, I asked the readers to send in their favorites. While I haven't exactly been inundated with mail, about a dozen readers did send some. Amazingly, about six of them were quite similar . . . some variation of "When all else fails . . ." Of the remainder, here are two. For all control liners, Allan Frank, of Mineola, New York, sends "It's only a small kink." Then, hitting my last several columns right smack on the snoz, Pete Smalley, of Rockway, New Jersey, advises eager mechanics, "If it works, don't fix it." Pete, you really know how to hurt a guy. Many thanks to all who took the time to write.

Let's move on to the subject for this month: How to break a piston ring in one easy lesson. Personally, I'm well qualified to teach such a lesson . . . I've sure broken my share of them. It's always an agonizing and exasperating experience, but maybe some of the tips in this article can save you some of that frustration.

Before getting into the mechanics of ring servicing, a few comments on piston ring theory will help in understanding why it's so necessary to have a clean, properly fitted ring and clean ring groove. Basically, our engines use either of two types of rings; tension or Dykes. Contrary to popular belief, the principle of operation of both rings is the same. The principle is simply that gas pressure above the piston forces the ring both down and out. That's what creates the seal . . . gas pressure on the top and inside of the ring. The Dykes and L-shaped ring was designed to prevent ring flutter. To accomplish this, the

Photo 1. Proper way to remove ring; lift out and raise one end, then work it around.

Dykes ring has more upper, horizontal surface area for the gas pressure to work against. That helps to maintain the seal between the bottom of the ring and the bottom of the ring groove, thereby preventing disasterous ring flutter at high RPM.

If you think a moment about the basic principle, you'll realize that the ring must be free in its groove so that the gas pressures can move it . . . both down and out. It must be a close but free fit. Obviously, dirt, grime and combustion "varnish" are not welcome. So, let's assume that, after disassembling your engine, it's quite obvious that you have to clean the ring and ring groove, and maybe even replace the ring.

The first step is to remove the ring . . . in one piece! At this point, let me offer some comforting information. If the ring has had many hours of operation, it will be more brittle than a new ring. Thus, it will be more susceptible to breaking. So, don't feel bad if one pops even though you followed these suggestions exactly. Now, take a look at the first photograph of a piston with a ring half-on and half-off. This shows the technique to use to either remove a ring, or to install one. Raise one end at a time, and gradually work it up and around the circumference. As you do this, the end will clear the top of the piston and thus be able to spring back inward to relieve some strain. If you try to simultaneously expand both ends of the ring to clear the piston, you'll surely break a ring . . . new or old.

Once the ring is off, immediately scribe a mark on it so that you'll know which sides were top and bottom. This will be important if you reinstall the same ring. Of course, if it pops, well . . . forget it, go have a cool one, and burn this article. *(Remove it from the magazine first. No use destroying the whole issue! wcn)*

At this point, when it's time to clean off the varnish, etc., I wish I could tell you about a solvent that will dissolve engine "varnish" without harming the parts. Unfortunately, I can't because there isn't any ideal one, or at least I haven't found one yet. Acetone, trisodium phosphate, Gunk degreaser, Hoppe's No. 9 Solvent, even Oven-Off, etc., etc.; I've tried them all, and had only limited success. It seems that anything that dissolves the "varnish" also likes to attack the metal. What to use? On relatively flat surfaces, such as the side or crown of a piston, 000 steel wool and WD-40 work best. Scrapers help if it's really baked on the crown. I have an old six-inch machinist's steel rule that works well . . . particularly in ring grooves. Don't use anything with a sharp edge. If you do, the chances are you'll whittle off metal. The object is to only scrape away crud. Pieces of very hard maple wood can also be used effectively in the ring groove. Scrap plastic is another tool. Above all, do not use sandpaper, and scrupulously avoid damaging or distorting the ring groove . . . especially the bottom surface. As for

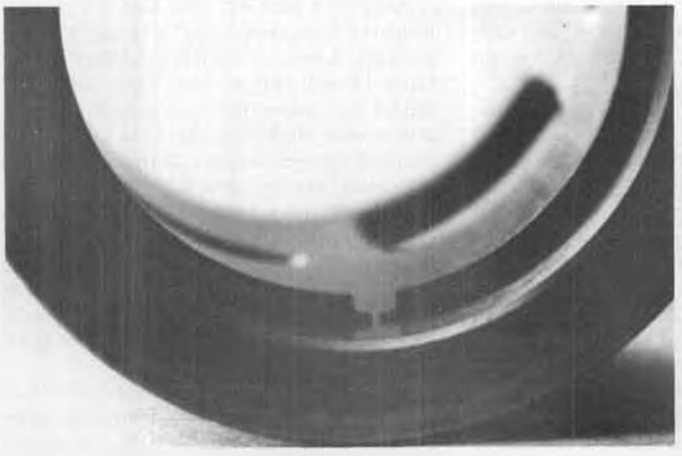


Photo 2. Well worn ring shows large gap between ends. Notches fit around pin, which prevents rotation of ring in ring groove.

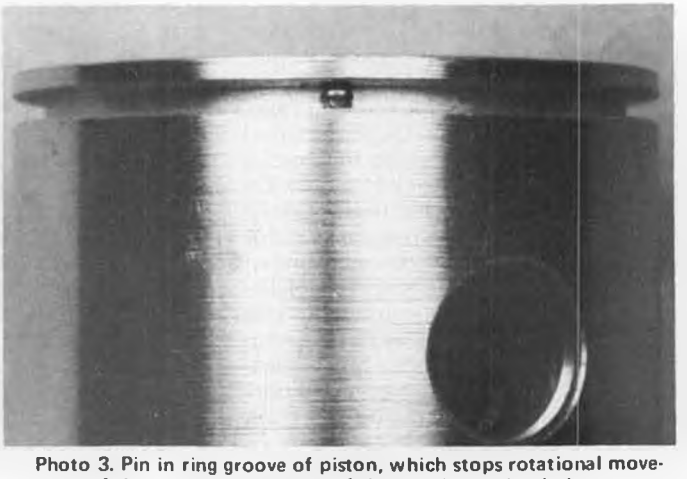


Photo 3. Pin in ring groove of piston, which stops rotational movement of ring; prevents snagging of ring gap in porting holes.

the ring, a scraper works best. Once everything has been thoroughly cleaned (including a final tooth brush and warm water detergent scrubbing), dry the parts, coat them with WD-40 and reinstall the ring. Use the reverse of the technique for removal; start one end, and work your way around. Just be sure the side you marked as top is indeed that way. The reason for this is that the ring already has been seated to the sleeve. Reversing it would probably cause a poor seal.

As another alternative, let's assume that you've decided to install a new ring. First, carefully position the ring in the top of the sleeve and push it down by inserting the head into the sleeve. Remove the head and hold the sleeve up to a bright opaque light source such as flourescent light. Look for light leaks around the outer edge of the ring where it contacts the sleeve. A light leak means a poor ring and/or an out-of-round sleeve. Either or both are bad news that call for replacement. Hopefully you didn't see any light leaks, so now look at the ring gap. If there isn't any, there should be. When an engine reaches operating temperature, the ring will expand, and the ring ends ideally will almost touch . . . effectively no gap. How much gap is right for a new ring? Here's a thumb rule: For a.40 size engine, .004 is about right. For .60's and up, .006 to .008 is fine. These figures are for new rings. As a ring becomes seated, the gap will increase slightly.

Measure the gap of the ring in the sleeve with a feeler gauge. If you don't have one, use scrap pieces of metal of known thickness. You can buy shim stock in good hobby shops that have a K&S metal display . . . brass and aluminum tubing, etc. If there's insufficient gap, use a jeweler's flat file or a thin Arkansas stone to adjust it. When it's right, then carefully stone the edges of the ring gap. Again that Arkansas stone is ideal. They can be purchased at a good hardware store for about $2.50. Don't settle for anything but an Arkansas stone. The purpose of stoning the gap is to get rid of any sharp corners that could catch in the sleeve. It only takes a couple of strokes, but it could prevent the ring from hanging up and breaking.

To give this all a bit more meaning, examine the second photograph. This shows a wide gap of a well worn ring that is kept in position by a pin. The notches in the ends of the ring fit around and over the pin. Photo three shows such a pin in a ring groove. The purpose of "pinning" a ring is to prevent the gap section from sliding all around the groove and catching in porting holes in the sleeve. Not all engines have pinned rings . . . only those with wide ports and no vertical webs to contain the ring. Be sure to check your engine carefully for this feature. If you have a pinned ring, it will require extra caution when inserting the piston and ring into the sleeve.

Okay, your new ring is properly gapped and you're ready to slip it on the piston. Wrong. First, be sure that it won't stick in the groove because it's not slightly thinner than the groove. Just test fit it in the groove without slipping it over the piston. If it feels tight, you get to use that good Arkansas stone again. Place the stone on a table, oil the top surface, and then lap the top and bottom surfaces of the ring. Always work the ring against the stone using a figure eight pattern. If you look very carefully at the fourth photograph, you'll see the very fine cross hatch lapping marks. Technically, the vertical clearance between a ring and groove should be about .0015, but you'll know it quite easily just by the feel of it. When everything fits right, install the ring on the piston. Then, sit back and congratulate yourself.

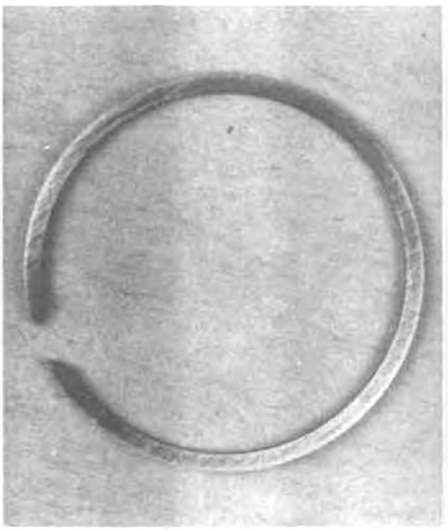


Photo 4. Ring has been lapped on a stone to loosen fit. Note cross-hatch lap marks.

Photo 5. Ring compressor tool provides best way to get piston/ring in cylinder.

Photo 6. Shim brass stock will compress ring for inserting piston. Easier than making tool.

Once the ring has been installed, the only remaining problem is to get piston and ring back into the sleeve . . . with the ring intact. I know of three ways to do this. The most common is called "the fingernail fumble." If you've ever installed a ring, you've probably tried it. It works, but it can be frustrating, and if you become exasperated you can break a ring. This method consists of nothing more than compressing the ring with three of your fingernails, lining up the gap, ring pin, and sleeve, and deftly sliding it all together. Simple. Until you try it.

The second method requires a ring compressor tool. Photo five shows a piston and ring part-way in the tool. (For simplicity, the rod is not shown in this or Photo Six.) The hole that has been bored in the tool is tapered half of its length. Since the initial opening is larger than the expanded ring, it automatically slips in. Just be sure the ring gap ends are over the ring pin. Then, as you push the piston through the tool, the ring will be uniformly compressed. The diameter of the exit hole of the tool is the same as the bore of the sleeve. So, with the piston skirt protruding from the bottom of the tool, all you have to do is slip the skirt into the top of the sleeve, and then push the piston the rest of the way through the tool and into the sleeve. Works perfect every time. Good news! But the bad news is that you cannot buy such tools. You have to machine them on a lathe. Since most of you will not have access to a lathe, let's go to the third method.

Take a close look at Photo Six. This technique requires only a piece of brass shim stock. Again, line up the ring gap and pin, and wrap the shim stock around the piston in order to compress the ring. It works best of you keep the ring gap opposite to the open side of the shim stock. Now slide the skirt of the piston into the top of the sleeve, and use a piece of doweling to push the piston completely into the sleeve. It's really the same principle as in the second method, however, it may take a bit of practice. Nevertheless, it sure beats "the fingernail fumble."

Guys, despite the admonition of Pete Smalley, you're now adept at servicing piston rings . . . or breaking them . . . •

Photo 1. Spark plug of the VAMPS, Bob Chambers, with his latest, a .60 powered Parmenter Swoose. Note two-wheel gear option.

Photo 2. Neat ignition and timer enclosure keeps desert dust out of Al Heinrich's Ranger. Photo by Bill Stroman.

PLUG SPARKS

By JOHN POND

• Las Vegas! Does that ever conjure up visions of "Tinsel Town," "The Strip," big-time shows, and in general, a wide open town for gambling. However, right in the heart of town gather's the Vegas Antique Model Plane Society (VAMPS) that annually stages the best winter meet you could ever hope to attend.

Greatest thing about Las Vegas is that when you take your wife along, you don't get that old complaint of "What will I do?" In most cases, the modelers have problems in dragging their spouses home!

Best part about flying in the Vegas area is the proximity of Henderson Dry Lake. Those easterners who were out for the 1977 SAM Champs know about this fabulous flying area. However, in February, the temperature rarely gets above 65 and the wind is non-existent. Probably the biggest hazard a free flighter encounters is his own model that spirals up and promptly lands in the same spot as it took off. Wild!

Hospitality has never been lacking at Las Vegas, as Bob Chambers has put up a flock of fellows at his place of business at a real terrific price. Photo No. 1 shows that dynamic sparkplug, Bob Chambers, 6655 W. Laredo, Las Vegas, NV 89102, with the latest Swoose approved for old timer competition by the SAM Board of Directors. The original Swoose was designed by Jack Roeser of Chicago during 1940, and was primarily a Class B size.

Some of the Chicago boys, notably Frank Parmenter, picked up the design for other sizes. When his job took him to Hampton Roads, Frank started flying his Class C Swoose in Virginia with good results. The design was immediately picked up by this writer in 1946, with a design called the "High Hatter" (Just another pencil bomber).

As can be seen in the photo, Bob has substituted two wheels for one to give it better handling characteristics on the ground. With twin rudders, this gives a four-point takeoff! Regardless of the levity, the model was good enough to win.

Photo No. 2 shows Al Heinrich's neat Ranger, and the even cleaner way of attaching the external leads. The hatch system is an excellent way to maintain the streamline shape of the Megow Ranger while keeping out that obnoxious desert dust.

As we mentioned before, Al Heinrich, of 3154 Falcon St., Pomona, CA 91767, produces an excellent line of gas and glow fuels suitable for just about any engine. Those using ignition engines will be surprised to find he markets several ignition fuels with varying degrees of octane. Best idea is to write Al, explaining what engine you are using, and he will recommend the best fuel for your jewel.

Although Rudy Calvo has been extremely busy with his new business, he has found time to build up one of the new 1/2A Texaco models that are proving so popular. The reason for such popularity is the ready access of Cox Black Widow engines, plus the "crackability" of these small models, meaning that they don't break up easily, and best of all, are easy to repair!

Photo No. 4, also taken at Henderson Dry Lake, depicts Damon Adcock and his latest OK 60 powered Powerhouse. Damon claims the OK is more than

Photo 4. Who says O.K. 60 engines don't pull? Damon Adcock is more than pleased with performance of his Powerhouse. (Stroman)

Photo 3. Half-A Texaco is becoming more popular at every contest. This is Rudy Calvo's Powerhouse. Photo by Bill Stroman.

Photo 5. R.D. Oliver, Cactus Club SAM 31, came up from Phoenix, Arizona with Zipper for the VAMPS meet.

Photo 7. Bob Haight (left) listening to SAM Speaks editor Jim Adams' sad tale about how his Zipper loops under power. (Needs big DT bands)

enough power and proved it on the field. It has been this writer's experience that there is nothing wrong with the OK 60 once you get the hang of running it. Most surprising is the ability of this engine to swing larger propellers at comparable and possibly better speeds than a Super Cyclone. Where best performance is generally obtained from a "Cyke" using a 12-6 prop, OK 60 engines will turn 14-6 in no uncertain terms. Something to think about, men!

SAM 31 of Phoenix, Arizona, was also represented by R.D. Oliver, the mainspring of the "Cactus Club." Shown here, in Photo No. 5, is a Comet Zipper entered and flown in the VAMPS Annual, February 14 and 15, by R.D. As can be seen, the weather was just impeccable over the two days. There was no appreciable weather changes until afternoon on Sunday, when a weather front came through for an hour or so.

An unusual feature of the contest is that all events are run on both days. The "sandbaggers" (including yours truly) have a tough time trying to outguess the weather. A typical case was using up all your flights on Saturday, only to find Sunday morning had better lift.

Photo No. 6 is living proof that eventually, all modelers drift to the easy going gait of old timers. Bill Stroman, one of the Flightmasters, is the latest to be hooked on old timers. Much to this writer's surprise, Bill showed up with two models, a American Ace 54 and a So Long, as shown in Photo No. 6. When it is fully trimmed out, this model should be a real threat!

Photo No. 7 shows Jim Adams, our intrepid SAM Speaks Editor, in a rather serious discussion with the Contest Director, Bob Haight, of the VAMPS, at this annual meet. As indicated by the photo caption, Jim has been experiencing trouble with stalls in the glide. Haight offered the rather sage advice to carefully check the dethermalizer string for tautness. As this writer found, bands do rot with age, losing their resiliency, therefore allowing the tail to raise up slightly, Up elevator!

Jim, who can be reached at 2538 N. Spurgeon, Santa Ana, CA 92706, issues a plea to all SAM members for material for the newsletter. After all fellows, SAM is the only game in town in regard to old timers, and deserves your support! Photos, articles, ideas . . . all are welcome!

Photo No. 8 is the kind of picture we like to run; of a well made and attractive model. After looking at this Trenton Terror built by VAMPS member, Floyd Denny, there may be a rush for plans for the Trenton Terror (**MB** Nov. 73, No. 1173-O.T., $4.00). Actually, this is a pretty terrific model to get started in old timer flying, as the design is so simple it requires only 1/4-square strips (plus sheet) to build. Neat way to go!

Photo No. 9 sez it all. This paragraph will be the wrapup on the VAMPS Winter O/T Annual, but what better way to end it than to show Cathy Archer, a winner in the .020 Replica Event over the boys! Strato-Streaks are hard to beat, and when built light for the .020 Cox engine, their performance is outstanding. This one was no different. Let's look at the results:

30 SECOND ANTIQUE	
1. Bud McNorgan	12:04
2. Don Weitz	10:46
3. Bill Cohen	9:13
CL. C PYLON	
1. Bob Chambers	12:28
2. John Zafris	9:42
3. Fred Emmert	6:03
TEXACO	
1. Bud McNorgan	41:50
2. Cliff Silva	13:20
3. John Pond	12:30
.020 REPLICA	
1. Cathie Archer	13:50
2. Bill Stroman	12:44
3. Bob Oslan	9:44

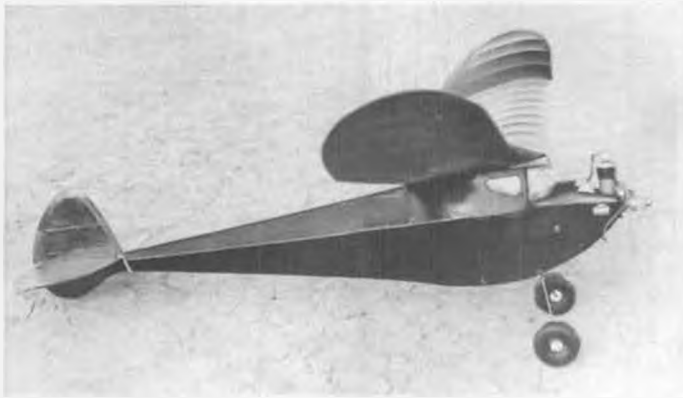


Photo 6. Bill Stroman's Ohlsson 23 powered So Long. This Flightmaster really getting serious about O.T. free flight.

Photo 8. Very nice looking Trenton Terror built by Floyd Denny, of the VAMPS. Power is Madewell .49.

Photo taken in Feb. 1951 by Al Wolsky, shows Barney Snyder cranking on his Miss Tiny at Rosecrans and Western. Al now in N.J.

Photo 9. Winner of the .020 Event! Cathy Archer seen with hot performing Strato Streak. Was timer watching model? (Stroman.)

CLASS AB PYLON

1. Jim Adams	13:06
2. Bob Oslan	12:56
3. Rudy Calvo	12:43

CL. C CABIN

1. Don Weitz	14:37
2. Fred Emmert	8:10
3. Phil McCary	7:46

CLASS AB CABIN

1. Sal Taibi	11:24
2. Don Weitz	8:18
3. Bill Cohen	7:44

.015 FUEL ALLOTMENT

1. Sal Taibi	56:47
2. Cliff Silva	30:16
3. Bud McNorgan	27:29

O/T SCALE

1. Cliff Silva	34:45
2. Sal Taibi	18:14
3. Bud McNorgan	18:04

Almost forgot to acknowledge the untiring efforts of Bob Haight, the Contest Director. Bob sits for two days, uncomplainingly, hour after hour. The VAMPS are fortunate to have such a dedicated fellow. His rendition of "Nobody loves you when you're a Contest Director" had everyone it stitches. Great brand of humor!

ENGINE OF THE MONTH

In line with our policy of introducing rare or little-known engines we are indebted to that well known engine collector and manufacturer, Karl Carlson, for the use of this month's engine, the Atomic 60.

When one first sees this motor, one is immediately struck with the similarity to a Hornet or McCoy engine, particularly the latter. Despite protestations to the contrary, this writer still feels the root of all good racing engines was the Hornet, as developed by Ray Snow and Walt Cave.

The Atomic, as it was called, was the brainchild of William P. Cubitt, San Francisco Bay Area Marine Operating Engineer. It might also be of interest to note the Talisman motor, now being offered by Replica Engines, was also a design by Cubitt.

According to Carlson, the initial output was to be 100 engines, with 1000 castings made up for future orders. This writer ran into the castings in a San Francisco foundry shop unclaimed (and unpaid for). At the time of this discovery, the foundry was busy reclaiming the aluminum alloy by remelting the existing castings. The author was able to salvage enough castings to make three engines, but alas, lacked the necessary lathe and sundry machining tools to complete the motors. Eventually the castings were given away to some forgotten modeler.

Bill Cubitt's background indicated he was no slouch at motor design, as he

Photo 10. Jim Walker at '49 Findlay, Ohio contest, winding up an A.J. Hornet.

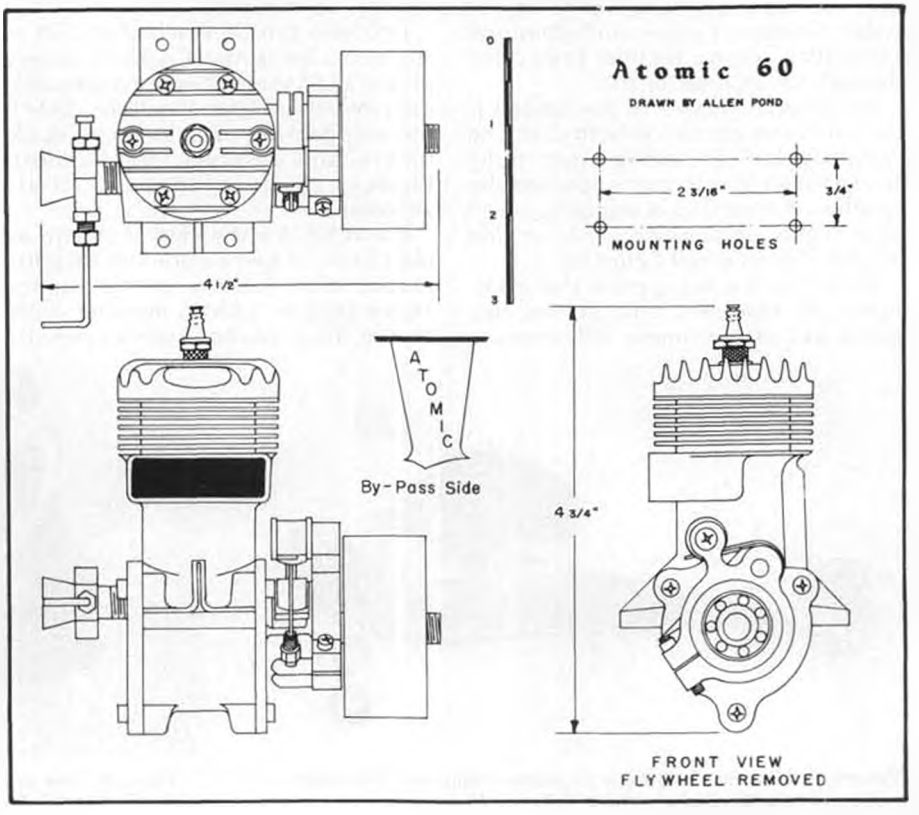


Photo 11. Joe Konefes (Buzzard Bombshell designer) at 1938 Detroit Nationals with 10-foot span, Brown Jr. powered sailplane. (Lester.)

Photo 12. Harold Lanser built this Victor Stanzel Tiger Shark, scaled up 50% to make R/C O.T. model. Hmm. . . very interesting!

participated heavily in rail track and tether cable race cars during the forties. Of course, during World War II, most of this activity declined as there simply were not enough engines and parts for the average modeler to maintain a good backlog of repair items.

Carlson relates that John Gracie, a noted collector in his own right, made many attempts to contact Cubitt during WWII, but was unable to locate him. Carlson, when put on the track of Cubitt, simply did what every good detective does first; look in the telephone book of the surrounding area of suburbs. Sure enough, there was Cubitt's name listed not more than a mile distant from Carl's home at that time!

The Atomic engine had several features worth mentioning, the most notable being the by-pass idea which was taken from Evinrude outboard motors. This, of course, was one of the trademarks of the later McCoys. Another interesting feature was the elongated slots in the rear back plate to allow small angular adjustments of the rotor valve. This was for those modelers who were looking for every little bit of rpm they could obtain from minute adjustments of their motor.

The Atomic was also one of the first racing engines that featured a hemispherical head with a domed combustion chamber, giving a displacement of .604 cu. in. (the top displacement allowed under race car rules). Hornet engine influence can be seen as the bore and stroke (.937 x .875) are identical, with a rated power of 3/4 hp. The Atomic, due to its one-piece crankcase, was slightly lighter at 13 ounces.

For the technically minded, the Atomic featured an integral sandcast aluminum cylinder and crankcase fitted with a Mehanite liner. The aluminum alloy piston was fitted with a bronze bearing for the wrist pin which in turn was fitted to a Dural 24ST connecting rod. The sand cast aluminum alloy head was fastened with six screws. A hardened steel crankshaft was carried by ball bearings with a thrust bearing to prevent the shaft from rubbing on the case. Intake, of course, was the popular speed method of the day, the rotary disk type intake.

Horsepower ratings were arrived at on the basis of 16,000 rpm. However, the manufacturer claimed 18,000 rpm using a 10-inch, 12-inch prop. Unfortunately, the fuel employed was not specified.

In conclusion, the Atomic 60 appeared to be a well made engine, but unfortunately, offered no specific advantage over the hot-selling McCoys or the ever dependable Hornet. It was simply another case of a good engine being pushed off the market for lack of sales and capital.

30 YEAR AGO, I WAS. . .

We are indebted to Don Ohl, 612 W. Park, Wausen, OH, for Photo No. 10, showing Jim Walker at a controline meet in Findlay, Ohio, 1949. For the benefit of those who are constantly astonished to find Jim Walker turning up at the oddest times, you must remember Jim made it rather big with the Fireball controline model and of course, big in the department stores, with his Hornet, Ceiling Walker, folding wing glider, etc.

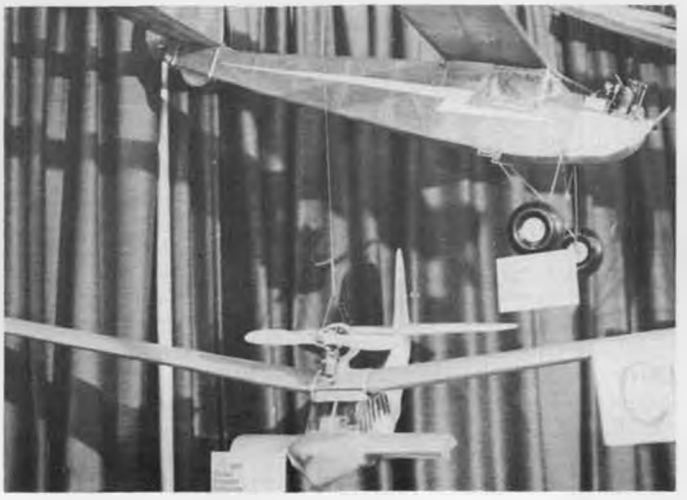
Walker bought himself a big DeSoto station wagon, and proceeded to take in all the meets that struck his fancy. The writer can clearly remember Jim Walker showing up for a S.F. Vulture Hydro Annual in 1950, with two Fireballs on floats. It was dedication to the hobby like this that made Jim Walker the most beloved character.

Don Ohl goes on to say he feels he may qualify as an old timer, as he started building rubber powered endurance models in 1936, at the tender age of 13. He dabbled mostly with his own designs but fondly remembers his best flyer as the Jabberwock. However, Don says he took quite a few liberties with the original design, such as shorter tail moment, twin rudders, airfoils, etc. He claimed his modified version stayed up better in light lift. The contest scene was fun in those days!

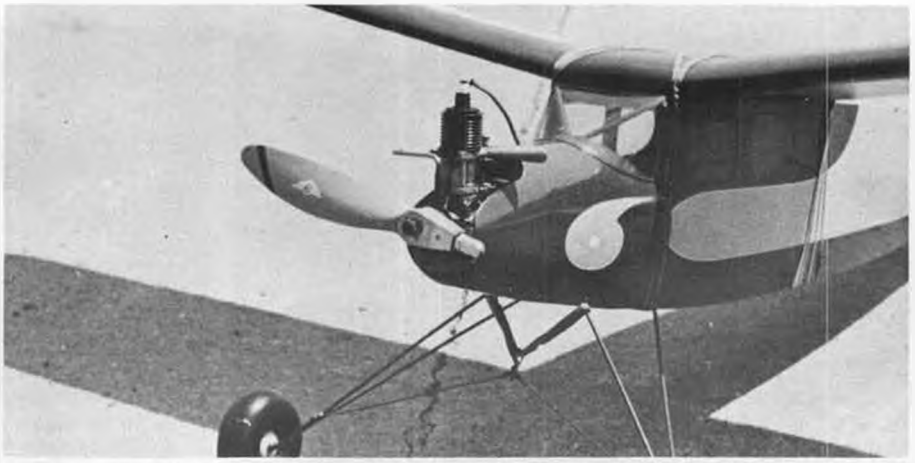
Later on, when the controline craze took modeling by storm, he remembered taking first in Stunt and first in Class B Speed at a contest with the same model, a Comet "Rookie Trainer." He still has the same engine he used in the 1946-49 period, an R-B Special, as made by Ralph B. Steele of Cleveland. (Don't all you engine collectors jump down this

Continued on page 82

Photo 13. Weather's Westerner by Eut Tileston is not only pretty, but performs well. Seen at West Coast SAM Champs. Photo 14. At England's 50th Model Engineer Exhibition, "Firebrand" by Mike Whittard, with Saito 4-cycle .30. "Mermaid" flying boat, Keil K6 engine, Dr. Forstore.



Harold Coovert and his 1938 Berryloid winner. Photo similar to one used in Air Trails article.



Designed by: Harold Coovert
Drawn by: Al Patterson
Text by: Bill Northrop

1938 BERRYLOID WINNER

• The selection of the 1938 Berryloid Trophy winner for our *O.T. Model of the Month* came about in an interesting way. You may recall that we featured a Waco YQC-6 cabin biplane as a Collector Plan in our March '81 issue. This plan for a 3/4-inch scale rubber model came from a pre-WW-II Scalemasters kit, and is probably one of the most accurately detailed kit plans ever produced.

What we didn't put together at the time we published this was the fact that the designer of the model, Harold Coovert, was also the designer and builder of the 1938 Berryloid Trophy winner. It took a letter from Bruce Thompson, of Toronto, Ontario, Canada, to bring this to our attention. It seems that Bruce, through relatives, had acquired a sizable collection of Coovert's original drawings, plus many photographs of his model aircraft. As luck would have it, some of these included never-before-published photos of the Berryloid winner, which he sent along to us. Naturally, it didn't take long to dig out the November 1938 *Air Trails* from our magazine collection, which contained the construction article for this model.

Incidentally, Bruce also sent us Coovert's mouth-watering 3/4-inch scale plans for the Stinson Reliant SR-7B "Gullwing," another Scalemasters kit plan. Unfortunately, this plan did not include the fuselage formers or the wing ribs (every one was different!), so it seems pointless to present it as a Collector Plan. Got some beautiful Edo float plans, though, and we will present these, as all of the bulkheads are included!

So what's a Berryloid Trophy? Actually this was a trophy sponsored by the Berry Brothers, of Detroit, Michigan, for the National Model Airplane Championships, to be awarded to the gas model with the best finish, using, hopefully, Berryloid dopes. Oh yes, the model had to fly at the contest to qualify for the Best Finish trophy!

Harold Coovert's skill and workmanship certainly went deeper than the finish on his winning model. Careful study of the plans reveals extremely clean lines and thorough structural design. Basically a conventional cabin model, there are gentle curves and sweeps here and there that set it apart. Note also the built-in downthrust, the single-bladed prop, the swiveling tail wheel, and the forerunners of DuBro wheel collars! And we're sure that Bud McNorgan, editor of the *SCAMPS* Newsletter, will appreciate what a fine R/C model it would make!

The elusive balance point (BP, not to be confused with CG) for this model is described by its designer as follows:

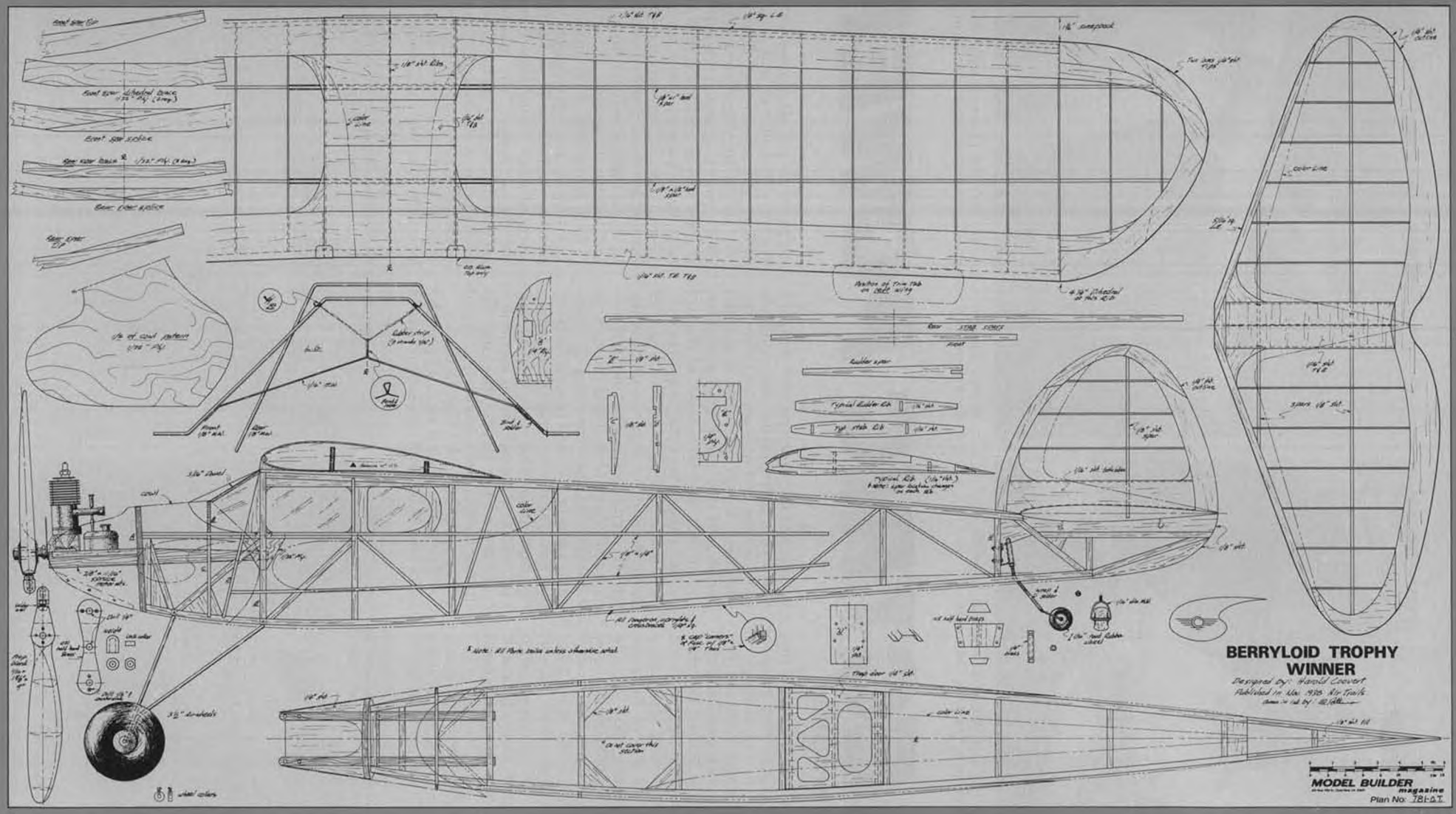
"A word about balance. The battery box is shifted back and forth until the nose is slightly heavy. This may be determined by holding the model under the wings, halfway out and [one] third way back, using your index finger." Actually this amounts to about 4 inches back from the leading edge where the wing meets the cabin . . . a little easier to check than reaching halfway out each wing panel.

CONSTRUCTION HINTS

Note the 1/8x1/4 strips glued to the outside of the longerons. These hold the covering out and away from the basic framing, preventing unsightly pulling in of the fabric where the verticals and cross-pieces meet the longerons.

We like to install brass tubing, with appropriate plywood gussets, for the landing gear. This way, the gear can be installed after the model is finished. After the main legs are shaped and soldered together, cut the gear apart at the middle, insert each half into the tubing, and lock it all in place by adding the V spreader.

It might be easier to build the wing by running the spars parallel to the leading and trailing edges. Nick the front face of spars at Rib 1, crack them back to match the sweep and glue. Then make dihedral braces that extend into the second bay beyond the joint. By using 1/32 ply, and possibly laminating two layers, the braces should follow the sweepback without any problem, particularly if held in place with C-clamps until the epoxy hardens. •



FULL SIZE PLANS AVAILABLE – SEE PAGE 100

Bob Sliff, Midway Models, with Astro 020 powered Scientific Mercury. Seen at IMS show in Pasadena, California.

Mitch's Olympic II flies very well with Leisure Selected Stock motor, 8 x 4 prop, six 1.2 amp cells. Powered flights of 8 to 10 minutes.

ELECTRIC POWER

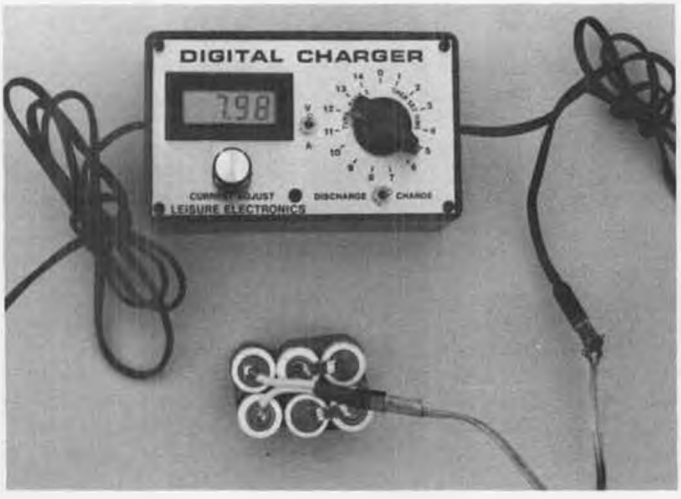
By MITCH POLING

• How would you like to have an 05 size motor that delivers super performance and flies for eight to ten minutes? I would, and when I was admiring the digital charger at the Leisure Electronics booth at the IMS show, Roland Boucher showed me a motor that he said could do just that. When Roland says something works well, I listen, because Roland and his brother Bob are the pioneers of electric flight in the U.S., and they really know electric flight from start to finish. The motor is the black label Leisure Electronics "hot wind" motor, very popular with the car racers, with ball bearings on both ends, balanced armature, and trued commutators (retail price $50).

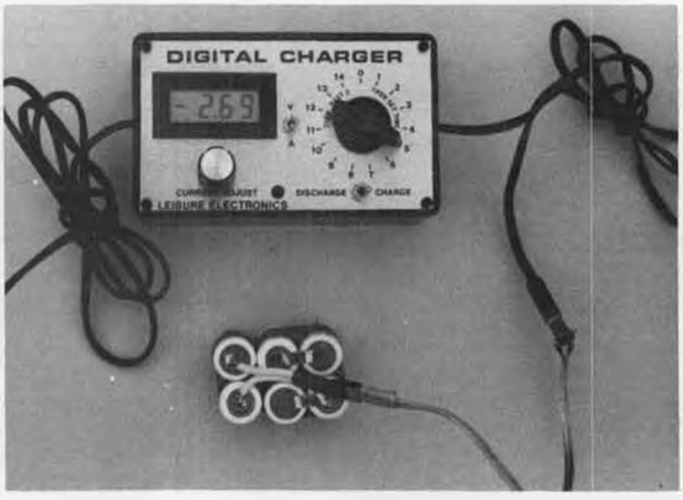
Roland suggested trying the motor on an 05 plane using six sub-C NiCds and a 6x4 prop. I did, and it was a revelation! In my Astro Stunt plane (my own design) it flew like a pylon plane, and could do spins, loops, and rolls on two channels with ease. In fact, the Astro Stunt flies better with this motor than any other, and it flies well with most of them. I could hardly believe the level of performance, and on six cells, two less than usual! Roland was right about duration, too, I'm getting consistent eight to ten-minute flights with stunting throughout the flight, not just from going for maximum altitude. I've had several fliers say that this was the first electric that they had been impressed with (they all flew gas), and one thought I was catching a lot of thermals to stay up that long! No thermals are necessary, just good engineering by Lesire Electronics!

I did some ground testing, and the specs are; 12,000 rpm on a 6x4 prop, at 14 amperes draw, all-up weight of the system with batteries and prop equals 17.5 oz., two ounces more than the Astro 05. Even so, the Astro Stunt weighs only 30 oz. with a Cannon receiver, Bantam midget servos, and a 250 mah receiver pack (two channel). The Astro Stunt is a 42-inch span, 290 sq. in. plane with a 10% flat bottom airfoil. The Astro Sport kitted by Astro Flight is very similar and would be ideal for this motor.

By this time I was really hooked on the performance of the motor and the duration with six cells, so I ordered the selected stock motor from Leisure and the digital charger. The selected stock motor is not reworked, but is picked out from the usual selection of 05 motors for superior power and running time (retail price $15). I found that an 8x4 prop flies best with it, at 8500 rpm, and 16 amperes



Leisure digital charger, display is on voltage, pack is on charge.



Digital charger with display switched to current, while charging. Very handy.

Berkeley Brigadier, with Leisure Selected Stock motor, 8 x 4 prop, six 1.2 amp cells, excellent flights of 8 to 10 minutes duration.

Astro Sport with Leisure Black Label motor, six 1.2 amp cells, 6 x 4 prop, 8 to 10 minutes of continuous powered flight.

Potent Leisure Black Label motor, delivers 12,000 rpm on 6 x 4 prop with only six cells!

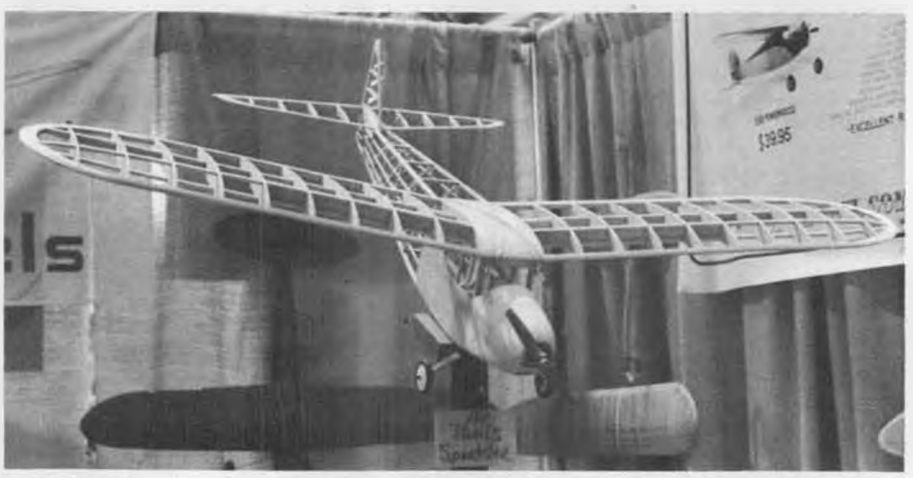
draw. This motor does a good job of pulling my Olympic II (99-inch span, 920 sq. in.) glider up to about 700 feet three times on one charge, which in no thermal conditions is good for eight to twelve minutes of flight time, a big improvement over the time I had been getting using a stock Astro 05 (about seven minutes, with two climbs to about 500 ft.). This motor is also ideal for old timers of 50 to 60 inch span, and in my Berkeley Brigadier (56 inch span), I get eight to ten minutes easily, with altitudes up to 800 feet.

If this were the whole story, it would be good enough, but there is more. Leisure makes a digital charger that is absolutely first class. It displays the voltage of the battery pack as it is being charged, and the charge current, on a big 1/2-inch LCD display. It will also trickle-charge, and discharge battery packs, on all packs from four cells (Astro 020) to twelve cells (Astro 10). Now that I've used it, the "old fashioned" chargers just don't seem good enough. The feature that really makes a difference is that you set the charge current you want, then monitor the voltage, until the voltage peaks. This is the 100% charge point, and it adds about 15% more flying time. The voltage reads out in hundredths of a volt, so the meter is very accurate in showing the peak. The peak does vary for different packs, for most of the packs I use, it is close to 10 volts under charge (sic cells). This type of charging, while not new, represents a breakthrough for the "Sunday flier," because this and the Jomac charger are the first on the market that allow digital monitoring. The precision and the confidence that this type of charging gives you are well worth the price of the charger, which is $100. It also gives that "prestige factor" at the field, which, of course, doesn't matter to you or I (ha!). Actually, the prestige factor shouldn't enter in, but I'll have to admit that fellow fliers at the field take electrics a whole lot more seriously when they see that digital display going! So I've got to hand it to Roland and Leisure Electronics. I think they have given electrics a new boost, maybe even a breakthrough. For more information, write Leisure Electronics, 11 Deerspring, Irvine, CA 92714, phone (714) 552-4540.

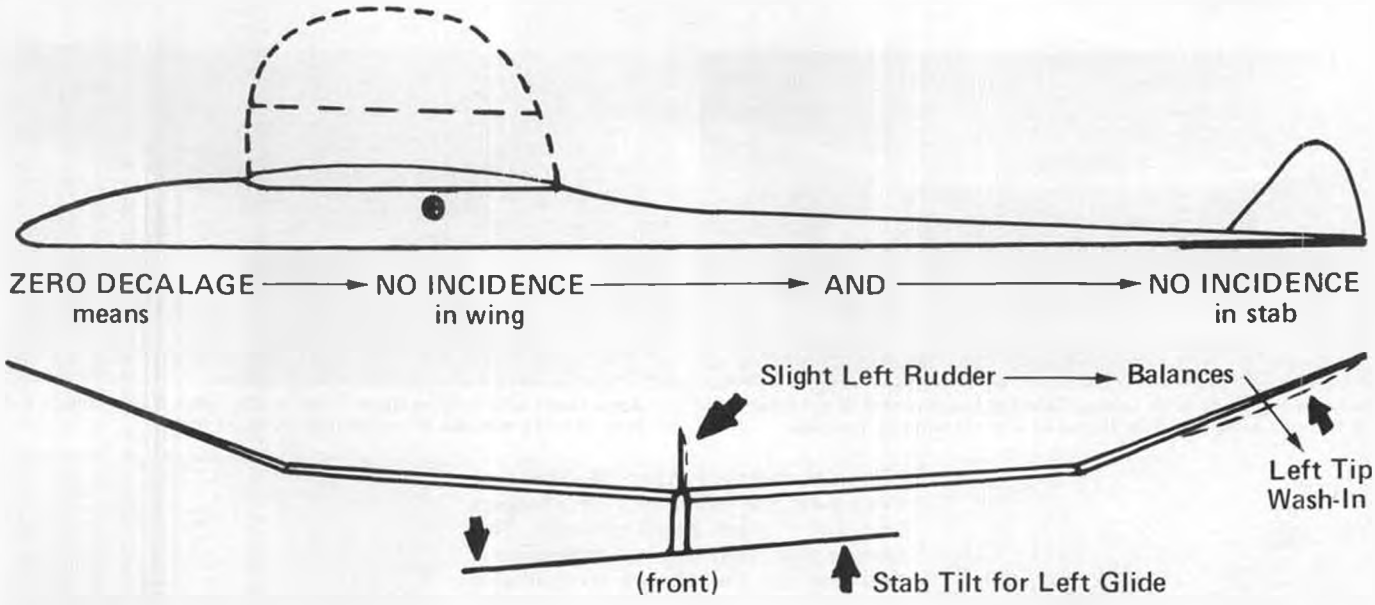
Another company with neat products for the electric flier is Midway Models, which also had a booth at the IMS show. Bob Sliff, who runs Midway Models, is an enthusiastic electric flier, and wrote a column on electric power in *Radio Control Sportsmen* (no longer published). He is also interested in old timers, and the Midway Models series of kits for the old timers is fantastic. The selection for the Astro 020 includes the Scientific Mercury, Ehling Request (a super flier, my favorite with Ace RO), Twin Cyclone, Cavalier, Miss America, Ranger, Sailplane, Buzzard Bombshell, New Ruler, Super Buccaneer, Playboy Sr., and Clipper Mk II. These range in price from $12 to $14, and in size from 30 to 36 inches. For the Astro 05 to 075, the Series 50 Air Trails Sportster (featured on our Jan. '81 cover) and the Powerhouse are ideal, at 380 sq. in., price $40. For the Astro 15 and 25, there are semi-kits of the full-size old timers, including ribs, wing tips, fuselage formers, plans, building notes, and information on installing the electric power. The semi-kits include the Quaker Flash, So Long, Playboy, Sailplane, Clipper Mk I, Zipper, Ranger, Trenton Terror, Dallaire Sportster, Mercury, Miss America, and Powerhouse. Sizes range from 46 up to 108 inches, and prices from $13 to $24. If you are interested in the catalog, write to Midway Model Company, 8044 Legion Place, No. 6, Midway City, CA 92655.

Till next time, charge digital, and fly longer electrically! •

Leisure Selected Stock motor, 8 x 4 prop.



Air Trails Sportster, made popular by Jan '81 RCMB cover, from Midway Models. Uses Astro 05 or 075 motor.



The four basic adjustments for successful handlaunch flying. Rearward CG and zero decalage give loop-free launches. Rudder provides launch turn, stab tilt provides glide turn. Wash-in prevents spiral dives. (All turn adjustments shown for right-handed launch.)

THORNBURG AT LARGE

The knight-errant of the New Mexico desert discovers handlaunch glider! Probably the first handlaunch article ever written by a beginner in the field . . . full of good info for other beginners. DAVE THORNBURG

• I call your attention, gentlemen, to one Sir George Cayley, a dead Englishman, Old Sir George, before he became dead, was an extraordinary fellow. He invented the Caterpillar tractor. He invented the bicycle wheel. He served as Whig member of parliament for Scarborough. But who gives a damn for all that? What makes Sir George interesting to you and me is just this: he invented the aeroplane!

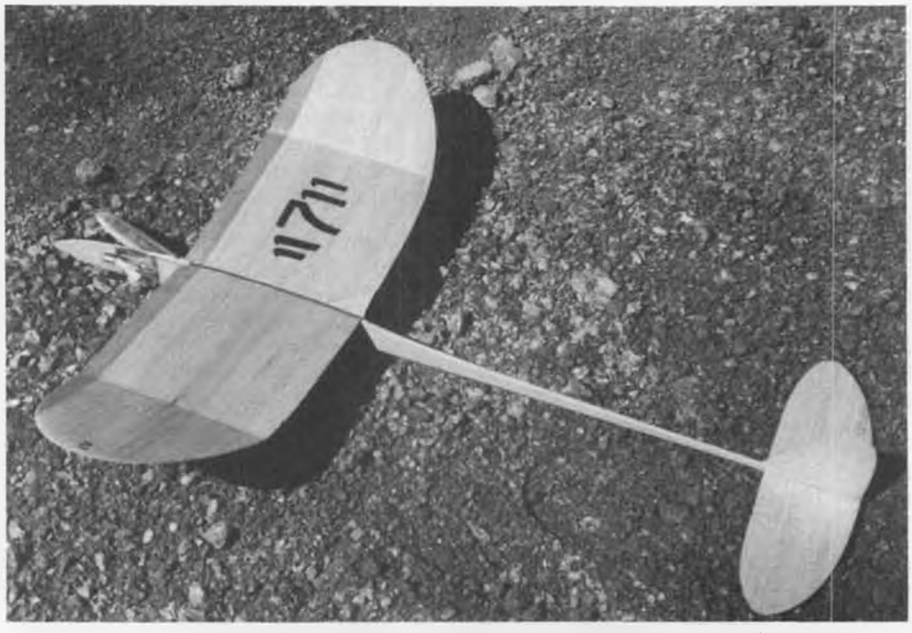
Before Sir George's time (1773-1857) men still dreamed of flapping their arms to fly. Sir George invented the fixed wing. He invented the airfoil. He invented dihedral. He invented rudders and stablizers, and while he was at it, biplanes. His first successful model glider, chucked aloft in the year 1804, looked amazingly like a Sweepette, minus the polyhedral.

Sir George Cayley. Keep him in mind. Without Sir George, we'd all be chasing golf balls or women on weekends.

What calls to mind this trivia about Sir George is my recent obsession . . . love affair . . . with the handlaunch glider. Not R/C handlaunch, but the real thing; the simple chuck glider, the original model aeroplane.

For the past six weeks I've been reviewing the literature on handlaunch . . . re-reading every article on the subject in my magazine collection, which stretches back through geologic time to the late Truman/early Eisenhower epoch. At the same time, I've been building and flying handlaunch like crazy; twelve gliders in the past four weeks.

Here's how my learning curve has progressed:

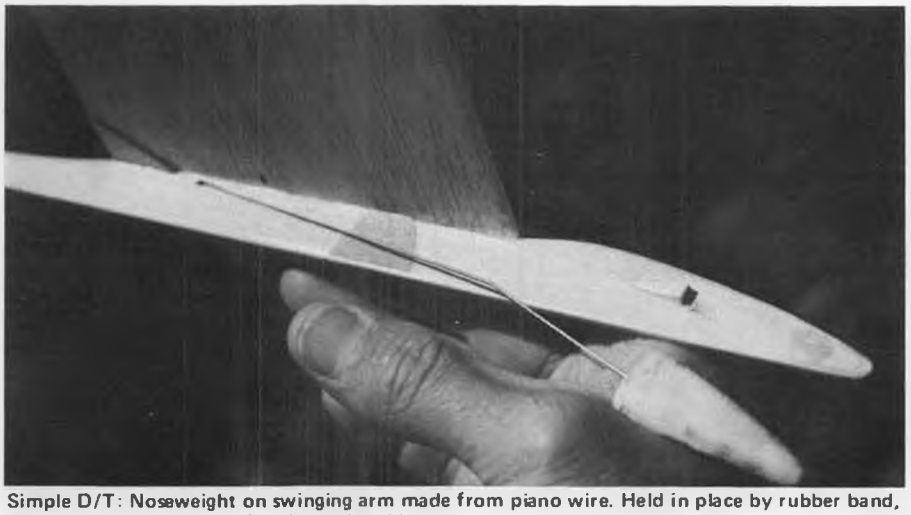


One of Dave's original-design handlaunches mentioned in the text. Fuselage is 1/8 basswood, wing 3/16 soft balsa. Note long tail moment.

FIRST WEEKEND. Out to the field with my first HLG's in almost twenty years: a pair of carefully built "Sleepwalkers." Now the Sleepwalker is an old Texas Eagles design, published in May 1957 *Flying Models*. I'd built a few of these as a kid, because the design and the article are so simple: full-size plans, vee dihedral, no funny angles to wing or stab. Never mind that the *FM* article was shot full of errors and inconsistencies between plan and text; the model was a holder of two national records. And handlaunch hasn't changed since 1804, right?

After tossing these two ships around for about three hours, it began to dawn on me why I never got very interested in HLG as a kid; this design, as published, is pure junk. I had been reading about how a HLG *should* fly; I'd even seen a few of them flown at free flight contests over the years. The Sleepwalker doesn't fly the way these articles describe. And at that point on the learning curve . . . Weekend One . . . I didn't have any of the tricks needed to make it perform.

Now the theory of handlaunch is very



Simple D/T: Noseweight on swinging arm made from piano wire. Held in place by rubber band, it swings backward when fuse burns band in two.

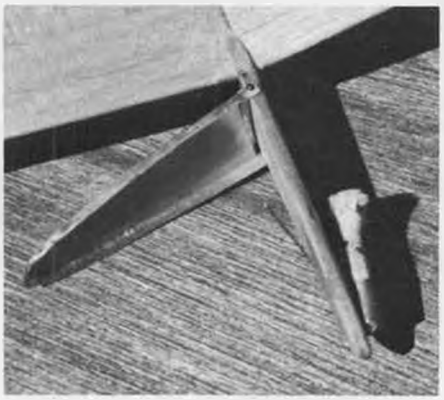
simple. First you build a plane that's wildly tailheavy (by R/C and sport free flight standards). You make it balance at 60% to 70% of the chord, instead of the usual 25-35%. This means the model is going to stall like mad. right? So, to prevent this, you build it with almost zero decalage: the wing and stab both sitting perfectly flat on the fuselage. None of that built-in "up trim" in the stabilizer that makes the average model so slow and stable.

Sounds like you're building a real time bomb, doesn't it? Sounds like your model is going to be so pitch-sensitive that the first gust will upset it and throw it into a screaming death-dive. Surprisingly, this doesn't happen.

What does hapopen is that you get a model that's reasonably stable at two radically different airspeeds: super fast and super slow.

At high speeds (and a good hand-launch leaves your hand at 45+ MPH) the "zero decalage" plane will fly more like an arrow than a model, it goes almost straight, with little tendency to climb or loop. The wing isn't lifting, you see . . . both wing and stab are travelling at very

Carrying box helps organize gaggle of gliders. This one built from 1/8 veneer ply. Gliders rest in notches in 1-inch Styrofoam.



Simple D/T: Hinged "drag plate" swings open when fuse burns rubber band, spins model out of thermal. Only takes hour to build.

low angles to the airstream, nose down and stroking, producing minimum drag and minimum lift.

You can't make this happen with the "toy" handlaunch gliders you buy in the drugstore for 25¢. These gliders are designed to be foolproof, so anyone can fly them. They have lots of noseweight and lots of built-in "up elevator", and the harder you throw them, the faster they loop. Even if you lower the stab angle and remove noseweight, you'll never be able to adjust them to a true "zero" trim: their undercambered airfoils make them too tricky at these low settings, Don't waste your time on them.

But the really magic thing about "zero decalage" trim is this: after the model loses its excess (launch) airspeed, it can settle down into a gentle, slow, tailheavy-but-not-too-much-so glide. The kind of glide that attracts thermals the way a milk cow attracts flies.

It CAN make this startling transition: but it doesn't always do it. The Sleepwalkers, for example, never did it even once.

SECOND WEEKEND. No more magazine plans, I'm on the field with a genuine Thermic B this time. A Zaic kit, dating back to the 1940's, still available in most good hobby shops. Nice balsa in the kit . . . wing panels medium-light, and well matched. Assembled in around an hour, using Super Jet. Sand with 400 paper, apply one coat of tung oil (it only adds 1.5 grams, and seals the wood better than a coat of dope) and she's ready to fly.

Unfortunately, she doesn't. Try what I will, the Thermic B flies no better than the Sleepwalker. At this point, I'm still using the simple "S-pattern" launch that I learned in my childhood . . . probably from the Thermic B plans. The S-pattern goes something like this: If you're left-handed, your plane is going to naturally bank to the left when you throw it (and if you're right-handed, it will bank right). So you MUST adjust the glide-turn of your model to be just the opposite of this natural bank. If you don't, your plane will roll onto its back and crash every time you throw it. The only way to make it pull out of a steep left (or right) bank in the toss is to have lots of opposite rudder. Sound good so far?

Now what does this opposite rudder do? It forces the model to begin rolling out of the bank almost as soon as it leaves your hand. Hey presto; a nice, climbing, S-turn! Safe; and it gets you up to pretty fair altitude. Handlaunch . . . even competition handlaunch . . . was flown in this pattern for forty years. Using this pattern, the balance point doesn't have to be *too far* back; 50% or so is fine.

The problem with the S-turn climb is the transition. If you throw too hard, the ship comes out on top of the S with too much airspeed, and stalls, losing half of your hard-earned altitude. Throw too soft and it never completes the S. No wonder the HLG rules allow you six throws to make three official flights!

Both the Sleepwalker and the Thermic B are designed to fly the S-pattern. Which means; sometimes they come out flying at the top of the launch, sometimes they don't. I've read of better performance than this. I've seen better performance than this. So I go off to consult my free flight guru, Buzz Averill, of Albuquerque.

Buzz looks at my Sleepwalkers. He looks at my Thermic B. The Thermic is an interesting airplane, he tells me. Anyone can make it fly; but no one can make it fly well.

The problem is in the tailfeathers. The stab is much too big. The rudder is much, *much* too big. In handlaunch, the transition is everything. If the model is too stable, it won't make the transition quickly and without altitude loss. I look at my Thermic: the stab is 50% of the wing area. Sleepwalker, same story. I remember Lee Hines' Sweepette, Sir George's 1804 model; both had long tails and petite rudders and stabs.

I go home and design two new models, from scratch.

THIRD WEEKEND. Two brand new models. One looks superficially like a Thermic, right down to the black trim on the leading edges. Same beautiful elliptical shapes to the wing and stab. Same ugly rudder, only much shrunken. I work with this plane for an hour or more. It climbs beautifully, glides beau-

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Radio equipment in hold of schooner Benjamin Lathum, built by Arnold Cross. Probar sail unit. Two-channel radio.

John Decker is able to trim the overlapping sails on his schooner yacht America by radio control. Heathkit R/C system.

the MODEL SHIPYARD

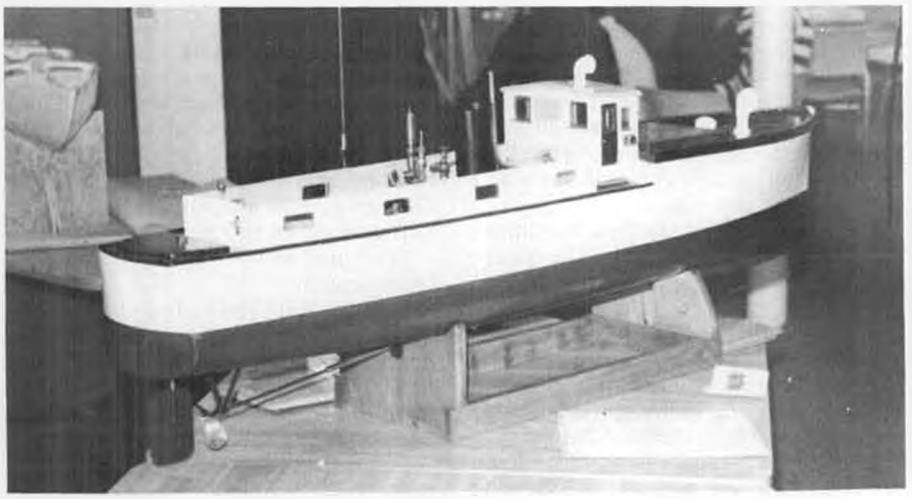
Guest Columnist DAVID MAINWARING

• A model ship exhibit and technical meeting was held by the Minuteman Model Yacht Club at the Palmer Center, Needham. Massachusetts. The MMYC organization is an association of shipmodelers with primary emphasis on radio controlled sailing model yachts and radio controlled model ships and boats. The model show and meeting is part of an outreach program being conducted by the club to attract new members and to offer organizational support to the traditional shipmodeler interested in building operational shipmodels and to the model engineer to encourage their interests in building operational shipmodels with live steam power plants. A week earlier the club had been guests at the Antique & Classic Boat Society meeting in Epping, New Hampshire, which had resulted in twelve new members joining local model clubs. The meeting at the Palmer Center attracted more than thirty shipmodelers and their guests. Minuteman hosted guest-member of Granite State Model Yacht Club, of Manchester, New Hampshire, and Narraganset Model Sailing Association, at the March meeting.

The current activities of the radio control model yacht clubs reflects a diversity of R/C shipmodeling among their members which has been developing over the past winter season. In past years, the clubs have been almost exclusively model racing yachts. They are best known in the New England area for their successful model sailing regrettas during the summer months. This year, the models displayed at the meetings ranged from small display sailing ships to wooden schooners with full radio control, not to mention several R/C live steam shipmodels.

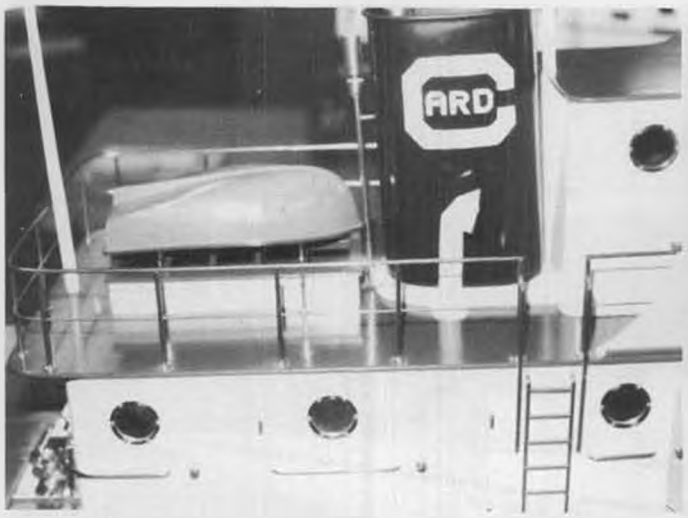
Bob Francis, from Weston, Massachusetts, is active in the R/C sailing races. For this exhibit, he brought two scale R/C models. His Emma C. Berry Schooner is a much modified kit with strip-plank-on-frame construction. The Berry is a very popular model, but as evidenced by the modifications that Bob made, the original kit doesn't allow for modern R/C equipment. His fishing trawler proves Bob's versatility. Built to scale, it is powered by one of the steam plants Bob has built, and is set up for operation by radio control.

Among the sailing models on exhibit,



Beautifully restored antique steam driven cabin launch by Harry Card now operates by radio control.

Close-up of antique steam unit in Harry Card's cabin launch.



Close-up of superstructure on steam driven tug built by Harry Card.

Harry Card's beautifully constructed steam powered tug. More description in text.

Dr. John Decker's detailed Schooner Yacht America proved that a successful EC12 racing skipper could set the standards for scale R/C sailing. Typically plank-on-frame kits do not provide enough space (note the same problem with Bob Francis' schooner) for sail winches and easy access to the R/C equipment. With the internal framing reduced, the America's hull became weak and subject to puncture. To overcome this, John used a resin-glass lay-up to back up the planking inside the hull, where it could not altar the scale plank detail on the hull's exterior. This particular model is internally ballasted to keep the hull true scale. It sails surprisingly well without added exterior ballast. Because it is a display model, John would probably not sail it in heavy air, which would necessitate an external lead keel.

Schooners are fast becoming popular R/C sailing craft in the New England area. Arnold Cross exhibited his new schooner model, a five-foot model of the Benjamin Lathum. Superbly carved from bread-and-butter pine planks, this model hull was the first radio controlled sailing model with a carved wood hull rather than a fiberglass hull that some of the racing skippers had ever seen. (This is quite revealing about the nature of the modern R/C shipbuilders). Arnold had done such a super job of carving and finishing the model that it was closely examined and praised by all in attendance. The interior of the hull was carved out, leaving the hull a shade heavier than "showing light" (to attain a super-thin hull the thickness of a sheet of paper, the shipmodeler will hold a carved hull up to a strong light to see if he can see light through the carved section. When the wood is "paper thin" and "uniformly thin" it will "show light.") Although almost exactly scale in all details, the model best fits the "excellent stand-off scale" category due to a few modifications in rigging and ballasting. To obtain the needed ballast, a lead-ballast-keel was faired to the bottom of the external keel, and there is expeditious use of bowsers and disconnect fittings on the standing rigging. The sail plan was kept scale and we were surprised to learn that all the sails are trimmed by a single Probar winch. The schooner R/C system consists of the "modelers delight," a two-channel R/C set.

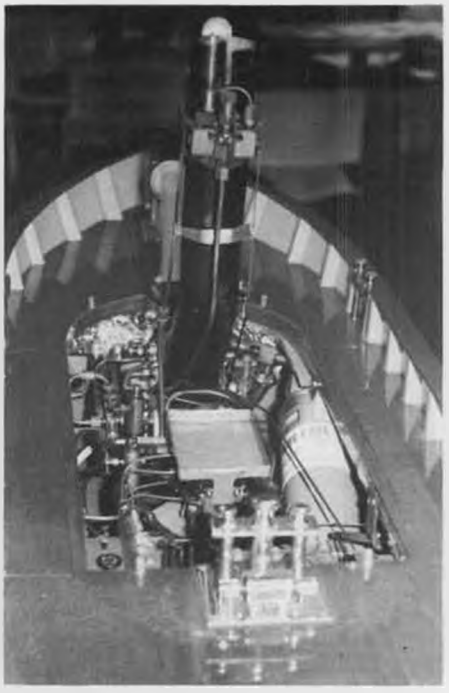
The New England area will see many more sailing regattas for classic traditional sailing craft in the next year; a Schooner regatta has been scheduled for Rosemary Lake, in Needham, on July 12, 1981. Indications are that at least fifteen (proably twenty or more will be registered by July) fully operational schooners will be exhibited and put through a racing program.

If you are an R/C shipmodeler, and have a schooner or any gaff or multi-masted sailing model, and would be willing to register it in a Classic Model Class for the purpose of gaining recognition as a sanctioned model class by the American Model Racing Association, please contact the Minuteman Model Yacht Club, Town Hall, Needham, MA 02192.

When I think of model engineers

Continued on page 69

Another view of the R/C schooner Benjamin Lathum, built by Arnold Cross. Hull is carved wood, using "bread and butter" system better known prior to fiberglass.



Inside view of Harry Card's steam-powered tug. Note Bernzomatic fuel cannister.

Dick Sherrer, nationally known OPC tunnel driver from Seal Beach, CA, holds exact quarter-scale model of his Seebolt hull, built by Jay Selby. Jay is N.A.M.B.A. Outboard National Chairman. (Jay Selby photo).

R/C POWER BOATS

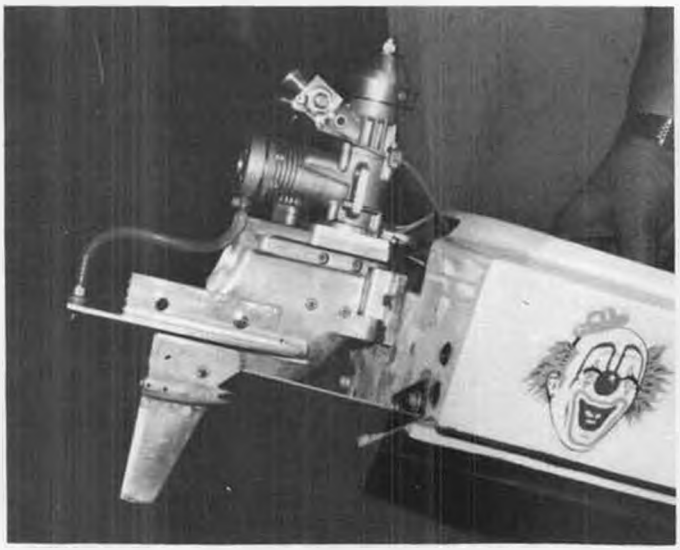
By JERRY DUNLAP

WHAT'S THE THING WITH THE WING?

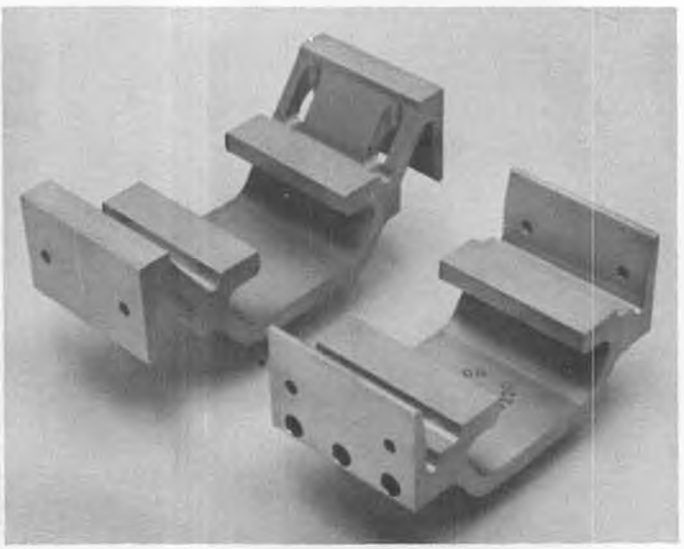
It seems like there is considerable interest in the bow wings that are beginning to appear on some of the tunnel hulls. A number of readers have written to me in recent months asking for information about wing size, location, angle of attack, and how to attach a wing to a tunnel hull. Since I have experimented with bow wings and have seen a number of them on tunnel boats, we'll attempt to provide some information on this topic.

Let's begin by examining why a wing, or air deflector, is something to consider adding to a model tunnel. You might wonder if such devices are used on full-size tunnel boats. I have never seen a full-size tunnel with a bow wing. But then I haven't seen every full-size tunnel either. However, it would be safe to say that they are not normally used in full-scale tunnels. So why are they used on the model tunnel boats?

It should be pointed out that full-size tunnel boats use a few devices to adjust the riding characteristics of the boat while it is actually being raced in competition. Most full-size tunnels have the ability to hydraulically adjust the engine away from the transom or under the transom. The new Prather Outboard Motor Mount provides the same type of adjustment, only it must be set and locked prior to running the boat. This particular motor adjustment will cause



Prototype K & B 40 Outboard, has been undergoing extensive testing for over a year. Should be available around August 1981.



Octura Models motor mounts for .90-size engines in either 5 or 6-inch widths.

Frontal view of bow wing on Excaliber II belonging to Dennis Caines, Olympia, WA. Dennis is Dist. 8 Outboard Chairman.

Side view of Excaliber II bow wing. Note 6-32 cap head bolt used for mounting wing.

Octura's new coupler for large (.90) engines, accepts .250 flex cable. See text.

Top three drivers at Fifth Annual Golden Gate Outboard Regatta (l to r): Steve Jensen 1st, Rick Barry 2nd, and Dan Jones 3rd. Note air deflectors on first two boats.

the bow to ride high when the engine is tilted away from the transom. A bow down ride will result when the engine is moved towards or under the transom. It is the shaft angle relative to the sponson riding surface that causes this change in riding attitude. Some full-size tunnels have the capability to hydraulically raise or lower the engine depth while underway. The Prather Outboard Motor Mount as well as the K&B Motor Mount and Hughey Outboard Motor Mount have slots in the mounts that allow this adjustment, however, this adjustment must be made and set before running the boat. I have read about some full-scale tunnel boats that have been equipped with movable plates that acted as air brakes somewhat like a flap on an airplane. One full-size tunnel I read about even had provisions for moving water ballast foward and aft to assist in balancing the boat. Although it might be possible to incorporate some or all of these functions into a model tunnel, it would take some pretty sophisticated engineering. The other problem that arises is trying to make adjustments to a model tunnel while actively engaged in competition. The driver of the full scale tunnel boat can dial in the adjustments he believes necessary as he flies the boat around the course. Trim changes can be made to improve the cornering or gain more speed down the straights.

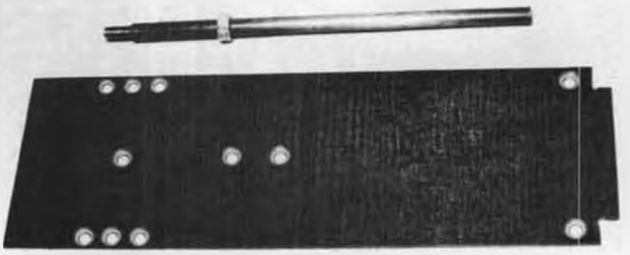
Trimming a model tunnel, however, is a compromise at best because the adjustments must be set prior to releasing the boat from the shore. Although I have seen a few model outboards with tilt motor mounts that could be adjusted by remote control, most of us are stuck with the preset adjustments once the boat is running and until it returns to the shore for possible changes in the trim. The bow wing has been found to be a successful method of assisting in the trimming of a model boat, because it gives an added trimming device. The main purpose of the bow wing is to provide added stability to the bow. I suppose the term "bow stabilizer" could be used. We have found that the bow wing, when properly set, will afford a little extra protection from "blow-over." "Blow-over" is a problem with a fast moving tunnel when it encounters a sudden gust of wind. The bow wing has allowed tunnels to fly with the bow higher and assisted in carrying the bow so the boat didn't bounce or porpoise.

I have seen a great variety of shapes used for this bow wing device, and all of them seemed to provide a method of deflecting the air. I have seen flat sheet type deflectors, concave shaped de-

Northern California 1980 OPC Championship Points winners (l to r): Nancy Miller, first; Dan Wells, second; Dave Grainger, third. Points totaled over 5-race circuit. (Selby photo).

Continued on page 75

Porsche 928 in 1/12 scale from Model Racing Products. Clean and nice body for GT racing.



Super light and strong graphite pan and axle for the JoMac Lightning 2000 car in 1/12 scale. Axle weighs about same as a pencil.

R/C AUTO NEWS

By DAN RUTHERFORD PHOTOS BY AUTHOR

Excuses, excuses . . . Yes, I know you must be waiting with car and tools in hand for the article(s) on setting up the Associated Team Nats car, figuring on getting that unfair advantage from these pages . . . but not this month. The (used to be) faithful camera is still in sick bay getting its internals sorted out. So you have to wait for the article, which is probably a lot easier than waiting for the repair bill for the camera, which is what I am doing.

TWEAK

Still, I kinda promised to go over tweak this month, so we'll wing it, all without pics and/or diagrams. I only ask that you do a couple of things. First, realize that getting the tweak just so is very important. Second, don't worry about the lack of diagrams and such as they generally confuse and there is always the off-chance that what I draw will get redrawn at **MB**'s office only with a mistake or two tossed in inadvertently. They are airplane guys, after all, and so not familiar with R/C cars. *(Until you've tried to eliminate front-end shimmy at 54-56 mph from a 1936 Cord, you ain't even* beginning *to learn about tweak! wcn)* Third, you probably ought to push from your mind previously heard descriptions of tweak, as I personally had three experienced racers explain it to me three *wrong* ways, back when first starting to race. Finally had to figure it out for myself, a process we will now try to relieve you of.

The effects of tweak are simple, as is the understanding of it, as well as its elimination. The effect of tweak is to cause an R/C car to turn one way better than the other, assuming that the car is set up with equal throw in the front wheels left to right, weight distribution is at least close to what the manufacturer suggests, etc. Rats, that's cheating, throwing in an "etc." or two, and I dislike it when others do it to me . . . let's just say that if your car is set up even reasonably close to factory specs and it turns better one way than the other, the turkey is tweaked. Let's also throw in that *all* R/C cars are tweaked when built. I have built a bunch and been around a couple of bunches more. I have never seen a new car come to the track that was not tweaked, even if only very slightly.

Tweak is nothing more than unequal weight loading on the front tires. That's

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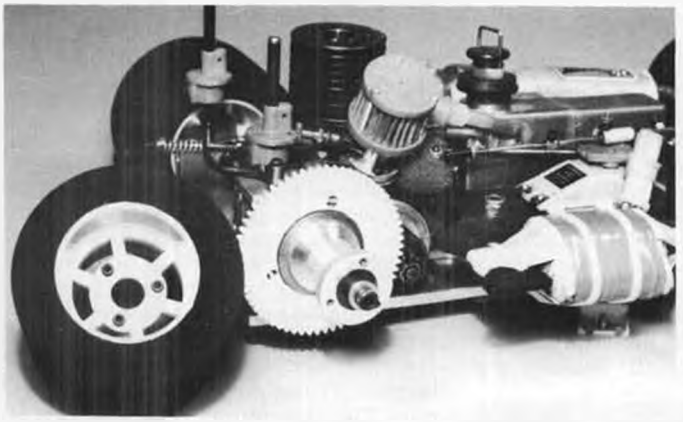
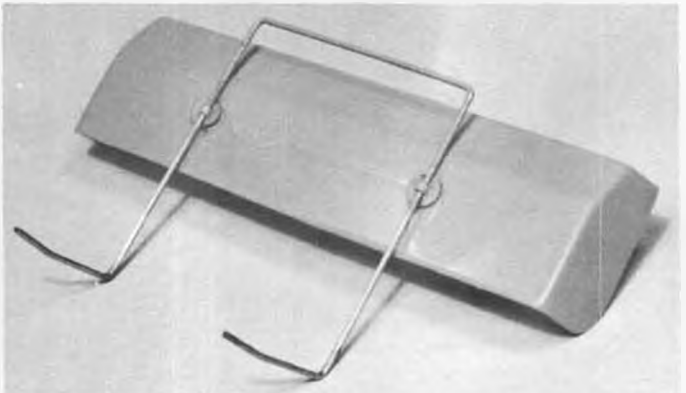


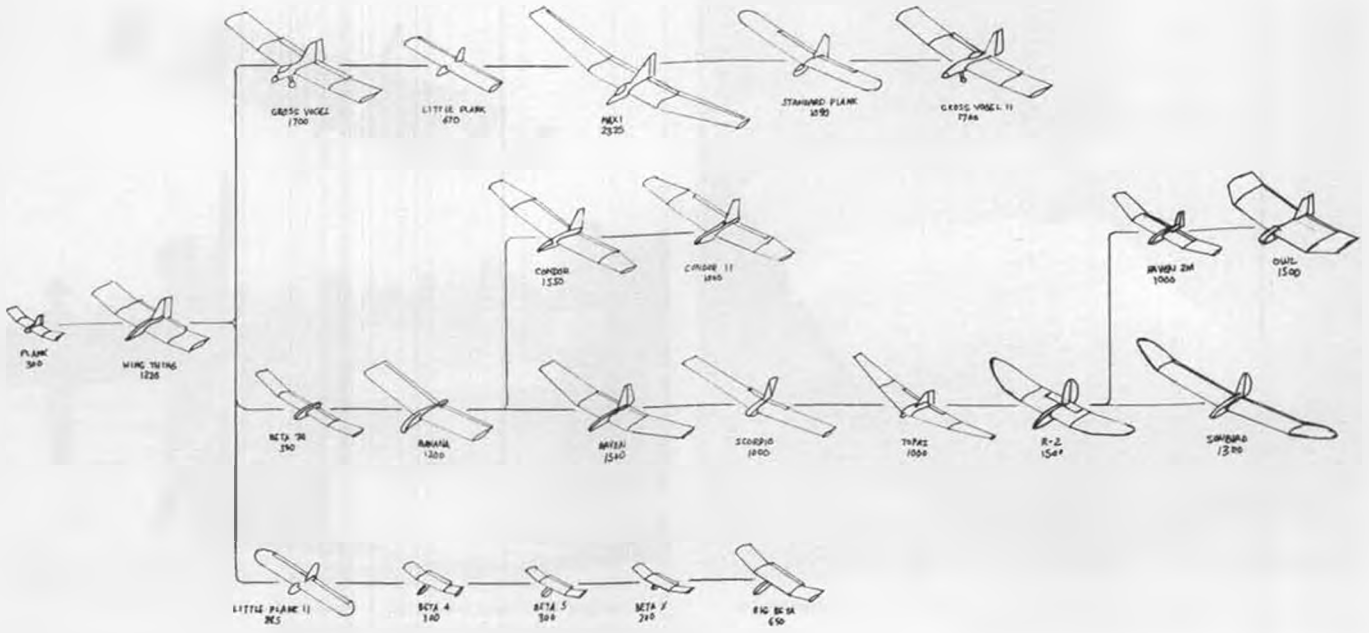
Thorpe diff, ball-type and designed for Associated RC300 car, 1/8 scale. Does the job and is strong.

This diff for 1/12 cars primarily intended for use on the MRP GP-12, but also fits many other cars.

Decal sheet for the off-road racers consists of many well-known off-road racing sponsors. Actually, it's mylar stick 'ems.



Adjustable wing and wing mount from Bolink, for 1/12 scale. Molded quite deep, it can be trimmed to get desired handling.

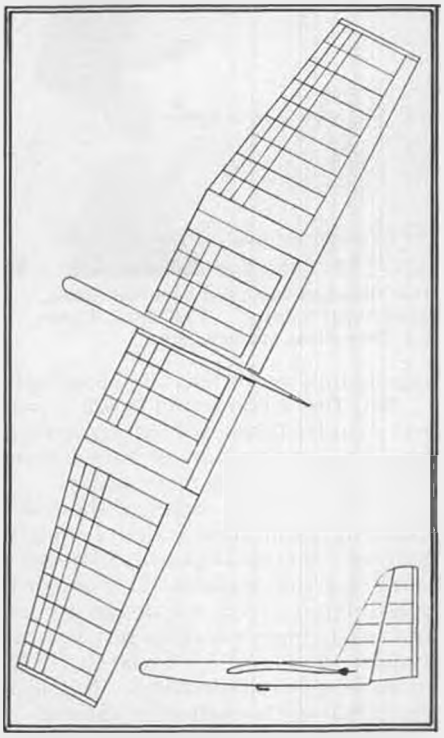


Geneology of tailless gliders and power models developed over a period of years by Dave Jones.

R/C SOARING

by Dr. LARRY FOGEL

• To the outsider, all R/C pilots look alike (looking skyward with transmitter in hand), but we know that ain't so. In fact, it's the diversity of personalities and interests that make this hobby/sport/craft so engaging. There are the eternal optimists who insist that their latest design will fly better in every way than anything that's ever flown before . . . in spite of the fact that each new design is a compromise . . . better in one way, at a cost in some other. Then there are the pessimists . . . but, let's not talk about them.



The 2-meter version of the Raven has 988 squares, weighs 26 to 34 ounces.

And there are those who focus on a particular aspect of R/C soaring. To illustrate, Dave Jones, of Torrance, California, has spent decades designing a succession of flying wing sailplanes. His aim has been to create a superior thermal machine. Hand-launched gliders and escapement movement single-channel R/C planes set the stage for the challenge posed by the flying wing configuration. A sequence of designs has helped him sort out the right combination of airfoil, aspect ratio, size, weight, and the other factors necessary for defeating conventional configuration gliders in thermal contests.

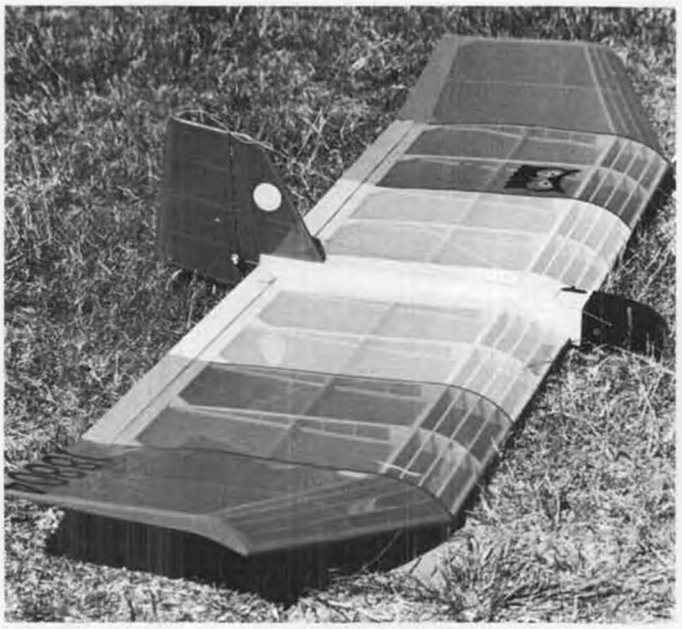
All this started with the 300-square-inch Plank that grew into the 1220 square inches "Wing Thing." He then tried different directions: the "Gross Vogel" ("large bird" in German) covered 1700 square inches, the Little Plank, and other designs. He produced the Beta-74 and the Little Plank II. The Banana was 80 inches in span, had a 15-inch chord, and used a 5.6% thick undercambered airfoil. The Condor was a 100-inch span, 1550-square-inch bird. The Owl was a two-meter flying cloud of Monokote.

His Plank-type Raven received considerable publicity in 1976. It's still a first class flying machine. I've owned and

Latest creation is the 1300 sq. in. Sunbird. Plans available. Two-piece wing.

enjoyed one of these. This 1500-square-inch wing is only slightly harder to build than the conventional sailplane. The R-2 is a 100-inch version of the Raven with slightly stronger construction and elliptical planform. It flies very well, but you need a very tight line on launch. Another version is the two-meter Raven-2M. Here is a fun ship with all of the Raven's good characteristics, but it's smaller and faster on the controls. Rick Pearson's first three flights on the prototype of this plane placed him third in a contest. Nowadays, there's a variety of Ravens floating around. For example, Brad Teeter, of Long Beach, used a flat-bottom airfoil and stretched the wing to 108 inches.

The Owl was an outgrowth of the



The Owl, a 2-meter design. Note wing rib construction. Appears to be extremely light. Photo by Jay Antognini.

Gordon Mathews launching a Raven, one of Dave Jones' more well known designs. Photo by Jay Antognini.

Raven designed especially for light wind conditions. The Sunbird is an offshoot designed for a much wider variety of winds. A high aspect ratio elevator is part of this three-meter span wing structure (made up of two 36-inch panels and two 22-inch elliptical tip panels). The prototype used two 3/16-inch diameter wing wires straight through the fuselage. A slight dihedral through the center results from slanting the receiving tubes in the wings. Most of the dihedral is between the main and tip panels. The mostly ply body is very strong. The rudder is shaped by wrapping layers of wet 1/16-inch balsa around a plywood form, holding this in place with tape until dry. Glue is added between the laminations, and the shape is retaped until dry. The result is very strong for its weight.

The wing has a standard "I-beam" spar with sheeted upper surface and a solid trailing edge. The tip panels are quite easy to build, continuing the same kind of construction. The bottom sheet is one-piece at the tip. The top is sheeted rib-to-rib to avoid requiring a compound curve. This makes the construction much easier, and the difference is hardly noticeable. The second prototype was built with tapered tips. The plans for this bird show both configurations. Naturally, you want to build light tip panels to improve the rudder sensitivity.

Dave developed a new wing section for this model . . . a modification of the one so successfully used on the Raven. "It uses the same camber but has a different thickness distribution that allows a flat-bottom for about 75% of the chord." There's a generous leading edge radius. The root chord is 12 inches. The aspect ratio 10.6 to one. There's room for three servos, since a speed brake can be of particular value on this kind of plane. The Sunbird launches high, and you can use full-up trim during the first part of the launch. The wing loading is five ounces per square foot, yet it can be flown over a wide range of speeds all the way from full-up elevator in the thermals to "flat out." Taking a vertical dive to get down quickly can be a dangerous maneuver. It's hard to see a low profile plane as it comes rushing toward you.

Properly balanced, the Sunbird is very stable. It has flown over three minutes with the transmitter sitting on the ground and has made a number of 40-minute flights (one with five or six different pilots at the stick). I recommend this flying wing to you if you want a new experience. In fact, I fully recommend all the flying wings offered by Western Plan Service, 5621 Michelle Dr., Torrance, CA 90503. Dave is a design engineer at North American Aviation Division of Rockwell International. He knows what he's doing, and he's willing to share his knowledge.

We've discussed some of his new design concepts, but rather than share these now, let me introduce a full-scale flying wing of the 21st century (as described in the February, 1981 issue of *Soaring*, the Journal of the Soaring Society of America). Here John McMaster tells how the Altostratus II won the World Championship. According to John, this isn't science fiction; it's merely a look into the expected future. Written in the first person, the author presents details on how this 25-meter flying wing performs. The cover of that issue of *Soaring* shows an artist's conception of what this plane might look like. Let this trigger your imagination!

By the way, while in Santa Monica the other day, I visited the headquarters of the Soaring Society of America. There, a very personable Cindy Brickner answered my questions directly and with considerable authority.

I asked, "Can you become an associate member of the SSA at less cost if you are only interested in R/C Soaring?"

Rick Norwood launching modified Raven, called Super Falcon . . . 137" span, 9% airfoil. Dave Jones sits on winch.

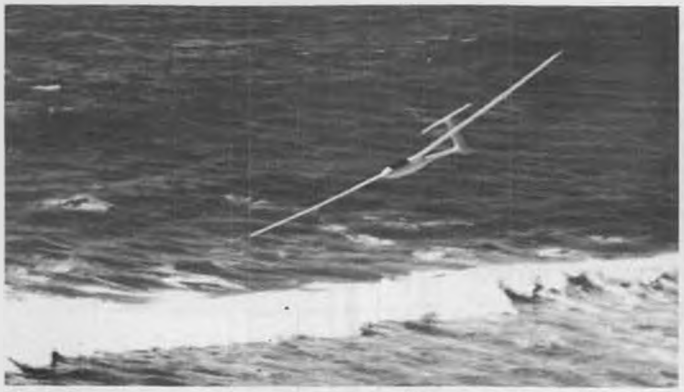
"No. The membership is $28 a year and includes 12 issues of *Soaring* and our *Handbook*, a *Directory* of the full-scale soaring sites and the membership."

She showed me copies of the SSA's quarterly publication called *Technical Soaring* that costs $12 a year. Some back issues are still available ($3 a copy). If you're interested in the design aspects of soaring, these will really turn you on. Volume V, Number 3, March, 1979, includes an article entitled, "Sailplane Performance Estimation." Volume V, Number 4, June, 1980, has an article entitled, "A Simplified Method of Airfoil

Scott Jenkins and his Hyper Locus, a very clean and fast machine. See more in text.

Dave Aniere and Bob Williams (right) holding twin Vipers (S-18's). Bob's design to be kitted by Dave.

The February 1981 cover painting by Jack Olson for "Soaring". Reproduced through courtesy of Soaring Society of America, Inc.



Hyper Locus sweeps low over the waves at Torrey Pines.

Hyper Locus and its shadow prepare to meet on the landing strip at Torrey Pines. Note slight curve in wings.

Design." Other articles in other issues deal with dynamic soaring. The SSA also offers a number of books on soaring . . . beautiful posters and a yearly calendar at reasonable prices. You'll receive a catalog of these items and further information if you send a stamped, self-addressed envelope to SSA, Box 66071, Los Angeles, CA 90066. At the end of our conversation, I asked Cindy why she's working for SSA. She quickly answered, "To support my habit of flying sailplanes."

★ ★ ★

First flights are always exciting . . . especially when the plane is really different. Remember Scott Jenkins, the specialist in high speed soaring? I described his Hyper-Locus in this column in the March, 1981 issue. Here's a plane that's obviously meant to go fast. The

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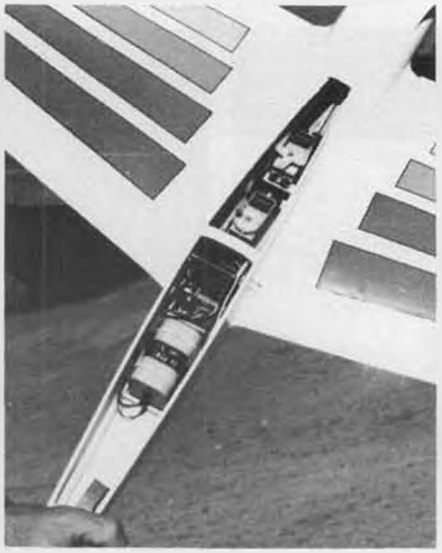
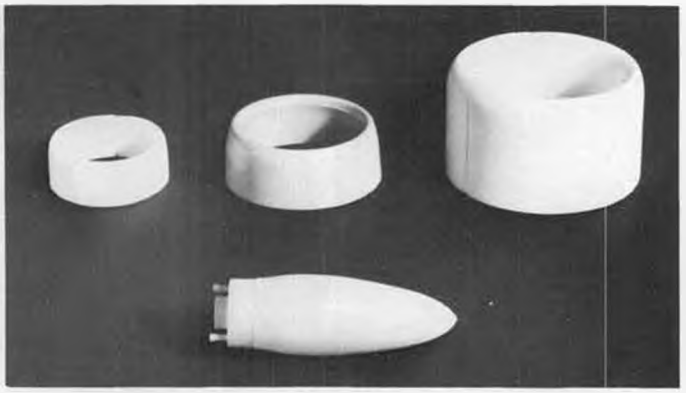


Snug but comfortable radio installation in S-18.

Larry Fogel behind Olympus 2 at Hourglass Field, San Diego. Photo by Pepper Kay.

Small Corsair by John Witemore, Connecticut Balsa Bugs VP, is powered by Tee Dee .09 with Davis Diesel conversion.



Accessory inlets and larger, 6 1/2 ounce fuel tank for RK-208 ducted fan all by Midwest Products Co.

Sport SCENE

By LARRY RENGER

• Thrust is what makes the models we fly move through the air. It overcomes the drag created by lifting the models and also the skin friction of the models' surfaces. Despite this prime relationship, you can't seem to get a handle on what the actual level of thrust is for a given engine, prop and model. Peter Chinn's engine test reports have been the engine lover's bible for all the time I can remember reading model magazines. Even he, however, gives power levels, not thrust. Naturally, in comparing engine to engine, he is doing exactly right, but for us poor designers of aircraft, that doesn't do much good.

As a rule of thumb, for example, it would be nice to be able to say that at 25 mph, the thrust of XYZ engine and QWR prop will be 1.2 pounds, which, therefore is the maximum weight you can allow a Pattern type aircraft to have for acceptable performance. Perhaps you could allow a sport model to weigh 25% more and a scale model to go to 2.5 lb. A better idea of the acceptable levels could be ascertained by review of successful models, if that pesky thrust information were available.

To the rescue! I dug through the pile of information I have, and came up with some rough figures for the static thrust of a variety of props; from the 3-inch dia. x 1.25-inch pitch prop for the Tee Dee .010 at 30,000 rpm (may it rest in peace) to a guess at an 11-inch dia. x 6-inch pitch for a competition Pattern .60 at 14,000 rpm. As a result of a mish-mash of theoretical and empirical finageling, I came up with a formula for

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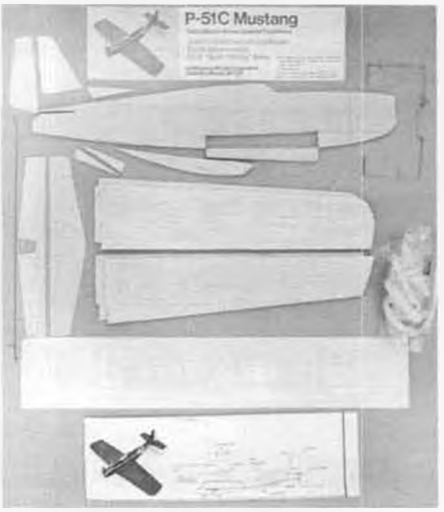
Tee Dee .049/.051 power pod still available from Rosie's R/C Products.



Profile P-51C Mustang ukie kit from Hobby Model Engineers, for .049 engines.

The Midwest Products Axiflo RK-20B ducted fan, for which the above accessories are available.

Latest version of the Goldberg "Skylark Jr." held by Bob Rich. Four channels of R/C and a .10 engine could make it a great performer.

FREE FLIGHT AND CONTROL LINE

One of first batch of F3F-2's that went to Navy squadron VF-6 aboard the USS Enterprise. Tail was true blue; fuselage band, cowl, and chevron were insignia red. Insignia is shooting star of VF-6. Photo supplied by Pete Westburg, to go with the scale views of this aircraft, 2nd part in this issue.

(See text for caption)

HANNAN'S HANGAR

"For every simple solution there are a number of complex problems."

• This month's aphorism, via Richard Miller, is by Lloyd Craine, and would seem to apply quite aptly to the entire realm of aerodynamics . . . model and full-scale.

FLY AWAY WITH ME

The delightful little pen and ink advertisement, from *Aircraft* magazine for May, 1911, caught our eye because of the little double-tailed variation of the Nieuport monoplane. It is, of course a close cousin to the Nieuport featured in our regular column logo. The caption of the advert reads thus:

He: Come dearest this is our chance. In an aeroplane we can't be overtaken.

She: Remember father's records.

He: (proudly) But my aeroplane is a *Nieuport* equipped with an *Anzani* motor.

She: Is that so! Then you are right as I know this machine equipped with the *Anzani* motor holds the World Record for speed with passenger. I have always trusted you, I have confidence in your machine. I am ready —

BOSTONIAN REFLECTIONS

A recent San Diego Scale Staffel contest, sponsored by **R/CMB's** own Walt Mooney, attracted some 32 entries. No big deal perhaps, except that this was just a short evening meet held in a small gymnasium with very little publicity. Yet, contestants drove from as far away as the Los Angeles area, about 130 miles distance. There must be some attraction!

The Bostonian concept, which as the name might indicate, originated on the east coast of the United States, has found enthusiastic reception in both Illinois and California. Promoted by Ed Whitten, of New York, the idea calling for 16-inch span rubber-powered models provides creative realism in contrast with the traditional pure duration types. Intended originally for indoor flying only, the modified rules west coast models are also flown outdoors.

During a recent Chicago event, Bill Gough, famous during the 1930's for his microfilm-covered flying scale Gee Bee, won with a "double bipe" (biplane wings *and* tail), and helped maintain the light-hearted Bostonian image by including a picture of himself in the cockpit as the pilot. Emblazoned on the fuselage side was the slogan "BEAT CHARLIE." The Charlie in question is Charles Sotich, all-around top-notch modeler and one of the sparkplugs of the Illinois Model Aero Club, who said: "I think it would be possible to guess who at least half of the Bostonian builders were just by looking at these models. It is interesting how many modelers get a recognizable style of designing, building and decorating their models."

Terry Mrakava, C.D. for the contest, described it as "clunky fun" and opined: "All of free flight should be. I think the trick is to keep yourself low-key and laughing. I've got 'serious' all day at work; that's enough for me."

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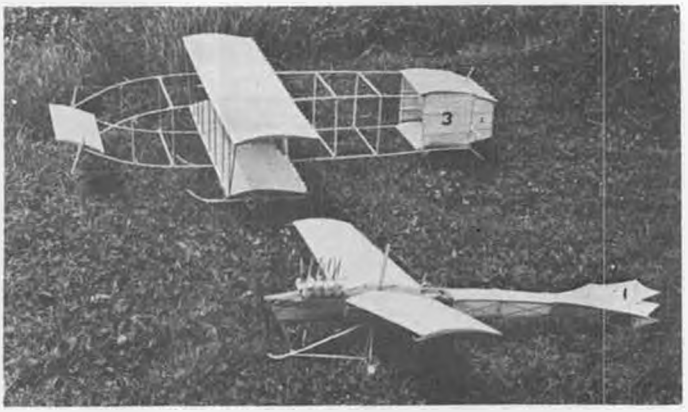
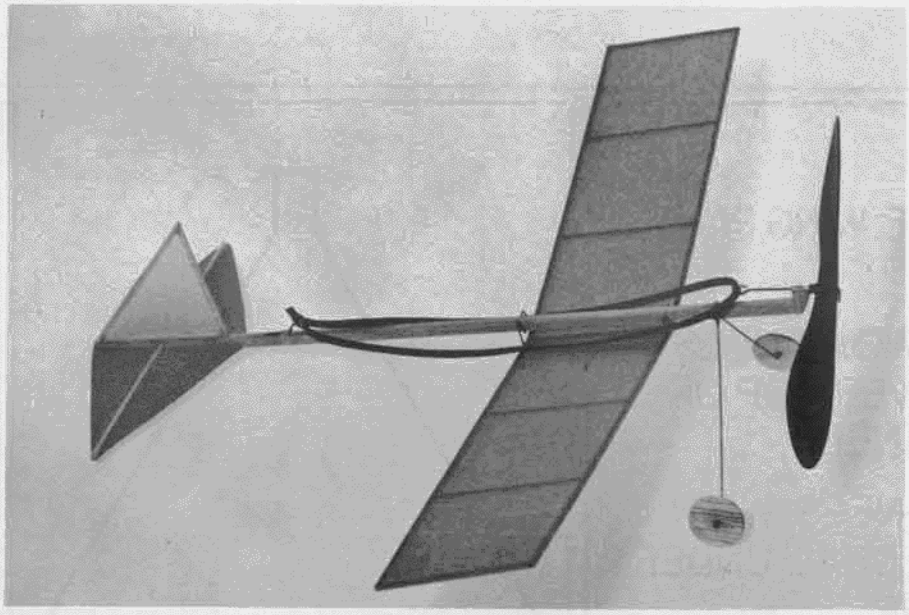
"Twin Plum", novel R/C design by Mr. Tate Bayashi, Japan, flies safely on one engine. Two .09 engines, 3-ch. radio. (Ichiro Yamada).



Static display Bristol Boxkite and Antoinette models by students of Dr. Piero Romagnano, teacher in Italy. He builds steam locomotives.



BABY R.O.G.

By JOHN WALKER . . . Most of today's "Senior" modelers should remember this one. It was the first flying model for many of us, and since it did such a good job of enticing newcomers into the hobby back then, why not now? A little wire bending by someone who knows how, and they should be on their way.

• They say you can't go back. That may be true with a lot of things, but not with model airplanes. You can enjoy them as much now as you did then. There were many pleasant memories brought to mind when the drawing for the BABY ROG was found drawn on the back of some old wallpaper. That's what we drew them on back in the 1930s. Where else could you get so much clean paper free? I'll take that back. If you delivered newspapers, you might have been able to con the pressroom foreman out of a few yards of newsprint.

The BABY ROG was part of the apprenticeship you served when you belonged to one of the clubs that made up the old Philadelphia Model Airplane Association. The first step was the "grease monkey." You had to construct the model (and that meant carving the prop), prove that you built it, and then get it to rise off the ground and fly a minimum of 30 seconds. It wasn't as easy as it sounds. Some of them just made the 30 seconds, while others flew much longer. I walked on air (pun intended) when mine flew for 48 seconds.

If I remember correctly, after you became a "grease monkey" you could fly in the Saturday contests in Philadelphia and compete against guys from the other clubs that made up PMAA. If you won, you could read about it in the next Saturday's *Evening Bulletin*. The paper had an entire page devoted to aviation in that issue, along with a Buck Rogers comic strip.

I often see a familiar name from that era in the present model press.

There was a kid who came to these weekly contests with a box full of model supplies that he sold to us kids from the "boonies." His name was Bernie Paul. Walt Schroder told me some time ago that he "thinks" he still has a small hobby business in Philadelphia under the title of B. Paul.

But enough of this information from the tree of useless knowledge.

BUILDING THE BABY ROG

The model was designed to fly indoors, but it's great to keep the kids or grandchildren occupied in the calm of summer evenings.

Select the wood carefully. Remove all "fuzzies" with fine abrasive paper. We used Ambroid to assemble the original model in the '30s, and it's still available. The plans are full size, and if you run them through a copy machine, both you and the kids can build one at the same time.

Construct two wing panels (only one-half of the wing is shown). Cover them. We used "banana oil" to adhere the tissue, but white glue thinned with water is much better and doesn't smell up the place. Glue the panels together, being sure you have included the proper dihedral.

Cut the motor stick (fuselage) to size and shape. Note the taper on the bottom rear. *On the tapered section* cut a notch as shown and cement the stabilizer spar into place. Be sure it is square. Cut the stabilizer tissue covering to outline shape and adhere it to the spar and motor stick. That's right. The bottom of the stabilizer is covered. Construct the rudder and glue it in position. It is covered only on one side.

Bend all of the wire parts to shape. Cement the rear hook in place. Using fine thread, carefully wrap the hook as shown on the plan. Be neat. Rub cement into the thread and hook.

The thrust bearing is made from 1/16 O.D. aluminum or brass tubing. Cement the bearing mount and tubing into place and carefully wrap with thread. Be sure it is well cemented into place. We made the thrust bearing on the original model by flattening a small finishing nail. *(Half of a cotter pin works well too. It's flat on one side. wcn)* The prop shaft hole was made using a section of the prop shaft wire as the drill.

Wheels can be made as shown or light plastic, commercially made wheels can be substituted.

You can carve the prop or use a plastic one. Just make sure the prop is balanced and rotates true.

Assemble the model and check for warps. When everything is OK, add a loop of rubber. If the model was built light, 1/16 thick rubber will be ample; otherwise, you will have to use 3/32 rubber. We put a few winds in the rubber before it was tied into a loop. This kept the rubber on the rear hook and prop shaft. Lubricate the rubber for best results and add a *small* drop of 3-in-1 oil to the washers on the thrust bearing.

Test glide the model. If it dives, move the wing forward. If it stalls, move it back. Use small movements until the model glides OK. Turns are accomplished by "washing-in" the wing tip opposite the direction you want the model to turn. "Wash-in" means that the wing tip is twisted (you have to "huff" your breath on the wing tip a few times to retain the twit) so the trailing edge is lower than the leading edge.

Put in 100 or so winds and let it take off. When the model flies like you want it to, grap the trusty winder and give it the "works." A minute and a half is the most I have seen these ROGs fly. •

ALL FLIGHT SURFACES 1/16 SQ. MED. HD. BALSA

NOTE-

ONLY ONE WING PANEL SHOWN.

MAKE TWO PANELS. ONLY COVER TOP OF EACH PANEL.

JOIN PANELS WITH 1 IN. DIHEDRAL UNDER EACH TIP.

TRIM TISSUE TO THIS OUTLINE

NOTE TAPER

1/16 O.D. x 1/8 LG. ALUM. TUBE WHEEL HUB.

LANDING GEAR .030 DIA. MUSIC WIRE

SMALL GLUE DROP

5 DIA. PECK PLASTIC PROP.

FRONT

REAR

WING CLIPS - .030 DIA. M.W.

BRASS WASHERS (2)

1/16 O.D. x 1/4 LG. ALUM. TUBE THRUST BEARING

POWER WITH ONE LOOP OF 1/16 OR 3/32 RUBBER

NOTCH FOR ELEVATOR SPAR

ONLY ONE SIDE OF RUDDER IS COVERED

NOTE TAPER

FRONT WING CLIP

REAR WING CLIP

1/8 x 3/16 x 15 LG. MED. HD. BALSA FUSELAGE

COVER ONLY BOTTOM OF ELEVATOR

WRAP WITH THREAD. GLUE WELL

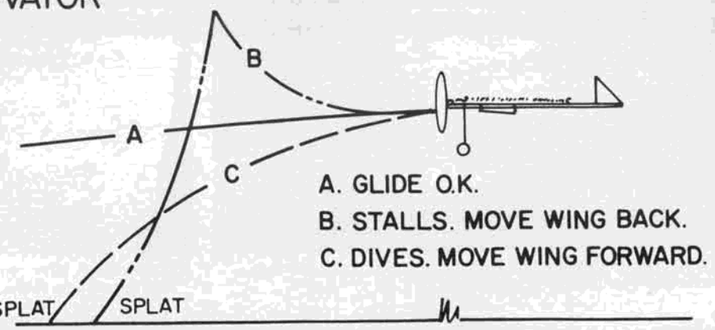
3/4 DIA x 1/16 THK. BALSA WHEELS

PROP HAD TO BE HAND CARVED ON 1938 MODEL.

BABY R.O.G.

(RISE OFF GROUND)

CIRCA 1938. MODEL HAD TO ROG AND FLY 30 SEC. MIN. FOR MODELER TO BECOME GREASE MONKEY IN PHILA. MOD. AIRPL. ASSOC.

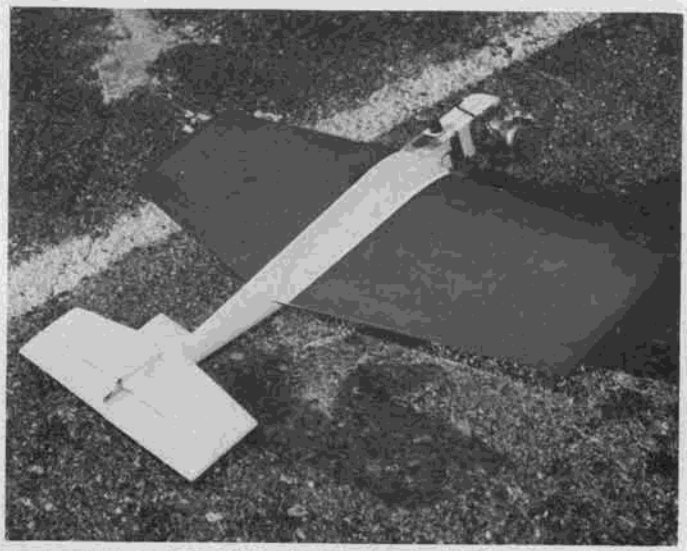


A. GLIDE O.K.

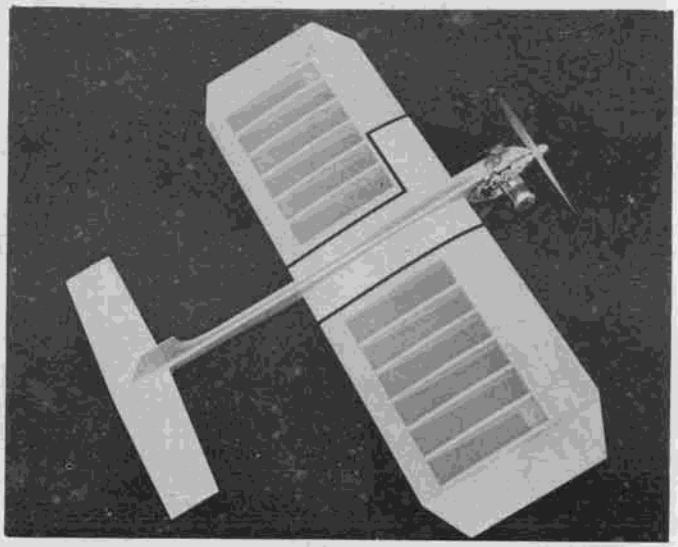
B. STALLS. MOVE WING BACK.

C. DIVES. MOVE WING FORWARD.

JRW 1-81



Texas style Slow Rat, inboard tank, primer to exhaust port. Pitting procedure includes pouring cup of water on head!



Steve DeBord's OS powered AMA Slow Rat. He's from El Cajon, CA. Built first racing and speed models from photos in Model Builder!

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY CHARLIE JOHNSON

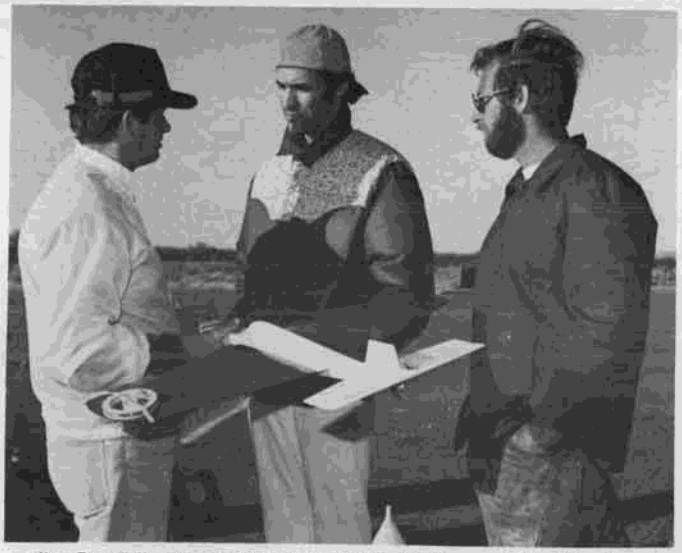
• First thing up this month is that the fellow sometimes known to pass himself off as Dirty Dan, with myself doing the opposite just to keep things interesting, none other than Rich von Lopez, passes along the word that he and Steve Hills will be Contest Directors for Small-Bore Combat at this year's AMA Nationals. Junior, Senior and Open members will fly in one combined class, so you youngsters better be prepared to really get it on. The SBC event will take place Thursday, right after Jr./Sr. AMA Combat. A system of double elimination will be used, other than that and engine size, consider AMA Combat rules to be in effect. Lines required are .012 diameter by 35 feet only, motors can be .049 or .051. Entry fee will be only $3, any profits will go to the FAI Combat Team Fund. Even though not official at this writing, Rich is working on having Cox Hobbies sponsor the event and knowing that they have done so in the past, plus the persuasiveness of Rich when promoting Combat, expect the trophies and prizes to be supplied by Cox.

MOTORS FOR SMALL-BORE COMBAT

The mention in Rich's announcement of allowing .051 engines in SBC reminds me that, as far as I know, there is really no reason to switch over to the slightly larger .051s, assuming you are already using decent running TD .049 motors. You see, the .051 version of the screamer of 1/2A motors was not developed to give the fliers a slightly more powerful powerplant. Instead, it was released as an engine that would give the F/F guys a chance to compete in two classes of competition, using the same model. At a F/F contest it is possible to put in all your flights with a 1/2A model, powered by a TD .049, then simply switch engines, dropping in an .051, and fly in Class A. And if you know anything at all about high-performance F/F models, you already realize that the trim is quite delicate and so about the last thing needed is more (or less) power to screw up the trim settings. So the idea with the .051 is to offer a legal Class A size motor, delivering the same power as an .049.

Have you ever noticed that very small ring that is cut into the piston skirt on .051 pistons? Looks like an "oiler" groove, except that it is way too low to

Tom Zon, Gordon Delaney, and Pat Wilcox (l to r) during break in Buckeye combat action.



Jim Ong tells all to Jed Kusik and Stan McCarver. "Use 5% nitro, put the prop on backwards if it pulls too hard, and wear hip boots."

George Cleveland adjusts Dick Stubblefield's needle valve during Rat Race at Buckeye . . . or maybe there was a screw loose.

"Gee, Richard, FAI Team Race is fun! Think officials will notice I'm whipping a little? Jim Ong thinks I'll land at his feet. Hah!

serve that purpose. My understanding is that the groove is there only to offset that advantage of the slightly larger bore and consequently larger displacement. Cox actually wants the .051 to give the same power as the .049, this groove effectively detuning the motor very slightly.

Of course anybody who has played much with handfuls of TD engines knows the variations in power from one example to the next, and these variations would seem to me to offset the detuning of the .051, making the chances of buying a matched (in power) set of .049 and .051 engines a very chancy thing at best.

Still, the point is that if you have strong .049 engines, don't go out and buy .051s or the .051 piston/cylinder sets. You won't come up with more power, instead will just complicate your spare parts situation. Inadvertently slipping an .049 piston into an .051 cylinder will happen sooner or later. . .

As long as we have started talking about TD motors and SBC, it seems appropriate to mention a few things about the care and feeding of the little beasties. First, if you want to save money and yet be fast, the best approach is to just buy your TDs from Joe Klause at Kustom Kraftsmanship, a regular advertiser here in **RCMB's** pages, also the guy who handles the "Fuel Lines" column, by the way. Yes, motors from Joe do cost more than off-the-shelf stockers, but having been down the road leading to getting honkin' 1/2A Combat motors, I can tell you that by the time you get there, you will have spent quite a few dollars on parts alone, not to mention the time involved . . . time better spent building new models or even just tying up lines. Trust me, let Joe do your engines; you just build and fly, it really is cheaper that way. 'Course, you can fly stock engines, nothing very wrong with that.

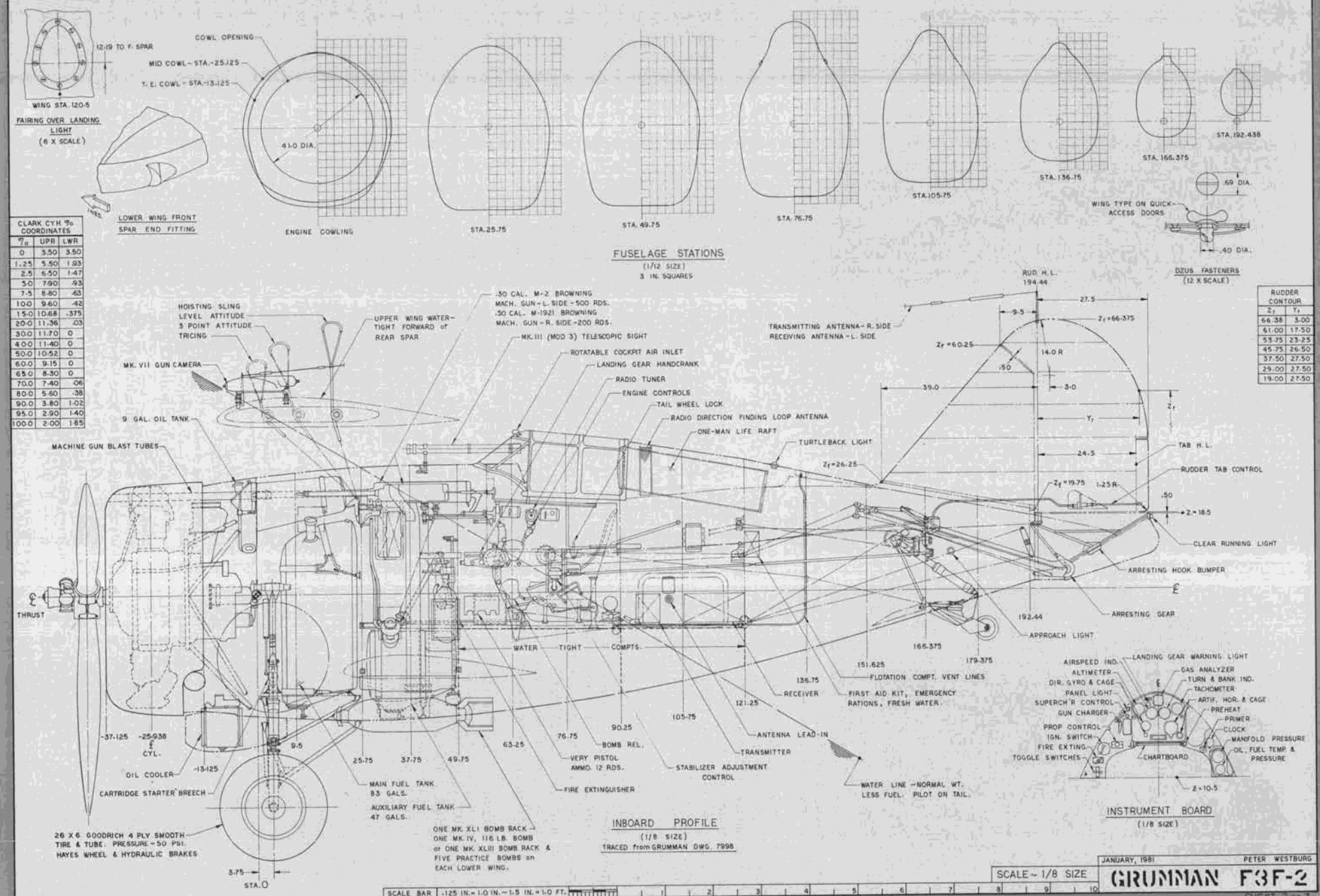
As a starter, let's assume you are going to fly stock engines. First, read the instructions that Cox furnishes with the engine. These instructions are pretty general, but at least don't tell you to do anything that will smoke your new screamer. The part that you really need to remember from the instructions is the slow break-in . . . or at least it seems slow for engines that can generally be run quite hard right out of the box. But that initial hard running can often lead to a short life for the motor, so do give the engine a few two or three-minute runs at a slightly rich needle setting. I generally do this with the motor already mounted on a model, holding the model for the required time. You need ear protection, of course, as this puts you pretty close to the dB generator, but also means that you can monitor the needle setting easily. For the first run, I like to have the setting so that the motor is running fast, just on the rich side. Seems hard to explain via this typer but the motor should be hitting every beat, as opposed to four-stroking. You just don't want to lean it down to running at full rpm. Between runs, the motor is allowed to cool, and with each run, the needle is bumped a little bit leaner. About the time you get tired of holding the model and playing with the needle, wanting instead to fly, the motor should be ready to go.

For the first flight, leave the extra head gaskets in place and be sure the motor is set off on the rich side. Normally, things will lean out after launch, and if the motor is set at peak rpm on the ground it will go real lean in the air. Avoiding over-lean runs with a TD is important enough that you should at least seriously consider bellying-in the model, even if it might break. Easiest way to do this seems to be to just get real low, pull full up and hope the bottom of one of the loops sees the model just touching down enough to kill the engine. If your new engine is on an equally new model, and this piece turns out to be warped enough that it turns on you after a couple of loops . . . well, that is simply your punishment for having new everything. . .

At this first flying session, don't put up too many flights, as it is time to tear the motor down to tighten that problem-causing socket in the ball/socket joint. Your local shop ought to have a specially designed tool made just for this job, otherwise order one from Kustom Kraftsmanship. Don't forget to do this. Ignoring the fit of the ball/socket joint will cause just as many problems as getting huge chunks of dirt in the motor. Having flown a lot of SBC myself, I pass this tip on from personal experience, having had almost as much trouble with breaking pistons as with breaking cranks. And it is suspected that an excessively loose ball/socket joint contributed greatly to most of the popped cranks.

Guess I forgot to mention fuel and props. For that whirring thing that goes up front, I like the Top Flite 5-1/4x3 props, either nylon or maple, with the nylon being a lot tougher, but the wood props being better performers in the air. The nylon version may be quite scarce, but worth looking for. As this size is a little small for normal sport flying, it is about right for break-in, which is handy. The pros in 1/2A flying usually will tell you to use a mild fuel, like 15% nitro, for break-in. I agree, but I just don't do it. I figure that as long as I am standing there

Continued on page 68


WING STA. 120-5
12-19 TO F. SPAR
FAIRING OVER LANDING LIGHT (6 X SCALE)
COWL OPENING
MID COWL - STA. -25.125
T. E. COWL - STA. -13.125
41-0 DIA.
ENGINE COWLING
STA. 25.75
STA. 49.75
STA. 76.75
STA. 105.75
STA. 136.75
STA. 166.375
STA. 192.438
.69 DIA.
WING TYPE ON QUICK-ACCESS DOORS
.40 DIA.
DZUS FASTENERS (12 X SCALE)
LOWER WING FRONT SPAR END FITTING
FUSELAGE STATIONS (1/12 SIZE) 3 IN. SQUARES
CLARK CYH % COORDINATES
% UPR LWR
0 3.50 3.50
1.25 5.50 1.93
2.5 6.50 1.47
5.0 7.90 .93
7.5 8.80 .63
10.0 9.60 .42
15.0 10.68 .375
20.0 11.36 .03
30.0 11.70 0
40.0 11.40 0
50.0 10.52 0
60.0 9.15 0
65.0 8.30 0
70.0 7.40 .06
80.0 5.60 .38
90.0 3.80 1.02
95.0 2.90 1.40
100.0 2.00 1.85
RUDDER CONTOUR
Zr Yr
66.38 3.00
61.00 17.50
53.75 23.25
45.75 26.50
37.50 27.50
29.00 27.50
19.00 27.50
HOISTING SLING LEVEL ATTITUDE 3 POINT ATTITUDE TRICING
MK. VII GUN CAMERA
9 GAL. OIL TANK
MACHINE GUN BLAST TUBES
UPPER WING WATER-TIGHT FORWARD of REAR SPAR
.30 CAL. M-2 BROWNING MACH. GUN - L. SIDE - 500 RDS.
.50 CAL. M-1921 BROWNING MACH. GUN - R. SIDE - 200 RDS.
MK. III (MOD 3) TELESCOPIC SIGHT
ROTATABLE COCKPIT AIR INLET
LANDING GEAR HANDCRANK
RADIO TUNER
ENGINE CONTROLS
TAIL WHEEL LOCK
RADIO DIRECTION FINDING LOOP ANTENNA
ONE-MAN LIFE RAFT
TURTLEBACK LIGHT
TRANSMITTING ANTENNA - R. SIDE
RECEIVING ANTENNA - L. SIDE
RUD. H. L. 194.44
27.5
9.5
Zr = 66.375
Zr = 60.25
14.0 R
.50
39.0
3.0
Yr
Zr
24.5
TAB H. L.
RUDDER TAB CONTROL
Zr = 26.25
Zr = 19.75
1.25 R
.50
Z = 18.5
CLEAR RUNNING LIGHT
ARRESTING HOOK BUMPER
ARRESTING GEAR
APPROACH LIGHT
192.44
166.375
179.375
151.625
136.75
121.25
105.75
90.25
76.75
63.25
49.75
37.75
25.75
9.5
-13.125
-25.938 ℄ CYL.
-37.125
THRUST
WATER TIGHT COMPTS.
FLOTATION COMPT. VENT LINES
FIRST AID KIT, EMERGENCY RATIONS, FRESH WATER.
RECEIVER
ANTENNA LEAD-IN
TRANSMITTER
STABILIZER ADJUSTMENT CONTROL
BOMB REL.
VERY PISTOL AMMO. 12 RDS.
FIRE EXTINGUISHER
WATER LINE - NORMAL WT. LESS FUEL. PILOT ON TAIL.
OIL COOLER
CARTRIDGE STARTER BREECH
MAIN FUEL TANK 83 GALS.
AUXILIARY FUEL TANK 47 GALS.
ONE MK. XLI BOMB RACK - ONE MK. IV, 116 LB. BOMB or ONE MK. XLIII BOMB RACK & FIVE PRACTICE BOMBS on EACH LOWER WING.
26 X 6 GOODRICH 4 PLY SMOOTH TIRE & TUBE. PRESSURE - 50 PSI.
HAYES WHEEL & HYDRAULIC BRAKES
3.75
STA. 0
INBOARD PROFILE (1/8 SIZE) TRACED from GRUMMAN DWG. 7998
AIRSPEED IND.
ALTIMETER
DIR. GYRO & CAGE
PANEL LIGHT
SUPERCH'R CONTROL
GUN CHARGER
PROP CONTROL
IGN. SWITCH
FIRE EXTING.
TOGGLE SWITCHES
LANDING GEAR WARNING LIGHT
GAS ANALYZER
TURN & BANK IND.
TACHOMETER
ARTIF. HOR. & CAGE
PREHEAT
PRIMER
CLOCK
MANIFOLD PRESSURE
OIL, FUEL TEMP. & PRESSURE
CHARTBOARD
Z = 10.5
INSTRUMENT BOARD (1/8 SIZE)
SCALE BAR .125 IN. = 1.0 IN. - 1.5 IN. = 1.0 FT.
SCALE - 1/8 SIZE
JANUARY, 1981
PETER WESTBURG
GRUMMAN F3F-2
SHEET 2 OF 3
ORIGINAL DWG. SIZE - 28 X 40-5

Factory scene shows many F3F-2's under construction. Airplanes in foreground went to Marine squadron VMF-1. Grumman photo.

GRUMMAN F3F-2

PART TWO

By PETER WESTBURG

The detail design of the F3F series was much the same as the design of the F2F with fabric covered, aluminum frame wings, rudder, and elevators. The fuselage was aluminum monocoque with skins wrapped around each pair of closely spaced frames and shingled aft. The construction was robust, prompting Navy pilots to refer to the Grumman Aircraft Engineering Corp. as the "Grumman Iron Works."

There was to be one more Grumman biplane, but it never materialized. As early as 1935, while the XF3F-1 was being tested, the Navy let two design study contracts for a new carrier-based fighter. Grumman and Brewster were selected. The Brewster entry was the XF2A Buffalo monoplane; the Grumman was the XF4F-1, originally conceived as a small biplane . . . a backup in case the monoplane didn't work out.

But the monoplane won and Brewster was given a contract in 1936. After four years of testing and evaluation, it began to replace F2F's and F3F's on the carriers. Leroy Grumman, seeing the writing on the wall, changed the design of the XF4F to a monoplane, and the famous WW-II Navy fighter was born. Though a totally different airplane from its predecessors, it retained the same retracting landing gear and shingled fuselage skins.

F3F's were flown by Navy squadrons until June of 1941; the Marines keeping theirs until October, a bare two months before Pearl Harbor. The stubby Grumman biplanes then went to training squadrons where rookie pilots and Navy mechanics systematically reduced them to scrap. The last Grumman biplane on the Navy roster was an F3F-2, s/n 0983, stricken in November of 1943.

The film "Flight Command" starring Robert Taylor, Walter Pidgeon, Red Skelton, and a Grumman F3F-2 from a fictitious Navy squadron, VF-8, made its appearance in 1940. From some unknown reason, the airplane was made

Continued on page 101

Landing gear design same as F2F. Cylinder and rod ahead of elbow is an air dampener to let the gear down easy. Grumman photo.

Spring loaded flaps on tail cone covered arresting gear hook. Hard rubber bumper inside flaps. (Walt Stampfli collection).

Canny Canard sport model designed by H.A. Thomas for M.A.N. Sheet fuselage modified to built-up by Mark Fineman, Hamden, CT.

XP-55 by Mark Fineman was built from enlarged Earl Stahl version featured in Flightmasters' newsletter.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• Building fuselages can be, and usually is, the most fun in model building. However, many do not go together without a few frustrating moments. In order to help you eliminate some pitfalls, here are hints, and some techniques that I use during fuselage construction.

Since the majority of fuselage structures involve the building of two sides, I'll discuss this type of construction rather than the half-shell method. These hints apply regardless if you are building from scratch or from a kit.

The first step to successful fuselage building is the selection of wood used for the longerons. I spend quite a bit of time trying to match the upper and lower longeron material. This is important, because if one is firmer than the other, the degree of bend will not be uniform. This can create a banana-shaped fuselage. If the fuselage length is such that one normal 36-inch balsa stick can be cut in half, I'll use one-half for one upper longeron, and the other half for the other upper longeron. Same for the lower longerons. I mark them so that I do not end up using them for something else.

Most fuselage side structures have some straight lines to them, especially the top longeron. Wherever these occur, I pin down a thick straight edge on the plan, then the longeron is pinned against the straight edge. This way, the longeron *has* to be straight. Sometimes plans shrink or get slightly distorted, leaving a wavy line that is not detectable unless a straight edge is placed on it.

Once the first side has been constructed, the second one is built directly over the first, assuring two identical sides. The neophyte modeler might be concerned about permanently gluing one side to the other. If proper gluing is followed . . . that is, simply use enough glue for the joint and no more . . . you should not encounter any difficulty.

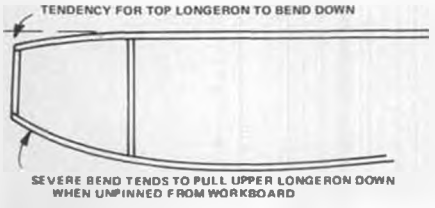
Before unpinning the two sides from the workboard, on a rubber model, I mark the location of the motor peg by driving a pin through the appropriate vertical member. Then the sides are unpinned and removed from the workboard. At this point, I check to see if, in fact, both sides are identical. If there are any irregularities, I sand them out with a sanding block, both sides being sanded uniformly. Next I smear some Super Jet on the area where the motor peg will go, then drill the proper size hole using a drill press (the Jet keeps the wood from splitting). If you are building a gas model with plug-in wings, this is the time to drill the holes for tubing, etc., so that the location will be exactly the same on both fuselage sides. At this point, the fuselage sides are ready for parting. This is easily done with half of a single edge razor blade, one end broken into a point, and sliding it carefully between the longerons. I start at the front and work back, leaving the tail post attached.

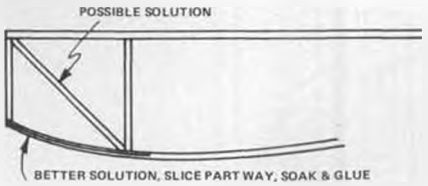
I like to start the framing by gluing the forward most cross-members in place. I then pin the fuselage flat on the workboard with a right triangle butted against the side. This assures a perfectly square

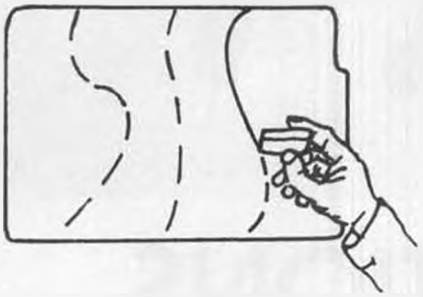
C.P. Woodward's 1-1/4-inch scale Monocoupe heading skyward on rubber power.

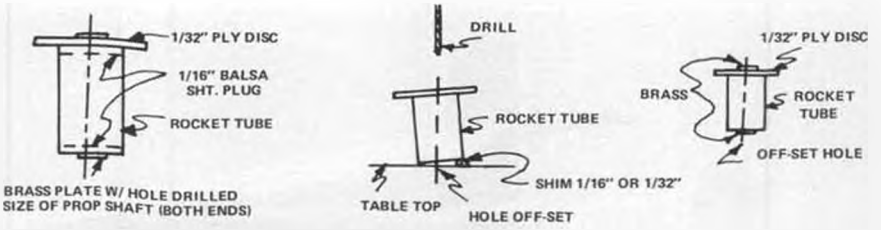
C.P. (Jim) Woodward's 18-inch span HE-46 on his solo winding stooge. He's from Canada.

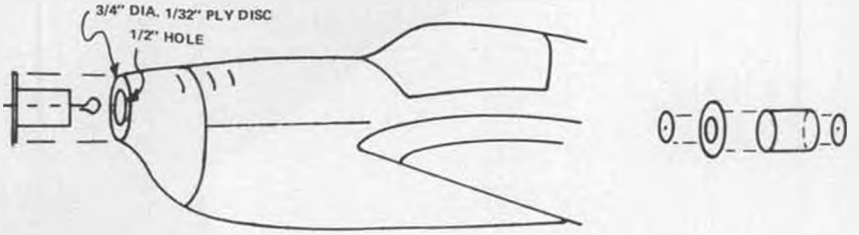
Jim Woodward's Monocoupe at rest. Really looks sharp. All Woodward photos taken by wife, Dorothy. Very nice shooting!

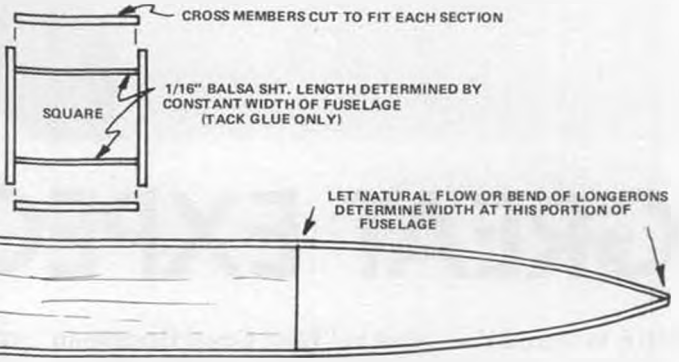


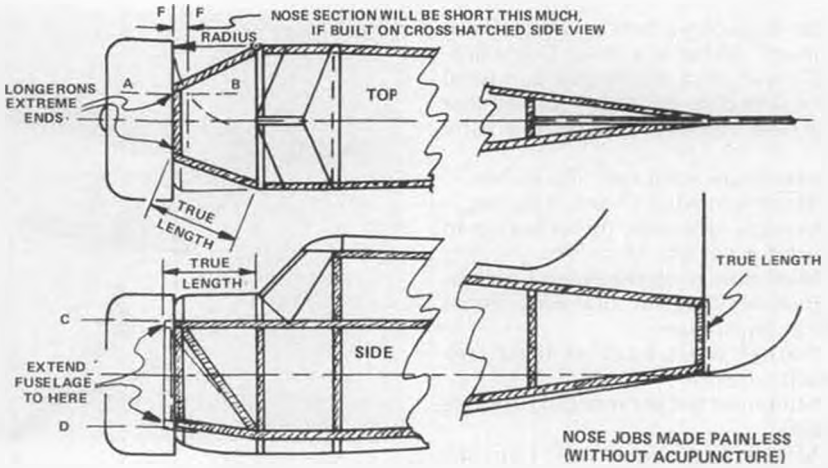












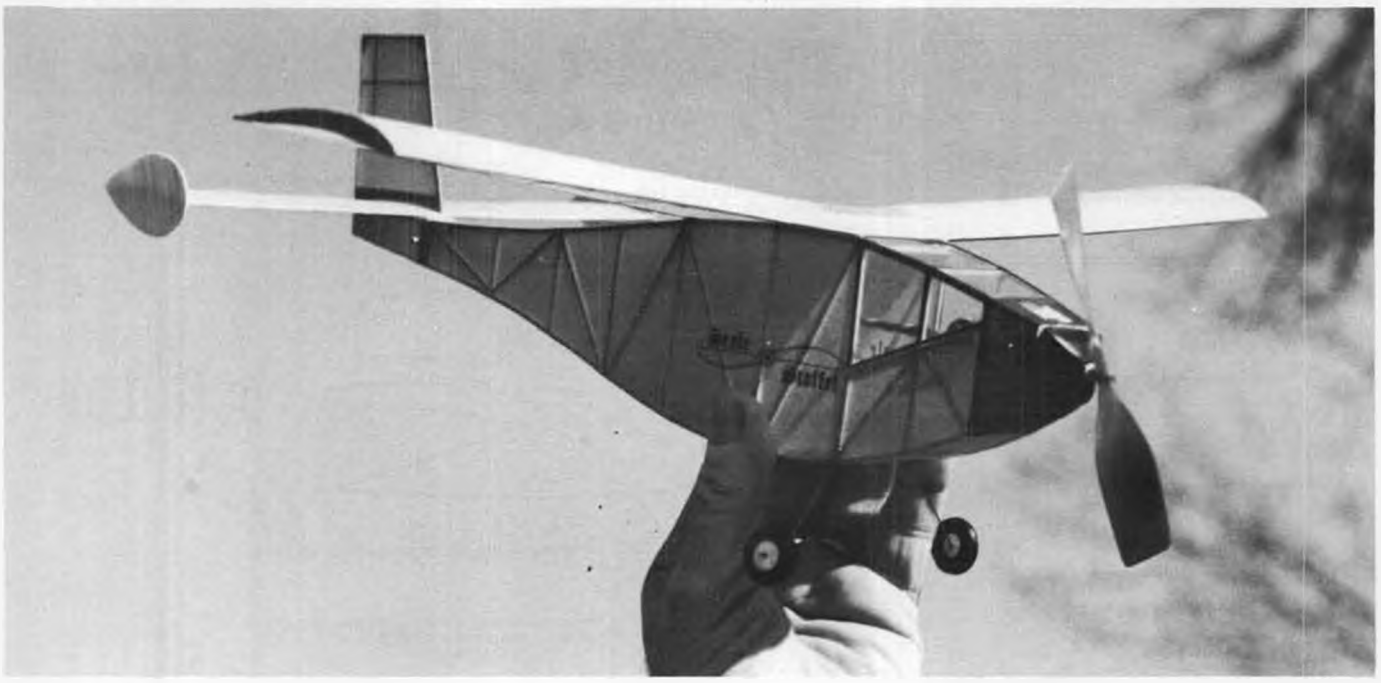
structure. When this dries, the other cross-members are added, and after every third or fourth member added, pin the fuselage down and check for alignment using the right triangle. At this time, the tail post is separated, and sanded so the thickness of the two tail post equals that of the rudder post.

When completed, the fuselage should be perfectly square. Sometimes I'll find the tail post, or more correctly the rear part of the fuselage, twisted. This causes the tail post to lean to one side. Needless to say, this is most annoying. The unequal stresses in the longerons causes this to happen. Fortunately, the remedy is an easy one. When this happens, I take a spray bottle of Windex, (Windex contains ammonia, and works well for bending balsa), and spray the rearward part of the fuselage. I then pin the fuselage (usually upside down) to the workboard, and prop the right triangle against the tail post until dry. This takes care of the distortion.

One other frustration that I have learned to overcome, is one that occurs when more than half of the cross-members are all the same width. For some inexplicable reason, I find that the sides of the fuselage do not appear to be perfectly parallel as they should. This really aggravates me, and this is after cutting every cross-member in a fixture to assure each one the same length. To overcome this, I take balsa sheet and strip it to the same width as the cross-members (see sketch). Two of these sheets are tack glued as shown, then the cross-members are cut to fit, between the longerons. When the cross-members have dried, the balsa sheets are carefully removed, leaving the desired

Continued on page 78

Jumbo scale (36-inch) Burnelli Transport based on early '30's plan by Bill Winter. Not yet flown as of late March. Maybe by now . . .



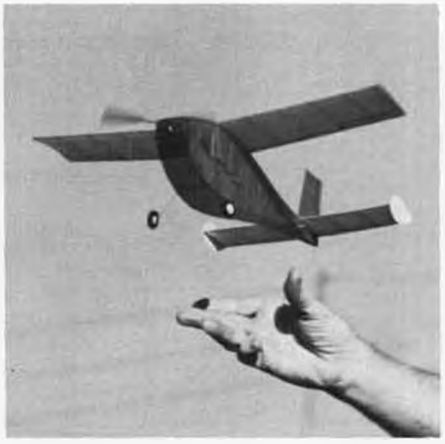
GREAT EXPECTATIONS

By ERNIE WRISLEY . . . Call it "West Coast Bostonian", call it "Mooney Bostonian", or whatever. It's still a cute little bird that does well in every contest it enters, and it goes together easily.

• Great Expectations is a "West Coast Bostonian." What is a West Coast Bostonian? Well, it's a simple little gumband event cooked up by Walt Mooney that can be held indoors or out. Here are the rules:

1. Maximum wing span, 16 inches.
2. Maximum wing chord, 3 inches.
3. Maximum length, thrust button to furtherest point aft, 14 inches.
4. Maximum prop diameter, 6 inches.
5. Biplanes OK, but total wing area is 48 sq. in. maximum.
6. Model must have at least two 3/4-inch wheels.
7. Minimum weight without rubber is 14 grams.
8. Model must have at least 1 sq. inch of windshield forward and the same amount of side window area on each side. Biplanes with cockpit must have 1 sq. in. windshield only.
9. Model must be designed so as to contain an imaginery cargo box 1-1/2x 2-1/2x3 inches.
10. The model must R.O.G. from the same position it comes to rest in when it is hand launched from a height of 5 feet. In other words, if you elect to build a short-coupled flimsy gear, and the plane tips up on one wing, that is the position you must R.O.G. from for your official flights!

This model fits both these rules and Embroyo too. The design came into being in March 1980. I got the name from the rather pregnant shape of the fuselage! At Walt Mooney's first Bostonian West contest, it placed 2nd indoors with a flight of 47 seconds. Next came the Flitemasters semi-annual, where G.E. placed first in Embroyo, outdoors. At the Scale Staffel Annual outdoor meet we again placed first in Embryo. On July 4th, at The Scale Staffel's Bostonian contest, the model's first flight was over 5 minutes! This flight was disqualified as the model did not have an American flag displayed on her hull! Quickly, I stuck a postage stamp on her snout, and just as promptly, lost the model O.O.S.! That one "airmail" flight netted me 3rd place. A new version was built and loaned to my son Randy for the Flitemasters West team challenge. Even my R/C oriented kid managed to place 2nd! The model is fast building, and its record proves its good flying, too. Just follow the simple directions and in a few days you can be flying yours!



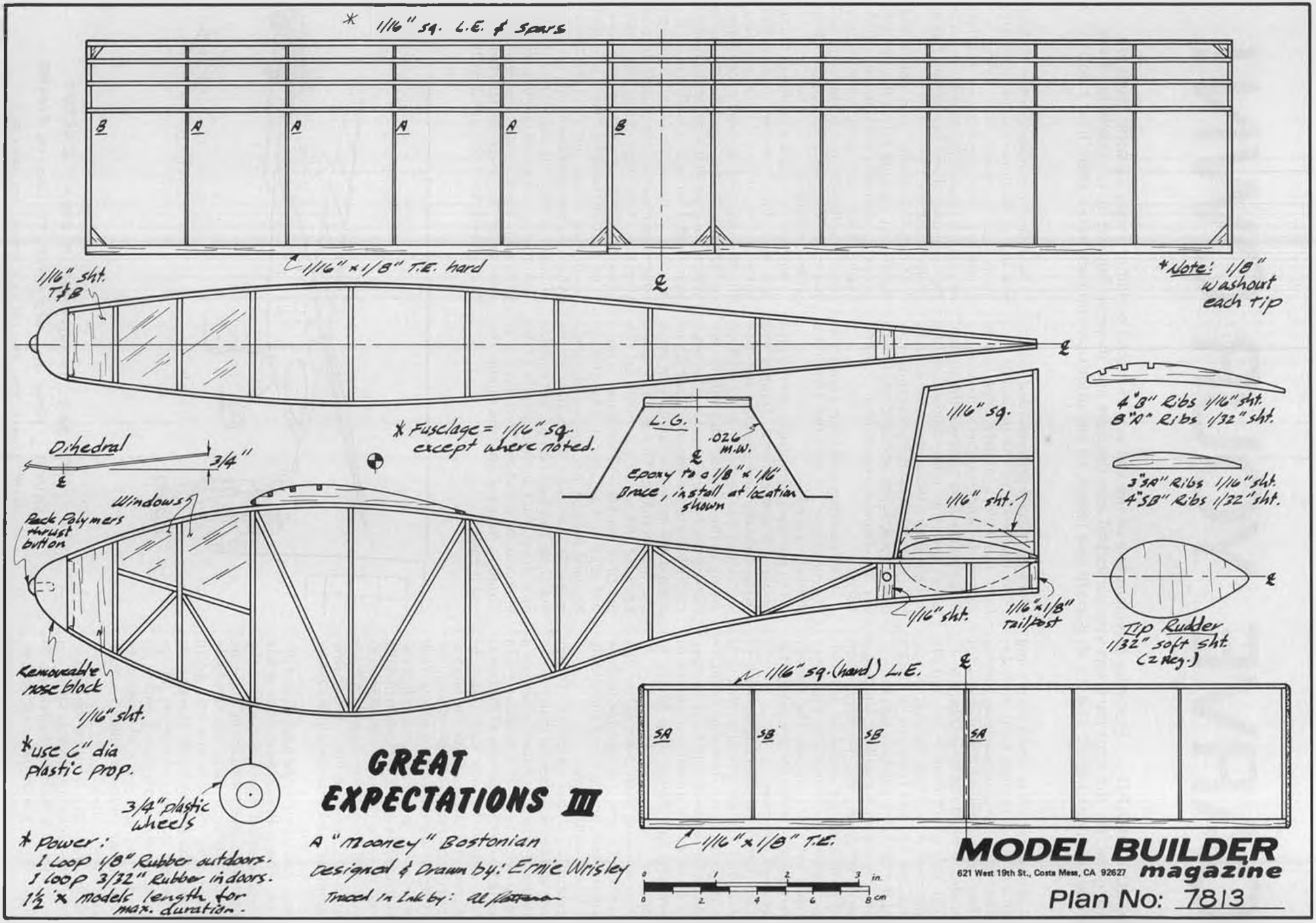
CONSTRUCTION

Start with the fuselage. Select flexible 1/16 square for the longerons. I didn't find it necessary to soak mine before bending, but it can be done. Build one side on top of the other to insure uniformity. Install the uprights, following the wood sizes indicated on the plan. Once the structure is dry, remove it from the board and separate the sides down to the tail-post. Leave it glued together to help keep things aligned. Cement the cross-braces in, starting at the station under the wing's T.E. Next glue the cross-brace in at the wing's L.E. Pull the nose in and cement the 1/16 sheet in place, top and bottom. When the fuselage is square, add the remaining pieces. Bend up the landing gear and thread wrap it to the landing gear brace. Epoxy the unit in place, as it will take some abuse. The nose block must be fitted carefully. Indoors, the model uses a long motor and we don't want the block falling out. The Peck-Polymers thrust button can be installed with 3 degrees downthrust to start. Sand the lumps and bumps off, then cover the fuselage with light-weight tissue. Cut the tissue away and cement the cellophane windows in at the locations shown.

WING

Make a template of the wing rib. Cut 8 "A" ribs from 1/32 sheet. Cut 4 "B" ribs from 1/16 balsa. Pin the 1/16 square L.E. and 1/16 x 1/8" T.E. down on the plan. Cement the "A" and "B" ribs in and

Continued on page 93



FULL SIZE PLANS AVAILABLE – SEE PAGE 100

CARVE YOUR OWN!

By ED LIDGARD . . . Propeller carving is one of the lost arts of model building. Today's plastic props are very good, for the most part, but you are locked into the sizes and shapes produced by the machines. Here is your chance to learn, and it's all done in one lesson, so pay attention and take notes, there'll be a quiz!

• Carving propellers, fitting hinges, and putting the assembly accurately together has been an obstacle to aspiring rubber powered model builders for decades. It need not be an obstacle.

The cost of materials is low and the time involved is short; so even if you mess one up, you have not lost much and the next one will be a success.

In this article we will be building a Sparky propeller, but the information and techniques are useful for any folding propeller, particularly for Old Timer models and sport models. The Spinner information is useful for any model that may need a spinner.

Get started by selecting a block of wood. Balsa of 8 lbs. per cubic foot to 12 lbs. per cubic foot is desirable. If you are not familiar enough with balsa to make the choice, ask another modeler or knowledgeable model shop people to help you.

You will most likely need to have the block cut to size. It is possible to draw accurate lines on the wood and whittle the block with a knife.

Friendly lumber yards or cabinet shops will be more helpful than you can imagine if you don't have a saw or a friend with one. The quarter-grain should be on the side view of the block. This results in the most stable grain for the propeller blades. Once the block is cut to the correct overall dimension, the carving outline is then carefully cut. Drill the propeller shaft hole on a drill press. If you need help here be sure to drill the hinge metal at the same time. One sixteenth and three thirty second drills are required. Check the block for square, smooth surfaces. A sanding block will be handy for this.

Start carving from the back side of the block. This is the undercamber of the propeller airfoil. The sketches show the direction to direct the carving knife. Be sure the knife is sharp. Kitchen knife sharpening devices are not good enough. Sharpening stones in even finer grades are best, but wet-or-dry polishing paper can be substituted, ending up with 400-grit or a piece of leather. Be careful to not cut past the lines you have drawn on the block.

When you have whittled the underside of the propeller blade as far as you are comfortable with, start sanding with 120 to 150-grit, good quality, sandpaper. Hold the sandpaper around a wood block that has a slightly rounded surface. Hold the block so the tip points to a light and hold a straight edge resting against the undercamber. Observe the shape of the light between the straight edge and the undercamber as the straight edge is drawn from the tip to the hub. Check against the airfoil shown, or one of your choice, and sand carefully to get the shape as you want it . . . don't hurry!

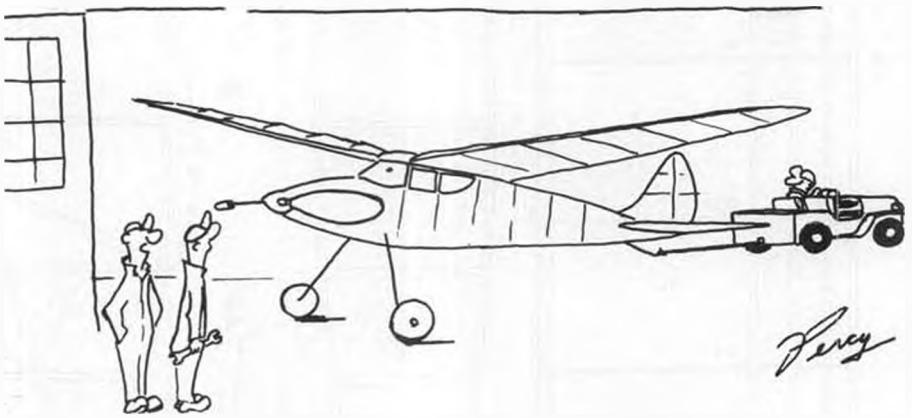
When you have one blade correct, do the other one . . . Now that wasn't too difficult, was it?

Cut the blade template from the plan or trace it and cut that. Transfer this shape onto the undercamber you have just carved. For accuracy, put a mark on the tip of the template and transfer this mark to the balsa. Reproduce that mark on the balsa to the opposite blade. Draw around the template carefully to mark the blade shape. This is hard to do because the wood grains divert the pencil or marker and the paper is not a stiff edge to draw against. Aha! This old buzzard, being a lazy guy, simply rubs a magic marker over the outline of the template. This looks messy, but makes a nice sharp black outline outside of the template. Now cut the black part away carefully. You are over the hump. The rest is easier.

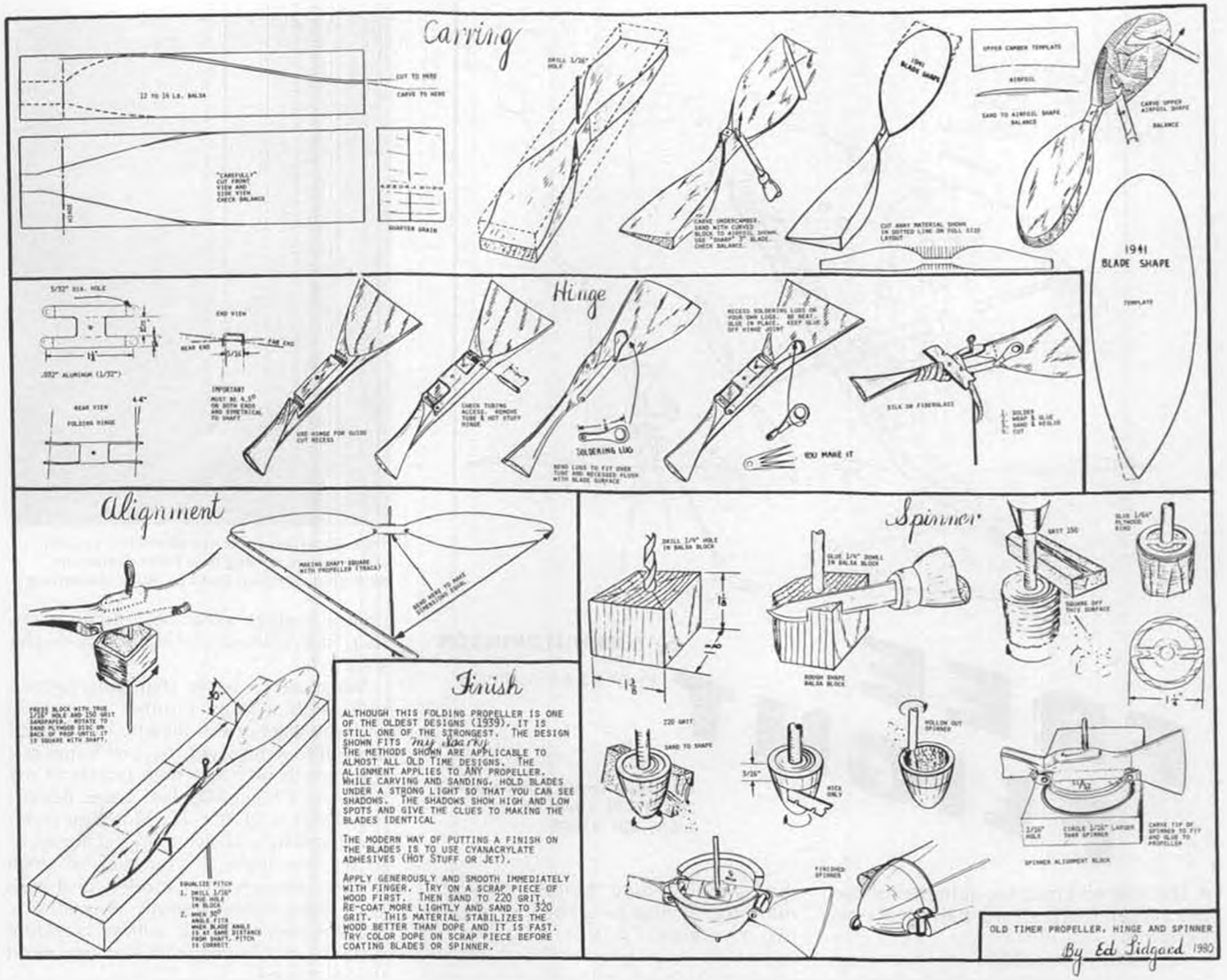
Now carve the upper camber. Do it by eye or use the upper camber template. Years ago we made thick airfoils on propellers. They were heavy and less efficient. So make the propeller airfoil as thin as shown. If you have a hard block, make it thinner.

Match the blades and check the balance by running a wire through the propeller shaft hole and watching which blade drops. Use judgement. If one blade has heavier wood, then you will put more dope on the opposite blade when finishing it.

Well, we're ready for the hinge. Hope you have done it earlier, or have had some one cut, drill, and bend it for you. It's wise to make several at one time, particularly if you need to get help. Watch the grain of the metal. You didn't know metal had grain? Well, it does. It's a result of being squished between rollers and spread out mostly in one direction. Use snips, files, fine saws, scissors, cutters, or what ever you have. A tip . . . drill the holes first. If you goof up drilling a hole, do it on the blank. What a pain to goof a hole after carefully cutting out the knife shape. You can tell I've goofed a few too. Bend carefully, preferably using a small vise. Bend the ends of the "H" shape so that when 3/32 brass tubing goes through one hole it



THEY SAY IT WILL BE A GREAT ENERGY SAVER, NOW ALL WE HAVE TO DO IS FIGURE OUT HOW TO PACK IN THE TURNS!



slides through the other hole without bending. That's easy . . . Now for the tricky part.

Through the hole, place 2 or 3-inch pieces of tubing. See "end view." Now hold a piece of wood under the "H" and sight carefully to align the tubes at the angles shown. To be sure, cut same identical balsa angles for sighting and glue them to the wood to permit re-bending to get the angles correct. Check both ends separately. This will take a few minutes, but it's not hard and this step assures the blades folding against the fuselage sides. Now match the propeller for the hinge as shown. Put a 1/16 wire through the prop shaft hole and recheck the positioning of the hinges to be sure the angles are equally balanced. Hot Stuff in place, putting enough on to harden the wood underneath.

Soldering lugs 7/8 inch long are getting hard to find. Check OLD radio stores. You can make your own from galvanized iron such as used in making duct work, or use .025 to .030 aluminum or sheet steel. Tin cans aren't thick enough. Bend to conform to the blade shape with the small hole over the tubing. Take your time. When neatly bent, draw around your lug on the prop and cut out the wood to the thickness of the metal. Place the lug in this depression and re-check the cut out and the bend of the lug. The part of the lug that sets over the tubing should fit flat against the hinge. Tack glue with Hot Stuff. Do all four. We will leave the hinge for a while and work on the propeller shaft.

Bend the loop in front of the propeller, bind and solder as shown. Cut an oval shaped piece of 1/32 plywood 1 x 1/4 inches. Taper the edges on one side and drill a 1/16 hole in the center. Glue the plywood and prop shaft onto the front of the propeller. Use Hot Stuff. Sand the balsa around the hub into a smooth shape in the area between the ends of the lugs. Wrap the hinge, shaft, and plywood with a narrow band (1/4") of silk, nylon or silkspan. Glue as you go with model airplane cement, Titebond or Hot Stuff. When dry, sand smooth.

Better check to see if the shaft is square with the propeller right now. See the drawings. Bend the shaft as needed. Finish sanding and doping the propeller. Cover the blades with tissue if you have soft wood.

Well, go ahead and cut the blade with a thin razor. How does it fold? Pull the tubing out of the hinge and lugs. Trim away any unwanted glue. Also trim a 3/16 diameter area centered around the tubing hole on the hinge. Solder over the ends of the tubing. This keeps the tube from falling out. Cover the hub and inner blade area with glue. Hot Stuff is more penetrating and very fast. Resand any rough areas and decorate to your hearts desire. Don't tell me you forgot to balance the prop *before* doping.

Since the prop shaft is nice and square with the propeller, we can make a nice square surface for the bearing to face against on the rear of the propeller. A disc of 1/32 plywood is glued around the shaft, and when dry, it is sanded with a piece of sandpaper on a block with a 1/16 hole in it that has been drilled on a drill press.

Making the spinner is well illustrated, so read carefully. This system can be adapted for any spinner. Now to stretch your imagination. How can you make wheels using these ideas? Conquering the carving of a propeller is one of the most gratifying experiences in free flight modeling. There are almost no other life experiences relative to carving a prop. The result is a functional art form and once it is completed it is a retained skill and lots of fun. If I've missed anything you need to know, send a stamped envelope to: Ed Lidgard, 24722 Marbella, Carson, CA 90745. •

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

Tom Hutchinson's new address
20518 S.W. Leeds Ct.
Aloha, OR 97005

Tom Cashman's thermal detection system; temperature sensing unit from device for detecting warm air leaks in home insulation!

• This month's mail brought the following letter from Craig Bailey, Barre, Vermont.

"I'm a 13-year-old boy who has always been amazed by radio controlled planes. Within the past year I've been looking up prices and different choices, and I've come to the conclusion that it's TOO DARN EXPENSIVE.

"I read your article in **RCMB** *on free flight and that's where I got your address. Until I read that magazine I never knew that there was such a thing as 'free flight' (emphasis added-TH), but after looking through a Sterling Models catalog, I think that it may be a cheaper alternative. However, I'm still lost a bit. You talked in your article about getting newcomers involved in the activity, well, here's your chance to help me! Would you please tell me the basic needs for getting started in building and flying free flight?"*

How would YOU answer a letter like that? What are the basic needs for a 13-year-old in Barre, Vermont, who wants to get started in free flight, and who will probably have to do it on his own, on a limited budget? What can you suggest to help him, without writing a book on the subject?

Since every letter that gets written represents a large number of people with the same questions who haven't got around to writing yet, maybe I'll start out this month with the high points of my reply to Craig. The first basic need I listed was A PLACE TO FLY. You don't need anything larger than a schoolyard to fly free flight, if you stick to small (hence, inexpensive) models and pick your flying times carefully. A small site, located conveniently within bicycling distance of a 13-year-old, is all you need to get started.

The next thing I suggested was a good hobby shop . . . a place where you can find all the basic supplies, as well as some of the special goodies you need if you're going to fly free flight: rubber, winders, tissue, nose bearings, prop hooks, etc. It would also be helpful to find a shop where the proprietor was familiar with "old-fashioned" stick and paper model-

Above: Dave Hagen's P-30 uses wing from Comet Cloudbuster design. Warp in right wing caused total destruction during power burst. Right: Bob White shows off P-20 design for 1-minute maxes on small fields. See text for more on this. Photo by Toni White.

Tom Cashman consults John Lenderman, and his black box before launching. More on thermal detection in text.

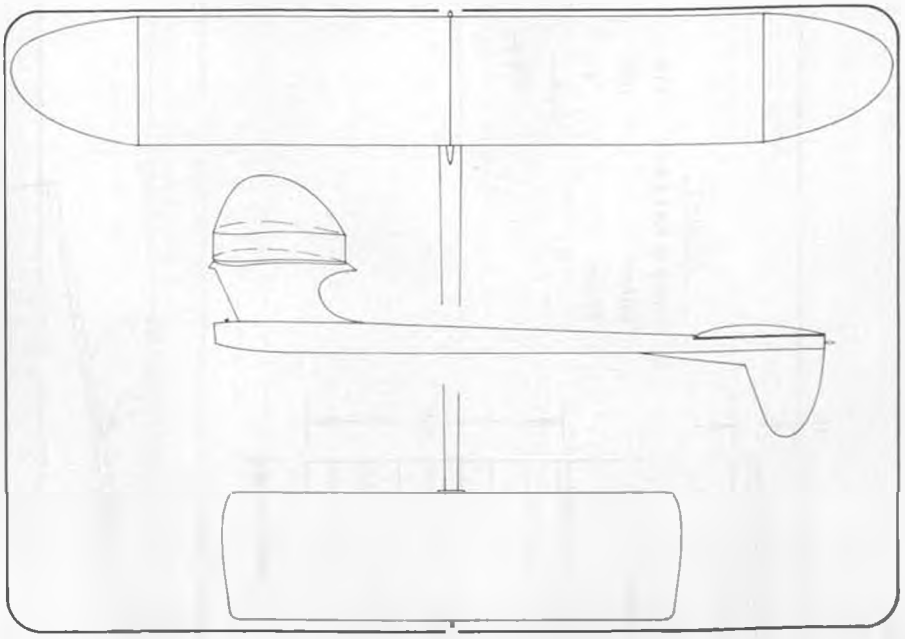
ing, and realized that there was more profit in the long run in encouraging a youngster to obtain basic modeling skills through inexpensive models rather than trying to make a killing on one big sale.

Such a shop is not likely to be found in most major metropolitan areas, much less in the upper corner of New England, so I suggested to Craig that he obtain a copy of the latest Sig catalog. When I first started flying, the only way I could get free flight supplies was through mail order . . . and Sig was usually able to get them down to my small home town in Louisiana in a week or less.

I also recommended that he invest in a good book about model building and flying. Since his letter showed interest in rubber-powered scale models, I recommended Bill Hannan's "Peanut Power," but any of the general purpose books I mentioned in the May issue would do as a basic reference work for the lone-wolf newcomer.

Finally, what kit to recommend? His choice of rubber power was ideal; quiet, inexpensive and suitable for small fields. But to start out, scale type models are just too finicky to make fly for a beginner. So I strongly recommended that his first few models be non-scale, with simple construction and proven flyability.

Heading the list of such outstanding beginners' kits are the new line of JASCO kits put out by Frank Zaic. All balsa, with clear plans and flying instructions . . . the X-12 and X-18 are the kind of kits that ANYBODY can make and fly.



JULY MYSTERY MODEL

Ken McBride, a picture of concentration as he prepares Spitfire powered Sailplane for old timer event at Fresno Annual, Sept. 1980. Photo by Will Nakashima.

The only drawback is that they almost have to be ordered directly from Frank (Box 135, Northridge, CA 91324), since most shops don't stock them.

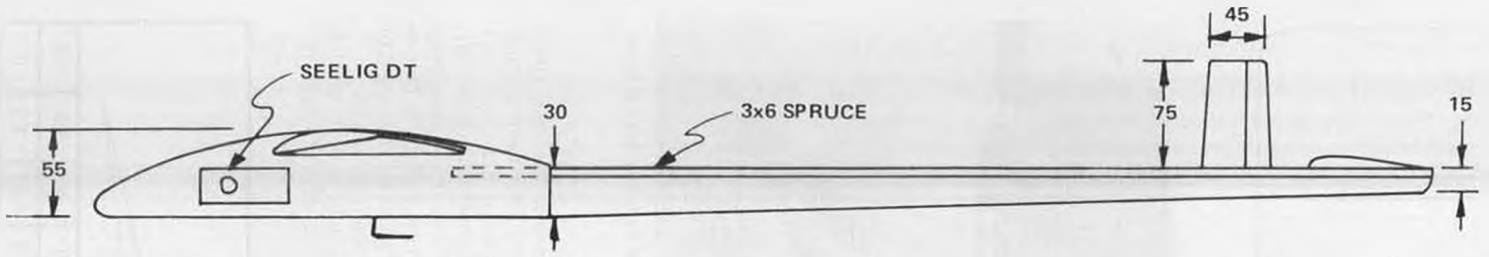
Some other kits are pretty good for beginners, but require tissue covering and are a bit more fragile to handle; the Peck ROG, AMA Racer, Sig Thermal Dart, for example. I'd suggest an investment in a North Pacific Sleek Streek or Skeeter to practice flying with, if the other ship breaks.

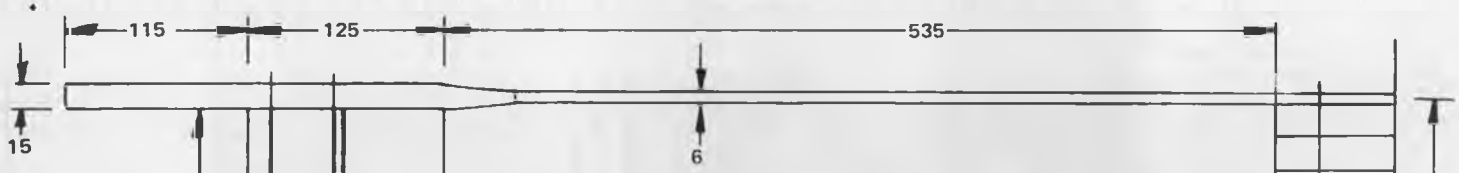
There are also a few "second step" rubber models to try after some experience has been gained: Sig Cub, Peck One Night 16, Comet Cloudbuster, Jetco Hawk. By the time these have been built and flown successfully, the beginner should be able to try rubber scale or competition types such as a P-30.

One other group of beginners models deserves mentioning, even though the

DARNED GOOD AIRFOIL — DAVIS no.3 (A=.9, B=.1)

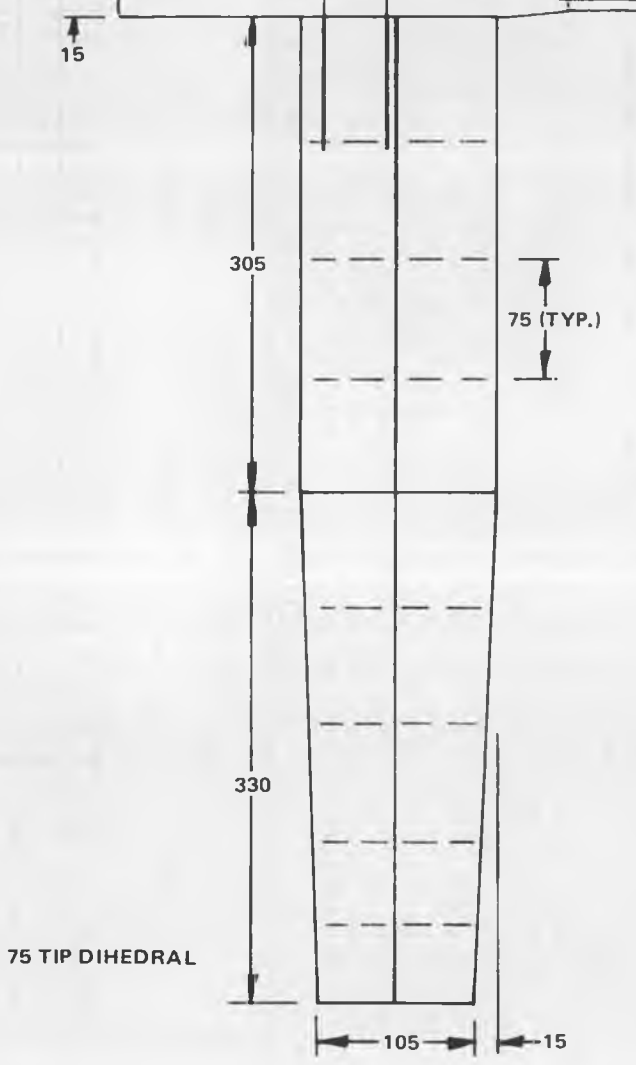
STATION	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPPER	0	1.5	2.17	3.3	4.31	5.11	6.51	7.5	8.1	8.47	8.86	8.62	7.77	6.41	4.64	2.47	1.3	0
LOWER	0	-0.27	-0.14	0.14	0.52	0.89	1.64	2.25	2.76	3.16	3.71	3.96	3.78	3.27	2.51	1.36	0.68	0

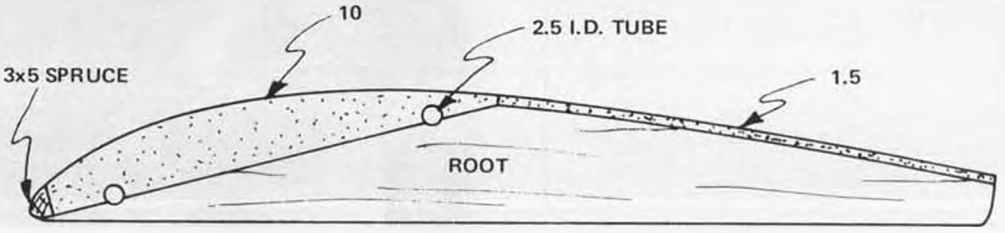


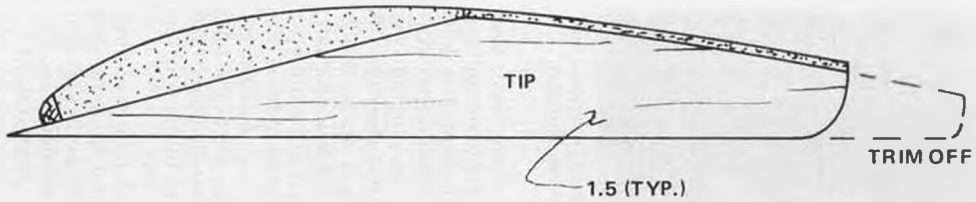


ALL DIM. IN mm

WEIGHT	
FUSE & BALLAST	118
WING	104
STAB	4
	226 gr.







BABY BAT – A-1
BY:
KEVIN COLLINS

Michael Hutchinson demonstrates unique field repair on father Tom's HLG . . . or is it the unique demountable fin system?

manufacturer has practically disowned them by poor marketing, packaging, and lack of publicity. Midwest is putting out the series of models formerly produced by Craft-Air *(not the same Craft-Air which currently advertises in* **RCMB.** *wcn)*, consisting of a pair of HLG's (Flip Jr. and Flip), a stick rubber model (Rogue) and an all-balsa cabin rubber model (Zip) (all designed by Ed Lidgard). Unfortunately, they're not available individually, but only as a set of four, with a price tag too big for the youngster who's the most likely customer. They are well-produced kits, but almost totally unavailable from distributors, unless a dealer special orders them.

I also suggested that he might be interested in HL gliders, but didn't push the idea too much, since I feel it's too hard for an absolute beginner to build one accurately enough to fly well. But, with a few initial models completed, HLG is the event with the most flying time per dollar.

My final suggestion was for him to write to AMA for a list of chartered clubs in the area. There's no substitute for someone nearby to contact personally for help when you need it. My hunch is that we'll be seeing a picture of Craig and some of his completed models in this column in the not-too-distant future?!!

MODEL OF THE MONTH:
Baby Bat A/1 Glider

I haven't featured an A/1 glider as a 3-view in a long time, so I'll rectify the situation this month. The A/1 class is an excellent competition class for beginners to get their feet wet since most of the top A/2 fliers don't bother with these baby brothers. Yet, with the increase in required weight to 220 grams, a fairly sturdy ship can be built without going overweight, even by new builders. The new 2-minute max makes it possible to fly on small fields without the necessity of shortening towlines to reduce performance to fit the field.

Unfortunately, the AMA has done its best to kill interest in the event by combining A/1 with A/2 at the Nats, and only offering A/1 as a Junior or Senior event for many years now. Without Open fliers having a reason to compete, not very much design development will be done. Local clubs compound the issue by insisting on combining A/1 and A/2 at regional contests. A good big model will beat a good small model nearly every time, so most people with an A/1 will not fly against A/2 models, if they've got a Nordic also ready to fly. A far better solution, if a club is going to combine A/1 with another event, is to try combining Coupe and A/1. Performance of both types is about the same, and both are now flown to five 2-minute maxes.

Kevin Collins' *Baby Bat* was flown in just such a combination, the Seattle WEBS (Winter Early Bird Series) contests held on early winter mornings, where both Coupe and A/1s competed equally. As Kevin comments in the *Bat Sheet:* "It was built as a quick and dirty A/1 for the WEBS contests. Being the first in a future series, there will be several modifications in the next model. First of all, circle tow is going to be a real necessity in order to fly this event competitively. Second, a slightly higher aspect ratio may help performance, but still provide adequate strength. However, more careful wood selection would be required to make minimum weight.

"As is, the model can be comfortably built to the 220 gram limit with moderate weight wood, which saves the 'good stuff' for A/2s and HLGs. This is also a plus to the newcomers who haven't yet run down a good supply of contest grade balsa."

MYSTERY MODEL

This month's MM appeared in the first issue of a model magazine that I bought. The designer was proud of a recently set record, back in the days of unlimited 4th flights. But it was a nice-looking model, even if the square lines of the 56% stab clashed with the elliptical lines everywhere else on the model. This, along with the underslung rudder, and geodetic construction (not used much in the Nostalgia era) should make good identifying features. If you think you know the design, send in your guess to the **RCMB** office (621 W. 19th St., Costa Mesa, CA 92627).

DARNED GOOD AIRFOIL
Davis #3 (A = .9, B = .1)

Back in the early days of WW-II, the Davis airfoil was rumored to be one of those super-secret, war-winning American inventions, like the Jeep. It was rumored to have 100% efficiency and to have practically no scale effect. Hank Cole used the Davis formula to plot a series of four airfoils for model use in the

Dist. 10 V.P. Jim Scarborough and wife Judy at Taft, a few years ago. Nordics straight from the aging tank!

May, 1942 issue of *Air Trails*. This section has been variously referred to as Davis #3, Davis (A = .9, B = .1) or Davis (A-B = .8, B = .1). This section is extremely thin (under 6%), but does meet the "Eppler test" of less than 5% upper camber dropoff between the 40% and 80% stations. It should make a good Wakefield or Nordic section, if you can find a way to fit adequate spars in the wing.

THERMISTORS AND THERMAL DETECTION SYSTEMS

A few months back, I published some comments by Lars Olofsson, who wished to see electronic thermal detection devices banned from World Championship competition. Such a move was, in fact proposed at the last CIAM meeting, but no action has yet been taken. I recently received some comments on the subject from Bob White, which are worth passing on. Bob feels that reports of the accuracy of such devices have been greatly exaggeraged. His opinion is that thermistor/electronics combinations only help the flier to observe temperature changes. Then, it is up to the skills of the flier to interpret these readings of temperature change and find a thermal. He feels that they are only ONE input that can be used, and that their help is actually very small. As he points out, you could sense these temperature changes by taking off most of your clothes (as some European teams do). In this case, banning electronic devices would give the same sort of advantage to those fliers most physically sensitive to temperature changes. *("Rule No. 73½: Contestants must remain fully dressed during competition!" wcn)*

Bob's thermal detection system uses three different kinds of devices: a mylar streamer, a thermistor and meter, and cattail fluffies. If he had to choose only one of these methods, he would choose the mylar streamer, since it gives the best indications and does not require an extra person around to hold it.

His second choice would be the

Continued on page 74

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

closely monitoring the needle setting, there is little reason to use low nitro fuel. The fuel with a strong shot of pop in it can potentially make more heat than the engine likes at this stage, but then a richer setting will keep things cool enough. Also saves having to take yet another blend of fuel when going flying. So, to get ready, I just break the little suckers in on my usual 1/2A fuel, which is 60% nitro. We now reach a point where it is kind of "do as I say, not as I do" time. For maximum life of the engine, break it in on mild fuel and work your way up to more nitro.

When flying, you can also do another thing that will help the motor live longer, and that is to avoid much level flying. With the high nitro fuel and the engine swinging that itty-bitty 5-1/4x3 prop, the engine stays in the power band through maneuvers but over-revs seriously in level flight. All it takes is a slightly loose ball/socket added into the equation to equal munched motor. In my shop there is a 3-pound coffee can full of broken TD motors and parts, and I'll bet you that only a couple of those motors popped while the model was in a maneuver.

Another thing that comes to mind is that if you fly with the nylon props from Top Flite, a couple of ground-pounders will bend the blades back noticeably. Many just chuckle and bend them back by hand. I used to do that too. Then I realized that each time that happened, the prop lost some pitch, further straining the motor. Sure, sounds bitchen, but will strain the motor to the limit as well as hurting the turn performance of the model.

Although nylon props have of late been accused of being dangerous, and in some cases this is true, on the .049s there seems to be little problem, even though common sense has to be used. If you're worried about it, stick to wood props, or the newer glass reinforced nylon numbers. A good source for this type of prop is Master Airscrew. I must admit to not having used their props for SBC, but suspect there are a couple of sizes offered that are worth trying, although they may need to be cut down in diameter. Have had good results using Master Airscrew props on R/C models ranging in size from 1/2A sport to Quicky's running relatively nasty 40s, so basic design seems good. They'll break about as easily as wood props, however.

WHAT MIGHT BE A GOOD IDEA. . .

Just to show a mixed bag for reading material, recently noticed an interesting tip in *RCM* that might find some applications in C/L building. Somebody wrote in saying that Titebond will set up real quickly if you hit it with some heat, like from a hand-held heat gun. As a rule, you want to be careful with glues like Titebond as they can warp balsa, but it would be worth trying to apply leading edge sheeting, for example, by laying on the glue, positioning the sheeting and then with the ordinary third hand applying some heat. This tip will no doubt only appeal to those who have yet to try either Satellite City's new version of Hot Stuff or Goldberg's Super Jet, both of which solve several of the problems inherent in the use of the original formulas.

BIG, BIGGER, AND HUGE. . .

Combat models just keep getting bigger and bigger, it seems. My Plastic Nasty design, finalized about three years ago and unchanged since, carries 494 square inches, which is still a plenty big model and was monstrous a couple of years ago. The PN is foam, which is only part of the reason for its being so large. Phil Cartier won the last NATS in AMA Combat with his foamie and it has 500 squares, along with more than just a couple of similarities to the PN, at least as far as construction details are concerned. This is traceable to the fact that Phil and I used to correspond via taped cassettes, picking each other's brains for new ideas in the building of foamies, with Phil sticking to the tapered planform models while I went to a constant chord design.

Now, from the pages of the *Dope Bucket*, newsletter of the Utah State Aeromodellers, Inc., I see that neither the Gotcha (Cartier's design) nor the Plastic Nasty are huge anymore. Gordon Delaney and Jim Womack have been

seen flying variations of Delaney's Challenger design that are humongous. Jim built a Slow Combat version that has 624 squares! Assuming reasonable weight, and if in fact Womack did indeed build it, then you can be assured it is light, the turning performance ought to be super. Gordon had a more reasonable model for AMA Combat, but even it had 493 square inches, putting it right up there with the largest of models seen so far. Finally, they also had an FAI model out that carries 340 squares, remember that a Nemesis II is 339 (I think) and it used to be regarded as plenty large for AMA Combat.

GO-FAST STUFF. . .

Back when I first got involved in C/L flying, I used to think that the guys involved in C/L Speed knew just about everything there was to know about making a two-stroke engine go amazingly fast. But for the past few years that idea has started to change. . . A lot.

But this bit is more complicated than that. You see, at one time in my life, and for a period of about 10 years, full-on racing motorcycles were just about all I could be concerned with. Ran top-of-the-line four strokes for several years and was around when the ring-dings (two-strokes) started making real serious inroads. Hated it, but was forced to make the switch and actually came around to liking the smoggers.

As it happened, when starting to fly C/L, I was still actively riding, but family obligations which meant more to me also were keeping me from riding that much, and so I retired from bikes for a few years. Now that Joshua is old enough to start riding, he's 10 now, we're reading most all of the bike magazines and have been for a year or two, where before only *Dirt Bike* and *Motocross Action* were regularly seen around here.

Reading some of the old standards like *Cycle*, *Cycle World*, and so on, where the outrageously powerful 500cc Gran Prix bikes are featured, has been enlightening, to say the least. In the years since I last followed motorcycle road racing, the two-stroke has been pushed to incredible levels of development. You think that in the Speed event there are some wild engines, and I used to, but you ought to see what privateer road racers can buy from Yamaha and Suzuki . . . and then when over that shock, take a look at the works bikes, of which Suzuki, for example, made just a dozen. The cylinders are literally cut full of bypass, intake and exhaust ports; it is hard to tell how the rings are kept from dropping into a port. Reed valves are common, even on some of the Suzukis, which used timed induction that is kinda similar to the rotor on rear rotor model engines. Most interesting to me was that last year Yamaha finally finished development of what they call a Power Valve, which effectively changes the exhaust timing as the throttle is opened, probably doing more to widen the powerband than to increase power at the top end. Except that with variable exhaust timing they can probably get more radical with exhaust timing, the Power Valve preventing loss of mid-range power.

There are a bunch more things the factories are doing, but the point is that they are doing it, and in modeling it would seem that some of this development ought to be coming into our hands pretty soon. Yes, I am aware of the fact that C/L Speed fliers are hobbyists, and so can't be expected to equal the multi-million dollar efforts of the motorcycle companies, even the larger model engine manufacturers are tiny when compared to a company like Yamaha. But a little investigation would seem to me to be very much worth the effort in the push for more power. Lots of Yamaha TZ750 engines are around, for example. I'll bet that a trip or two through the internals of one of these rockets would be very interesting. How about it, you C/L Speed guys? •

Shipyard . . . *Continued from page 41*

with their small lathes and milling machines coupled with their enthusiasm for machining parts and building such things as double and triple expansion engines, water tube vs. gas tube boilers, and vertical vs. horizontal compound engines, my thoughts turn to the world of model railroading and its inner world of live steam engines. So it is interesting to find Minuteman Model Yacht Club, a sailing organization, soliciting model engineers to join with them in an effort

to encourage the building of radio controlled shipmodels. This effort is expected to greatly expand the resources (namely the strength found in sharing high technology skills among the membership).

Two long-time members of Minuteman have been quitely building steam driven craft, yet are best known locally for their sailing activities. Harry Card, a recent "find" at the Antique and Classic Boat Society, tremendously impressed the R/C sail buffs at the MMYC meeting when he exhibited two of his steam driven models. His beautifully restored antique steam cabin launch measured in at five feet, with a beam of 11 inches. This genuine museum piece has a Stewart Double 10 two-cylinder, single expansion steam engine, with 3/4-inch bore and stroke. The water tube boiler is fired with an alcohol burner with the steam pressure set at 30 to 50 pounds. The launch was operated by a six-channel R/C system. Harry brought his tug from the CARD line for the members to look over and to get all enthusiastic about. This little beauty of Harry's is scratch built from the interior details inside the pilot house to the shiny handcrafted prop. With the cabin housing removed, one finds the hull packed with all manner of model machinists delights. The hull is plank-on-frame with resin glass covering. Its specs are: length 51 inches, beam 17 inches, draft 7.5 inches, and displacement 75 pounds. An eight-channel R/C system handles all the controls. The single expansion, two-cylinder Stewart with 1-inch bore and 7/8-inch stroke, works at 60 pounds pressure and provides enough power to tow Harry behind the tug in a full-sized dinghy. Tucked away along side the steam plant is a Bernzomatic tank, which provides fuel for two hours of operation.

The radio controlled model sailing races have become a Sunday event for many spectators in the greater Needham area. This summer they will be treated to a fleet of steam powered models when MMYC hosts the local fleet on July 26, 1981, at the model sailing facility at Rosemary Lake in Needham, Massachusetts. The locals are taking advantage of the lack of wind during the mid-summer weeks to set up activities for the non-racing model buffs.

Although the MMYC club encourages all types of shipmodeling, with great emphasis on operating models, they are adament about observing the Park and Recreation department's rule that all gasoline and diesel, as well as high speed racing models, be specifically prohibited from Needham ponds. With thousands of other model types to choose from, that has not been the slightest handicap. The model boat club and its members is recognized by the town as a great resource and an asset. It keeps the town's backing by reaching out to find members of all walks of life; it seeks members from the senior groups, and the wheelchair handicapped. The club has become, in essence, a cost-free (no cost to the town!) activity for town residents and neighbors. If you live within commuting distance of Needham, and have a lot of shipmodels, by all means join the MMYC. If you are out of the area, write to Dick Foote, Director of Park and Recreation, Town of Needham, Needham, MA 02192 (phone 617/449-1500), and he will share with you and your local town officials the success of having town support of model boating as a town affiliate (encouraged) activity.●

Soaring . . . . . *Continued from page 47*

130-inch, 21 to 1 aspect ratio wings cover 806 square inches. This seven-pound demon also carries up to seven pounds of ballast . . . to be parachute-dropped prior to landing. That cuts the landing speed and inertia to within controllable limits.

In March, the plane was ready for paint and the first high wind at Torrey Pines. Now that first flight is history! Everything went perfectly. It was a work of art in motion. The plane responded well, and there was no flutter. Imagine 500-foot vertical loops. An hour later, Scott brought the Hyper-Locus in for its first landing. The door opens, and a large wheel comes out. A dust trail marks the touchdown. That flight was a real thrill.

I asked how he test-glided this bird. Scott strongly advised against the usual procedure. "You can't throw a plane that size and weight fast enough, and if you did, there's only six feet of altitude

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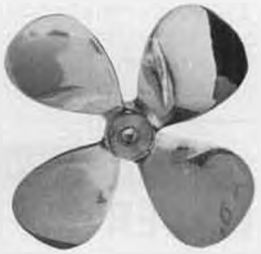

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left for correcting any trim errors." Instead, he recommends having a friend drive an open sunroof or convertible car while you hold the plane above the turbulence (just under the c.g.). You adjust the trim after the car exceeds stall speed. "Use an empty parking lot when there's no wind. That's the way the Hyper-Locus was tuned." I'll have to remember that trick. *(A LARGE parking lot, no doubt! wcn)*

And other new designs deserve attention. David Aniere of Laguna Beach, California, built the Procrastinator as designed by Dale Winder. This aerobat operates on two channels (aileron and flying stab). The fiberglass fuselage supports a 60-inch span, 12"⅝ thick, Eppler 374 wing. If you like decor, this plane deserves your applause.

Bob Williams, of Laguna Niguel, designed the S-18 Viper, a takeoff on the F-18; the "S" standing for slope. Here is a smaller, lighter craft spanning only 50.5 inches. The 31-inch fuselage is of balsa and ply built around two cardboard tubes that originally held Monokote. The 408 square inch wing tapers from 11-1/2 inches at the root to six inches at the tip. The full span ailerons and elevator provide sensitive aerobatic performance. The 10"⅝ thick Eppler 374 airfoil is modified to allow greater speed producing more efficient flight even under light air conditions.

★ ★ ★

I receive letters from all over. For example, Raul Araico Lomeli, of Guadalajara, Mexico writes:

"I want to congratulate you for your fine articles in **R/CMB**, which I like very much, especially the two last ones in the December and January numbers about your visit to Germany.

"About your question of the glider appearing on page 43 (January), it is a Scheibe 'Spatz' (L-Spatz 55) (sparrow), designed by Herr Egon Scheibe and built by Scheibe-Flugzeugbau GmbH Dachau bei Munchen. To verify, I'm including photocopies of the pocketbook edited in 1963, entitled *50 Moderne Segelflugzeuge*.

"Now about his condition of vintage quality. It's a matter of discussion: First, according to several trends of the U.S.A., one of them says that a vintage sailplane should be designed prior to 1950. Second, considering the date and the title of the book at that time, I don't believe that the design was more than 10 years old. I guess in 10 years more anybody can be sure it's a vintage.

"Keep up your good work in **R/CMB** as well as those fine photos. Thanks for letting me express one point of view."

Let me hear from you if you want to share items of interest with our many friends and flying buddies. Interesting black and white glossy photos always help tell the story. To make this invitation more personal, there's a picture of me in this column, as seen through the lens of Pepper Kay's camera.

Next month we'll go into some new construction techniques. See you then. •

Pattern . . . . . *Continued from page 10*

didn't everyone go bigger? Simply put . . . it wasn't necessary for the old maneuvers. Also, it takes time to develop all the changes necessary for a successful new design and the engines weren't as powerful.

The problem of wind drifting is worse on some designs than others, and is not due to size alone. In fact, the larger a plane is, the better it handles wind . . . unless the weight is much too low and the airframe design is wrong for a lighter, large model.

Watch, ask questions and if you get the chance, fly some of the bigger birds. You will most likely see an improvement in stability and smoothness.

Next month: (1) Top Hat, (2) Rev. Top Hat, (3) Figure "M". •

Thornburg . . . *Continued from page 39*

tifully, but still no transition.

The problem is this: By the time I get enough right rudder cranked in (I'm left-handed, remember) to make for a decent transition and right-circling glide, the climb has become a wild corkscrew. What's happening? The rudder is simply too effective at high speeds, and not effective enough at low speeds.

But the cure is simple; use stabilizer tilt for the glide turn, keeping just enough rudder for the transition.

Now stab tilt is one of those magic adjustments I never understood as a kid. But it's very simple. Tilt a free flight stabilizer away from the direction you want your model to turn (see drawing) and it will virtually "lift" the tail of your model away from the circle, pushing the nose into the desired turn. But its real virtue for handlaunch is this; *it only works in the glide*. During this launch, remember, wing and stab are flying at zero incidence, hence zero lift But in the glide, when the tail drops and the stab assumes the same positive (lifting) angle of attack as the wing, then any tilt the stab may have will begin working to turn the model. Ain't science wunnerful?

Once I got this little item figured out, I went back over all five of my gliders and broke off the stabs with a karate chop, gluing them back on with a wild tilt . . . some parallel to the inboard wing panel, as shown in the drawing, and some tilted even more.

When I tried the models again, one of the five showed real promise. Here's what "real promise" means to me: On gentle hand glides, it went into a tight (30 foot diameter) glide circle, with just the faintest hint of a stall. On the first hard throw, it went up like an arrow, stopped, and came down exactly the same way, impacting in some tall grass with no damage. When a handlaunch goes straight where you point it, and then fails to make a transition, it is only a tweak of up-elevator away from perfection.

Sure-enough, a tweak of up and it

popped right out on top, settling in for a near-fifty-second glide to earth. On the second toss it did exactly the same, rolling out on top of a fat thermal. It disappeared into cloudbase in just under four minutes.

Rats!

I had just hit the first big plateau in handlaunch, and learned the basic law of the sport; *if it's good enough to keep, it's good enough to lose.* The doggy ol' sport gliders . . . the Sleepwalkers, the Thermic B's . . . stick around forever. The good ones go over the hill.

So I go home and build five more gliders just like the one I lost. (These are the ships shown in the photos.) I keep the same planform, but experiment with airfoils. I put nice, tilted stabs on all of them. I arrange the wing so that the heaviest panel is on the inside of the glide turn. I put built-in washin in the tip of this inside panel. The washin, according to my reading, does two things; it makes the panel stall first, dropping the ship into the core of the thermal; and it also keeps the plane from spiralling too tightly once it is in the thermal. More science.

I spend all of Weekend Four trimming and adjusting these new gliders. Toss them up, watch their transition, chase them 200-300 feet downwind, bring them back and do it again. Always being careful to toss *between* the thermals; I don't want to see another one disappear overhead, like last week.

By Sunday evening, I'm bored.

This is surely not what handlaunch is all about . . . tossing your models into neutral-to-bad air. Even the best flight seldom breaks 40 seconds; the worst ones are down around twenty.

So I deliberately wait for fat air. I wait for that warm, pregnant pause in the breeze; the soft, warm back-wind on the nape of my neck; and finally the great hot thermal that comes churning down on me like a Mack truck, ripping and tearing at the grass around my feet, tugging at my hair and shirttails, begging me for a spare airplane. As soon as the core of it passes, I heave . . .

. . . and another glider heads for cloudbase.

Oh mixed emotions! What a thrill to see your model bouncing and tossing upwards into the sky, what an honor to have your own creation singled out for consumption by the Thermal Gods!

But at the same time . . . what a loss! There goes two hours work, a couple of bucks worth of hand-selected balsa, and . . . what's worse . . . a darn good airplane! I pack up and go home and start putting dethermalizers on my remaining four ships.

Dethermalizers! I hadn't built one since I was a kid. And then it was mostly

wishful thinking: not many of my planes were built well enough to thermal. I was a sloppy, impatient builder, too anxious to rush off to the flying field. You can get away with that in R/C, if you're good enough on the sticks. Not so the free flight, every warp, every misalignment shows up in the performance, especially in small, high-speed handlaunch gliders.

So I spend a week putting fuse dethermalizers on my four good gliders, and head to the field for. . .

WEEKEND FIVE. This, gentlemen, is what handlaunch is all about. I erect a "thermal flag", a 20-foot pole with a few feet of thin mylar type hanging off it. I watch this tape. When it stands on end, like the hair of a hippie skydiver, I apply a piece of smouldering cotton clothesline rope to the Peck-Polymers DT fuse on the nose of my glider, chuck it up into the thermal, and trot off downwind to wait for the fuse to burn the rubber band, releasing the drag flap and causing the model to spin down out of the sky. On Sunday last I recorded seven flights in excess of three minutes, *all with the same model!* This to me is amazing . . . I never before had a good handlaunch that I didn't lose immediately!

And that's where I stand presently on the learning curve. If my beginning experience stimulates you to try handlaunch, hurrah! Rush out and buy one of the fine AME handlaunch kits (Flash, Polly, U.S. Kid, Sweepette) from Aero Modeling Enterprises, Box 11, Cerritos, CA 90701. Or a kit from FAI Model Supply (Box 3957, Torrance, CA 90510). Or from Blue Ridge Models (Box 429, Skyland, NC 28776). Or scour your back issues for plans; "Fritz" (Aug. '75), "Paragon" (June '77), "Blackjack" (April '80).

I've saved two confronting quotations about handlaunch for the end; you can pick the one that suits you and run with it.

Jim Taylor (twice U.S. team member): "Handlaunch glider is the toughest and most demanding form of free flight competition."

Blaine Miller (senior national record-holder in HLG, back in the seventies): "All that super-athelete mystique is pure bunk. Build a good glider and toss it into a thermal every time, and you'll win."●

F/F . . . . . *Continued from page 67*

thermistor. It does show the patches of warmer air . . . the problem is in identifying these warm patches of air with thermals. With a surface wind, you're looking at a patch of air that is not overhead, one which has already gone by. Bob feels that, in many cases, we fly our models on the basis of surface indications of air that has already gone by, so that we actually fly in the next patch of air.

Bob feels that soap bubbles and/or fluffies are the least reliable of all thermal detection devices. Too many times, they give a false indication of lift. They are actually too sensitive for thermal detection purposes, often identifying very tiny updrafts that won't budge an airplane.

In Bob's opinion, we're not really as good at picking air as we think we are . . . it's just that on some days we're luckier than others. As far as he's concerned, nothing beats a model that climbs high, circles well, has a low sinking speed, and centers well in a thermal. He also feels that the only reliable lift indicator is another airplane in good air.

Paul Lagan had some similar comments about thermistors in a recent issue of *South Island News* (New Zealand): "There is a fair amount of wizardry about someone peering into a meter indicating air temperature or whatever and, after suitable warnings, indicating categorically that 'NOW' is the time to launch. The wizardry is complete if the order is obeyed and the model is sucked up into lift. Omnipotence! Despite the apparent success of the Lagan thermistor, let it be said that in 9 out of 10 flights that the thermistor is used (by me) I will not fly unless there are *other* (better?) indications around than just the swing of a needle. The thermistor is useful for warning one that thermal activity is possible, but unless one can launch veritable clouds of fluffies or squadrons of models at the same time as observing the temperature changes, then it is unlikely that one will ever attain enough experience with the *effect* of the meter readings to be able to 'call' thermals with accuracy."

ONE MINUTE MAXES, ANYONE?

Southern California free flighters are facing a serious problem in finding flying sites. The flooding of Lake Elsinore last year eliminated the use of the nearest contest site from the Los Angeles area. Not very many people are willing to make a 300 mile round trip to Taft for test flying, so activity has been limited to those smaller sites which are available. As a means of perking up local flying activity in between the large Taft contests, several of the rubber fliers down there (Bob White, John Ferrer, Ed Lidgard) have been scratching their heads trying to come up with an event that could be flown on schoolyard sites, to a 1-minute max. Aside from HL gliders, there's nary a competition existing which can be flown in such a confined area.

Their first thought was for a variation on the P-30 theme, but to a smaller size and weight (20-inch max dimension, plastic prop, minimum weight 20 grams, including 5 grams of rubber). Bob White built a ship to these specs, based on his P-30 design, and found a couple of bugs in the formula. Models that size are too difficult to build, and they fly too well! With 5 grams of rubber, Bob's ship is closer to a 2-minute model than a 1-minute model. So how DO you come up with a 1-minute model?

John Ferrer has done some thinking on the subject of 60-second rubber models. In a recent article in *Bugs'Buzz*, he looked carefully at the specifications for Coupe and P-30 models and their flight characteristics to establish requirements for a model with less than a minute performance. Scaling down Coupe and P-30 performance can be done, he says, by keeping total weights the same, but reducing the motor size proportionately to get the new desired still air times. Then scaling down the "detuned" P-30 will give the specification for a true 1-minute P-20. Here are the specs John suggests for a 60-second rubber event (or events . . . take your pick!).

60 second Coupe: AMA rules except 5-gram motor, and weight without motor of 75 grams. (May use stock coupe with 5 gram motor extender.)

60 second P-30: AMA rules except 4-gram motor, and weight without motor of 45 grams. (May use stock P-30 with 6-gram motor extender.)

P-20: Similar to P-30 except 20 inches dimension, weight without motor of 20 grams, 2-gram motor weight. Must use unmodified commercial plastic prop.

Mini-Coupe: 30-gram airframe weight, 2-gram motor, 1.4 sq. in. cross-section area in fuselage.

John says that all events could be combined for experimental/contest purposes, since they would be well-balanced with each other. The CD could even supply the rubber to all contestants (a big equalizer), since the motor sizes required would be quite small (like supplying fuel to FAI Power fliers). Since retrieval times would be less, increase the number of flights to allow more flying time. You could even experiment with mass launching, or paired launching (maybe a single or double elimination tournament set-up).

The only suggestion I'd make would be to allow an unenclosed motor in P-20, to make the model easier for beginners to try. In any event, it sounds like a good way to keep free flight alive in the neighborhood, not just out in the boonies. *(Hmmm . . . Take another look at page 51. . . Are we on the final leg of a 45-year cycle? wcn)* •

R/C Boats . . . *Continued from page 43*

signs, and even some foil designs that looked like they were taken from a small airplane wing. Most of these devices were mounted in a manner that would allow the wing to be pivoted to adjust the angle of attack. Many were just screwed or bolted into the inside of the tunnel near the bow. I think the most effective bow wing I've seen is one designed by Rod Gerghety, of Seattle, for my Excaliber II design. Two photos of this bow wing are shown on Dennis Caines's very fine running Excaliber II. As can be seen in the photos, this wing is canted upward slightly in the center. It is constructed of 1/8 inch plywood, and the leading and trailing edges are rounded. It's really not all that difficult

to put together.

So how do you adjust it once it's on the boat? Adjusting the bow wing is a matter of trial and error. It will probably take some amount of experimenting with the angle of attack to find that setting which is right for your particular boat. It's a good idea to make some marks on the wing where it attaches to the hull and on the hull so you can return to certain settings for varying wind or water conditions.So there you are gang . . . go wing it.

OCTURA MODELS WANTS TO MOUNT AND COUPLE YOUR BIG ENGINES

Tom Perzentka, Mr. Octura Models, sent along a couple of photos and some information about two new items from his shop that should interest those of you who think big is better. The first item is a motor mount to accommodate engines like the Rossi 90, OPS 90, Webra 90, OS Max 90, or CMB 90. The mount is 6 inches wide and 2-1/2 inches long. In the release I received, Tom points out that the mounting hole spacing in the side flanges is the same as other Octura mounts, 1-11/16 inches on the crankshaft center line. There is a modified version available in a 5-inch width.

Now that you have a mount, how about a coupler? I mean all that engine will get you nowhere unless you somehow attach it to the shaft. Octura Models now has available a flex-hex coupler with a 10mm thread to fit the OPS 90 to a .250 flex cable. The coupling has a pilot to fit the OPS 90 stock flywheel. A separate collet is not used, as coupling is intended for use with .250 cable only. A companion flex-hex with a 8mm thread is available for use on the Rossi 90. Prices are to be announced. For more information check with: Octura Models, 7351 N. Hamlin Ave., Skokie, IL 60075.

ENGINES FOR MODEL BOATING

I have received some inquiries about what type of engines are best suited for model boating application. Many people wonder why engines that are popular for R/C aircraft are not used in model boat applications. Most engines used in R/C aircraft are not designed to operate at high rpms. The fellows flying model airplanes, unless they are flying pylon racers, are looking for engines that have a good idle and power to pull the model through maneuvers. Such engines could be used in model boats and in some instances would probably be a good choice. I'm thinking of someone who doesn't want to go racing, but just go out to a lake and run a boat for his own amusement.

For model boat racing applications, however, a high performance engine capable of generating lots of rpms is a must. Unless the engine is designed with racing potential in mind, it can't easily be modified to make it suitable for racing. One letter that comes to mind was from a young man who wanted to know if his Kraft .61 could be made more competitive by adding a pipe and burning fuel with a higher nitro content. The addition of a tuned pipe would improve the performance of this particular engine. However, the Kraft .61 will never be able to offer the high rpm that is obtainable from an OPS or Rossi racing marine engine. If a person is interested in the performance aspects of model boating, then it will be necessary to purchase the type of equipment that is designed to meet that purpose.

This sorta brings up an interesting thing that is happening in the new N.A.M.B.A. Sport 40 Hydroplane Class. As has been mentioned in some of my other articles, this class has two engine divisions. One division restricts the engines to front intake, non-Schneurle ported engines. I have been told that some of the individuals racing in this class are making some rather exotic internal changes in their front intake engines to increase the power and rpms. This to me seems to defeat the purpose of this engine class restriction. If it is necessary to modify the existing engine drastically to get it to perform, why not just purchase an engine that was designed for high performance? Allowing radical changes to an engine that is supposed to run in a restricted engine class places those new people racing the event at a real disadvantage because most of them don't have the ability to modify their engines. I'll stop my editorializing on this topic, but I'd certainly like to know what some others think about this situation.

(Because there are those who prefer

collecting trophies by trying to take unfair advantage, rather than using driving [or flying]skills, we are forced to create highly restrictive rules, which are only followed by honest competitors. ***wcn).***

N.A.M.B.A. OUTBOARD CHAIRMAN REPORTS

My ole tunnel racing buddy, Jay Selby, sent in some race results and photos that are certainly worth sharing. One photo that particularly caught my attention was his new .40 size tunnel. Jay is without doubt one of the finest tunnel builders around and his new 37-inch Crusader Tunnel is a real beauty. Jay has been using an AMPS 40 on the boat, but reports that the engine just doesn't develop the power necessary to really make the boat work properly. He is most excited about the new .40 size outboard that K&B Manufacturing is supposed to be releasing some time this year. *(Seen at Toledo. wcn)* Anyone in the Northern California area who is interested in finding out more about model tunnel racing activities should contact Jay. His address is: 682 Emerald Hill Road, Redwood, CA 94061. How about doing an article on how to build that .40 size tunnel, Jay? I bet there are lots of people who'd be interested in the boat when the K&B 40 Outboard becomes available.

Here are the results of the 1980 Northern California OPC Championship Standings:

1. Nancy Miller
2. Dan Wells
3. Dave Grainger
4. Jay Selby
5. Rob Cummins

1980 Most Improved Driver — Steve Jensen

1980 "Splintered Sponson Award" — Dan Jones

1980 Rookie of the Year — Hap Miller

1980 Outstanding Driver — Dave Grainger

The Fifth Annual Golden Gate Outboard Regatta was held at Lake Spreckles in San Francisco's Golden Gate Park on November 9. It was well attended and excellent weather made for a most pleasant event. Unfortunately, the lake was rather loaded with debris, and there were numerous DNFs (did not finishes) due to the boats striking material in the water. Jay reports that they are now using 500 feet of safety netting to keep the boats from coming out of the lake and possibly striking someone. If anyone realizes the value of these safety nets, it's Jay. While practicing for the First Annual G.G., Jay was hit in the leg by a tunnel that came out of the lake. He ended up in a hospital emergency room for stitches to sew a leg puncture together.

The Golden Gate Outboard Regatta featured a Concours d' Elegance event along with the heat racing and five-minute enduros. Ken Reilly, of San Francisco, took top honors in the Concours d' Elegance judging. Ken really builds beautiful model boats. His R/C Unlimited, the Natural Light, was judged the Best of Scale at the 1980 N.A.M.B.A. Nationals last August. The winner of the G.G. Outboard Regatta was Steve Jensen, of Santa Rosa. Steve's three firsts, a second, and a third in the heat racing was sufficient to garner the victory. The final results are as follows.

HEAT RACING

1. Steve Jensen
2. Rick Barry
3. Dan Jones
4. Darrell Batteux
5. Dan Meckler

ENDUROS

1. Rick Harrison
2. Nancy Miller
3. Dan Wells
4. Hap Miller
5. Dan Meckler

HAVE YOU TRIED BALLOON BREAKS AND POKER RALLIES?

It sometimes seems like those of us involved in model powerboat racing get so involved in competition events like heat racing, enduros, and time trials, that we tend to overlook some activities that are rather fun to do occasionally. Two such events, a balloon break and poker rally, have proven to be very popular with the membership of the Puget Sound Model Boat Club. These fun events are conducted during the off-season, which runs from December through March here in the Northwest. They are relatively easy to conduct and provide an opportunity to get the gang together. Let me briefly describe each event.

The balloon break features one boat running for a given period of time, we use five minutes, and trying to break as many free floating balloons as possible. The boats are allowed to have a single pointed device on the bow, something like a hat pin works well. Each contestant is given a dozen balloons and a large pastic garbage sack. The balloons are inflated and stuck in the sack. The event begins by releasing the sack of balloons at a pre-established distance from the beach and then allowing the boat to be released from the shoreline. Believe me, it's a real challenge trying to stalk down those balloons. It is a good idea to keep time on those who break all the balloons prior to the expiration of the time limit. At our last balloon break, we had five contestants break the balloons in less than five minutes. The winner was decided on least amount of time needed.

The poker rally is basically a five-minute enduro with an interesting twist. All the boats run a five-minute enduro to establish a lap count for each participant. Since most of our club members have some type of .21 boat, we limit the event to that size engine and any hull type. Prior to the rally, each contestant pitches in an ante amount. We generally ante a dollar. After every-

one has run, the individual's laps are divided in half to determine how many cards they will be dealt. Those who complete more laps will receive a couple of more cards than someone who doesn't get in many laps. However, just receiving the most cards doesn't guarantee winning a pot. I've seen cases where a person who only received two cards was dealt a pair, while a person receiving six cards came up empty handed. We split the pot three ways when we conduct this event. The pot is evenly divided three ways, between the top two hands, and the club. Depending on time and interest, it's possible to run two or three such rallies in a day.

The Puget Sound Model Boat Club conducted a balloon break on January 4 and a poker rally on February 1. The top three finishers in the balloon break were: 1st, Dave Robinson using a Klampon-Kai Tunnel; 2nd, Rusty Boyatt running a Dumas wooden Hotshot Tunnel; and 3rd, Mark Anderson driving a Westcoast Marine Stingray Outboard Vee. Those taking home parts of the poker rally pots were: your boating columnist and his son, Paul (when we both had top hands in the first rally there were charges of dealing off the bottom of the deck!), Kevin Zinski, and District 8's new N.A.M.B.A. Director , Leo Dreith. We've had a good time with these events and they just might be something your group would find enjoyable.

In our next column, we'll examine the new Offshore Class that has lots of folks in N.A.M.B.A. a tad bit upset. The address is 119 Crestwood Dr. S.W., Tacoma, WA 98498 for letters, photos, comments, or complaints. ●

F/F Scale . . . . *Continued from page 59*

results. I realize that not everyone will be willing to go through so much work, but sometimes it becomes necessary if quality work is sought. Remember, it is easy to be mediocre!

Many times I have found that with a kit drawing, cutting cross-members toward the rear of the fuselage, from the drawing, does not always provide the proper curvature. I usually fudge by letting the natural curve of the longerons dictate the actual width. Then I cut and trim the cross-members on assembly. Sometimes bulkheads have to be slightly modified to fit, if this is done.

Whether you are building from a kit or not, one suggestion that might prove helpful, is to never cut the stringer notches out ahead of time. Common practice is to cut out all the bulkheads, including the marked stringer notches. I find that most of the time when the stringers are laid in place, they aren't straight. I prefer to notch only the very first and last bulkhead, then lay the stringer in place. I adjust the stringer until it lays perfectly straight, then I mark its location and notch the bulkheads. Many times, I also find that if the notches line up, the natural flow of the stringer over the bulkhead is not right due to a bulkhead or two being too high. This correction can be made at the same time the notches are made for the stringers. Personally, I prefer to undercut each bulkhead by the thickness of the stringers, and just let the stringers lay on top of the bulkhead instead of in a notch.

There's another problem which can ruin a fuselage structure even if care is taken when selecting longerons. If a fuselage shape is such that the lower longeron at the front has a severe curve (see illustration), when the fuselage side is unpinned, the curved portion of that longeron has a tendency to straighten out. This in turn causes the upper longeron to bend downward. This can happen even if the longeron has been first soaked in water. There are a couple of ways to prevent this from happening. One is to add a diagonal as shown from the front lower vertical to the upper second vertical members. A better technique is to slice the longeron lengthwise and pin in place. This is almost the same as laminating, and will keep the curve the way it should be. I've done this with as little as 1/16 square, when necessary, with no problems at all.

One last pitfall that the beginner might overlook, is again better explained by the sketch and text submitted by Bob Berreyesa, of Sacramento:

"If you have been wondering why your experience peanuts (grown from high priced kits) sometimes look a little pugnosed and come out tail heavy, then a little concentration on the illustration may prove a revelation.

"To show, right on your plan, how much too short the fuselage would be if built directly on the side-view, you need draw only one straight line and swing one arc, as shown thusly:

1. Draw line AB parallel to thrust, and through extreme end of longeron.

2. Swing arc, centered at corner of longeron bend, and with radius as shown, down across AB.

Distance between arc/AB intersection, and front edge of fuselage, as drawn, is the invisible but deadly f/f (frustration factor).

"To build a fuselage of correct length, as shown in the top-view, draw in the longeron extension required in the side-

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view, as follows:

1. Draw longeron extension lines C and D from upper and lower fuselage corners, parallel to thrust line.

2. Pick up forward longeron true length from top view, (read rules) and transfer to lines C and D, as shown. Sketch in new vertical and diagonal member locations.

"The distance between the windshield and cowling on most scale models is much less than shown here (non-scale sketch). The f/f would eat this up; a scale pilot's feet would end up in the carburetor, and on launch, your peanut would do maybe two tight loops, with a last loop cut short at the bottom by the third planet from the sun.

"The same fore-shortening (comes in cans) occurs aft also (see side-view), but is a smaller percentage lengthwise, and is really an advantage weight-wise (scale judges disregard).

"Determination and picturing of true lengths on plans, for building, is a basic function the draftsman should have learned before first recess. Send 'em a nasty letter!"

I've talked about the following topic before, but I think it's worth repeating. Stanley, the tool company, has a circle cutter that's adjustable from about 7/8 to about 4 inches. I use this tool for cutting out discs from plywood and balsa. It can also be used on non-ferrous metals. I have two of these with the cutting blade of each one held at a different angle (see sketch). One blade angle cuts a neat disc from a sheet of wood, and the other blade angle is used to cut a neat hole from the center of the disc. Certainly, the same tool can be used, but the blade angle has to be changed each time depending on whether a disc or a hole is desired.

Using the cutter can be dangerous with all the arms spinning around in a drill press. I've eliminated the risks by spot-tacking the sheetwood onto the corner of a drill board using Super Jet. Once I'm through cutting, the disc can be removed easily using a razor blade. By using the corner of the drill board instead of the middle, it makes prying off much easier.

Why the plywood discs? First, I like to make my thrust plugs using Estes rocket tubes, which incidentally, come in 1/2, 3/4 and 1 inch diameters. I'm going to digress for a moment and explain how and why I use this type of thrust plug. to begin with, it permits an opening at the front of the model large enough to accommodate a healthy row of knots. Whatever size rocket tube was used for the thrust plug can also be used as a safety winding tube.

The sketch pretty much explains the construction of the thrust plug, but a few remarks are warranted. Let's assume that the 1/2-inch diameter rocket tube is large enough to do the job, and that the cowling of the model is 3/4 inch in diameter. I first cut the rocket tube about 5/8 inch in length, making as square a cut as possible (actually, I use a radial arm saw . . . certainly not necessary), and each end is plugged with 1/16 balsa sheet. Since the front of the model is 3/4 inch in diameter, the front disc of the plug should be the same. Therefore, I cut out a 3/4 inch diameter disc from 1/32 plywood (1/32 ply is usually adequate, on larger models, 1/16 ply should be used). Before cutting out the 3/4 inch disc, I draw perpendicular lines on the plywood and cut on center. These lines help center the disc on the rocket tube section. The disc is then glued in place. The back balsa plug is given a liberal coat of Jet to make the balsa hard.

Next, drill a 1/16 or 3/32 hole through the plug so that it comes out off-center in the back (see sketch). Why the larger hole and drilled off-center? You may be thinking that the larger hole than the propshaft is for a brass bushing. Not so. I prefer to epoxy a brass plate on either end of the plug with holes the same diameter as the propshaft. I found out long ago that a bushing in the plug can cause binding if the propshaft gets bent the slightest amount. As for the off-set hole, it is used for making thrust adjustments easily. Simply rotate it so you have down, or down and right, or any combination your model requires. Once it is flying correctly, make a mark on the plug and cowl to keep it in the same position each time. It beats unsightly balsa shims!

Getting back to the plywood discs. Any aircraft design that has a round cowl, especially behind a spinner like the WW-II fighters and Thompson racers, are good subjects to use the plywood ring. It's so much easier to cut the ring using the Stanley tool. This ring in turn is glued on the balsa block, which forms the cowl. When the front is sanded, it conforms to the ring, and the front will be perfectly round. Much better than drawing a circle on the plywood and cutting it out with jigsaw and sanding it to get it round. Not only that, for radial engine cowls, balsa rings can be cut out and laminated together to get the desired effect. Believe me, I use my circle cutter on almost every project!

Mark Fineman sent in the following ideas to share with the rest of our F/F

scale readers:

"Dear Fernando,

"Just a few more thoughts on drawing up plans: The only method I use is to enlarge a slide of the original; graph paper (usually ruled in 1/4 inch squares) is indispensible. It tells you instantly if perpendiculars are correct and also allows you to correct slight parallax errors in the original slide. It's always a good idea to draw a square or rectangular border on the original artwork and include it on the slide. If it projects squarely on the graph paper, you know the rest of the drawing is OK. If it doesn't, just tilt your projector slightly to compensate for the photographic error.

"Here's another idea: Extremely cheap large and handy 'French curves' can be made by slicing S-curves on an ordinary manila file folder using a single-edged razor. Cuts should be made in a single, swift pass. By varying the shallowness of the S-curves, an almost endless variety of curves can be drawn. I've found them to be absolutely superb for tracing enlarged projections!"

Thanks, Mark, for those helpful hints.

In closing this month, here's the Flightmaster contest schedule for the year. On June 21, an R.O.W. contest for rubber and power F/F at Lake Elsinore. On September 19 and 20, the Flightmasters Annual at Mile Square Park, and on December 6, the Peanut-Jumbo Scale year-ender. •

Hannan . . . . . *Continued from page 50*

In California, Bill Noonan who has constructed four Bostonian to date, agreed, pointing out that it offers a change-of-pace outlet for scale modelers, allowing more freedom for creative expression. Fernando Ramos expressed some reservations that fewer scale models might be forthcoming as a result of the diversification of interest to Bostonians, but only time will tell.

Similar classes of models exist or have existed in the past, including *Manhattan Formula*, which may have indirectly led to Bostonian; *Embryo Endurance*, the outdoor event originating in Connecticut; and *Sainte Formula*, an indoor class strongly supported in Europe. From time to time other proposals have appeared along parallel lines, such as Richard Allen's *Extended Scale*, from Canada, and Bob Meuser's *Formula Frisco*. Curiously, very few new categories gain truly widespread acceptance, but it would appear that Bostonians will make the grade.

BAG OF BOSTON?

If your curiosity has been aroused, you might wish to see an actual Bostonian plan. Or two. Simply order Walt Mooney's latest "Bag of Peanuts #4," which in addition to 14 Peanut plans includes two Bostonians, the *Back Bay Bellanca* and the *Revere Speedster*. At five bucks for the entire pack, this works out to be only about 36 cents each, surely a bargain in today's economy. See Walt's advert elsewhere in this issue.

QUOTE WITHOUT COMMENT

Bob Wisniewski, of the Palomar R/C Flyers, who works parttime in the American Hobby Supply, San Marcos, California, has this observation: "I've reached the conclusion that most rubber-power model builders are either cheap or poor." *(Wouldn't touch that with a 10-foot antenna! wcn)*

THOUGHT FOR THE DAY

Ideas are like children . . . your own are beautiful.

AND IF YOU HAVE ANY GOOD IDEAS

William C. Pine, Aero Era, 5955 S.W. Glenbrook Road, Beaverton, OR 97007, is interested in suggestions or new designs for his range of small model plans.

HISTORY ACCORDING TO SNOOPY

Did you think Charles Shultz' famous cartoon dog Snoopy was only checked out in Sopwith Camels? Then think again! It seems he is quite knowledgeable about all phases of aviation, as demonstrated by the recent release *Snoopy Antique Planes Coloring Book*. Published by Ottenheimer Inc., and distributed by Price/Stern/Sloan, 410 North La Cienega Blvd., Los Angeles, CA 90048, the offering features line drawings intended for budding crayon artists to illuminate. (A few samples are even provided for non-creative types.) Among the aircraft represented are such diverse subjects as the Bellanca Skyrocket, Waco UPF-7, Boeing P-26, Doug-

las Dauntless, Fokker D-VII, Gee Bee R-1, Handley Page H.P. 42, Lockheed Orion, Messerschmitt Me 210, and Sikorsky VS-300 helicopter. Even lesser-known pioneer machines, such as the Avro triplane and Sommer biplane are in this collection, each of which also contains a Snoopy keynote. At $2.50, this little gem should be the ideal gift for every air-minded youngster in your family . . . or maybe even for yourself!

DEFINITION:

Former flight instructor Glen Williams evidently takes a dim view of water-borne vehicles: "A boat is a hole in the water surrounded by wood into which one pours money!"

AKRON'S FIRST AEROPLANE

Al Schmidt, writing in the Goodyear Model Airplane Club of Ohio newsletter "Windsock": "I recently discovered this old photograph hanging on the wall of the 'Ground Floor Deli' on State Street, across from O'Neill's in downtown Akron. It is an extremely clear picture of a *Demoiselle*. Attachment of flying wires and other details are very obvious. The caption under the picture reads as follows: "Akron's first flying machine poised for takeoff from a fairway at Portage Country Club (old clubhouse in background). John R. Gammeter, who owned Akron's first plane, gained fame as an inventor. His 266 inventions included the first machine for winding golf balls with rubber thread."

TAME YOUR RUBBER MODELS WITH A WILDER TORQUE METER?

Most rubber driven models are wound mechanically, and the usual way of "keeping track of the power" is counting the turns. Unfortunately, rubber by its very nature is rather inconsistent, with variations in size, batch quality, temperature sensitivity, etc. One approach to a more consistent measurement of rubber characteristics involves the use of a torque meter, which reflects the actual twist being exerted by a wound motor. In the past, numerous homemade units have appeared, but few commercially made examples. Bob Wilder is now producing in limited quantity such a unit, designed specifically for his indoor winder. The meter is designed for 1 inch ounce with a 360° deflection, and has a stop to protect the torque rod from accidental overload.

Materials and workmanship are first-class, certainly justifying the $18.50 postpaid price. Since there is a waiting list for these hand-crafted instruments, it is suggested that anyone interested should not send money, but rather a stamped, addressed letter for notification to: Bob Wilder, 2010 Boston, Irving, TX 75061.

THE PASSING PARADE

More aviation "greats" have left us within the past few months, among them Donald Douglas, James S. McDonnell, Jacqueline Cochran, and John "Jack" Northrop. Each became legends in their own time for remarkable contributions to the progress of aircraft. Special credit is due Jack Northrop, one of the most innovative designers of all time, whose influence was felt in many more projects than those which actually bore his name. How sad that some of his great efforts were hampered by interference from Washington's self-appointed anti-aircraft forces. Rest well, Jack, your accomplishments will be remembered long after all the petty and totally non-productive politicians have been forgotten.

AND SPEAKING OF FORGETTING

We should be more concerned about those still among us who are being neglected. As Frank Zaic so concisely put it: "Seems that there should be a special place for the old timers . . . we are preserving and restoring the old planes but not their pilots."

THE LAST WORD

Georges Chaulet relates an anecdote about pioneer airman Henri Farman, who in the very early days of flight was conducting experiments with a Voisin pusher biplane, at Issy Les Moulineaux, near Paris. There were plenty of curious people at the field, all eagerly giving advice and suggestions. One would say, "Why are your wings curved instead of flat?" "It would be better instead of having the curve on the top to have it on the bottom like a boat?" "Why are you using a gas engine. A steam engine would be much superior!"

At this point, Farman sat down calmly and asked: "Well sir, what are YOU flying?" The visitor turned his back and hurried away without another word. •

Plug Sparks . . *Continued from page 33*

guy's throat, now!) He further claims he would stack this engine up against any of the hot ones of nowadays!

Of course, we couldn't close off this section of the column without a photo from Bruce Lester, of Toronto, Canada. As most of you are aware by now, Bruce used to take his trusty Brownie camera to the Nationals and snap pictures when he could. Of course, some of the negatives have badly weathered with age, but as long as Bruce can do successful "missionary" work on the old prints, we

will continue to print them.

Photo No. 11, taken at the 1938 Detroit Nationals, shows Joe Konefes in his younger days with his idea of a winning combination; a high performance glider with a Brown Jr. in the nose. This idea remained in limbo until recently popularized in R/C glider designs in the last five years. There is nothing new in the modeling world!

NATIONALS O/T EVENTS

Last issue, we listed what events were going to be held over the three day O/T flying session at the San Antonio Nationals. Now, we have some more good news!

Despite the loss of his grandaughter (to boys), George Perryman has again graciously offered to sponsor the O/T Rubber Event for Juniors. Trophies will be to third place. So fellows, get junior off his duff and start flying those models I know he has built in conjunction with you. It really is fun!

Bill Baker of Norman, Oklahoma has indicated he will sponsor the Twin Pusher Event at the Nationals. This is a mass fly-off type event complete with countdown and launch. Last man down is the winner. If you missed your chance at the SAM Champs, here is another! Don't miss the fun!

CONTROLINE CAPERS

Just received a short note from Robert Sargent, 1694 Wright Avenue, Rocky River, OH 44116, announcing a commemorative controline contest to honor the 40th Anniversary of the first controline contest in the USA. The foregoing information was supplied by Chuck Tracy, retired Aviation Editor, Scripps-Howard "Cleveland Press."

The first meet was actually held in Brookside Park, Cleveland, on December 7, 1941. According to Sargent, Bill Schwab took photos and Jim Grega flew in the meet. Bob feels this is the time to celebrate. Can't help agree with him!

Almost forgot, the 40th Anniversary O/T Controline contest will be held on December 6, 1981. This is something real special, so don't miss it. We'll keep you posted on events as they develop.

While on the O/T controline vein, Photo No. 12, received from Harold Lanser, 5836 Caldwell, Visalia, CA 93277, shows an original Victor Stanzel Tiger Shark G-Line, scale up 1-1/2 times for R/C purposes. Hal sez he used a Falcon 56 wing with Friese type ailerons as a basis to build the Shark wing. Span came out 61-1/2 inches. The model is powered with a Torpedo 40X controline engine. That ought to make the boys sit up and take notice!

JIM WALKER MEMORIAL

Received another enthusiastic telephone call from Frank Macy, who is heavily involved in the Jim Walker Museum. The latest information is the results of a "Walker Get-Together" on March 27, where a complete update on the proposed Jim Walker Museum was given.

The meeting was attended by all of the Walker family and most of the employees of the American Junior Mfg. plant. Many of Jim Walker's artifacts were uncovered and brought to this meeting. Probably the most exciting thing to be uncovered besides Jim's model was the box of company photos, publicity, etc., and all information on proposed, experimental, and production models.

In the line of experimental models, the variety that showed up was truly a tribute to the inventiveness and genius of Jim Walker. Among the things that showed were the acoustic (R/C) controlled glider, biplane Fireball, a Fireball with flaps and wheel brakes, his idea on folding wings.

Actually, the main purpose of the meeting was to solicit help. It is Macy's intentions to turn everything over to the Oregon Historical Society. However, there is a problem of display room; hence, much of Walker's stuff may have to be farmed out to other museums. Frank is hopeful most of the memorabilia can be confined to one museum, but he recognizes the space problem and is presently dickering with the Washington State Museum in Seattle.

Frank says he has been so busy on this project, he hasn't had time to write his book dedicated to Jim Walker called *Fireball in the Sky*. Frank indicates he will keep this columnist and all other modelers fully informed on the progress of the museum.

SAM CHAPTER REPORTS

SAM 27: Most clubs feel they are fortunate in having one steady field to use, but the SAM 27 boys, according to Don Bekins, have three: McGuiness County Park, Indian Valley College, and the C.G. Station of Petaluma. At one time, the club had only the Coast Guard Station area to use, but energetic action has produced the extra fields. No wonder SAM 27 is growing like a weed!

SAM 30 BROWNS VALLEY INTERNATIONAL has always had the honor of leading off the California schedule of old time R/C Assist Contests, and 1981 was no different. Held at the Speed Hughes ranch, Brown Valley, California, the meet was almost postponed, as the weather reports were so threatening.

Surprisingly, the turnout was quite heavy. The predicted rain never did materialize, and the entries were heavy in all events. To help speed up fre-

quency control for Sunday's Texaco Events, the 1/2A Texaco Event was moved to Saturday, giving four events on one day: Class AB, Class C, Antique, and 1/2A. In spite of the apparent crowding of events, it actually turned out to be the smartest move, as the big Texaco Event was the only activity to get washed out on Sunday.

On Saturday, with temperatures not too encouraging, quite a few of the modelers held back. Surprise! There was all sorts of lift, and by 12 Noon, at least two "maxes" in each event was the order of the day. Turned out in practically all events, if you didn't get into the early air, you blew it!

The boys using ignition motors in their models again stole the show in Class C by taking the first six places! (Signs of the times?) Ignition powered models also scored in Antique with the first two places. Looks good to have all types of engine represented. Let's take a look at the results:

CLASS B

1. Don Bekins	20:40
2. Charles Critch	13:24
3. Rich Kultti	12:36
4. John Pond	7:20

CLASS C

1. Ted Kafer	26:00
2. Ed Solenberger	24:46
3. Don Bekins	21:00
4. Jack Alten	20:05
5. John Pond	18:25

ANTIQUE

1. Don Bekins	30:40
2. Speed Hughes	28:12
3. Carl Tulp	27:18
4. Steve Roselle	21:37
5. Jack Alten	20:40

1/2A TEXACO

1. B. Vincent	30:00
2. Don Stringer	27:47
3. Don Bekins	27:35
4. Don Carll	23:27
5. Eut Tileston	23:22

In summarizing the contest, the way to a man's heart is his stomach! The girls, especially Neva Nicholau and Miriam Schmidt, put on a hot dog and hamburger feed, complete with beans and salad that was out of this world! Everyone was a winner at the chow table!

Photo No. 13 depicts Eut Tileston's Weathers' Westerner, powered by an O.S. 60 4-cycle. This model has been used extensively in model shows. Eut does things with this old timer you wouldn't believe. To really rub salt in the wounds, Tileston can really make the model soar, as he has won or placed numerous times. He now has a scaled down version for 1/2A Texaco. Flies just as good!

SAM 39: Ralph Turner reports the Randall Park Mall Static Show went over quite well. Ralph rightly takes the complainers of the judges to task. He states the objective of the show has always been the promotion of model aviation. The participants should realize the tremendous amount of work and time that goes into the organization of these meets. We are not thanking the voluntary help by criticizing their efforts.

I wish I had thought of that!! You've got to remember, fellows, this is a hobby and should be regarded as such. If you are not having fun, you are wasting your time.

SAM 40: Otto Gunnesch, of 214 E. Henry St., Saline, MI 48176, writes to say SAM 40 had 8 contest in 1980, and has scheduled 8 more for 1981. If you are in the Michigan area, pay attention to these dates: May 17, June 14, July 12, August 9, September 6, and September 27. In addition, Otto says they will have two meets on June 21 and July 19 that will feature 1/2A Texaco, rubber power, and catapult glider. How about that for variety?

Gunnesch reports with old timer activity swelling (SAM 4 is also in the area), there should be no lack of old timer contests and activity. In addition, the Exchange Club, at Troy, sponsors a huge statewide meet that includes old timers. Things are really popping in Michigan!!

SAM 41 Newsletter Editor George Wagner reports that the San Diego Aeroneers monthly contests are slowly increasing in size every month. Now that the club has adopted 1/2A Texaco, this writer looks for added membership participation. This one is truly a fun event!

ENGLAND: Keith Harris sent us Photo No. 14, taken at the Model Engineer Show in London. The upper model is one of those little seen designs called the "Firebird." Mike Whittard, who has been spearheading the O/T R/C Assist movement in England, was responsible for this model. No reports yet on how well the Saito 30 4-cycle handles the model.

MISCELLANEOUS: Just received a letter from President Dick Tanis of the North Jersey R/C Club wherein he announces they have secured a new field. All due credit should go to John Denke who has put in a multitude of hours locating a field. The field selected is on state land, deep in the middle of a forest, located on the top of a mountain. Talk about getting away from the maddening crowd!!

Dick says the area is beautiful, with a lake at one end for the kids to go fishing. So far, field expenses have run them over 1500 dollars, with another thousand needed. They are also working on an area for the wives. You'd better, fellows!

THE WRAP-UP

Generally, this columnist likes to end the column in a humorous vein, but this time we must report that Sven-Olov Linden, of Hovstavagen 15, 70363 Orebro, Sweden, has finally run out of gas and will no longer be publishing the excellent newsletter *"Old Timer."* As Sven notes, the writing, printing, collating, and mailing just got to be too much for him to handle. Matter of fact, Sven felt it was taking all his spare time.

However, Linden will continue to write and his material can be seen in the Swedish Aeromodelling magazine, *Modellflygnytt*. This is the official paper of the SMFF (Swedish equivalent to American AMA). Those who want to continue to receive news of O/T activities in Sweden should take out a subscription. Those interested can write to: Sveriges Modellflygforbund, Box 100-22, S-600 10 Norrkoping, Sweden. Sven concludes by saying he will maintain correspondence with this writer and magazine. Hopefully, in the near future, he will keep us advised of Swedish old timer activities and will possibly send some more of those good photos! How about that? •

R/C Cars . . . . *Continued from page 44*

all it is, no real mystery. If you prefer, you can think of it as the pressure each front tire exerts on the ground being unequal, which of course is the same thing. If you like, you can go to the back end and apply the same thinking there. Tweak is unequal weight loading of the rear tires. And it is, but as it is much easier to adjust tweak (weight loading) at the front than the rear, let's get no further into that, except to realize that different weight loading at the front wheels directly affects the rear tires and their weight loading.

This relation between the front and rear tires is also easy to understand, especially as our R/C cars use such rigid chassis pans. Any weighting of either front tire, whether light or heavy in relation to the other front tire, affects the diagonally opposed rear tire in exactly the same way. If the left front tire has more weighting than the right front, this causes the right rear tire to have more weighting than the left rear. Which means that the right front and left rear have, in this case, less weighting. For the doubters, simply grab your car, place it on a flat surface and start picking it up by the corners, one at a time. If you pick up the right front, the "light" tire in the preceding example, you should note that only the diagonally opposed tire,

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(plus $8 shipping)

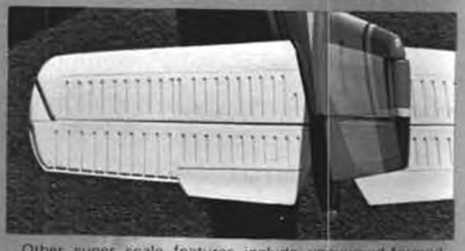
Kit includes scale wingtip nav/strobe detailing.

A-36
Retail value - $181.20
Factory direct - $154.02
(plus $8 shipping)

T-34B
Retail value - $186.20
Factory direct - $158.27
(plus $8 shipping)

Scale effects include molded louvered inspection panel, landing light and grill plus scale nose gear strut, wheel doors, cowel flaps, engine exhaust & removable cowel.

T-34C
Retail value - $198.00
Factory direct - $168.30
(plus $8 shipping)



Other super scale features include vacuumed-formed skin detailing for stabs and control surfaces.

An optional instrument panel and cabin interior are also available for the V-35B, F-33A and A-36.

Optional Interior
Retail value-$29.50
Factory direct-$25.08
(plus $2.50 shipping)

Prices subject to change without notice.

Byron Originals - P.O. Box 279 - Ida Grove, Iowa 51445 - Ph: 712-364-3165 - Telex: 439012 IDAG

⅓ Scale Pitts Special
Suggested Retail Value
$292.80

Factory Direct Price
$248.88
(Plus $12.50 shipping)

Pitts
Wing Span - 68"
Wing Area - 1400 sq. in.
Length - 62"
Power Quadra engine or .60 Byro-Drive Prop Reducer

Kit highlights of our new Beechcraft Series

•Scale detailed fiberglass fuselage •injection molded foam wings, stabs and control surfaces •wheels •landing gear •Robart scale nose strut •spinner •scale, vacuum-formed detail for all control surfaces •decals •antenna & beacon •one-piece, vacuum-formed window insert •hinges •pushrods •cowel flaps •wingtip nav/strobe detail •plus all necessary hardware and die-cut materials to complete model.

Model	Wing Span	Wing Area (sq in)	SPECIFICATIONS Ready-to-fly wt.	Channels No. req.	Power (No Prop) Reducer required	Length
V-35B	66"	700	8-9	4-6	stand. .60s	53"
F-33A	66"	700	8-9	4-6	stand. .60s	53"
A-36	66"	700	8-9	4-6	stand. .60s	54¼"
T-34B	66"	700	8-9	4-6	stand. .60s	53"
T-34C	66"	700	8-9	4-6	stand. .60s	57"

MiG-15
Wing Span - 57"
Length - 55"
Wing Area - 600 sq. in.
Flying Wt. - 8-9 lbs.
Power - Byro-Jet Ducted Fan & .60 Engine.

MiG-15
Suggested Retail Value
$170.68

Factory Direct Price
$145.08
(Plus $8.00 shipping)

In The Classic Byron Originals Tradition.

1/5 Scale P-51D Mustang

Actual photo of model on final with operational flaps and scale retracts extending

SPECIFICATIONS

WING SPAN	85"
WING AREA	1300 sq. in.
LENGTH	76"
Ready-to-fly weight	22½ lbs.
CHANNELS	4
(6 for flaps & opt. retracts)	

Retract System

Suggested Retail Value $169.94
Mail Order Price $144.45
plus $2.65 shipping Sorry, no C.O.D.'s

P-51 Kit

Suggested Retail Value $699.95
Mail Order Price $594.96
plus $13 shipping Sorry, no C.O.D.'s

VISA

Complete Power Package Included in Kit!

Consists of:
- Complete drive unit & mounting
- Scale 24 x 15 four bladed prop
- Quadra's latest Schnuerle ported engine
- 5½" spinner

Optional Pneumatic Retract System!

(Includes all necessary hardware)
- Sequencing gear & wheel doors
- Operational scale Oleo struts
- Scale tires & wheels
- Single servo actuation

(Fully illustrated in plans)

Prices Effective June 1, 1981 (subject to change without notice)

Complete Kit Concept!

This deluxe, super scale kit, complete with factory-installed Quadra engine and prop reduction system, is unquestionably the most sophisticated and realistic scale reproduction ever made of this famous WW II fighter. Kit includes detailed fiberglass fuselage, injection molded wings and control surfaces and all necessary hardware to complete model as shown. Four deluxe decal schemes, three view and detailed plans and isometric drawings also included. **NOTE:** Pilot, paint, covering material and radio gear not included. In order for you to better appreciate this superb kit, we are offering a detailed information pack, complete with materials list, owners manual, parts price sheet and a miniaturized set of assembly plans and isometric drawings. Simply send us $2.00 along with your name and address and we'll forward your pack immediately. Once you review it, you'll understand why the P-51 from Byron Originals is being heralded as the greatest engineering achievement in modeling history.

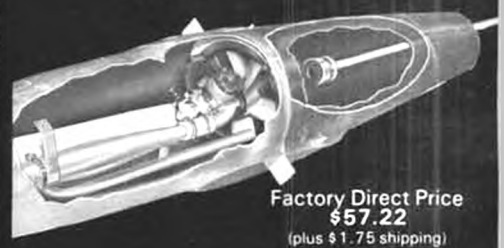
Byro-Jet Fan Unit
Suggested Retail Value
$62.44

Factory Direct Price
$53.08
(plus $2.00 shipping)

F-16 Kit
Suggested Retail Value
$270.26
Factory Direct Price
$229.73
(plus $10.50 shipping)

F-16
Wing Span - 47"
Length - 74½"
Effective Wing Area - 750 sq. in.
Flying Wt. - 9½ lbs.
(less optional tanks & missiles)

Byro-Jet Tuned Pipe System
Suggested Retail Value
$67.31



Factory Direct Price
$57.22
(plus $1.75 shipping)

the left rear has more weight transferred to it, carried to extremes, the other tires come completely off the ground, effectively proving the point. *(Tweak has been around ever since the first four-legged table refused to sit solid, without rocking on two diagonally opposite legs . . . could be uneven legs or uneven floor . . . or both . . . Until match books were invented, we don't know how our ancestors managed to solve the problem. Who needs a diagram for that? Hah! wcn)*

Before eliminating the tweak, it is necessary to understand more precisely its effect, as to know that it causes tighter turning one way than the other is not enough. As the tweak is adjusted at the front end, I always think of it in those terms, and so just remember that the car will turn tighter toward the heavy front tire. Why this is true is also easy to understand. With the left front more heavily loaded, the diagonally opposed tire, the right rear, is also loaded, as per above. More pressure on the tire means more traction, the right rear is simply contributing more than its fair share of push, and this push is shoving the car around to the left, giving the steering front wheels a bit of help. With nothing changed, except the car in a right hand turn now, the right rear tire is still kicking in with a bit more push, only this time it isn't helping the front tires, it is fighting them.

To clean things up a little, so far we are dealing with a chassis that has the left front and right rear tires more heavily loaded than the right front and left rear. The car turns tight to the left, wide to the right. We want it to turn equally well in both directions.

And this can be accomplished two different, oops, at least three different ways, depending upon the car. Hmmm, missed again, I can now think of four ways to do it, but suggest only three, again depending on the car. In the case of a car like the Associated RC 12E, the only method I trust is to shim up the heavy side front suspension piece. But the RC 12E seems to have a little problem all its own in that quite often something in the front suspension pieces is not true, probably the surface that is common to the chassis pan itself. Before correcting for tweak, carefully check to be sure that both front tires run flat. If not, this can be fixed by shimming just one side of the suspension piece where it is bolted to the pan. I generally only need a .005 to .010 shim to get this right. Although this thin shim doesn't seem like much, the difference at the wheel is easily seen by eye. With this condition corrected . . . if it exists in your car . . . run the car again to see if the tweak is still there. After determining the heavy front wheel, which is always to the inside of the tighter turn, you get to start fiddling with shims. I personally regard shimming in .010 increments as being too coarse, but it will at least result in a definite change, and being able to notice the change is the first important step in working with chassis tweak. So, until you get more experienced with the car, shim .010 at a time, running the car each time, carefully noting any changes. When it gets close, you might have to use .005 shims or even .002 to get things just perf. The Delta Super J 1/8-gas cars are set up in a very similar manner, using shims to change weight loading, the only difference being that I use a Delta Tweak Board instead of running the car after each adjustment. This instrument is very accurate and I regularly shim our racing Delta's to a tolerance of plus or minus .002, which ought to give you an idea of how fine the adjustment can and should be.

Even though most of the Dirty Racing Team cars are shimmed to get proper tweak, or more accurately to eliminate it, there is another way that is a lot handier, especially for the racers without tweak boards. And this is the tweak plate, an invention of Bob Welch's and marketed by Model Racing Products. It consists of a "V" shaped piece of 3/16 thick flat aluminum. It is bolted to the chassis pan with a single bolt placed at the bottom of the "V", generally directly under the servo saver. This places the upper legs of the "V" adjacent to the left and right front suspension pieces. Each leg, at the forward end, is tapped for a setscrew and by turning, for example, the right hand screw in until it contacts the chassis pan, the screw preloads the pan, also loading that tire more heavily than the other. It is quite effective, so much so that you will see Team Associated using them on their 1/8 cars . . . and none of the different manufacturers are at all prone to using equipment manufactured by others. I have used the MRP Tweak Plate on all our 1/8 cars, excepting the Delta's, which don't seem to go out of adjustment once set properly, plus not having a spot to fit the plate into. Many will set the tweak at the track using this handy gadget, however, I prefer to do it with the tweak board and again the tolerance is held very closely.

Another tweak adjustment is used on the 1/2 cars featuring springs in the front end assembly, the most common being JoMac's older Jerobee chassis and the

all-new Lightning 2000, as well as BoLink cars utilizing the Jerobee chassis. With these cars, the springs can be cut or stretched to get adjustment of weight loading, although I much prefer, with the Lightning 2000 chassis, to simply shim the heavy side, as with the Associated car. Whatever works for you is the best. Try it both ways and look to the instruction manual furnished with Lightning cars for more information.

The fourth method of adjusting tweak, and one that I have *never* had satisfactory success with, is to simply grab the front and rear of the car, twisting the pan in a direction that might equalize weight loading. I have seen a couple of damn good racers do this often, but they are very experienced and even at that, I've seen them go the wrong way with the twist a few times. My idea here is that twisting the pan is an unacceptably inaccurate way of adjusting something that should be right down to a couple of thou or so. And most pans in common use will go right back to their built-in tweak, especially after a couple of good hard knocks (as in hitting another car or the track barrier). The glass we see in chassis pans seem to have a "memory" and simply shaking a car hard, maybe even bouncing it on the ground, will settle the pan back to whatever degree of warp was there way back when the resin dried in the manufacturing process.

Now that you know what tweak is, what it does, and how to eliminate it, the discussion isn't finished until mention is made that some racers have been known to set in some tweak on purpose. I have tried this, did not like it, and so never set my cars up this way and suggest that you won't like it either. However, the idea is that with most road courses having more right hand corners than lefties, the right hand turns should be favored, tweaking the car to help. And on some tracks there might be one or two particularly tight right or left hand corners, the tweak being set to gain an advantage here. It is an interesting idea, but I feel that to be worth an intentionally tweaked car, the corner(s) would have to be outrageously tight.

A more logical time and place to use intentional tweak would seem to be at the occasional Oval race where the cars only have to turn to the left and the corners quite often are to the same radius. Again, I have tried intentional tweak in Oval racing in 1/12 Gas, 1/12 Electric (indoors on carpet) and 1/8 Gas. Given more experience in Oval racing, I might even learn to like using tweak to adjust the left hand turns, but what I came up against was the fact that, even in Oval racing, you really don't turn only to the left. In single-car qualifying, maybe. Add a few other cars to the track and you will quickly find that turning to the right is also necessary to get through traffic. I can still recall the time I fiddled with my Super J, setting the tweak so that the Oval turns were simply turn-and-hit-the-power, the car almost driving itself through. Ecstasy! Until I had to dodge to the right, when the pussycat turned tiger and was in fact almost impossible to control. Chances of success in using intentional tweak are greater in 1/12 Oval racing, by the way, due to the lower power-to-weight ratio.

Final reasoning for not shimming in any tweak is that, especially in 1/8 racing where the cars are high-powered, tweaked cars tend to come off the start line in directions other than straight ahead. Definitely not a handy thing. . .

Now that you understand tweak and all its implications, it is no doubt easier to see why it is always best to be racing on matched sets of tires, or at least to start out on matched sets. Matched in not only compound, but in the really important area, diameter. No, the fronts don't need to be as tall as the rears, haven't you been paying attention to any of this?

GETTING A GOOD START

The start of a race is always hectic, especially at the first turn. Everybody wants to be the first one through and on to a clear track. So getting a quick start is very important.

Now this may sound dumb, but do you look at your car or the flagman or the flag when the start of the race is imminent? As it works out, most probably keep their eyes on the car, which ends up being (for not so obvious reasons) the hot tip, but I have seen racers who would watch the flag, thinking that it would give them a jump, and then being able to pick up their car after it is off the line.

Don't ever do that! Instead, watch your car, only trying to avoid getting a fixation on it. You can easily see the flag come up out of the corner of your eye, and as is common knowledge in motorcycle racing, the human body reacts quicker to movement seen to the sides than to those seen in the center of the field of vision. Don't ask me why this is true, although it probably goes back to some caveman worried about being attacked by a wild animal. Just accept it as a proven fact. Or next time you are at a motorcycle race, watch the pros at the start. They do *not* look at the flagman, instead focus directly in front of them

where they want to be as fast as possible. Last time we went to a bicycle motocross, I noticed that even some of these youngsters had either picked up on this on their own or been advised by a biker. Either way, they were the ones getting the good starts.

NEXT MONTH. . .

Who knows? Will the camera be fixed? Will I have another excuse? Can we find anybody who cares? *(Will you solve the Cord's shimmy? wcn)* •

R/C Scale . . . . *Continued from page 23*

tion program. Everyone, as I understand it, will be eligible to try for the team by declaring their intention to do so in the Expert classification and paying the required fees. This must be done *in advance* of turning the model in for judging.

NOTES FROM AROUND

A letter from Del Major brings the following interesting information to go with the pictures this month.

"Dear Bob,

"Here I am at the Wrams Show and I was hoping you would be here, but maybe we can connect at Toledo. I talked to you at the Nats about some pictures and the Brimfield Hydro Contest. The Brimfield, Massachusetts contest is just about the oldest of its type in the country, being around 15 years old. There are 2 contests per year, in the spring and fall. The spring event, May 16-17, 1981, is a fly-in, fun-fly type of weekend, and the fall contest (September) is pattern and scale.

"The pictures are of a Waco SRE by Sterling. Bob McKenno is the builder and the plane is powered by an old Merco .49.

"The Tiger Moth, powered by an Enya .29, was built and flown by Don Foster (of Gee Bee Line).

"The PBM, by John Nicalaci, was the cover model on M.A.N. about five years ago. John flys it every contest and it's a show stopper. It has a 13 foot wingspan, weighs 40 pounds, is powered by two St.71s with Eastcraft starters. The functions include bombs, parachutes, and torpedos.

"I hope you can use these pictures at some time so that the West Coast can see where this stuff originated.

Del Major"

Thank you, Del, for the photos and information. I've always itched at the thought of having a chance to fly off water. It sounds like a great thrill (as long as you don't have to retrieve from under the water).

MORE NOTES

Top Flite's new material, Fabrikote, is on the market and appears to be a very good product. Not having anything to cover at this time, I "farmed" the task to a good modeling friend in St. Louis, Joe Nabor. Joe is an outstanding builder and is extremely familiar with using Monokote. He has built a number of scale models using the paintable variety, and has given the demonstration for my yearly Newcomers Class for years. The following notes were set down by Joe after completing a new model.

Because of the weave of cloth, it seems that the glue or gripping area is less than on Monokote . . . so it is more important to have a smooth and *very clean* surface with no dust.

If you do get a wrinkle . . . keep working area with heat and rub with rag . . . wrinkle will work out. Don't give up too soon.

Shrinkage rate in this material will eliminate all but the most ridiculous wrinkles. I couldn't seem to make any situations where the excess would not shrink out tight.

Material when tight has a good, taut feel.

Always hold edge of the material while heating, or a piece will literally shrink away from where you put it. Do not stretch tight . . . just hold a "slight" tension to counteract the shrink of the material.

Heat solid or wood areas first . . . shrink open area last. Use very little heat in fillet areas . . . heat and press material down with rag (too hot for fingers).

It would probably be best to try and adhere material with some adhesive or find something that reacts with the material adhesive to make it stick without heating (for areas such as joint between stab and fuselage).

On wings, tack all around wing perimeter (1/4-inch tacks about 2-3 inches centers). Work as best you can from center or start of wood areas outward to edges. While heating, hold some pressures on material to prevent excessive shrinking. Be sure and start with a 1 inch or move overlap. High shrinkage could leave you without a finger grip.

Material holds heat much longer than Monokote, so hold down areas with rag a few seconds after heating for glue to cool and harden. Otherwise shrinkage can cause lifting from surface. Had to work a bit at making seam lines exactly straight in beginning due to shrinkage. Suggest an overlap, heating about 1/8 inch past edge of line required (such as centerline of wing panels) then trim excess

along line.

It would appear that Joe worked at giving a fair and complete workout to the material. He felt that the material was a valuable addition to the Top Flite line. Since these notes were provided, he has painted the model using his standard technique. In this case, one coat of primer was sprayed on the model and then color. It took very little paint material to achieve the finish. The control required to create either a fabric texture finish or a super smooth glossy finish was easy to maintain. For those who need not paint, there are a variety of colors. Check out your local hobby shop, as the material is available.

STILL MORE NOTES

Sky Books International Inc., 48 East 50th St., New York, NY 10022, provides books which include some aircraft items as well as uniforms, tanks, etc.

AND ANOTHER

A recent communication from a modeler who appeared to be greatly frustrated with a number of problems reminded me of a situation that I encountered when first starting in this hobby about 13 years ago. I showed up in an area away from home with a particular brand of engine on my model. Considerable attention was paid to it since that brand was rarely used in that area. Most of the local modelers used one specific brand. At a later date, when another trip was made to that town, I went to the local hobby shop. The owner, knowing that I was from out of town, asked whether I would be interested in a really super deal on one of the engines that the local guys had used almost exclusively. I noted that he had a case full of them. When I asked about why such a good deal, he responded by saying that the "local expert had decided that they weren't any good anymore," and he couldn't give them away.

That experience prompted me to store away the fact that one must beware of experts! Actually I am speaking of those persons, generally self styled experts, who try to suggest that there is only one way to go whether it be with equipment, materials, building techniques or whatever. Such an approach generally is not either realistic or honest. As a result of this belief, we have always attempted to suggest to the members of our yearly Newcomers class to spend a considerable amount of time listening and watching in an effort to assimilate information before making their own carefully considered decision. Some fellas have a great deal of success with certain equipment, materials, or building techniques, while others have nothing but trouble. Therefore, visit the local flying areas and club meetings and talk and ask questions but hold what you hear and see in reserve.

A THREE-VIEW VIEW

Over the last year or two I have had the opportunity to possess the original factory three-view (or copies of them) for aircraft that I am interested in modeling. Very often one tends to think that with this type of document you possess the "ultimate building weapon." T'ain't necessarily so, however. As I compared the factory drawings with photos, I discovered a considerable number of differences between what was finally built and what was originally drawn. Lest you tend to think that perhaps the photos were of a later model of the aircraft, forget it. The aircraft that I am speaking of was the only one built, therefore the changes could not have crept in with the building of subsequent versions of the aircraft.

Certainly what happened was that as the aircraft was in the building stage, certain modifications were necessary for one reason or another. What didn't happen were "as-built" changes to the original drawing, with which I eventually came in contact. When you come up with a three-view made *after* the production of the aircraft, you may actually come in contact with fewer errors.

Often the errors that we are speaking of have little or no effect on the flying characteristics of the aircraft. They may tend to be cosmetic in nature. Unfortunately, these items are the ones that very often show up the most when the model is judged statically from a distance. As a result, they may actually show up more in a Sport Scale competition than in precision, where the judges spend a great deal of their time closer to the model.

Some illustrations of the types of things that you might pay particular attention to include the following:

Tip shapes: wing, stab, vertical fin, rudder, etc.

Canopy shapes: very often these are different.

Windows: Their placement, shape, size, especially the corners.

Cooling openings: shape and size

Trim tabs: They have a way of appearing and disappearing.

Those are just a few of the differences that can very often appear between the original drawings and the finished aircraft. It would be to your advantage to *carefully* check your photos and any three-view for these types of items *before* one drop of glue hits one stick. In addition, don't act on the assumption that a three-view drawn at a date after the aircraft construction is completely accurate either. It is entirely possible that the person who drew the later one used the original factory drawings and didn't pick up all the subtle changes. Of course, you must also remember that at times a three-view will be published for an aircraft and the person who produced the drawing will never have seen the aircraft in person but will simply have created the drawing from photos. Don't misunderstand, I am not saying

that it might not be an accurate drawing, but experience leads me to personally be very cautious in doing my checking.

I guess what we are saying for the umpteenth time, is to spend lots of time sorting out these kinds of things before you start. I cannot begin to count the number of times I have been called or have received letters that ask where a person can come up for information "on the Widget Ten *that I am now building*"! That person is bound to run into problems that can prove to be very difficult to overcome. It is very much like the parent asking, "When should I begin teaching my child good manners?" When the child expert asked how old the child was and learned that he was three, the answer was given; "You are three years and nine months too late!"

AND A LAST SHOT

The mail brought a few samples of spruce that is now being marketed by Midwest Products, Hobart, Indiana. The wood, under Midwest's standard trade name, Micro-Cut finish, comes in 72-inch lengths. It is stated that the wood is full size aircraft grade. There were ten sizes listed, running from 1/8 x 1/8 x 72, up to 3/8 x 1-1/2 x 72. The basic thrust of the market need would probably be in the giant scale area, although I can see some very practical application for any size model.

Remember that when the future really looks bleak, a little scale will shrink it down to a size you can handle. ●

Sport Scene . . *Continued from page 48*

static thrust which seems to work well.

Thrust is a force, and as such can only be related to a change in momentum. In the case of a propeller, the easiest way to look at it is that the prop generates an ever-lengthening tube of high velocity air. That is, the velocity is constant, but the total mass is steadily increasing. Basing the thrust on that we get Thrust equals function (pitch x diameter x rpm)^2. Well, I tried that formula, and the fit to the data I had was lousy. After fiddling around for about half a day with my programmable calculator, I came up with the following:

$$\text{Thrust} = \frac{\text{diameter}^{1.75} \times \text{pitch}^{1.2} \times \text{rpm}^{1.2}}{145}$$

where diameter and pitch are both measured in inches, and the rpm figure is in 1000's of rpm. Just to show you how it works, a Fox .25 R/C with muffler is reputed to turn a 9x4 prop at 13,200 rpm. Plugging that data into the formula (use a calculator with a y^x function or relearn how to use log tables . . . yuk!, the thrust comes out at 37 ounces. So? Well, the additional data from that engine test yields information that the engine would put out 39 ounces at 11,700 on a 10x4, 43 ounces at 11,900 on a 9x5, and 45 ounces of static thrust at 14,600 on an 8x5 propeller. So you can not only use this information to select the prop that will pull the hardest for an airplane you have, but you can use the information to correctly size a new model for your engine.

As a companion to the above formula let me remind you of another I published some time ago, one for the relationship between weight and wing area, with scale effects thrown in.

$$\text{Weight} = k \times \text{Wing Area}^{1.5}$$

Weight is in ounces, Wing Area in square inches, and that funny factor "k" is a dimensionless constant related to the type of model. Some key "k" numbers are:

Pattern R/C	.005
C/L Stunt	.0045
C/L Combat	.003
R/C Glider (sport)	.002
R/C Glider (comp.)	.0012
C/L & R/C Scale	.009

You can calculate your own "k" factor from the actual weight and wing area of any model you especially like and then use that for your new designs.

Once you have the engine, the engine performance and the thrust it generated, you can use the above formula to calculate the wing area of the model you intend to build.

Again, take the Fox .25 and use the 8x5 prop on an aerobatic model. The weight should be just under the static thrust for true vertical performance. I'd pick 42 ounces. Using the second formula and our k=.005, we get a wing area for the model of 413 square inches. That is not a surprise to anyone who builds models that size, but isn't it a confidence builder to see that results make sense?

The thrust equation is on somewhat shakey ground in my opinion, because it was empirically derived from relatively few data points, and does not, for example, take different prop designs into consideration. What would be ideal, would be for some brave and honest soul to build a for-real thrust stand and record the thrust and power absorption vs rpm for lots of the most popular propellers. Given each a few props at a few rpm levels each, the formula could be tightened up considerably. T'would be a great college experimental project or even within the reach of some enterprising high school

science fair project. I would love to hear and discuss other opinions and ideas on this subject, just keep them clean and suitable for a family magazine if you disagree violently with my analysis.

At the IMS show this year, Dale Willoughby had a booth for his new Scale Model Research Photos service. You can get a beautiful pack of photos on most of the popular scale model subjects, and even some pretty obscure aircraft. Dale is adding to the list all the time. If you want his list, prices, etc., send a SASE and $1 to P.O. Box 675, Orange, CA 92666, with your request. The photo packs that I saw were for-real color prints of photos shot with the scale modeler in mind. Lots of views and lots of detail.

The first model presented this month is a beautiful Corsair which is especially remarkable in that it is quite small. All the information I have on it is that it was built by John Witemore, who is the VP of the Connecticut Balsa Bugs. The photo was sent to me by Bob Davis, and not too surprisingly, the model sports a diesel converted Tee Dee .09 engine. The photo was shot in the summer of 1980. I don't have any data on whether it is a kit, scratch-built, or magazine plan design.

Second, we have an oldie-but goodie from Rosie's R/C products, the Tee Dee .049 size power pod. She's still selling them, and they are well built and convenient to mount to your glider. The easiest mounting is a sheet of ply with the pod screwed to it; then rubber band that over the wing. Another scheme is the replacement canopy with the pod fastened to it. You could even hinge the pod at the rear so that when the engine runs out of fuel, the pod flops back into a recess in the fuselage.

Next airplane is the latest version of the Goldberg "Skylark Jr." This copy is held by a smiling Bob Rich. This is a model which deserves serious consideration. It was way ahead of its time in that it is reasonably lightly built and large for the class of engines recommended for it. With the latest in .10 engines and 4 channels of the smallest R/C gear, it should be an outstanding sport performer. With tissue covering and a clear finish, it would perform well even with a hot .049 and two channels, too.

From Hobby Hideaway comes an attractive control-line sport model for .049 engines. The design is a profile of the famous P-51C which won the Bendix Trophy race in the hands of Paul Mantz. Everything seems to be there to produce an enjoyable model. When both ends of the pushrod come pre-bent you know that the manufacturer has good confidence in the engineering and fit of his kit!

Last bit for the month is a pair of photos from Midwest Products Co. It has recently been in production on the RK-20B ducted fan unit. In addition, it has now come out with a variety of special accessories to allow use of the fan system in more varied circumstances. Inlets are now available for all three sizes of fan units to boost performance when the fan is external (as on a jetliner, for example). The inlets are molded urethane foam and are paintable. In addition, a larger size fuel tank is being produced for the RK-20B, to give 6-1/2 ounce capacity. When running engines at very high rpm, I guess the fuel consumption is bound to go significantly higher than normal. •

Great Exp. . . . *Continued from page 61*

allow to dry. Crack the L.E. and T.E. at the center section. Raise the L.E. 3/4 inch at each tip and the T.E. 7/8 inch. Don't omit the washout, as it helps the model to circle tight without tip-stalling. Add the 1/16 square spars now, while the wing is still on the board. Once the cement sets, pull the wing off the board and sand the structure to shape. When covering, don't forget to stick the tissue to the bottom of each rib so the undercamber is preserved.

TAIL SURFACES

Make a template and cut out the stab ribs. Pin the L.E. and T.E. down and install the ribs. Use hard balsa here for strength. The rudder is 1/16 square balsa and likewise built over the plan. The tip rudders are cut from soft 1/32 balsa and cemented to the stab after covering.

ASSEMBLY

Cement the stab to the fuselage. The rudder is cemented to the stab. Hold the wing on the fuselage with a drop of 30-second contact cement applied at each corner of the center section. If you plan on flying the model outdoors, add a coat or two of thinned-out nitrate dope. If you are flying indoors, don't dope at all. I use a length of 1/8-inch aluminum tube for a motor peg. Slip the wheels on and it's about ready to fly!

FLYING

Test glide your G.E. and add clay to the nose or tail to achieve a smooth glide. Start with a loop of 3/32 rubber about 10 inches long for first flights. Eighth-inch rubber has prived best for maximum duration outdoors. Both of my G.E.'s have flown left under power and left in the glide. Have fun with yours, that's what free-flight is all about! •

Giant . . . . . *Continued from page 25*

PACKS will supply an equal portion of the radio's power needs. Should one pack become weaker for any reason, that pack's load will be reduced, and a greater supply will be accepted from the good pack. Should one pack die for any reason, that pack will be LOCKED OUT of the circuit, and the remaining good pack will assume the entire load! No power can flow from one pack into the other, so there is no way for a dead pack to drain the remaining good one.

George's system contains three LED indicators. There is one indicator for each of the separate batteries, and one that shows power flowing toward the receiver. The amount of information that these three indicators give you is

unbelievable. In normal use, each battery will be delivering equal power, and therefore each battery LED will glow equally, and at a slightly reduced level (each battery supplying only half the radio's requirements). With the receiver on, but the transmitter off, the Supply LED, the one that monitors the total power going to the receiver, will be at moderate brightness, because with the transmitter off, the receiver SHOULD NOT be oscillating. When you turn your transmitter on, the receiver will immediately start oscillating, draw more power, and the Supply LED will then go to full brightness. An indication that the radio is now fully functional.

If one battery should start to lose power, it will be shown on the battery LED's. The weaker battery's LED will dim, and the good battery's LED will get brighter. This Dim/Bright balance is proportional to the strength of the batteries. Should one battery die completely, its LED will go out, and the saving pack will show a very bright LED. Therefore the indicators not only tell you when a pack has failed, they also give you a CONTINUOUS reading on the relative health of the batteries!

Now, anyone with an ounce of electronic sense knows that you can't put any kind of a circuit in a line without a voltage drop out of that circuit. With our standard 4.8 volt packs, when you tack on long servo leads, and pile on chokes and resistors in those leads to stop radio interference, the power getting to our servos is pretty darned weak to begin with. In some cases, the power currently being delivered is just plain marginal. Slap in the Battery Comparitor circuit, and then the voltage drop total makes for an unreliable radio, even with two healthy batteries. You were very iffy/marginal to begin with.

George realized this, and designed in FIVE-CELL battery packs! This five-cell pack supplies an original 6 volts to the radio, instead of the 4.8 volt in a standard pack. "OH, BOY," you say, "Knew there was a catch, now I have to buy all new battery packs." NOPE, George thought of that one too. If you plug two standard 550 mah, 4-cell battery packs into George's system (giving you a total of about 1,200 mah capacity, more than enough for most systems), the EXTRA CELL to make these 4-cell packs into FIVE-CELL packs is contained WITHIN GEORGE'S CIRCUITRY! If you want to use two large-capacity batteries, then you have to build your own five-cell packs, and the Comparitor circuit is smaller and cheaper. I'd recommend the standard system though, unless you are running many servos on a very heavy, oversized plane.

Now, the neat thing about this five-cell pack theory is that the one extra battery supplies more power than is lost through the Comparitor circuit. The result is that your servos, out at the end of those long leads with their power-robbing chokes, and previously suffering from power starvation to begin with, are now being delivered approximately 20% greater power than they were before the Comparitor circuit. Your sick, anemic servo is suddenly a buzzing beast again.

(Note: As a result of all this research, George also experimentally proved exactly what causes radio interference with long leads. The servo motor armature is the source. Chokes and other items in the leads only buffer this problem, not eliminate it. George has now designed a very simple, CHEAP filter network that filters out the problem, not just choking it down to an acceptable level.)

The system is a completely modular unit, and to put it in your plane you have only to take out your current switch harness, and plug in the Comparitor circuit. The circuit and fifth-cells for the batteries are housed in a Kraft Sport Series receiver case, with the three LED's mounted through holes in the case. These LED's do need to be visible at some time, so you do have to pack the circuit into your plane with this in mind. One man here locally installed his so that the LED's were instrument panel lights. He put in a mini-switch in place of the standard one, and mounted it also on the instrument panel so that his entire system integrates into part of the panel. Super neat!

The batteries are charged in the normal manner, except that you use a transmitter charger, and charge a little longer. This is detailed in George's instructions, of course.

The system has been flown extensively and is well-proven. By the time you read this, George will have caught up with his local orders, and will be able to sell generally. (We local guys get ours first, you understand.) If you send George a self-addressed, stamped envelopre, he'll return you a brochure with full particulars. George Steiner, 2238 Rogue River Rd., Sacramento, CA 95826.

A SUPER SERVO

Two columns back, I mentioned a couple of items I thought manufacturers should bring out, and one of them was my idea of a good servo. I thought my thinking was pretty deep, and that it would be quite a while before I saw any

result.

About two weeks after that article appeared, I got a package from World Engines, and a little note that said, "Read your article, and maybe you'd like to take a look at this." Inside was the most BEAUTIFUL piece of servo engineering I have ever seen. Bar none.

It was the World Engines S-16 servo, an item that has been around for a couple of years, but has been a real sleeper. This servo is just under twice as large as a Kraft or EMS 20H, and weighs about 2-3/4 ounces. It puts one ONE HUNDRED, FIFTY-SIX in/oz. of torque! That is darned close to THREE TIMES as much as the 20H's, the most powerful common servo on the market.

The case is heavy molded nylon, with reinforcing webs on the mounting flanges, and everywhere else additional beef is needed. The output shaft is 1/4 inch square, where all other servos have 1/8-inch outputs. The servo arms supplied are all glass-reinforced nylon, where other servo's arms are soft virgin nylon. The output shaft bearing is the same one as is used on the crankshaft of an O.S. .25 Schneurle. The output gear is super-heavy, 1/4-inch thick, it is driven by a *brass* pinion gear, and the shaft that holds that pinion gear fits into BRASS-BUSHED case holes! The entire case is completely O-ring sealed on all joints. The servo pot is a sealed high-quality Clarostat unit, not a standard multi-piece R/C pot. Centering adjustment is through the center of the output shaft, no disassembly of the servo required.

The servo comes, of course, wired for a World Engines radio, but by changing the plugs, it will work with any positive-pulse radio. The list cost is $49.95, and it is available from your dealer, or direct from World Engines.

Guys, this servo shows all the signs of being designed for industrial applications, rather than as a hobby item. While I have not had a chance yet to extensively fly it, and therefore can't give a totally unreserved recommendation, it has the most beautiful engineering thought that I have ever seen in this hobby, incorporates every single idea that I had originally thought about and quite a bit more. With this baby pushing my surfaces around, I won't worry about servo power any more.

Most of you will remember the 135-lb, 13-1/2-ft. wingspan Grumman Goose that was pictured in my column in the past. It is World Engines S-16 servos that will be pushing the elevator around on this bird when it flies very shortly. *That* is what I think of this item.

Just a quick note on servo useage. Most everyone has been flying their giant aircraft on standard servos, and successfully. "So why change?" Any machine is capable of working to its maximum capacity, but how long will it last if it has to work that way all the time? That is what we are asking small servos to do in our Giant models. Items such as the World S-16, and on lighter applications, the "heavy-duty" standard servos, have more than necessary strength, and therefore aren't straining to do their job. This "easier working" just automatically makes them more reliable in our useage. Why strain the guts out of a small servo, when something with some backup strength is easily available for the same cost? Your plane will thank you eventually! World Engines, 8960 Rossash Ave., Cleveland, OH 45236.

LATE NOTE

Just received word that Electronic Model Systems (EMS) will be coming out with its version of the S-16, utilizing the same mechanics. Check with EMS for more info on its version. EMS, 6175 Palo Alto Dr., Anaheim, CA 92807.

A SMOKE SYSTEM THAT WORKS!

One of the most elusive things that I have seen modelers working on has been a smoke system that actually will do the job. I have seen quite a few different systems, some that were pretty good, but none that would actually be considered (by myself) as acceptable. People used all kinds of preheater piping, exotic smoke fluids, fancy valves, switches, tanks, some even went so far as to strap on super-expensive smoke cartridges. None of these things really worked like the real air-show smoke system of a full-size plane.

Guys, I have finally seen a model smoke system that works. Don Harris, of Auburn, California (23668 Shadow Dr., zip 95603), has designed a special muffler for his 3.7 Roper that flat does the job. As you can see from the pictures, it pumps out clouds of billowing (super stinky), diesel smoke. It utilizes just plain old diesel fuel, nothing exotic.

There are actually two parts to Don's system; first the special muffler, and then an electric fuel pump to deliver a sufficient volume of diesel juice to the muffler. No other system has been successful in pumping enough fluid to the muffler, though we haven't tried pressurizing the smoke tank with Freon, which should also work. On Don's Roper-powered Halfbreed, his smoke will consume a 16-oz. tank of diesel in 2-1/2 minutes. This is the volume required for adequate smoke. A 24-oz. tank should give about 4 minutes, which we think would be just right.

The muffler is of special dual-chamber construction, of basically standard appearance. The diesel fluid is piped directly into the inner chamber, and sprayed into it directly in the path of the hot exhaust gases. It is super-heated in this inner chamber, then passes into the outer chamber before it can exit through the exhaust pipes. By this time, it has had enough time to circulate around inside the super-hot muffler to completely

vaporize. This is the secret; most other attempts sprayed the diesel fuel into an open chamber, and it was instantly blasted out of the muffler by the exhaust gases before it had sufficient time to burn. The result was poor smoke, and a lot of raw diesel spray out the pipes.

Don has the Roper muffler completely ready and working. He is working on units for the Quadra, and other engines.

Some food for thought. The whole secret to good smoke is sufficient HEAT to vaporize the smoke fluid. The more heat, the more fluid can be handled completely. Therefore, obviously the bigger, hotter-running engines with their massive amount of hot exhaust, are going to be the best producers of smoke. Excellent smoke generator designs such as Don's will make most efficient use of that heat, but it has to be there to begin with. Select your engine for smoke experiments with this in mind.

Send Don a S.A.S.E. for more info on his generator. He is marketing them.

NEW GIANT SCALE PLANS AVAILABLE!

P-6E

Wendell Hostetler, 1041 Heatherwood Lane, Orrville, OH 44667, has come out with another winner in his version of the Curtiss Hawk P-6E ($24.50 pp). This beautiful brute of a plane has always been a favorite of biplane buffs, and Wendell's version maintains all of the "sex appeal" of the plane, incorporated into an easy-to-build structure that has very minor outline changes that dramatically decrease building effort. Wendell has excellent experience with Giant birds, extensively flying each of his designs, and since this is his 4th (after the excellent Liberty Sport, 77"; the Skybolt, 76-1/2"; and the Bucker Jungmeister, 77"), he knows what he is doing on his plans and design. His instruction manual is unsurpassed. It's a great bird whose appearance belies its ease of construction.

CHRISTEN EAGLE

Thomas Keeling, 30925 Block, Garden City, MI 48135, who is well-known for his excellent fiberglass cowls which he has available for virtually all of the giant scale planes around, has made the jump into plans also. His first offering is the 1/4-scale (plus, slightly), Christen Eagle. His 63-inch wingspan version of this most recent star of the aerobatic world is specifically designed for a Quadra (also good for a .90), and is small enough to be an excellent, virtually unlimited aerobat with this power, yet big enough to be attractive. Tom has backed off and analyzed our activity until now, and I think he has come up with just the right-sized bird for the Quadra, if it is to perform as per the original.

His plans seem very complete and well-drawn, with a good amount of detail on those areas where so many designers leave you on your own. Obviously, this is not the kind of plane that you build for your first scratch-built, but anyone with a couple of previous plans-building experiences will have no problems. His instruction book helps out on the difficult areas, and included are some "A.D.'s" to add to the plans.

'Til next time; fly big, fly safe, and let me know what you're doing. Lee Taylor, 216 Willow Ave., Roseville, CA 95678; (916) 786-2725, evenings only. •

FB-100 . . . . . *Continued from page 17*

We had one of the new DuBro Kwik-Lock spinners to try out, so didn't use the Goldberg unit included. Any 2-1/4 incher would do. The DuBro requires the use of a small single-slot screwdriver for installation or removal, but locks securely and turns true.

We chose to epoxy servo rails across the fuselage in order to mount three JR servos side-by-side, making a tentative balance test first to determine the best position. Tubing was slipped over the nose-gear steering pushrod so the foam around the receiver and battery pack would not drag against the rod.

Hmmm . . . that's about it. The wing saddle of 1/32 ply already includes a foam cushion to seal the radio compartment. After running the antenna through a hole in the fuselage (smooth and bevel the hole so it won't cut the antenna) and checking control movements, we were all set.

A call to Bob Upton, who had his Goldberg P-6E all ready to go, and we were off to Mile Square Park, in Fountain Valley. This blankety-blank magazine has kept us so busy that we've not flown a full-house machine for several years; only gliders and old timers, so we were a little apprehensive about the flying project. Bob didn't provide that much moral support either, because his job, plus full-scale aircraft building, has kept him away from the flying field too. We both felt like a couple of rank amateurs.

Well, the apprehension was totally unnecessary. We lit up the Enya, let it warm up, fiddled with the idle a bit until it would sit still without restraint, taxied around for a few moments to get a feel for the steering action, and then lined up on the runway. As we added throttle, it was necessary to hold some right on the steering because of a little cross-wind, but other than that, the takeoff was smooth. What can we say? After a few minutes of straight flight and 180° turns, we determined that the FB-100 knew all about flying and we were the only thing holding it back! It took about a 1/16 of rudder trim to the right and that was it. The Enya 45 easily pulled the model through large, smooth loops. Rolls could be fast or slow, whichever you want. Landings are a pleasure . . . put all three on the deck at once or drag it in slowly and ease back and drive along with the nosewheel in the air. The gear is just the right length to provide zero setting when the ship is rolling. It takes

off when you ask for it, and if you ask gently, you can't tell when it happens.

We handed the box to Bob, with the remark that we were already back to our peak of years ago (take that any way you want), and took some flight photos while he flew. Bob felt the same way about the ease of flying the FB-100 . . . it not only came out of the box all built, it also came out trimmed for flying. It is an extremely comfortable airplane to operate, making you feel as if you've been flying it for years and know exactly what it's going to do. There's just no better way to describe it. It's a comfortable airplane.

We won't expand on the operation of the JR radio at this time, as we are planning a comprehensive review of the system in the near future. Our unit is on FM and 6-meters (W6-MGK), and has operated flawlessly since we've had it. From a strictly flying point of view, it does everything right, the sticks have a nice feel, and the servo response and centering is reliable. The new coreless servos are especially nice . . . instant response, positive centering, fast, and quiet. Like the FB-100, it's comfortable. •

Big Props . . . . *Continued from page 27*

quired curves, it is necessary to plot the peak points for many propellers on this chart. These points are located for over 30 props and several of the engines mentioned.

For a particular prop size, a vertical line almost parallel to the airplane lines connects points for that prop for different engines. It was a surprise to realize that, if a certain prop was correct for a plane with a large engine, the same prop was correct on the same plane on a smaller engine at a lower airspeed . . . of course, if the engine could swing it.

There are curved lines through some prop peak points to illustrate how thrust horsepower of a propeller varies with speed, because prop efficiency is less on either side of the peak or design V/ND value. For example, study the 22-6, 20-10, 20-12, 20-14 lines at the top of the chart where they are driven by the Roper engine. The 20-10 prop peaks at 72.6 mph and 2.46 thp (3.69 bhp times 0.66 eff.). At 50 mph, it delivers 2.16 thp at full throttle, and at 85 mph, 2.14 thp. Also, at 85 mph, the 20-10 prop is in an unloaded condition and probably would allow the engine to overspeed. Thus, the 20-10 prop would work great on a P-51D up to 73 mph, then start to unload, lose efficiency and thrust horsepower. By the time the plane had reached 85 mph, the engine might sound great in the air, but would really be overspeeding, and the decrease in thrust horsepower would make the plane seem to fly a bit sluggishly. The same condition would occur with a smaller engine (i.e., Webra Black Head 60 on a DuBro drive) except at a much lower speed. Does this sound familiar to anyone?

The same 20-10 prop would be good for the J-3 Cub, but please don't use a Roper in this case . . . the Cub just should not fly that fast! As we said, a Fox .78 and a 14-6 prop worked very nicely, and the plane looked like a Cub is supposed to look in-flight.

For the P-51D (1800), the prop closest to the airplane line is a 20-14, only 1 mph away, which is a very close match, and should get 90 mph out of the combination. With a Quadra, a 20-14 would give 64.5 mph and be an excellent match.

The chart shows that a 22-14 or 22-16 prop would be satisfactory for Mr. Mulligan. On the slow end of the chart, the PUP would do well with a 22-6 prop on a Roper (*this* plane can't have too much power!). The smaller and fast CAP 20L and the Laser 200 are a bit of a problem as far as prop selection by this method is concerned; Tom Walker used a Fox Twin in his Laser, but did not specify what prop he used. Chart #2 indicates a 16-12 would be close, but where does one get a 16-12 or a 20-12, 20-14, 20-16, or other such high-pitched large propeller?

This exact situation was personally discussed by the author with two propeller manufacturers. These companies can produce higher pitch large propellers if that is what the modelers want, need, and are willing to pay for. New tooling and/or manufacturing changes cost money, and you know who will pay for the goodies. Please, no nose-overs on landing . . . we can't stand to see grown men cry over "$10" landings!

How important is this pitch problem? A quick review of Chart #2 indicates the following suggested propellers for some of the planes:

Sopwith Pup	22-6,24-8,(27-10)
Gere Sport	22-10,24-12,20-8,18-6
J-3 Cub	20-10,22-12,18-8,16-6, (14-6),14-5
Mulligan	24-18,22-16,22-14,20-12,18-10
Heath-Pixie	14-6,16-8,18-10
P-47 D	20-12,20-14,22-16,24-18,18-10
P-51 D (1800)	18-12,20-14,22-16,24-20
P-51 D (1/5sc)	18-12,18-14,20-16,16-10
Pete	16-10,18-14
CAP 20 L	14-8,16-12,18-14
Laser 200	14-10,16-12,18-14

Unfortunately, the majority of these props have a larger pitch than is currently available, so the full potential is not being realized from the planes, and there is a strong possibility of not enough prop to avoid engine overspeeding in flight. Of course, a pilot can always throttle back if the engine seems to be going too fast . . . (famous last words)?

We hate to mention it, but the question of thrust, especially static, or on-the-ground thrust, is bound to be raised. This prop is pulling 20 to 25 pounds and isn't that just great? Yes and no! It is great for takeoff and climb, but not great for top speed . . . unless you are flying the PUP. Does it surprise you to learn that static thrust is from 1.4 to 1.9 *times* the thrust at the prop's most efficient airspeed? Did you also know that a prop can actually develop negative thrust (yes, a fixed pitch prop) under certain conditions such as a dive at high speed?

A fixed pitch prop (all model props I've seen) is made with a blade angle such as to match the effective pitch in flight. Therefore, in ground operation, the blade is at a higher angle of attack to the incoming air, develops more lift and thrust, but more drag, too, so does not turn as fast as in flight. A low pitch, low blade angle prop is operating closer to its optimum on the ground than a high pitched prop which may even be partially stalled in ground operation. Thus, the low pitch is better for takeoff and climb, but reaches its optimum airspeed and then starts to unload at a relatively low airspeed.

What is "unloading?" This is a bit hard to visualize, but try this: At the optimum in-flight condition, the prop blade is at its best lift/drag ratio angle to the incoming air. This angle is only about six degrees above the angle of attack for zero lift, and it does not take too much more speed to eat up that six degrees. On the low end of an airfoil curve, the lift coefficient is decreasing rapidly toward zero, and in that high speed dive, the angle of attack can go negative.

Perhaps a couple of examples from Chart #2 will help. The 22-6 prop is a low pitch job that peaks the Roper at 45.5 mph, but has had it by 54 mph. Can you envision this prop on one of the high speed planes on the chart? At the other extreme, the 20-14 is a relatively high pitch prop that runs the same engine at 89.7 mph, but isn't going good until 50 mph, and definitely would not be as

good for takeoff and climb. On full-sized planes, this problem is solved by use of a variable pitch propeller which can be set for low pitch (high rpm) for takeoff and climb, then reset at a higher pitch for top speed or cruising speed. No, we have not heard of a variable-pitch model prop. Can you imagine what one would cost? *(Such a prop does exist, and has had limited use by some pattern fliers, but has not been seen yet in larger sizes. Any bets on how long it will be before such a prop becomes standard equipment on the biggies? wcn)*

What else can we tell you? If your engine is not on Chart #1, locate the peak rpm and bhp and sketch the curve between existing curves. Likewise, your plane's THP curve can be located on Chart #2 with a little guestimating; a high wing job might be between the Cub and Mulligan, and low wing jobs, according to relative area to P-51, P-47, CAP 20, Laser, etc. I know Laser is a mid-wing, but it should have about the same drag characteristics as a low winger.

On Chart #2, the prop peak point probably should be within about 5 mph of the airplane curve. A prop with too much pitch is a bit safer than with low pitch. Takeoffs will be longer, but overspeeding the engine is unlikely.

You put a lot of time, money and yourself into your big pride and joy; isn't it worth that extra step to select a propeller that will provide optimum performance for your airplane? Good flying. •

Counter . . . . *Continued from page 9*

volt meter tap #3780 is $2.50. Associated Electrics, 1928 E. Edinger, Santa Ana, CA 92705; (714) 547-4986.

★ ★ ★

Bill Effinger, father of Berkeley Models, famous for its line of scale kits, the Brigadiers, Buccaneers, and many other well-known models of yesteryear (and still being flown today in O.T. events) has reentered the hobby scene with the formation of W.E. Technical Services, Inc. Bill is reintroducing updated versions of his designs, showing such things as modern engines, R/C installations, and additions of ailerons and steerable nose gear as necessary. A 66-inch wingspan Super Brigadier for .15 to .25 engines and an 88-inch wingspan Super Buccaneer for .35 to .75 engines are among the first offerings. Plan sets include separate layout plans with parts arranged to maximize use of sheet balsa and plywood. Bills of materials are included, too. Also available now are plans for a 1/4-scale SE-5A with an 80-1/4 inch wingspan, suitable for 1.9 to 2.4 cubic inch engines. Bill cross-checked his data against Royal Air Factory drawings and against the actual plane at the Royal Air Museum, Hendon, England. Plan # RCQS-7 for $24.95. Bill is no newcomer to 1/4-scale, having designed a Buhl Pup in 1935 to 1/4-scale! Send $1, refundable against your first order, to: W.E. Technical Services, P.O. Box 76884, Altanta, GA 30328.

★ ★ ★

A 45-inch wingspan and high quality moldings yielding a perfect fit highlight Midwest Products Piper J-3 Cub, the newest addition to its line of ARF foam kits. The model features such scale detail as molded-in-place engine cylinders, fabric "sag" between wing ribs, window outlines, and even functional wing struts. Designed for 3-channel operation, it can be set up for 4-channel (ailerons) as linkage cutouts are already provided in the foam wing. The J-3 Cub is a deluxe kit, with pre-formed aluminum landing gear and wing struts, aluminum motor mounts for .09 to .15 engines, all fasteners and linkages, large trim sheet and instructions. The Cub offers a quick start to the beginner in radio control. Deliveries will begin in July. Look for it. Midwest Products Co., 400 S. Indiana St., Hobart, IN 46342.

★ ★ ★

For the large power boat crowd, J-5 Enterprises has developed its J-5 drive-train boat hardware kit. Designed to fit the industrial Quadra, a most important feature of the kit is the centrifugal clutch, allowing safer engine starting and launching, as at idle, the boat does not move in the water. Included in the kit with the clutch is a 1/4-inch steel prop shaft, threaded shaft casing with strut brazed in place, rudder with 1/4-inch diameter rudder bar, control arm for push-pull steering, mounting plate with hardware and bronze bearings for rudder and prop shaft. Engineered to fit the J-5 Pickle Fork Hydro Unlimited, the J-5 Hydro Unlimited, or the J-5 Thundermarine, the drive kit could possibly be adapted to other large unlimited R/C boat designs. Kit is $99.50, shipping charges included for the U.S. and Canada. The J-5 Thundermarine boat is 50 inches long with a 20-inch beam. The gelcoated fiberglass hull and deck are joined with snap-on silver trim, furnished in the kit. Also included is a 1/2-inch ply motor mount and 1/4-inch ply side rails. The Thundermarine is reported to be at home in 1-1/2 to 2 foot waves. J-5 Enterprises, P.O. Box 82, Belmont, Ontario, Canada N0L 1B0; (519) 644-0375.

★ ★ ★

Astro Flight, Inc., announces a price roll back on NiCd batteries and electric

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Model Engine Collector's Association will hold its National Collectorgether in conjunction with the SAM Champs on Monday, June 29, 9 a.m. to 5 p.m., Hilton Inn, Highway 99 at Highway 58, Bakersfield. Host: Ted (805) 589-0554. National Collectogether "Warm Up" will be held at La Palma Recreation Hall, 7821 Walker, La Palma, Sunday, June 28, 12 noon to 4 p.m. "Collectogether" is a "Buy-Sell-Swap" meet. Bring your old engines, race cars, kits, etc., broken or dirty, and sell or trade. Our biggest problem is to convince modelers that their unwanted engines, kits, etc. will sell. Some have actually sold over $752, $1,637, and one sold over $4,123. So can you! Send SASE for notices of future meets. Chuck Bartunek, 5051 Cartagena Circle, La Palma, CA 90623.

FREE FLIGHT ONLY! 1981 catalog. 70 pages. $2. Che Hobbies, 10900 Eastwood Ave., Inglewood, CA 90304.

GLASS CLOTH: 0.6 oz., finest woven quality, 38" wide, continuous length; 5 yds. $16.65; 10 yds. $29.70 — ppd. Airmail overseas add $2. Dan Parsons, 11809 Fulmer N.E., Albuquerque, NM 87111.

HOBBY SWAP NEWS — The model enthusiasts "used equipment guide." Buy — Sell — Trade. Hundreds of bargains. Planes, Helicopters, Engines, Radios, Boats, etc. First ad free when submitted with subscription order, $10/year (10 issues) 3rd class mail. Add $3 for 1st class. Last month's issue $2 PPD. Write: HSN free ad offer, P.O. Box 834, Santa Maria, CA 93456.

OLD TIME ENGINES. Member of Model Engine Collectors Association, Jimmy Robertson 1249-6, has large list of old time engines for sale. Mostly ignition and a few glow. All are excellent to new in box. Reasonably priced. Send large SASE for list. Also have new in box Ross opposed all black twin R/C at $275. Jimmy Robertson, 35 Stonecrest, St. Joseph, MO 64506, (816) 279-1127.

020 REPLICA Old Time Kits. Free list. Write J&R Models, 5021 W. Sheridan St., Phoenix, AZ 85035.

WANTED — Air Trails, Aviation Pulps & miscellaneous publications. Will trade. F.A. Dorris, 3587 Renner Dr., Fortuna, CA 95540, (707) 725-2241.

WANTED — OLD MODEL ignition engines, cars, etc. Paying top dollar. Bill Simpson, 7413 Via Lorado, Rancho Palos Verdes, CA 90274, (213) 377-3532.

EMBLEMS - Direct from manufacturer. Swiss embroidered. Custom made to your design. Send sample or sketch and quantity needed for free quotation. David Haemmerle & Sons, Inc., Box 711, West New York, NJ 07093.

PEANUT SCALE PLANS. Curtiss SB2C Helldiver, Lockheed Orion, others. Send $1 for sample plan and list. David Diels, Box 101, Woodville, OH 43469.

WANTED: Old model airplane engines, gas model race cars, related items 1935-55. Arthur Suhr, W218 N5866, Maclynn Court, Menomonee Falls, WI 53051.

AIRCRAFT MODELS designed and/or built. Research/test/commercial applications, demonstration/display/flying, remote controlled; fixed or rotary wing. AERO DEVELOPMENT, Box 80276, Ft. Worth, TX 76180.

TWO HOUR VIDEOTAPE of One-Eighth Airforce 1981 Phoenix Scale Fly-in or CAF Airsho 80. Unedited, unnarrated, with natural sounds. $35 ea. ppd., specify VHS or Beta. Wright Enterprises, 13315 Chico Rd. N.E., Albuquerque, NM 87123.

IGNITION ENGINES — Kits and hobby items — send $3 for 5 page list. Larry Vance, 5066 Cindy Way, Las Vegas, NV 89102.

HELP! Need three-view for BD-8 Super Peanut. P.J. Herman, 6317 Ansley Lane, Raleigh, NC 27612.

systems. After a move to larger quarters and reestablishing production, the following are back in stock again: the Astro Sport, Super Monterey, P-68 Victory, ASW-17, Californian, Super Malibu, and the Porterfield. For a copy of its catalog and parts/price list, send a SASE to: Astro Flight, Inc., 13311 Beach Ave., Venice, CA 90291; (213) 821-6241.

★ ★ ★

E.W.H. Specialties announces the MK-II version of the Super Hustler as the SMALL WONDER. Tighter bearing tolerances and new balance factors contribute to a smoother running, longer lasting engine and airframe. The MK-II, with a pointless ignition system, together with finite balancing, yields up to 10% more horsepower; 25 to 26 pounds of thrust with a 20x8 prop at 7,200 rpm. Engine layout allows for cowling in where space may be a problem. Owners of older model Hustlers can have them upgraded to MK-II status. For more information, contact E.W.H. Specialties, Inc., 3012 Ave. "E" East, Arlington, TX 76011.

★ ★ ★

Dumas Products, Inc., a company well-known for its fine boat kits and associated model marine hardware, announces two new, big, ship models, "Mr. Darby," a scale deepwater tug, and the "American Beauty," a Mississippi River towboat. Mr. Darby is a 47-inch long, 12-inch wide model of the 150-foot Halter Marine tug presently in service towing offshore oil rigs. The kit, #1217, features a finely detailed fiberglass hull, cleanly die-cut decks and super-structure parts, and, a deck hardware kit is included! The large size of the hull, cabins, and wheelhouse offers lots of room for detailing and installation of R/C equipment, drive units and batteries. A running hardware kit, #2340, including two, 4-inch x 4-inch propellers, stuffing boxes, shafts, and related

items, is available. The American Beauty, #1215 river towboat model, builds out 37 inches long with a beam of 12 inches and is 2 inches deep! The real American Beauty plies between St. Louis and New Orleans and is owned by Agri-Trans Corp. A molded fiberglass hull and die-cut plywood decks and superstructure form the basis of this model. Dumas has a complete deck hardware kit, #2104, and a running hardware kit, #2339, which includes two scale cast bronze 2-inch propellers, two scale cast aluminum kort nozzles, six rudders, stuffing boxes, shafts, and other hardware. Two Dumas motors, #2004, will power the towboat nicely. Dumas has available, kit #1219, containing parts and material to build one lead barge and one middle barge. Combining the two kits, gives the modeler a 10-foot long tow!! For its most comprehensive catalog, send $1 to: Dumas Products, Inc., 909 E. 17th St., Tucson, AZ 85719.

★ ★ ★

Electroline Models announces the release of the first in a series of safe, low-voltage, battery powered, control line models, the Challenger. The complete kit includes the airplane kit, featuring die-cut balsa parts, electric motor, prop, spinner, landing gear and wheels, pre-bent pushrod, nylon bellcranks and horn. Also included is the control handle with push-button switch, a pair of 25-foot long insulated control lines, rechargeable battery and charger with automatic cutoff. The Challenger offers quiet flying in restricted spaces and no helper is needed! Fifteen to 20 minutes flying time per charge, plus being able to shoot touch-and-go landings with the push-button handle/switch are an added bonus. Suggested retail is $50. An optional battery case with belt clip is available for $5. Fifteen additional kits are being planned for production. Electroline Models, P.O. Box 2503, Beverly Hills, CA 90213.

★ ★ ★

Sig Mfg. announces the availability, once again, of 12-inch wide sheet balsa. Many years ago, Sig had to discontinue this popular item due to rising costs and a shortage of wide mill run balsa planks. Now, with improved methods of gluing, sawing, and sanding to insure uniform thickness, plus a better supply of balsa, 12-inch wide balsa for wing skins are back at your dealers in popular sizes of 1/16 and 3/32 thickness, in 24 and 36-inch lengths. Sig Mfg., P.O. Box 1, RR 1, Montezuma, IA 50171.

★ ★ ★

Top Flite Models proudly offers modelers its rendition of the J-3 Cub. Designed for engines in the .40 size range, it has a wealth of features, such as: scale outlines, the option of building it in two versions with either a wingspan of 77-1/8 inches and 795 sq. in. of wing area, or a more aerobatic 'clipped wing' version with a 59-1/2 wingspan and a wing area of 595 sq. in. A one-piece injection molded cowl in "Cub Yellow," glass fiber filled motor mount, two sheets of die-cut windows and windshield parts, three sheets of decals, scale hinged doors, shear bolt wing attachment, shaped hardwood struts, pre-formed landing gear and a complete hardware package, round out this kit. With clearly marked, precision die-cut parts and a detailed, completely illustrated instruction manual, scale documentation, an original 'Hank Clark' cutaway scale illustration, and three full-size plan sheets, Top Flite has spared no detail to provide a complete scale kit. For more information, the latest catalog, prop chart and free samples of Monokote and new FabriKote, send your request with 50¢ to: Top Flite Models, Inc., 1901 N. Narragansett Ave., Chicago, IL 60639.

★ ★ ★

Gossamer Odyssey; The Triumph of Human Powered Flight, by team member Morton Grosser, is an exciting and engrossing account of Dr. Paul D. MacCready, Jr., his life as a youth flying model airplanes in competition, to later years as an avid full size sailplane competitor, and his kindling of interest in human powered flight. Morton Grosser has researched and detailed well, man's early efforts to be his own source of

power to sustain flight. The elusive pursuit and capture of the Kremer Competition prizes, the feelings and emotions of Bryan Allen as he pedaled the Gossamer Albatross to within one minute of his absolute endurance limit that had been predicted five days before the flight, the close knit feelings of the entire crew, is intensely rewarding reading . . . a must. *Gossamer Odyssey; The Triumph of Human Powered Flight*, published by Houghton Mifflin Co., 2 Park St., Boston, MA 02107.

★ ★ ★

Offshore Enterprises presents its Deep Vee 67, an authentic race version deep vee that will accept almost any type of power plant, from .60 or .90 sized engines, single or paired, up to twin Quadras! Of hand-laid fiberglass construction, with white gelcoat exterior, the kit includes hull, deck, engine hatch with raised windshield, and rear offshore style hatch. Front and rear bulkheads are included as is extra hardwood for motor mounts. Specs are 67 inches overall, with a 20-inch beam. For more information, contact: Offshore Enterprises, P.O. Box 355, Algonac, MI 48001; (313) 794-9611.

★ ★ ★

The Chester River Machine Tool Co. offers its 1981 catalog for $2, refundable against your first order. Items listed cater to the model steamboat enthusiast, from the Gay '90s steam launch "Diana" and various steam engines, to books explaining how to build them. Machine shop services are offered, too. Boiler shell tube, copper fittings, and rivets to brass wire, silver solders, and special lubricants, complement the line of special taps, dies, drill bits and small (#00) self-tapping screws. The Chester River Machine Tool Co., 600 Cannon St., P.O. Drawer 119, Chestertown, MD 21620.

★ ★ ★

"It's about time," says the Electric Eagle of Santa Ana, California, as it announces its new LCD Countdown Timer with alarm. R/C fliers for years, have been running out of fuel, at inopportune moments, and attaching stopwatches or other makeshift timers to their transmitters to 'remind' them it's time to land. The Electric Eagle has developed a small, portable timer/clock/alarm that will slip into its own holder device that you attach to your transmitter, yet can be removed and slipped into a shirt pocket with ease. It can be utilized as a countdown timer with alarm (with obvious benefits) and as a 12 or 24-hour military clock. It also displays month and date. The LCD is highly visible, even in bright sunlight. An extra battery is included for extended use. Price is only $21.95. Dealer inquiries are invited. The Electric Eagle, 205 W. Stevens, Santa Ana, CA 92707. •

F3F-2 . . . . . *Continued from page 57*

exactly 15/16th size. It was an excellent mockup, with an aluminum skinned fuselage wrapped around a large iron pipe and having an electric motor to turn the prop and wheels for taxiing* short distances. All details were faithfully reproduced. The fuselage on its landing gear and empennage still on, is now at the Planes of Fame Museum in Chino, Cal., where it is slowly being restored. Unfortunately, no other remnant of the last biplane fighter in the U.S. military exists.

**(Editor's Note: The verb 'to taxi' originated in 1911 at Brooklands Aerodrome in England, where a ground-bound trainer was used to give pre-flight instruction. It looked like a taxi.)*

Spine Tail . . . . *Continued from page 22*

styrofoam. Also mark the wing centerline and the leading edge position.

STEP 2: Cut the styrofoam to the side profile. Make sure the front of the fuselage is perpendicular to the wing centerline and fuselage sides.

STEP 3: Lay out the fuselage top profile with a centerline to help maintain symmetry of the fuselage during the sanding operation.

STEP 4: Cut the fuselage to the top profile. Re-mark the wing centerline and leading edge position.

STEP 5: Make 1/8 plywood templates of the three fuselage cross sections. Also mark and cut out the two wing cross section templates from 1/8 plywood.

STEP 6: Bolt the two wing templates to the sides of the fuselage (I used control rods cutoff and bent to 2-1/4 inches long with 2-56 nuts). Align these templates carefully with the centerlines and leading edge position lines, because the fuselage contour is formed using these templates as the major guides.

STEP 7: Cut out the firewall, install the (3) 4-40 blind nuts, and 5-minute epoxy the firewall to the styrofoam, making sure the entire back of the firewall is coated with epoxy. When installing the firewall, don't forget to position it so that the locations of the blind nuts allows side mounting of the engine. Put oil-coated 4-40 screws through the blind nuts to prevent epoxy from plugging up the threaded holes.

STEP 8: Sand the fuselage to size with 60 grit paper on a sanding block using the contour templates frequently to maintain proper form. Be careful not to sand the wing templates or the firewall. Do not sand off the top and bottom or wing centerline.

STEP 9: As the fuselage is being made inside out, the front wing dowel assembly (F1 & F2) and the wing hold down screw assembly (F4 and F5) will have to be made and installed into the styrofoam at this point. Mark the fuselage and cut out to accept these assembles. Make the two assemblies, leaving excess material in the outside contour. Set the

assemblies into the fuselage cutouts, mark the correct contours, remove and cut to your marks. Coat the parts completely with 5-minute epoxy and let harden. This is done to prevent the wood from soaking up any gasoline if used at the final operation for dissolving the styrofoam. Now reassemble the parts with waxed paper between F1 and F2, and F4 and F5. Place the assemblies into the fuselage cutouts and tack in place using 5-minute epoxy. After the epoxy has set up, sand the two assemblies to the exact contour of the fuselage.

STEP 10: Cut a 1/16 x 45 degree chamfer in the styrofoam around the back of the firewall. This will allow epoxy to form a fillet all around the back of the firewall when the fiberglass is added.

STEP 11: You are now ready to add the fiberglass cloth. First remove the two wing templates.

STEP 12: Mix up a batch of Hobby Poxy 2 mixed 50-50 with micro-balloons. I wish I could tell you exactly how much to mix up but I have no quantitative value. The only help I can give here is "mix up enough to coat a little bit more than one side of the fuselage." Cut out the following pieces of 6-ounce fiberglass:

a. 1 inch wide x 5 inches long (to wrap around the front of the fuselage overlapping the plywood firewall).

b. 3/4 inch x 5 inches long (to lengthen the top of the fuselage between the firewall and the wing).

c. 3/4 inch x 14 inches long (to strengthen the bottom of the fuselage from the firewall to past the back edge of the wing).

d. Two pieces approximately 80% larger than the fuselage side view. I normally just cut out these pieces freehand, using a modeling knife, with the fiberglass laying on my building board and the fuselage laying on the fiberglass. I then trim the excess off later. The idea is to have the fiberglass cloth overlap the top and bottom centerlines by a 1/2 inch.

STEP 13: Brush the epoxy around the nose O.D., including the firewall O.D., onto the top of the fuselage, from the front of the wing to the firewall, and onto the bottom, from the firewall to 2 inches past the rear of the wing. Now add the fiberglass strips to these areas, working the epoxy through the fiberglass with your fingers. Keep a spray bottle filled with denatured alcohol and several rags close by to clean the epoxy off your fingers and anything else you might get the epoxy on.

STEP 14: Brush the epoxy onto one side of the fuselage and over onto the other side approximately 3/4 inch past the top and bottom centerlines.

STEP 15: Apply the glass cloth to the fuselage side and work the epoxy through the cloth with your fingers. Also work out any wrinkles and make sure the cloth edges overlap the top and bottom centerlines by approximately 1/2 inch and are tacked down, i.e., not lifting up away from the fuselage.

STEP 16: Hang up the fuselage to harden with a piece of wire wrapped around one of the bolts in the firewall. Keep an eye on the cloth edges as they tend to lift up. If an edge does lift up, spray some denatured alcohol onto your fingers and work the cloth back into place.

STEP 17: Repeat steps 14 through 16 on the second side.

STEP 18: Using a sanding block with 60 grit paper, sand down the high spots, being careful not to sand through the cloth. Sand the firewall flat.

STEP 19: Glue and bolt the Fourmost mount to the firewall, using "Hot Stuff" or "Jet." Sand the mount to conform to the firewall shape.

STEP 20: Mix up another 50-50 batch of Hobby Poxy 2 and micro-balloons and apply a second coat.

STEP 21: When the second coat is cured, again block sand with 60 grit sandpaper.

STEP 22: Install the engine and set up this fuselage assembly with the thrust line at 0 degree incidence on a flat working surface. Using the large squaring blocks, align the fuselage sides in the vertical plane. When you are convinced that you have the fuselage aligned as true as possible, mark the wing centerline on both sides of the fuselage, working off the flat working surface at a dimension of 5/8 inches above the thrust line. Remove the engine.

STEP 23: Now that you have the wing centerline marked, install the plywood wing templates to the side of the fuselage. Align the templates as accurately as possible to the wing centerlines with the leading edge of the templates at the break line between the two forward plywood fuselage formers F1 and F2. Tighten the studs holding these templates to eliminate movement.

STEP 24: Using a knife saw, cut through the fiberglass skin down to the break line between the plywood formers F1 and F2 located at the wing templates leading edges, and F4 and F5 at the wing template trailing edges.

STEP 25: Cut out the (2) 1/64 plywood wing saddles and tack in place to the fuselage around the wing template with "HOT STUFF" and baking soda. Be careful not to glue the saddles to the wing template.

STEP 26: Form the fillets between the wing saddle and fuselage with HOBBY POXY 2 mixed with micro-balloons. After this has set up, sand the fillets smooth.

STEP 27: With a sharp model knife, cut the fiberglass skin through to the styrofoam around the wing template.

STEP 28: Remove the wing template and poke out the styrofoam between the top and bottom fuselage halves. You should now be able to separate the two halves.

STEP 29: Remove the styrofoam from inside the two fuselage halves. You can remove the styrofoam in one of several ways. The styrofoam can be dissolved using a solvent such as gasoline, or it can be poked and scrapewd out using screw drivers, files, music wire etc. I would recommend that the poke/scrape method be used, as it is much safer.

3. WING/FUSELAGE ASSEMBLY

STEP 1: Position the fuselage top to the wing and try to install this assembly to the fuselage bottom. Trim the fuselage top until the three components fit together properly.

STEP 2: Assemble the three components and align the wing so that the wing tips are equidistant from the vertical centerline of the engine mount at the nose. Tack the top fuselage half to the wing using "HOT STUFF" and baking soda. You now have just two main components.

STEP 3: Disassemble the two components and build up fillets between the fuselage top and the wing, again using HOBBY POXY 2 and micro-balloons. When cured, sand the fillets smooth.

4. EMPENNAGE

STEP 1: Cut out the empennage parts and glue together. To insure proper alignment, use the two squaring blocks set at 120 degree angle. Clamp the two empennage halves to the blocks with the back edge down on a flat surface and the two halves butted together at the center. Now join the two halves together and add the 120 degree gusset to the middle.

STEP 2: Sand a 3/8 wide flat portion on the bottom of the joint. Make sure this flat is 30 degrees from each empennage half and that it is also parallel to the horizontal plane of the empennage halves. This can be checked using the squaring blocks and a standard square.

STEP 3: Form the (2) 1/32 diameter music wire control horns. Make sure you make a left and a right horn. Also modify a nylon snap link by cutting off and drilling a 1/32 diameter hole.

STEP 4: Cut out the two elevator surfaces. Cut out and drill these for accepting the wire control horns.

STEP 5: Cut out the hinges from the hinge material using scissors. Cut the slots for the hinges. Assemble all the empennage components and double check to make sure the wire control horns are located properly in relation to the exit hole in the back of the fuselage. If not, re-bend the wires or relocate the wires on the elevator surfaces.

STEP 6: When satisfied that the empennage assembly parts fit properly, disassemble and prepare for covering.

5. FINAL ASSEMBLY

STEP 1: Make the servo blocks and install the servos and control rods. Install the balsa former F3. Assemble the wing, fuselage and empennage (without gluing on the empennage) to make sure that everything fits and that there is no interference or binding of the control rods and surfaces.

STEP 2: Disassemble all the components and sand the entire aircraft dry with 320 wet-or-dry paper.

STEP 3: Cover the wing and empennage with Super Monokote. An easy way to cover the fillets at the wing tip is to first cover each fillet with a strip of Super Monokote approximately a 1/2 inch wide, then cover the tips. Finally, cover the bottom, then the top of the wing. With this method, there will be no wrinkles at the fillets and the job will look professional. Don't try to cover the fuselage portion which is connected to the wing. There are too many compound curves and you could make a mess. It should be painted.

STEP 4: Prime the fuselage bottom and top, which is attached to the wing, with K&B Super Poxy Primer and wet sand with 320 wet-or-dry.

STEP 5: Finish paint the fuselage top and bottom using either HOBBY POXY or K&B Super Poxy epoxy paint.

STEP 6: Assemble the wing to the fuselage and set up this assembly on blocks with the wing incidence set at 0 degree. Check the empennage saddle on the fuselage and modify if necessary to insure that the empennage saddle will also be at 0 degree incidence. Align the empennage and pin in place to the fuselage, making sure that the empennage surfaces are parallel to the fuselage centerline axis. Carefully remove the pins and empennage, mix up some 5-minute epoxy and add it to the empennage saddle. Now re-install the empennage to the fuselage using the same pin holes that were produced during the alignment procedure. Use a 30-degree triangle to set the proper angle of the empennage.

STEP 7: Install the engine and fuel tank using silicon sealer to seal around the fuel exits from the fuselage. Also put 1/4 inch thick foam on all (4) sides of the fuel tank in order to absorb vibration and minimize fuel foaming.

STEP 8: At this time you can install the "stinger" out the back to support the receiver antenna wire. I use the yellow inner tube from a Sullivan GOLD-N-ROD pushrod setup. Make sure the "stinger" doesn't interfere with the elevator controls. Place a piece of 1x4 long square foam inside the canopy and on the floor of the fuselage. Wrap the battery and receiver with 1/4 inch foam. Glue a piece of 1/4 inch foam into the battery pocket of the wing. Install the radio and again check to make sure there is no control binding or interference.

INITIAL FLIGHT INSTRUCTIONS

Before you attempt to fly this aircraft, make sure that everything is working properly. Make sure the CG is properly located without fuel in the tank. Run the engine and set it just a tad rich. It normally will lean out in the air. Make sure the engine will quit when the plane is inverted. Make a radio range check of the radio with the engine running. Preplan where you intend to fly and where and how you intend to land. The next

recommendation will probably be questioned by the regular sport flyer, but I can assure you that you will be better off if you follow it. Do not attempt to make your first flight in dead calm air. You should have a steady breeze of 10 to 15 mph. This will improve your chances of saving the plane on launch in case it happens to be out of trim. Have an experienced flyer make the first flight and trim adjustments. Also make sure that someone other than the pilot launches the plane. The amount of control surface throws stated on the drawings suit my flying tastes, so you may want to increase or decrease them a slight amount, but *not* before the first flight. Start with the throws stated. I would suggest gluing a small piece of emery cloth to each side of the fuselage to prevent a poor hand launch.

The Spine-Tailed Swift will loop and roll with the best 2-channel aircraft, and has no bad characteristics, but remember that it was designed for one primary goal and that is "turning left and going fast." ●

Workbench . . *Continued from page 6*

Let's tie a string to the tailwheel strut of the Cub and let the Cub hang by that string. Imagine a straight line extending from that string and running straight down through the Cub. At some *point*, that line passes through the Cub's C.G. Next, we tie the string to a wing tip of the Cub, hang it up, and follow an imaginary extension of that line down through the Cub. Again, at some point, that line will pass through the C.G. of the Cub. Wanna try one more? Hmm . . . let's tie the string to one wheel axle. The poor Cub is now hanging upside down and banked about 45 degrees. Now run that imaginary line on down from the string. You gettin' the message? Right, it goes through the Cub's C.G., meeting the other two imaginary lines at that magic point.

Now, if you had a pencil that could go right through that Cub at any angle without touching it (well of course not, dummy, just imagine it!), and you could set the C.G. of the Cub on the point of that pencil, the Cub would just sit there. You could rotate it in any direction around the C.G., let go, and it would just sit there . . . pointing up, pointing down, upside down, knife edge, anyway you want . . . it'll just sit there. The center of its weight is concentrated at that one point, and nothing but an outside force (a breeze, your finger, a drop of water on a wing tip) will make it move. It is perfectly balanced IN ALL DIRECTIONS. So much for C.G.

Now let's BALANCE this Cub for proper flight trim. The instructions on the plans (if done correctly) will tell you to "balance the model at the point shown," which is normally about 1/3 of the wing chord back from the leading edge. This "point" is usually indicated by a heavy black arrow pointing to the underside of the wing. Actually, this POINT is along a LINE, which in the top view, would run from wing tip to wing tip, at 1/3 of the chord back from the leading edge. The model should balance with the fuselage horizontal when you suspend the model with a fingertip under each wing panel and somewhere along that balance line.

Let's try to visualize one more thing, which ties it all together. While the model is nicely balanced on your fingertips, imagine another line dropping straight down from that balance line, right where it crosses through the center of the fuselage. Yep, right through the C.G.!

Anyway, from now on, please, all you guys who really know better, show us where the model should BALANCE, and let's leave the C.G. for the designers who worry about nose moments, tail moments, CLA, center of pressure, and all that other stuff.

IMAA's FIRST

The International Miniature Aircraft Association Inc. has announced its first annual International Fun Fly Festival, to be held at the E.P. "Tom" Sawyer State Park, Louisville, Kentucky, on September 25, 26, and 27, 1981.

The Fun Fly Festival will be similar to the annual Las Vegas Fly-in of the QSAA, in that it is to be a no-contest affair where everyone who flies, does so strictly for their own amazement as well as for the amazement of the others attending. However, the IMAA will not present trophy awards for various non-flying achievements as is done at the Las Vegas affair. The IMAA also plans to put more emphasis on manufacturer attendance, with arrangements for indoor and outdoor display booths at the Kentucky State Park facility.

A registration fee (landing fee) of $30 is required for each participant, with additional picnic and banquet tickets going for $5 and $16 respectively; children under 12 years at half price. Write to IMAA President, Don Godfrey, 254 Washington St., Binghamton, NY 13901, for more information and registration forms for fliers and/or exhibitors. ●

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WHEN START OTHER R/C CARS TO GET BORING... MRC TAMIYA'S FAMED BAJA BUGGIES START TO GET GOING.

There's just so much you can do with ordinary R/C cars. There are just so many places you can run them, just so long before the running takes its toll. After a while, conventional R/C cars lose their zip and appeal. That's when you begin to really appreciate the versatility of these off-the-road racing buggies from MRC-Tamiya.

You'll never run out of places to run... The excitement never quits, the fun never stops. You'll continually find new courses to challenge, new terrains to conquer.

In 1/10 scale, they mimic their full size, off-the-road racing prototypes in speed and durability. Their two forward and two reverse speeds, powered by a high output electric motor, will take you through dirt, sand, grass, and water. You'll race on beaches, desert courses, and over mud soaked trails. They'll clear obstacles that would roll other cars. Fly over jumps and bumps other models can't handle, then land on all fours like a cat and keep on trucking. Their agility and tank-like durability has helped them become the most popular R/C car kits ever made.

Engineered to do it all... The engineering is awesome. For starters, a water resistant box protects your radio equipment and battery, while a sealed metal case envelops the transmission.You'll actually assemble the oil-filled shock absorbers and then fill them with the oil included in the kit. You'll place the shocks on the 4-wheel independent suspension system which features adjustable torsion to permit tuning the chassis to road conditions... and a front suspension with double trailing arms for big car control. And that's just the beginning of the feature-filled, state-of-the-art engineering. These buggies have it all.

So if you're ready for an off-the-road racer that never gets boring, see the "wild pair" at your hobby shop and get going... everywhere.

To Get The Most Out Of Your R/C Cars, Use An MRC-Tamiya Nickel Cadmium Battery Pack and Charger. Specially designed to deliver more power and offer more running time between charges.

RC-14 6-Cell, 7.2 Volts 1200 MAH with charger.

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RB0010 Quick Charger... plugs into your auto's cigarette lighter to recharge your batteries within 15 minutes.

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