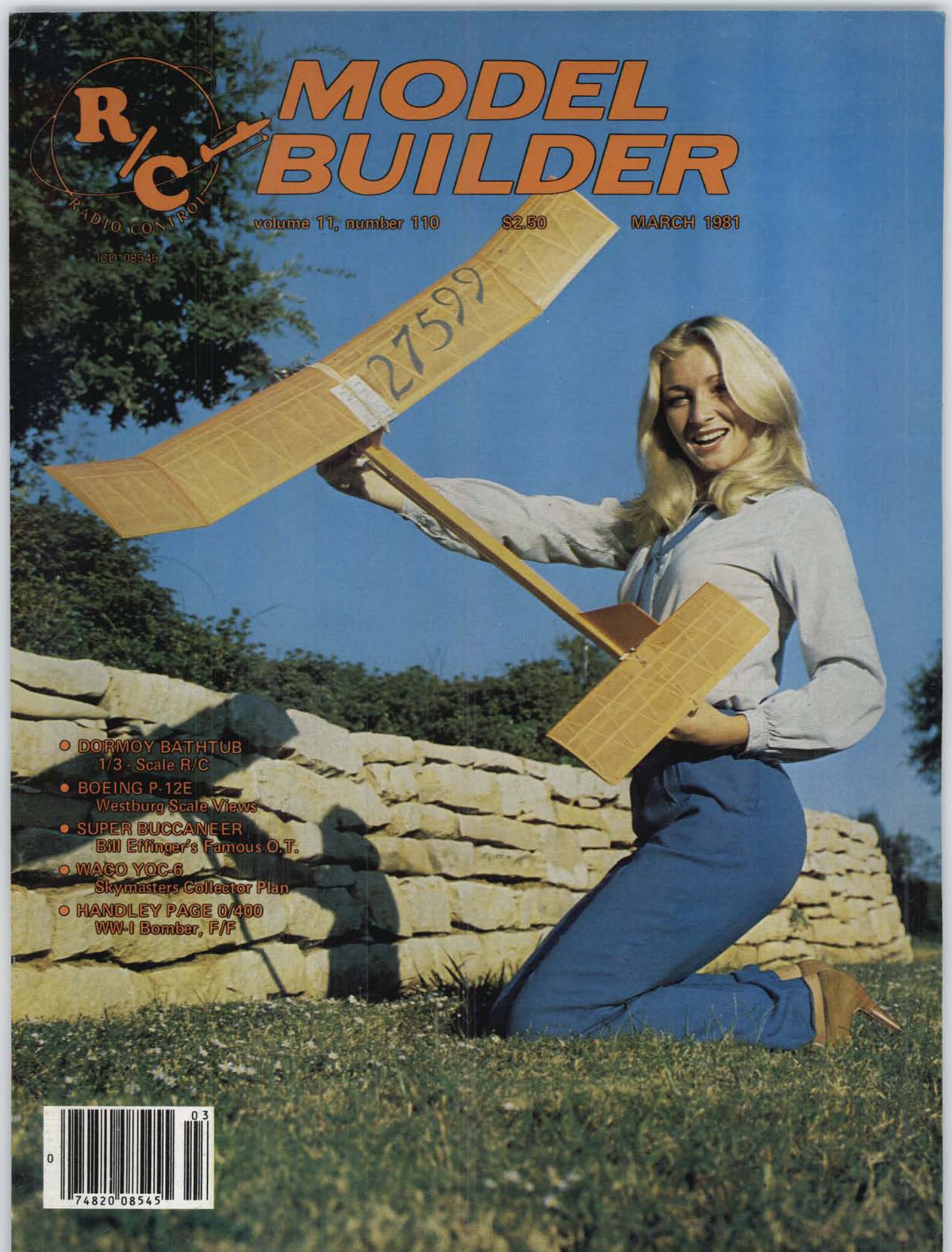
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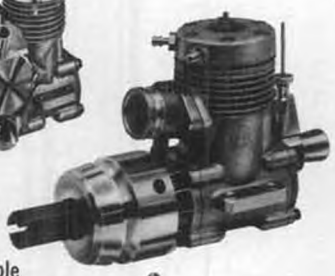

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R/C MODEL BUILDER

MARCH

1981

volume 11, number 110

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FEATURES

SCALE VIEWS

CONSTRUCTION

Cover: Elaine Williams, Fashion Merchandising and Modeling major at Bauder Fashion College, Arlington, Texas, is the subject of this cover shot by fashion photographer Steve Petit. Elaine is 20 years old, weighs 110 pounds, and is 5'-5".

The what? The model airplane? Oh . . . well, it's a 1/2A "Witch Hawk", designed by Jim Clem. This one was built by Keith Williams, Bartlesville, Okla. Yes, he's Elaine's Dad.

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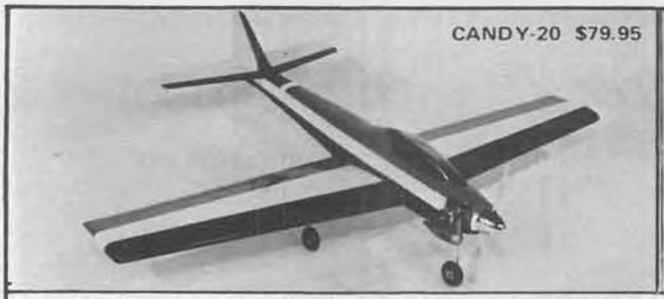

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CANDY, TWISTER, *and* **YAMATO** *are 80% completed, factory-built models in traditional balsa and plywood materials, as shown in photo at right.* **SKY MATE** *is a complete kit, with all parts pre-cut to exact size.*

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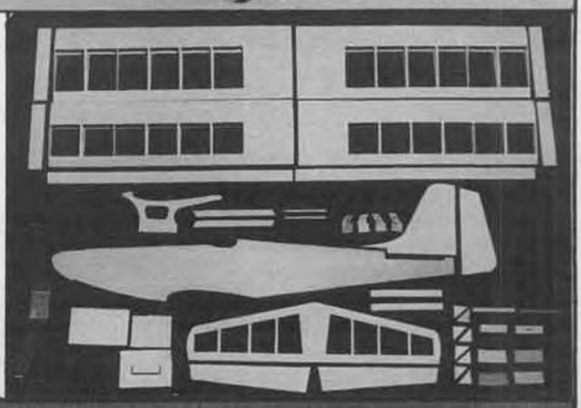

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A New Concept From Craft-Air

Craft-Air is now offering two composite kits, i.e., kits which are complete except for the radio.

- No longer does the newcomer have to shop again and again to collect the proper accessories.
- No longer are potential R/C hobbyists lost to the sport because of the wrong covering, engine, hi-start, etc.
- No longer will it be necessary to make repeated trips to the hobby shop to pick up items you forgot, or didn't know you needed.
- And last, and probably most important, the chances of success of the beginner are greatly enhanced.

Your dealer should recommend his choice of a 2 or 3 channel radio and you should be able to pick up the complete ensemble at a very attractive price.

Drifter II COMPOSITE KIT

2 METER CLASS COMPETITION SAILPLANE
YET A TRAINER EXTRAORDINAIRE

CAT. 801

Designed by Tom Williams

SAILPLANE KIT, MONOKOTE, LAUNCHER, ETC. ALL FOR ONLY **$54.95** NEEDS ONLY A 2 CHANNEL RADIO

Wing Span	6 feet
Wing Area	573 sq. in.
Weight Without Radio	9 oz.
Typical Flying Weight	18 oz.
Wing Loading	4.5 oz./ft.^{2}
Airfoil	FB1151

ABSOLUTELY NOTHING ELSE NEEDED
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EVERYTHING INCLUDED... EVEN THE GLUE!

Piece O' Cake COMPOSITE KIT

MAY VERY WELL BE
THE EASIEST TO FLY RADIO CONTROL TRAINER EVER DESIGNED

Designed by Tom Williams

CAT. 802

Wing Span	6 ft.
Wing Area	573 in.^{2}
Flying Weight	24 oz.
Landing Speed	16 m.p.h. (most trainers ...25-35 m.p.h.)
Wing Loading	6 oz./ft.^{2}
Engine	049 reed valve
Airfoil	FB1151

AIRPLANE KIT, MONOKOTE, ENGINE, ETC. ALL FOR ONLY **$51.95** NEEDS ONLY A 2 CHANNEL RADIO

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THE IDEAL CHOICE FOR BEGINNERS

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SIG
KIT RC-49

WING SPAN: 57-1/4"
WING AREA: 635 SQ. IN.
LENGTH: 44-1/4"
WEIGHT: 5 LBS. (AVERAGE)
ENGINES: .25 TO .40 CU. IN.

KADET MARK II

FOR AILERON CONTROL WITH 4 CHANNEL RADIO EQUIPMENT OR RUDDER CONTROL WITH UP TO 3 CHANNELS.

HERE ARE JUST SOME OF THE IMPROVEMENTS:

- All new full-size plan.
- Fewer parts, but stronger than ever.
- Quicker assembly
- More wing area
- Larger ailerons with differential movement horns — more up, less down for smoother turns.
- Sturdy aluminum main gear with greater ground clearance
- Room for larger fuel tank.
- Built-in down thrust.
- Easier access to nose.
- Big 36 page building book with more than 150 step-by-step pictures and illustrations.

Plus all the usual value-packed Sig kit items: Separate booklet on flying techniques, die cut balsa and plywood parts, aluminum motor mounts, nylon horns, molded hinges, injection-molded cowling, Tuf-Steel RC links and rods, formed coil spring nose gear, nylon nose gear bearing and steering arm, blind nuts, etc.

New Economy Price!

KADET MARK I

For Rudder Control With Up To 3 Channel Equipment

$45.95

KIT FEATURES:
- Strong Injection Molded Cowl
- Flying Check List and Piloting Tips
- Handy Printed Fuselage Sides; Build Internal Structure Directly on the Wood
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- Full-Size Plans
- Formed Nose Gear with Shock-Absorbing Coil Torsion Bar Main Gear

SIG
KIT RC-51

LENGTH: 42"
WING SPAN: 57"
WEIGHT: 4 Lbs.
ENGINES: .19 - .40

Ailerons are not supplied in Kadet Mark I, but a conversion kit RP-AK-331 for addition of ailerons is available for $3.85.

See your dealer first! To order direct, add $1 postage under $10. Postage free over $10. No C.O.D. Send $2 for the latest catalog of kits, accessories and supplies by SIG and other major companies.

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When USPJA judge John Targos and his family went to Europe on vacation last summer, they visited the office of MODELAR magazine in Czechoslovakia, and met its Editor, Vladimir Hadac (center), Assistant Editor Tomas Sladek (rt), and the Editor of the Czech full-scale magazine LETECTVI + KOSMONAUTICA, Otakar Saffek (far left). We have corresponded with Vladimir in the past, and will soon be presenting a construction article from MODELAR for a beautiful 1/5-scale Blanik sailplane with alternate power pod. Hello from the USA!!

from Bill Northrop's workbench

• For the first time in its history, the AMA is faced with a toss-up in its presidential election, primarily brought on by a strong write-in vote. Without having the proper statistics in front of us, we can't state positively, but this could also be the first election in which the existing president's name did not appear on the ballot, the first time that a 51% majority was not acquired by any one candidate on the first round of voting, and the first time that a write-in candidate ever accumulated more than a token quantity of votes.

Of course, we're talking about the singular accomplishments of Earl Witt, AMA's no-nonsense president for the past two years. In like manner, but with even a higher ratio of write-in votes, Horrace Cain, of District VI, came out on top of his two official competitors, Bryant Thompson and Rick Gerling, forcing a runoff vote for vice president in that district.

By the time this appears, the runoff elections for president and District VI vice president will have been completed. The actual announcement may be in a dead heat with the publishing of this issue, but the results will put either John Grigg or Earl Witt in as president of AMA for the next two years, and Horrace Cain or Bryant Thompson will represent District VI on the Executive Council, as a vice president. No matter what the outcome in either race, this election proves beyond any doubt that the voting membership can no longer be hoodwinked into buying whatever is placed in front of them, disguised in fancy wrapping. The controversies of recent years have brought out the largest vote ever tallied (28.7% of the eligible voters, or 19,163 in number), tangible evidence that the unrest has not been caused by the so-called misguided efforts of a few people.

We wish the 1981-82 president a successful term in office, and a rapport with his other Executive Council members that will be fruitful and beneficial to all AMA members.

TRADE SHOW UPDATE

Word has just come to us by co-director Chuck Holden, that the tentative date for the Dallas-based Southwest Modeler Show we published last month, has been changed. Instead of March 14 and 15, it will be May 16 and 17. This show, which has been plagued with bad weather, last-minute schedule foul-ups beyond its control, and last year, a hot weekend in June with a crapped-out air conditioning system, deserves better luck. With a change of location to facilities at the Inn of the America's Holiday Inn-North, instead of the fairgrounds used for the past three years, perhaps that luck will improve. We sure hope so.

Anyone interested can obtain further information from Chuck Holden at (214) 742-2001, Ext. 230, or Mike Clark, (214) 948-2108.

★ ★ ★

The Westerville (Ohio) Model Aeronautics Association, Inc. is sponsoring its 11th annual R/C Show on March 21, 1981, from 0900 to 1600 hours. The location is an 11,000 sq. ft. facility at 3850 Stelzer Rd., Columbus, Ohio, near the Morse Rd. Exit of the I-270 Columbus outerbelt. Displays will include most everything in the hobby field, and a giant-size swap shop is featured. For more information, contact Rich Ritchison, 1834 E. Beaumont Rd., Columbus, OH 43224.

INDUSTRY NOTES

Bob Boucher announces that as of mid-December 1980, Astro Flight has moved to a new facility at 13311 Beach Ave., Venice, CA 90291. The phone number remains the same, (213) 821-6242.

★ ★ ★

Rosie's R/C Products has also made an address change, to 972 Begonia Ave., Costa Mesa, CA 92626, while maintaining the same business phone, (714) 557-1453.

★ ★ ★

John Gorham, of Gorham Model Products, observes that between helicopter kit production and replacement service, his company consumes an average of one mile of rotor blade stock per month!

★ ★ ★

This news will help the Quarter Midget Pylon engine situation. Currently, there is much discussion concerning the serious shortage of competitive .15 R/C engines, with many in favor of incorporating the more abundant 3.5cc (.21 cu. in.) units (turned down by R/C Contest Board).

Now comes news that Henry Nelson, Nelson Competition Engines, will soon be marketing a .15/.15 R/C that is claimed to be able to blow the fins off any .15 engine made to date. To be distributed by Kustom Kraftsmanship (Joe Klause), P.O. Box 2699, Laguna Hills, CA 92653, and available by June 1, 1981 (availability of quantities suitable to meet AMA requirements for legality, will not occur until too late for them to be used at the 1981 Nats), the prices will be $159.95 standard, and $169.95 R/C.

Some general information follows. Any further info concerning specs, delivery, dealer inquiries, etc., can be

Continued on page 103

"...THREE if by AIR"

(Letters to the Editor)

Dear Bill:

The two part article, "The Jimmie Allen Story," appearing in your November and December issues of **RCMB** brought back some memories as well as having informed me of aspects of the Jimmie Allen activities new to me. I enjoyed the article, as I do every issue of your entire magazine.

In 1935 I was attending an aircraft design class, and was active in building scale model aircraft. The long school summer vacation stretched before me.

The Richfield Oil Company of California, through their Jimmie Allen Flying Club, announced a "Non-Flying Scale Model Airplane Building Contest" open to all members of the Club except professional model makers, the contest to start June 1 and end July 15, the completed models having to be turned in for judging by the latter date.

Models had to be of types specified, to the exact size shown on plans provided, and were required to be finished in the special Richfield blue and yellow colors.

There were three classes of competition:

Class A: Open to all ages. Transport and commercial models. Douglas DC-2, Boeing 247D, Northrop Gamma 2-D Mailplane, Stinson Reliant, Kinner Envoy. Any materials desired could be used.

Class B: 13 years and under. Sport plane model: Curtiss-Wright "Baby Bunting," to be made of wood.

Class C: 8 years and under, a model of any material and any size not exceeding 12" span, of any of the above, or of any American airplane in production as of January 1, 1935.

At my Dad's urging, I entered the contest, electing to build the Northrop Gamma 2-D Mailplane.

The contest involved the entire West Coast, models first being judged in local communities, then being forwarded to semi-final judgings held in Seattle, Portland, San Francisco and Los Angeles. Winners here went to a single final judging held in Los Angeles, where the final Grand Prize winners in each Class and for each type were determined.

The contest was a major event. Local merchants supported it, giving merchandise awards to local winners. Cash prizes were given at the four semi-final judgings, and at the final Grand Prize judging. Richfield reserved the right to purchase the final Grand Prize winners, and in fact exercised that option, paying for the models. A professional photo of each model was sent to its builder along with the check. The models were displayed in the elevator lobby of the Black and Gold Richfield Building in downtown Los Angeles (the building is now gone, replaced by the Arco Towers).

The cash prizes for each of the aircraft types noted were donated by the manufacturers of the real aircraft. In Los Angeles, judging was conducted at the May Company, and the Grand Prize winners were announced at the Los Angeles Times building in their auditorium.

Model airplane hobby shops supported the contest by providing kits for each type. These were no "shake the box" prefab type kits, but were simply an assist to the modeler by providing him with blocks and planks of fine quality balsa cut to proper overall dimensions. Nitrate dopes in the proper shades of Richfield yellow and blue were also available. The Richfield yellow in particular would have been very difficult for most modelers to mix from standard colors.

I bought my kit of wood and dopes from Peg and Barney Snyder, who at that time had their small "Modelcraft" shop on 54th Street in Los Angeles, at approximately 4th Avenue. I worked constantly on the model Northrop Gamma of 24" span, to meet the July 15 deadline.

After carving and sanding the external lines of the model, I hollowed the fuselage, mounted the right-hand half on the wing, installed a cockpit interior and full working controls (flaps, ailerons, rudder, elevator, trailing antenna reel), then added the fuselage left side and a sliding canopy which permitted access to the controls when open. The model was finished in the yellow (actually closer to a cream color) with blue striping, set off with the Richfield Eagle emblem, and the Northrop Corporation circle logo on the fin. Oh yes, there were extendable landing lights on the underside of the wing, too.

I had attached a small note to my model calling attention to the fact that the controls were movable from the cockpit. At the May Co. judging, Dudley Steele, Richfield's Chief of Staff and a pilot, discovered the note, tried the controls (poking in through the open canopy with the eraser tip of a pencil, his finger was too large), fell in love with their positive response, played with them, insisted on every other judge coming over and watching. There is little doubt in my mind that these controls and Steele's enthusiasm for them were the deciding factors in my model winning the Grand Prize in the Northrop category. The controls were all push-pull rod and bellcrank, with torque tubes out through the wing to the ailerons. Free play was thus minimized. One other Northrop entered also had cockpit controls, but these worked through threads over pulleys. The threads had stretched, and little action resulted at the surfaces when the controls were moved.

Paul Buckner of Northrop's Inspection Dept. (if I recall correctly) was the judge representing Northrop.

I still have a letter signed by John Northrop congratulating me, and inviting me to attend the Northrop factory for a tour and to meet him. The factory was then at approximately Imperial Highway and Lapham Street in El Segundo. Somehow I never got there. Many years later I finally met Mr. Northrop at an aircraft historical meeting, told him of this, and that I had ended up working for North American Aviation across the street from him, under Dutch Kindelberger. He smiled and said I had picked a pretty good outfit there too.

Stories on the contest appeared in the L.A. Times, with pictures of the winners and their models.

Winners in this contest, which received such enthusiastic sponsorship and such a great turnout of models, are listed below. I wonder how many went on to become involved with aircraft as I did, and how many continued with their model interest, and are today perhaps readers of **RCMB**?

Grand Prize Winners, Class A:

Douglas DC-2:

John McGinnis, Los Angeles, California

Stinson Reliant:

John Townsley, San Francisco, California

Boeing 247D:

Alastair Johnstone, Portland, Oregon

Kinner Envoy:

Elbert Weathers, San Diego, California

Northrop Gamma:

Kenneth Hamilton, Los Angeles, California

Grand Prize Winners, Class B:

Curtiss-Wright "Baby Bunting":

Lens Murakami, Los Angeles, California

Class C:

There was no Grand Prize in this class. Trophies were awarded at division contests only.

Bill, this got rather long, but I thought it might be of some interest to you. I still have the Jimmie Allen contest folder containing the very good quality 3-views, sections, and a photo of the prototype airplane of each contest type. Also a copy of Richfield's magazine for their dealers, "The Firing Line" for Autumn 1935, in which the contest is covered, and a couple of very yellowed L.A. Times clippings with photos. I have my own size 116 black-and-white snapshots of my completed model from various angles, and somewhere (I have seen it recently) I have the studio shot given me by Richfield, but turning the place upside down has been to no avail! I also still have the check vouchers from the Northrop Corporation for the local and Grand Prizes.

While on this nostalgia kick, I will mention having a number of mementos of the '33 National Air Races at Mines Field, the program, my Gold Pass for a box seat the four days, various Air Race and L.A. Times letters, the model contest folder with plans of Laird Solution, Howard, and Gee Bee No. 11 racers, also the required pylon to which the model was to be mounted. My Gee Bee won Senior 1st, and it still hangs on my den wall. The pylon disappeared somewhere years ago.

Very best regards,
Ken Hamilton
Rancho Palos Verdes, California

Thanks for your very interesting letter, Ken. After reading Walter House's article and your letter, one begins to wonder whatever happened to all of that mass enthusiasm for sponsoring youth activities in modeling, that existed during those pre-World War II years. Are the potential sponsors turned off? Are the modelers turned off? Where are the spark plugs who put the whole act together? One sign of the times . . . back then, Plymouth (Chrysler) sponsored huge national model competitions. Now we, through government loans, are sponsoring Chrysler!

In a future article, we'll present one of Ken's fine models from an early issue of Flying Aces, as the Old Timer Model of the Month.

Dear Sirs,

Incidentally, one of your columnists recently wrote on the subject of covering silk on tissue, and the problems created. I can tell him the easy way.

1. Cover with tissue in the usual way, and give two coats of thinned dope (50/50).

2. Cut silk to shape (I used lightweight Esaki, ironed to remove crease marks), lay in place and apply cellulose thinners (not dope) liberally, working from the center outwards to avoid bubbles.

3. When dry, dope in the usual way, but remember, at stage 2, use LOTS of thinner.

I have successfully and easily covered an Air

Continued on page 98

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.

Sig's latest is the Kadet Mark II, an improved version of the popular Sig trainer.

• One of the best R/C trainers around, Sig's "Kadet," has just been updated into a Mark II version for quicker building and even better flying qualities . . . if such a thing is possible. Looking at pics of the old and new Kadets, the only external changes we can detect are a larger vertical stab (looks the same as the one on the smaller Kadet Jr.) and a bent aluminum main gear in place of the original wire gear. It does go deeper than that, however. The new airplane is slightly larger all around and has about 30 square inches more wing area than the Mark I version, most of it coming from the wider ailerons, which, incidentally, are fitted with differential control horns for more up travel than down . . . makes for smoother turns. Construction has been altered somewhat to reduce the overall number of parts, but the finished model is claimed to be stronger than ever. Beginners should have no trouble getting this one put together, as the kit includes a big 36-page instruction manual with over 150 photos and illustrations. Full hardware is supplied, including machined aluminum motor mounts, and an injection-molded plastic cowling.

Specs on the Mark II Kadet are: wing span, 57-1/4 inches; wing area, 635 square inches; length, 44-1/4 inches; and average weight 5 pounds. Recommended engine size is .25 to .40. Although designed primarily for four-channel flying (i.e., with ailerons), the new Kadet will perform very well on just three channels (rudder/elevator/throttle), for novices who presently own three-channel systems. Suggested retail price is $49.95, same as the old Mark I Kadet.

From Sig Mfg. Co., Montezuma, IA 50171.

★ ★ ★

In the market for a new R/C system, one that is moderately priced and built by a reputable firm? If so, Tower Hobbies may have what you're looking for in its new "System 4" four and six-channel rigs, made in Japan by . . . but on second thought, we'll let you figure it out for yourself. (Hint: the servos, especially the servo wheels, are a dead giveaway.) At any rate, both systems include transmitter, receiver, four servos (three normal and one reverse), ni-cds all around, charger, switch harness, servo trays, and all other related hardware.

Some of the features are:

• Transmitter:

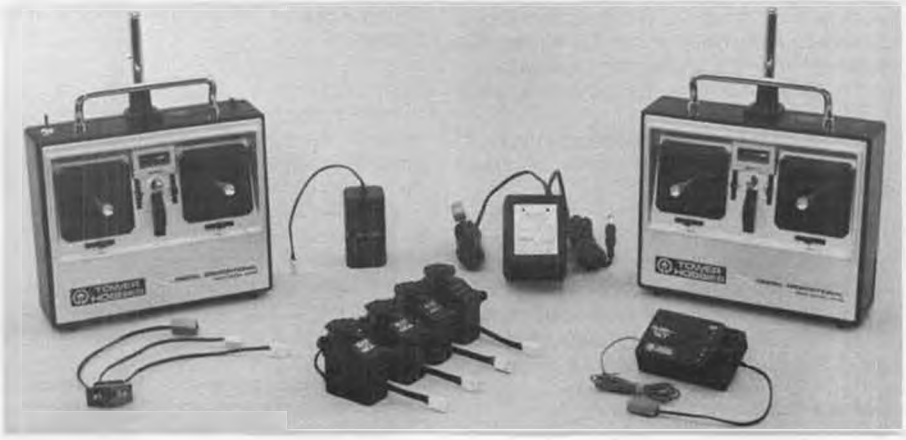
Metal construction with plastic mid-section; 10.8-volt ni-cd battery pack; closed-face open gimbal sticks; convenient carrying handle.

• Receiver:

Measures 2.5 x 1.6 x .8 inches; weighs just two ounces; has a strong glass-filled nylon case.

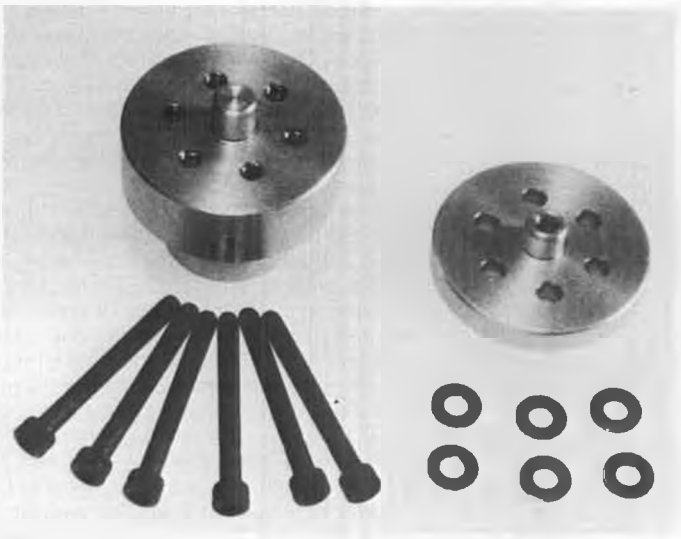
• Servos:

Measures 1.5 x .75 x 1.6 inches; weighs 1.8 ounces; produces 30 ounce-inches of torque; has 23 splines on the output

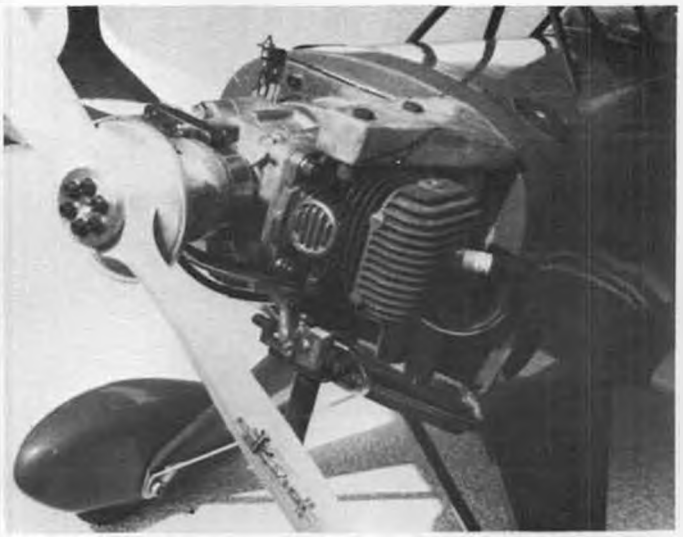


New radio systems from Tower Hobbies, the "System 4." Four and Six-channel versions available.

Goldberg's expanded hinge slotting kit and new large size (2 oz.) Super Jet.



The six-bolt prop adaptor, new from Roush Manufacturing.



Roush Manufacturing is also handing the mighty Kioritz 2.42 cu. in. engine for Giant Scale models.

shaft for accurate positioning of the six-armed servo wheels.

• Airborne ni-cd:

Weighs four ounces; has 500 MAh capacity; measures 1.25 x 1.25 x 2.25 inches.

Introductory prices on the "System 4" radios are a very reasonable $149.95 for the four-channel and $169.95 for the six. Both are covered by a full one-year warranty, and all repairs and service work will be done at Tower's Champaign, Illinois office.

Looks and sounds good to us. If you feel the same, you can order or get more information from Tower Hobbies, P.O. Box 778, Champaign, IL 61820, or call (800) 637-6050, (800) 637-8700, or (800) 252-1113. Illinois residents call (217) 398-3636.

★ ★ ★

RAM (**RA**dio Controlled **M**odels) has added "The Red Line" of electronic marvels to its popular series of sport R/C boats and related accessories. The "red" in "Red Line" stands for **R**AM **E**lectronic **D**evices, which presently includes five different types of miniature lighting systems (flashing aircraft nav lights, a rotating beacon, landing lights, a strobe, and marine navigation lights), all powered by common nine-volt transistor radio type batteries. Running time varies with the number and type of bulbs. All systems are completely assembled and ready to go; the only extra item you'll need is a battery. RAM suggests using alkaline cells for best performance.

Also included in this product line are a Mini and Maxi Electronic Throttle, for controlling motor speed in all types of electric-powered models, and an Electronic Switcher, which is used to control various circuits such as lights, auxiliary glow plug battery, or auxiliary electric motors. These three units work off of your airborne receiver batteries and plug directly into your receiver, bypassing the need for an extra servo. Like the lighting systems just described, these come fully assembled, but without connectors for the receiver; you'll have to supply and wire them up yourself.

RAM has a poop sheet available that explains all of these systems in much greater detail than we have room for here. If interested, send an S.A.S.E. and ask for the fact sheet on "The Red Line" electronic products. Write to RAM, 3631 N. Kedvale Ave., Chicago, IL 60641.

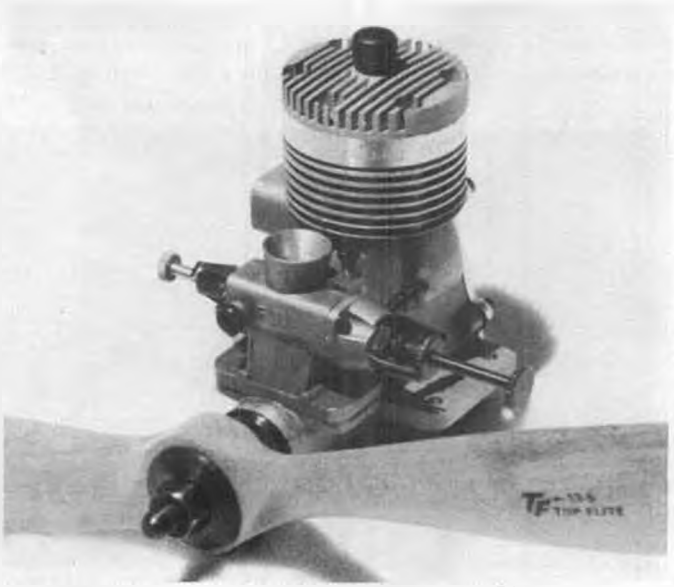
★ ★ ★

Active builders who lean toward the use of the thick gap-filling cyanoacrylates will be happy to learn that Carl Goldberg Models has just introduced a larger size of its very popular Super Jet adhesive . . . a big two-ounce bottle, which at $12.95 represents better than a 1/3 saving for you the consumer.

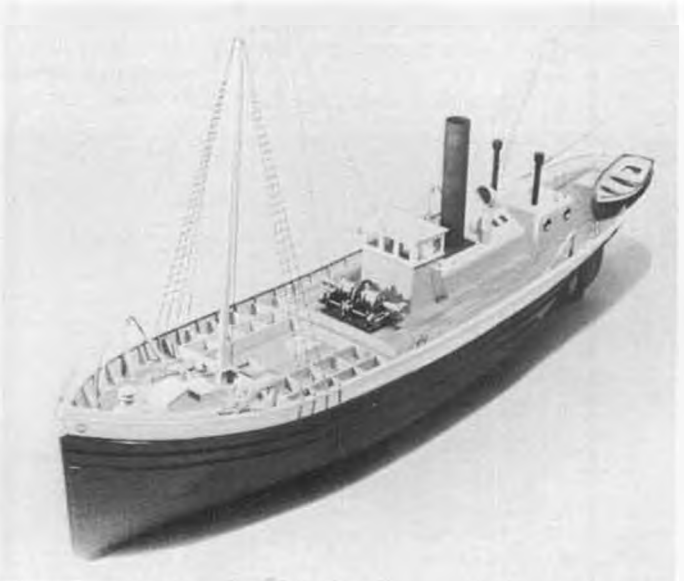
Goldberg also has an expanded version of its one-of-a-kind hinge slotting kit; now included are two centering guides, which provide for perfectly aligned hinges in your flying surfaces. It works with both sizes of Klett regular hinges and also with the newer flex points. The seven-piece set goes for only $2.95.

Both from Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60651.

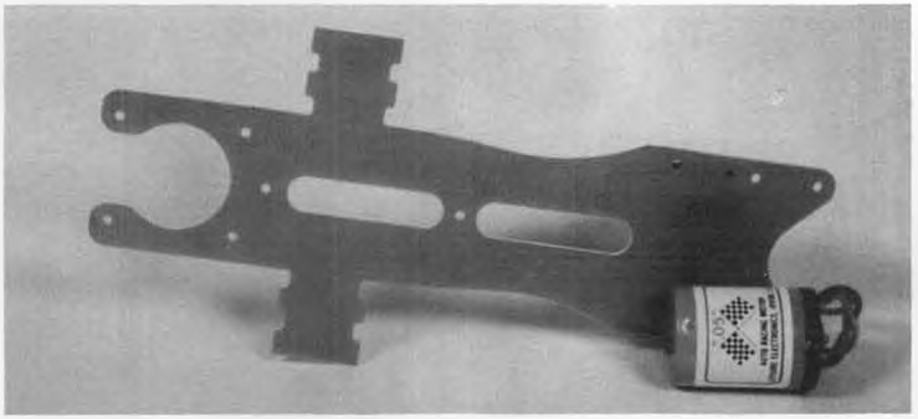
★ ★ ★



The familiar Fox .45 B.B., fitted with the new Davis Diesel conversion head.



Big 67-inch steam trawler, offered in fiberglass hull form by Dynamic Models.



Leisure Electronics' improved epoxyglass chassis and new electric motor for 1/12-scale R/C cars.

Leisure Electronics' Roland Boucher favored us with samples of his company's new Team Leisure electric R/C car motor and improved epoxyglass chassis. The motor (No. 1002-D) is the same as Leisure's No. 1002 05 stock motor, but is dynomometer tested and broken in at the factory, assuring you of top performance right out of the package. The new motor is certified ROAR-legal for Stock racing events and sells for $15.

The epoxyglass chassis has been improved by the addition of two elongated holes down the middle (see photo). The holes are there to provide more flexibility and "give" without sacrificing strength, plus they make the piece a bit lighter, too. Part number (2001) and price ($13) remain the same.

From Leisure Electronics, 11 Deerspring, Irvine, CA 92714.

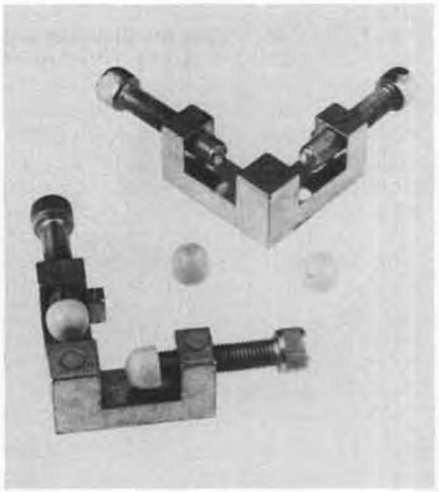
★ ★ ★

Latest item in PanaVise's line of high-quality tools for craftsmen and hobbyists is the unique Dual 90° Corner Clamps, designed to hold workpieces at exact 90° angles for gluing or machining. The clamp body itself is of cast aluminum, while the actual clamping is done by two socket-head machine screws, which are fitted with removable vinyl plastic caps to protect your work from dings and scratches. With the plastic caps removed the clamps will hold pieces up to 3/4 of an inch thick.

Packaged two to a card, the new PanaVise clamps should be available by the time this issue hits the stands. If not, you can order direct from PanaVise Products, 2850 E. 29th St., Long Beach, CA 90806.

★ ★ ★

The chainsaw-type engine occupying the entire nose of the Byron Pitts in one of the photos is the Kioritz 2.42 cubic inch powerplant, converted to aircraft use and marketed by Tom and Dick Roush, who together are the driving forces behind Roush Manufacturing, located out in Sandyville, Ohio. The Kioritz is generally considered by those involved in the Giant Scale movement to be about the most powerful ready-to-use model engine presently available (3.2 horsepower at 8,000 rpm), and therefore the engine of choice for the biggest of the biggies or heaviest of the heavies, or on large aerobatic types when no other motor gives the desired performance.



Handy Dual 90° Corner Clamps from PanaVise.

Here are some of the engine's more noteworthy features, as quoted from the press release:

The engine uses a three-ring piston running in a chrome bore for outstanding compression and long life. The crank and rod are of chrome-moly steel, with caged roller bearings on the rod ends and massive ball bearings on both ends of the crank. The carburetor is the Walbro type and is set up so it can be turned 180° from its original position for ease of throttle hookup. The weight of the Kioritz is 6.5 lbs. Points are sealed in the rear casting, free from oil and dirt.

Probably the Kioritz's best feature is the full one-year warranty against defects in material and workmanship. Warranty or service work can be done by Roush Mfg. or by your nearest Echo-Kioritz dealer (take the engine into his shop with the fuselage still attached and watch his jaw drop!). Price is $189.95.

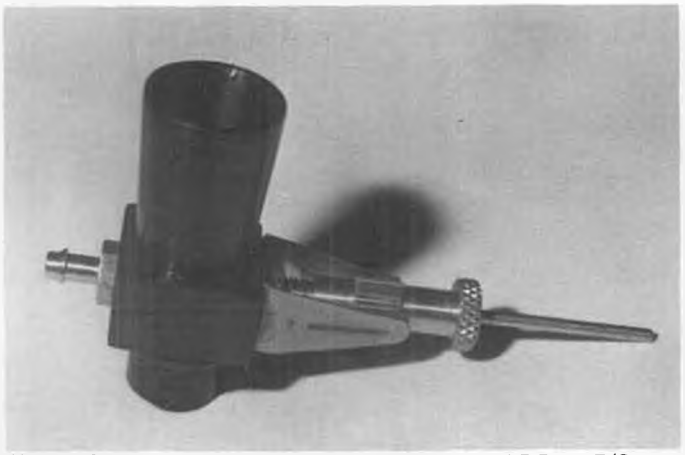
Also being offered by Roush Mfg. is a six-bolt prop adaptor for the popular Quadra engine, or any other motor with a 5/16-24 threaded shaft. Both the adaptor and front bolt plate are machined with alignment studs in the center, and the bolt plate also doubles as a drill jig for the prop. The bolt plate is tapped for a spinner screw (didn't say what thread size), so special adaptors are unnecessary. Included in the $19.95 price tag are the prop adaptor, bolt plate, and six socket-head bolts and washers.

From Roush Manufacturing, P.O. Box 251, Sandyville, OH 44671.

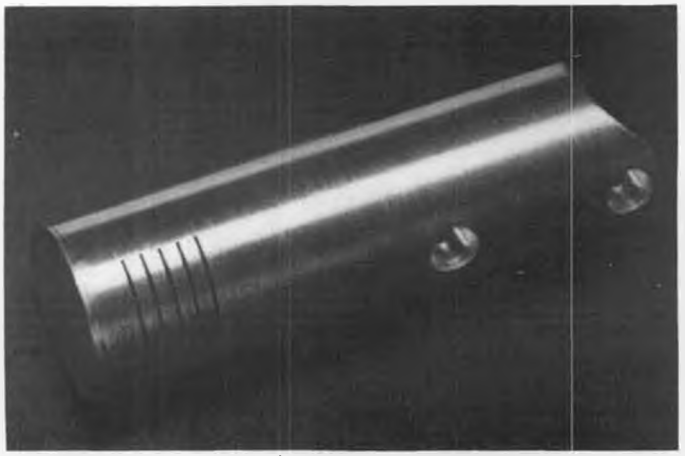
★ ★ ★

Head honcho of Davis Diesel Development, Bob Davis, is expanding his line of diesel conversions by offering a diesel head for the Fox .45 B.B. Bob sez the converted Fox will swing a 12x6 prop at better than 12,000 rpm and a 14x4 at over 9,000 rpm, with a reliable idle at 2,000

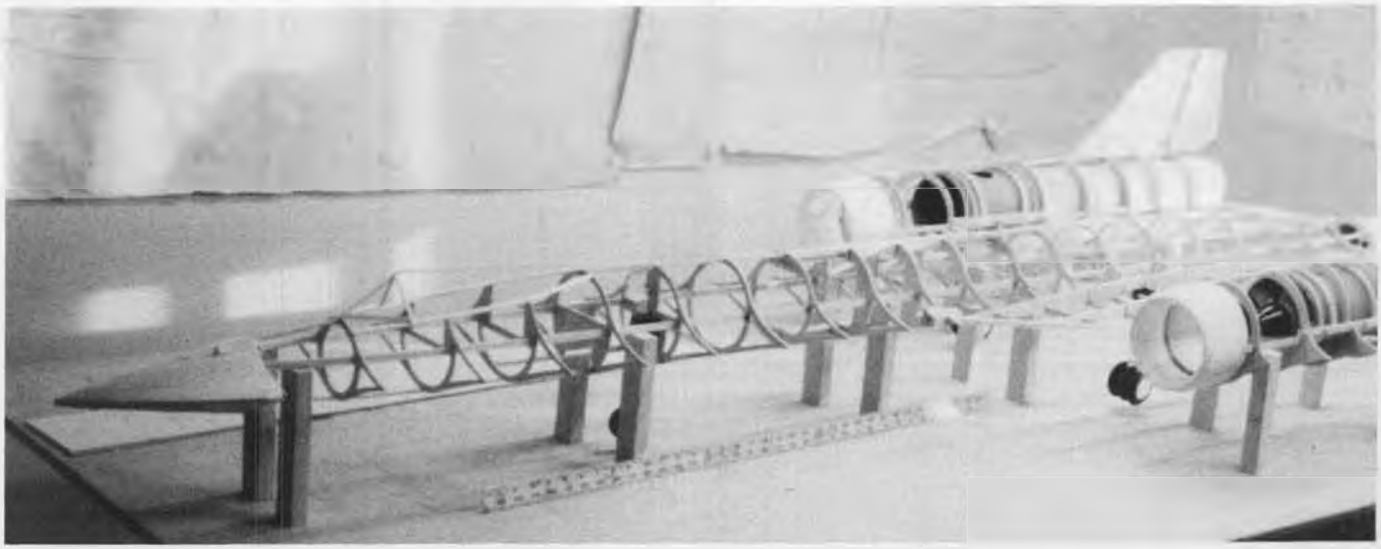
Continued on page 99



High-performance racing venturi for the K&B 3.5 and 7.5, by R/C B. Products.



Unusual but effective muffler for the K&B 3.5, by Bill Evans R/C Aircraft.



Wotta project! Certainly one of the most ambitious undertakings we've ever seen, is Don Allen's Lockheed SR-71, shown here ready for balsa planking. Total length is eight feet, power will be two K&B 7.5 ducted fans . . . more details in text. Photo by Frank Broach.

1 TO 1 SCALE

By BOB UNDERWOOD

1 TO 1 SCALE

• Christmas is over, and while everything went just fine last year, some modelers seem to have experienced some delivery problems concerning our red-suited friend from the North Pole. I received a letter, from our old friend Herman Schlunk, that was directed to Mr. Claus. We felt that your knowing of these problems might help you plan more carefully for next year.

December 26, 1980

Dear Santa,

Gosh, it looks like we had a communication problem again this year. While the gifts that you brought were really very nice, I think I might have a little trouble using some of them. For instance, the one item listed as a tuned pipe had a specific use. I don't think what you left me will work too well, since a flute has just too many holes for the exhaust to leak through.

One whale of a problem developed when the owner of my apartment building discovered I was keeping a horse in my bedroom. I guess you didn't remember back to World War II times, or maybe I should have put a "P-51" in front of the word "Mustang" on the list. I was wondering, if I can't get rid of the horse is there any chance that you could get a few bales of hay to me? I'm going broke trying to feed the horse shredded wheat.

In regard to the third item, I really have to hand it to you for originality and ingenuity. The micro-balloons you sent are fantastic! Under the microscope I could see each one of those little jobbies and how you ever got your picture on each one I'll never know. But what was really marvelous was the little 1/8-inch-high elf you sent along to blow them up.

Lastly, Santa, I hinted that I needed a new radio outfit because the one I have now keeps glitching and causes me a lot of trouble. I can't see that your gift will be of any value at all. Three pounds of medicated powder, according to the manufacturer, may solve an "itch" but it won't do a darn thing for a "glitch."

Well, I guess that's about all, Santa. I really hate to send you a letter like this but I feel you really have to know about these problems. Maybe you should computerize to help with accuracy and speed. I understand they can be very helpful when working with model activities, especially contests.

Sincerely,
Herman Schlunk

STUFF AND THINGS

We've included a couple of photos this month concerning a project being developed by Don Allen, of St. Louis. While Don has not consistently hit the contest trail, he has created some excellently done projects over the last several years. His German ME-163 Komet (rocket plane) is a fine flying model and is beautifully built. He is working hard to sharpen his flying skills and is continuing to seek out challenging subjects. Don's latest is an SR-71 twin ducted fan model.

Continued on page 86

At left is Canada's Jim Crawford, with what appears to be (and this is only a guess) a 1/3-scale Baby Ace. Fellow on the right is Bill Hunt, Naples, Florida, with scratch-built Miles Sparrowhawk. Both photos by Don Prentice, at the 1980 Flying Dutchmen Scale Rally, Ontario, Canada.

Yes, it do fly! The monstrous (yet only 1/20 scale) Hughes flying boat "Spruce Goose", built by Darrell and Merle Meyer, Orange, California, piloted by John Elliot (flight controls) and Darrell Meyer (engine controls), completed a takeoff, one gentle 'S' turn, and a landing at Prado Park, south of Chino, California, on Nov.29, 1980. Flight was highly satisfactory. Takeoff weight was 83 pounds for the 16-ft. span model.

R/C WORLD

by BILL NORTHROP

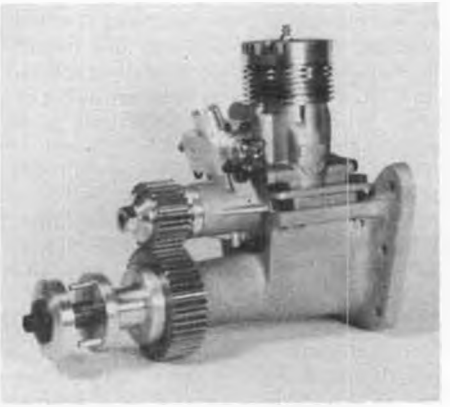
SPRUCE GOOSE PHOTOS BY GRETA ELLIOT

• The initial voting on R/C rules proposals for the 1982-83 competition period has been tabulated, with some interesting results (at least for those who care something about competition).

In R/C Pylon, Formula 1 goes into still another two years without any changes. On the one hand, this would indicate that the rules are quite satisfactory to all concerned. On the other hand, it could mean that dying interest in the event results in a "who cares" attitude toward making any improvements or changes.

Quarter Midget Pylon had two similar proposals to allow engines up to 3.5cc (.21 cu. in.) displacement. Reasoning was quite logical . . . the only two really competitive .15 cu. in. engines for this event, the Rossi and Cox Conquest, have become endangered species. On the other hand, R/C auto and boat racing has hatched quite a number of potent, and very available engines in the .21 cu. in. class. Strangely enough, one board member voted 'yes' on one of the proposals, and 'no' on the other, but both proposals went down the tubes. Personally, we think the idea should have been kept open for further consideration.

Incidentally, the new Nelson .15, to come out in mid-1981, could still solve the problem. See "Workbench" for more information.

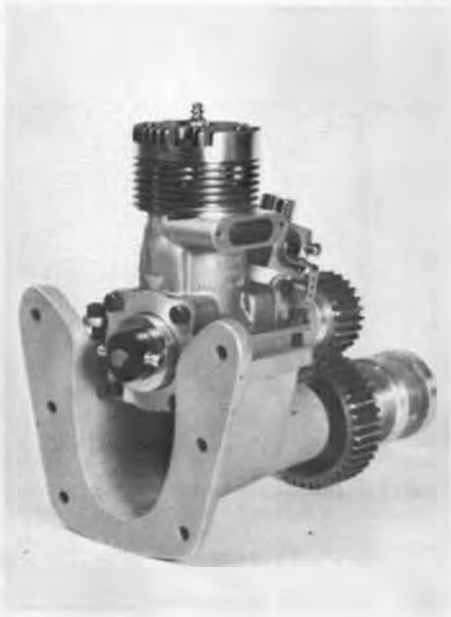


Bolt-on reduction gear base for .61 or .90 engines, by Leo O'Reilly, Keswick, Australia. Reduction is 1 to 1.7. We have his full address.

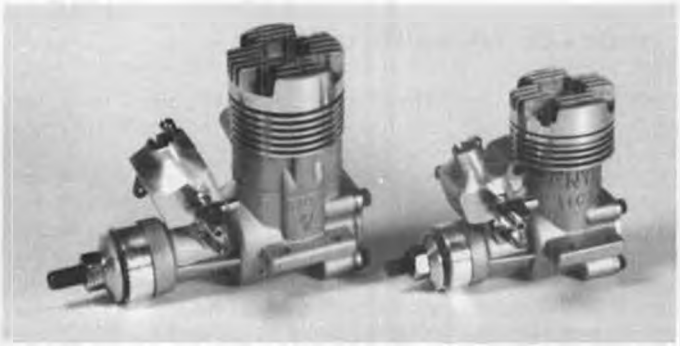
"Big John" Elliot, holding the left wingtip, does very little to shrink the size of the huge flying boat during assembly. Darrell Meyer guides the wing into place. Eight K&B .61 pumpers.

New 4-stroke .35 coming from Enya. We don't know when it is to be available in US.

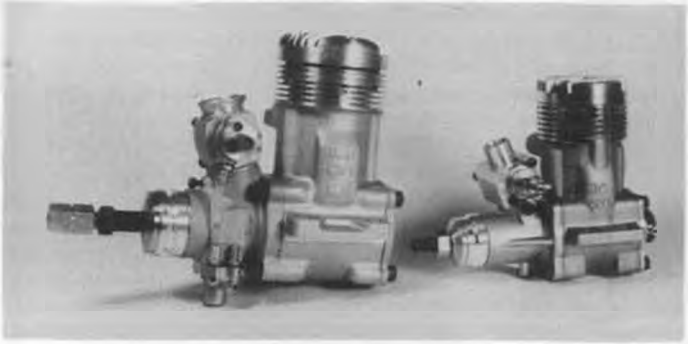
Merle Meyer watches as John Elliot signals "throttle down" to Darrell Meyer at the engine console. Dave New holds the tac. Special transmitter splits throttles into four individual pairs.



Rear view of O'Reilly reduction gear base, also shows new Enya .60X pump.



Two more new Enya R/C engines are on the way. At left, the .21X, and right, the .11CX. Both shown to us by Leo O'Reilly.



At left, the YS 120, as used by I. Matsui in his T.O.C. Laser. At right, another view of the new Enya 60X.

A proposal to allow fiberglass props in Q.M. Pylon was also defeated in the initial vote.

Half-A Pylon, which has had many proposals in the last two voting periods, had only one proposal this time . . . to allow pressurized fuel systems. It passed 9-2.

Two more pylon categories were proposed. One, to revise the dead Sport Pylon by including Formula 500, was passed by the board. The second, a category for Reno Warbirds (hopped up WW-II prop-driven fighters) racing, was diverted to the Scale Board. Word from Chairman Claude McCullough is that it passed the initial vote unanimously.

We're kinda sorry to see 500 racing (Quickie 500, Formula 500, or whatever) heading toward nationalization. Although standardizing rules is good in most respects, it seems that in racing, it

Continued on page 91

These photos arrived too late to use with our construction article in last month's issue on Roger Stern's 3-1/4" scale Liberty Sport. Photos show Roger (in appropriate T-shirt!) holding the ship, for size reference, and then two shots of it in the air. Even at 5,000 feet, it's very spry!

PHOTOS BY AUTHOR

Ain't that just the purtiest thing you ever saw? It's Paul Sims' nine-foot Champ, just starting to climb up on the step for takeoff. Normally "Herman," Paul's pilot, would be on board, but on these first flights on water, he chickened out! (Said he couldn't swim.)

GIANT SCALE FLIGHT LINE

By LEE TAYLOR

GIANT SCALE FLIGHT-LINE

• On Tuesday, October 28, 1980, two friends and I had an absolute BLAST!

Two years ago, several giant modelers in my area became interested in the possibility of flying our big birds on floats. The impetus for this ridiculous thought, at a time when most guys had yet to even fly a giant successfully on wheels, came from the "Lakeport Renegades," three men who fly seaplanes extensively because they live right on the shore of Clear Lake, California. What's worse, they were doing it with a Quadra-powered Cub, and having a total blast doing so! The idea of joining in on that kind of fun had us absolutely drooling.

As usual, other projects kept interfering, and the idea just simmered on a back burner, too durned intriguing to allow ourselves to think about it too much. This summer, though, the itch was just too much to avoid scratching. Paul Sims got a set of Sid Morgan float plans from me and proceeded to build two sets of floats, one for his Nosen Champ and one for mine. Ken Runestrand got a Balsa USA 45-inch float kit and built himself a set for his original L-4 Cub. Both of these guys are expert, highly innovative modelers with extensive float-flying experience, so it was not so much "will it work?" but rather, "What's a super-neat solution to this problem?" Things such as absolutely rigid float mounts, sub-fins for additional yaw stability, and water-rudder steering were tackled. All of the requirements were well known from our previous experience, but adapting them to the bigger models took some thinking.

Anyway, true to form and history, Paul took all summer to build two absolutely immaculate pairs of floats, then engineered a mounting system with machined metal struts that duplicates full-scale practice. His plane has both wheel and float "hardpoints" built into the fuselage, and removing/installing a few pins converts his plane back and forth between the two. His water rudder is steered by a servo mounted in a waterproof box in the float, and is interconnected to the air rudder servo via a "T" harness. The servo lead plugs into a mating plug mounted flush to the fuselage belly.

Ken got busy about two weeks before the due-date, and in his characteristic manner whipped out his very nice effort almost overnight. His floats use a heavy wire mount cage that slips into cross-fuselage slots, and are held in with metal straps ala pattern ship fixed wire landing gears. Ken opted initially to just put fixed stabilizing fins on his floats and depend on the air rudder for steering.

Both Ken and Paul used a sub-fin mounted to a plate that easily screws onto the belly under the tail. Remove three screws to take off the sub-fin, and you're back to a landplane configuration.

As I said, history repeated itself. Paul worked slowly but steadily all summer, Ken blasted through in two weeks, and how'd I do? Mine are still unmounted. Typical. Disgusting!

Anyway, to make a long story short (forget it, Taylor, it's already too late!), Tuesday, October 28 arrived with both Ken and Paul ready to go, and me the poor orphan tagging along with only a camera. We loaded up and headed out to nearby Folsom Lake. The day was absolutely perfect, no wind, a highly unusual glass-smooth lake, a hard sand beach on an Indian-Summer day after the summer's crowds had left. It seemed there were only the three of us on the whole lake.

Paul was the first to get ready to go,

After the flight, Herman did at least agree to pose on the plane. Floats were built from Sid Morgan plans, uses a steerable water rudder on the right float only.

Ken Runestrand's Piper L-4 and Paul Sims' Aeronca Champ, resting peacefully after a fun-filled day of flying. Note the auxiliary sub-fins, added to compensate for the lateral area of the floats. You guys who live near a lake and haven't tried seaplanes are really missing the fun.

but soon discovered an engine that needed a little tweaking. Back to shore and off with the cowl.

Ken set his bird in the water, grabbed his transmitter and pullcord starter (he uses a pulley machined onto the prop driver made by Dynathrust . . . very effective), then tried to figure out how to hold the transmitter, hold the plane, and pull on the starter. "Hmm, put the transmitter on top of the plane, then hold and pull." "KEN, YOU #$%¢&#, that plane's sitting in the WATER!!" I could envision the transmitter going glug-glug-gurgle! Paul ran over and helped out.

With the engine started and controls checked out, the L-4 was released roughly parallel to shore, Ken intending to turn outward using the air rudder (remember no water rudder on his yet). "Hmm, them sub-fins sure do their job, they keep the plane going straight NO MATTER WHAT!" A hundred yards further and the plane gently beached itself.

With the plane retrieved and aimed in the proper direction, Ken advanced the throttle. The plane jumped up on step just as pretty as a picture, then started to go over slightly too far onto the front of the floats. A quick little jerk of up and

TAKEOFF RUN! Note full up elevator, used during the first part of the run and during all taxiing maneuvers. Text lists sources of float plans and kits.

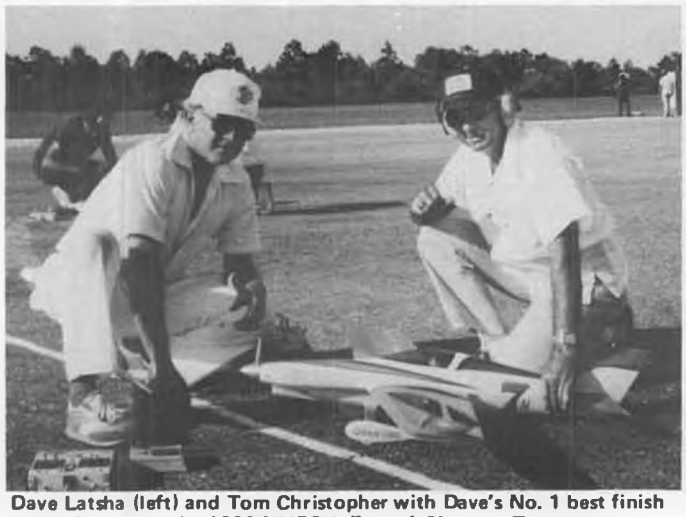
the Cub leaped off the water like a cat. Certainly no doubt about the flyability of this bird, the takeoff run from throttle-forward to leap-off was only about 20 yards.

In the air, the L-4 proved to handle even better than it did without floats. The additional weight makes it a more solid-feeling plane, with a slightly higher approach speed and more positive rate of descent to a landing. On wheels, this 17-lb. plane is somewhat light and "floaty." On floats at 21 lbs., everything is just more positive. Glide is still unbelievably flat, and penetration is better with the additional weight.

After feeling out the bird and making several low passes for the camera, Ken started to wring the bird out. Now, you have to understand that the Quadra is not exactly scale power for what is supposed to be a 65-hp Piper Cub. It is much more like how the 150-hp Super Cub, lightly loaded, with an expert pilot on board would perform. Ken has never

Continued on page 89

Ken Runestrand built his L-4 from a Balsa USA J-3 kit, making several structural mods in the process. He opted to do away with a steerable water rudder, a decision he regretted later when he found the model totally unresponsive to the air rudder while on the water.



Dave Latsha (left) and Tom Christopher with Dave's No. 1 best finish award Polecat at the 1980 NMPRA Form 1 Champs. Tom was numero uno in the Championship Race.

Overall 3rd placer, Dave Shadel (left), just about to set the new official F-1 fast time record of 1:09.00. Samurai Racing Team member, Jim Shinohara, doing the holding.

PHOTOS BY DAVE LATSHA

PYLON

"GO FAST AND Turn Left!"

By JIM GAGER

1980 NMPRA FORMULA 1 CHAMPIONSHIPS

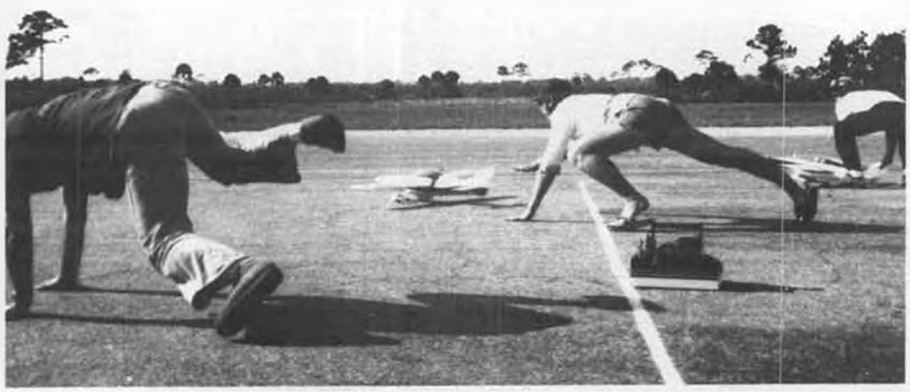
Due to a fire at my place of employment just a week prior to the championships, I was unable to attend. A last-minute call to my good buddy Dave Latsha, to request he take some pictures and some notes so we could have some results for this column, resulted in an extensive and excellent report by Dave.

With that . . . here's Dave!

How good a Formula I Championship race will be somewhat depends on Mother Nature and the gods that travel around with the Form I racers. Regardless of that, 1980's Formula I Championship pylon race was held at Titusville, Florida, hosted by the Moonport Modelers of Titusville. The C.D., Roy Joehanson, and his crew were all well prepared for whatever was to take place during the two days of racing. Rod and Sali Gier were the contest coordinators. Rod was also the official starter for two days. From the Form I pilots and all other people interested in Form I, many thanks to these people, for a job well done.

The flying site location and field conditions were the finest, located on the Tico Airport. Pylon placement was excellent in either direction, depending upon the setup for the wind. Pit conditions were equally as fine, located on an adjacent concrete taxi strip, with a grass pit area just off to one side. Arriving at Titusville and seeing this for the first time was enough to turn any pylon racer on and want to get out the equipment and "get it on," which is exactly what happened. Test flights were made until darkness set in.

Friday, most everyone from the north, south, east and west . . . 45 fliers, to be exact . . . showed up very early at the flying site and proceeded to hone their beautiful screaming banshees in hopes of becoming the Number One man for the year. With all their wishful thinking, this was not to be known until about 4:00 p.m. Sunday afternoon, after Mother Nature had pulled her bag of tricks and the gods of dumb thumbs and other usual wondrous problems were pulled on the Form I pilots and their pit crews, leaving the victorious and others with the Floridian warm feeling of having had another super Championship race. Tom Christopher came out top dog, No. 1 with a perfect score for ten rounds. Greg Doe was 2nd, Dave Shadel 3rd, John McDermott 4th, and Brian Richmond 5th. Dave Shadel also shared Tom Christopher's "high as a kite" feelings, because during the contest he turned in the new official Formula I fast time record of 1:09 flat. Dave Latsha was still soaring in the clouds because he copped the Form I static best finish award. (Ask Dave how



Jim Shinohara doing a leap-frog number after Dave Shadel's fast-time winner. In contrast, note Bruce Richmond's form . . . the perfect launch!

Bruce Richmond holding for Greg Doe. When the dust cleared after two days of all-out racing, Greg was in 2nd place overall.

Behind Jim Shinohara is the wagon tram, provided by the contest management. Saved many an aching muscle for everyone.

Number One high-point man for the past Form 1 season was Dave Shadel.

to break cranks in both QM and Form I engines.)

Friday evening, after the practice session, all of the Form I pilots and their crews (needed for moral support and a bending of the elbows) checked in at the Ramada Inn for registration, technical inspection, static judging for race take-off positions, and the best finish award for the Championship race. Rod and Sali Gier registered the fliers and at this point deserve a vote of thanks; they stayed up until the wee hours of the morning, like 4:00 a.m., to prepare the matrix, and were back out on the flight line at 7:00 a.m. for the race to start at 8:30 a.m. Rod was the official starter, and Sali the scorekeeper. Early Saturday morning, as the rooster crowed, he was soon to be drowned out by the throaty roar of the first Form I engine started. Then another, and another, until the pits came alive with screaming engines. And then it happened: the first three heats were called and placed in the pit box grid.

The starting line area was connected to the pit grid by a taxiway across an open grass field, with some 600+ feet between them, which raised all safety limits above the normal standards. Spectator viewing was excellent, and the distance was no problem, due to a flatbed wagon tram that picked up the pilots and callers at the pit box and quickly whisked them away to the starting line, then picked up the last heat contestants, picked up the stray planes that landed beyond pylon No. 1, then returned planes and everyone back to the pit boxes. The driver of this wagon tram had visions of being at Indianapolis, leaving no room for you to not be prepared. When his pit boss said, "Go," he went. Many a pit crew man was seen playing airplane, screaming like a Form I engine, trying to catch up to the wagon tram, if he was not on it when it left. Most of them caught it, due to the driver's erratic brakes and the flier's high-pitched screams, shouting *"STOP!"*. Seriously, the tram was a fine feature and saved considerable energy.

Being a Championship race, the first heat started in a fury, and all heats stayed that way for the following two days of racing. Many of the pilots constantly turned times in the mid and low teens throughout the contest. No room for errors, just all-out go. As mentioned in the beginning, Mother Nature was to take her part in this event. She decided to leave the temperature and humidity conditions ideal, but couldn't resist seeing how the pilots would handle some windy conditions. Now, everyone knows that Mother Nature has a good side and a bad side. The good side was nice, warm Florida air, and no rain. And then the other side that pilots heard above all the other excitement: *"Gotcha!"* Granted, she didn't do this to

Continued on page 83

Bruce Richmond held and called for his brother Brian. They made a good team, Brian ended up in a creditable 5th place.

Top six finishers, from left: Dave Shadel, 3rd; John McDermott, 4th; Brian Richmond, 5th; Dave Pearce, 6th; and Greg Doe, 2nd. No. 1 man, Tom Christopher, in center.

KIMBREL DORMOY BATHTUB

By HANK ILTZSCH . . . Giant Scale at its very best! This 1/3 exact scale replica of Mike Kimbrel's VW-powered homebuilt captures all of the flavor of the original 1924 machine, and doesn't need a monster chainsaw engine up front to fly in a realistic manner.

PHOTOS BY AUTHOR

• At the outset, let it be clear that this is a *model of a replica*. The plane that I present here is a model of Mike Kimbrel's replica of the 1924 Dormoy Bathtub. Although it may seem strange to model a replica, rather than the original, there are a number of practical reasons for this. First, there is the problem of documentation in the event the plane were to be entered into competition. Second, and related to the first reason, is the unavailability and lack of structural information on the subject to be modeled. The information available on the original 1924 Dormoy Bathtub is a bit sketchy, sufficiently so that most competition oriented scale builders would shy away from it because of the difficulty in documentation. Oh, there are three-views and a few black-and-white photos around, but certainly not the abundance of material needed (and in most cases required) in today's competition in Precision or Sport Scale.

But since Mike took this sketchy information and converted it into substance, complete with many available photos and complete sets of construction drawings, we now have a subject which can be authenticated to the nth degree, while still capturing all of the flavor and character of the original. Make sense?

It would seem that with today's great push into the building of full-scale replicas, we are opening many new vistas for the scale modeler. Of course, it does depend somewhat on how close to authentic-looking the replica is built, as some subjects I have seen lose something in the translation, but these appear to be in the minority.

Like many modelers, those with a bent toward scale in particular, I cannot look at an aircraft or picture thereof without envisioning it as a model. There is almost an inate sequence of assessments and calculations that run through my mind as I look through various books and publications. Wing shape and number, general configuration relative to ease of duplication, and moments and proportions are considered along with numerous other trivia. In the event most of the above comes out favorably, the subject is mentally filed as a possible.

Then there are the times, such as when I first saw the pictures of Mike's Tub in the September 1978 issue of *Sport Aviation*, when all reason leaves. You are smitten and the plane has to be built, no question. The subject may or may not be a good subject from the standpoint of competition, but then a vast number of scalers don't enter competition anyway, but work for their own inner satisfaction.

Recognize it? It's called "scale madness," and is cured only by frantic gathering of information, drawing many lines on a piece of paper, then feverishly slaving over the workbench until the subject is *fait accompli*. Unfortunately, it is like the flu. You can get it many times in your lifetime, or maybe only once, depending on your mental resistance and stability.

Now that the reasons for building the model are clear, let's look into some of the background on the original 1924 Dormoy Bathtub, which obviously gave Mike Kimbrel a case of "full scale" madness, a closely related affliction.

The original aircraft was designed and built by Etienne Dormoy. This illustrious

The basically complete fuselage and tail surfaces, ready for covering. Construction is more or less scale throughout, except for the nose section (for obvious reasons).

Frenchman was one of those whose thread of works and genius was woven continuously through aviation history, from before WW-I, on through and beyond WW-II. In chronological order, the following is a listing of his accomplishments in, and contributions to, aviation.

He began in 1911 as a draftsman for Aeroplanes Deperdussin. He immigrated to America in 1913 and worked as a designer for Schmitt Aeroplanes in Paterson, New Jersey. After the outbreak of WW-I, he returned to France and enlisted in the flying corps, where he flew Caudron bombers. He returned to the U.S. in 1917 as liaison engineer for S.P.A.D. He contributed to the design of the Packard-LePere pursuit, went to work for the Air Service Engineering Division at McCook field. During the ensuing period he numbered among his colleagues, gifted men such as Ivan Driggs, producer of the famous Dart and instrumental in the organization of McDonnell Aircraft; John Dohse and Jean Roche, builders of the original Aeronca; Orville Snyder, designer of the Curtiss-Wright Jr.; and Harold Morehouse, lightplane engine specialist who was instrumental in perfecting the current Lycoming engine line.

Dormoy was an early advocate of ultralight aircraft, having envisioned a strap-on, propeller-driven craft similar to some of the earlier Lilienthal gliders, but equipped with controls and a motor. At this point in history, no ultralight engines were available, so the idea remained just that.

After designing a simplistic biplane in 1923, which flew utilizing an 18-hp Henderson engine, he culminated his minimum plane ideas in 1924, with the building of what was to become known as "Dormoy's Flying Bath Tub." He entered the plane in the 1924 National Air Races at Dayton, Ohio, in the first cross-country race for lightplanes to be held in the U.S. He won the race and the Rickenbacker Trophy with an average speed of 70 mph over a 140-mile course . . . quite a feat for what was described at the time as little more than a broomstick body with a pair of closet doors for wings, powered by a 20-hp Henderson engine.

If there's a full-size homebuilt around that has the charm and appeal of Mike Kimbrel's Tub, we haven't seen it. A 100% fun flying machine.

If we stopped here, we would have what we need for the origins of the plane we are modeling, but I would like to take you on a bit, to see what else Mr. Dormoy begat.

Briefly, our French genius went to work for the Buhl Aircraft Co. and numbered the Buhl "Bull Pup" among his several accomplishments from 1925 to 1930. This plane embodied, for the first time in a lightplane, an all-metal monocoque fuselage. During the '30s he spent several years with Boeing, where he was the dominant influence in what was then the Boeing Model 299, known by all today as the B-17 Flying Fortress. He had a later association with Reuben Fleet and Consolidated, where he helped engineer the PBY Catalina, as well as most of the later Convair models. So we see it was a rather extraordinary man who produced our rather unorthodox subject aircraft.

Some 50-odd years after the original Bathtub design, Mike Kimbrel, with his interest in ultralights stimulated by an association with the Sorrell boys (of Hiperbipe fame), fabricated the second, living, flying, 1924 Dormoy Bathtub.

★ ★ ★

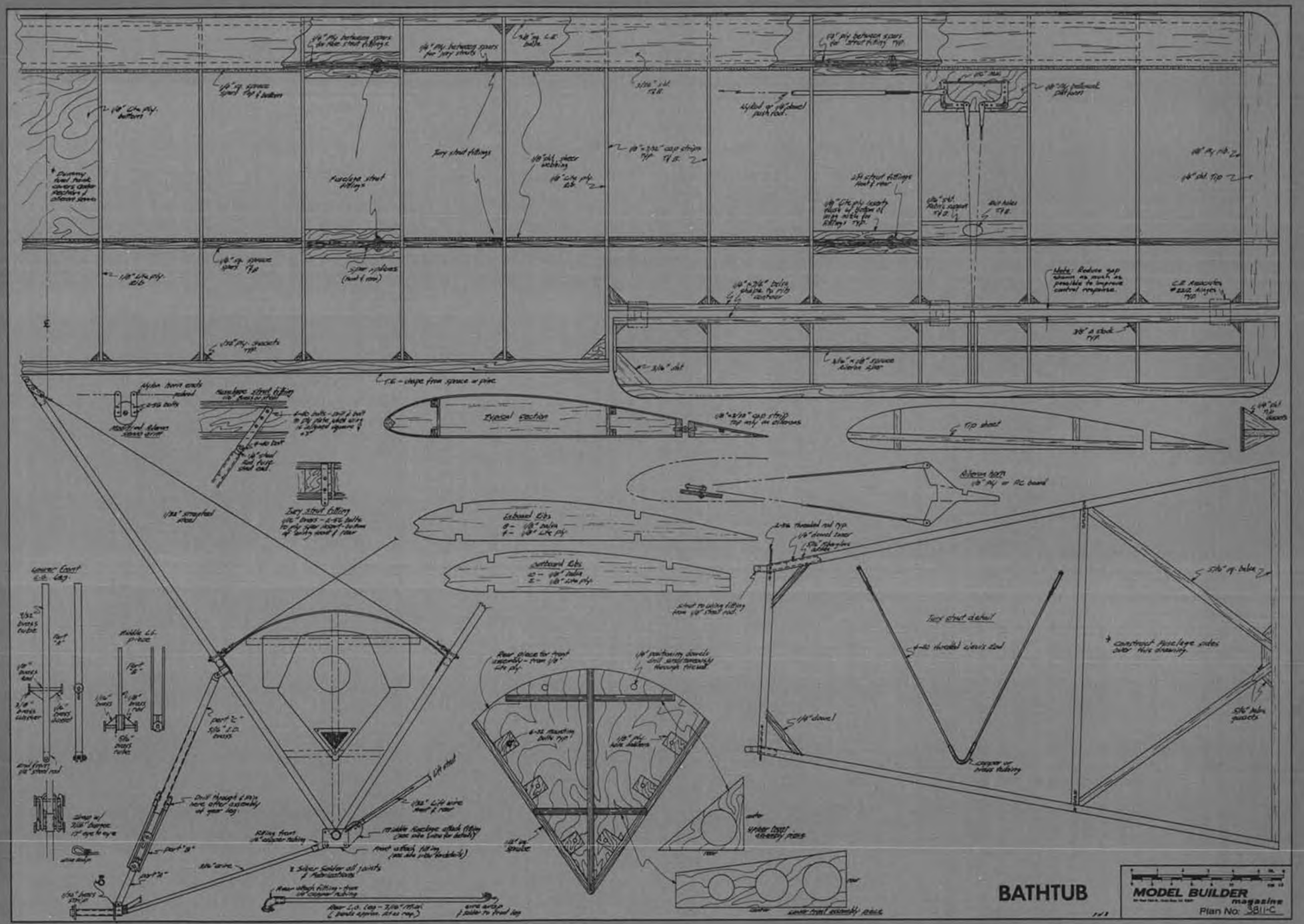
Be aware from the start, that although this looks like a rather simple craft, it is not. In its own way, it is one of the most complex subjects that I have ever built. A redeeming fact is that we are working in such a large scale, that 90% of the plane is simply a reduced size duplication of the full-scale. The remaining 10%, which is predominately the front section containing the powerplant, are minor concessions to the fact that this is a model.

Many construction articles can incorporate the phrase, "Construction is rather straightforward, embodying only basic model fabrication techniques." In this instance, we have anything but the usual, and as such, I recommend the plane only to those who are either well skilled in scale model construction, or who want a strong challenge to their developing skills.

The following text will only attempt to explain some of the major construction sequences and unusual details, and is certainly not a step-by-step type of chronicle. There are many areas where an alternate method or approach is possible, and I am sure some builders may favor their own methodology over my selections. It is my experience that no two scale builders will use all the same techniques for solving the various facets of construction. So do your own thing in areas where you disagree with my thinking.

If you are going to build this model, begin as I did, by acquiring the following items, sources for which are listed at the end of this article. Get a copy (or two) of the September 1978 issue of *Sport Aviation*. Then procure a set of Mike Kimbrel's drawings for the full-scale airplane. They are inexpensive, complete, and will answer many perplexing small questions which may not be immediately clear from my plans or text. Purchase a set of 6-5/8 inch wire wheels. Once having these, you will not be satisfied with just fondling them, but will

Hank Iltzsch and his replica of a replica. Even at a big 1/3 scale, span is only eight feet. Flying characteristics of the model are "different," sez Hank.


BATHTUB
MODEL BUILDER magazine
Plan No: 381-C

want to view them affixed to the finished work. You could perhaps use a set of Williams Bros. vintage wheels in this size, but a lot of the flavor of the subject would be lost. In retrospect, these would be a good investment for use in initial flight testing to prevent damage to the spoked jewels. I did not, and really have no regrets.

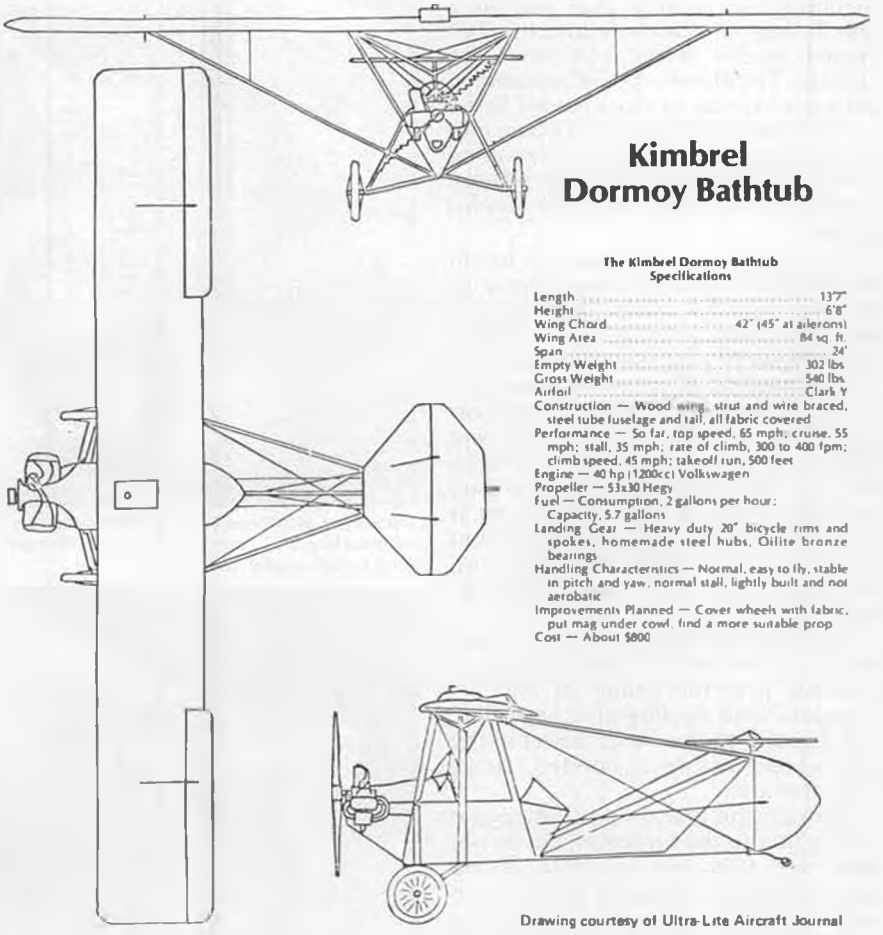
The sequence of construction is of somewhat lesser importance when you are building from completed plans, than it is when starting from zip and working upward. I will narrate the following in the sequence in which I built the original plane, the reasons for which were merely my own logic.

Begin construction with the fabrication of the main landing gear struts. This will require much study of the plans, and the Kimbrel drawings will be a big help here as you go along, but once the general principle is grasped, you should have no problems. Brass tubing, steel, and silver solder are the instruments of construction. Once fabricated, keep them and the wheels around to look at, and they will provide a stimulus for completion of the rest of the project.

Using the appropriate plan section, construct two fuselage side structures. These are constructed mostly of 5/16-inch fiberglass pushrod material, into which 1/4-inch dowel has been inserted. Put a few drops of the gap filling type Hot Stuff inside the fiberglass rod, then insert a previously fitted section of 1/4-inch dowel. Leave room for insertion of fittings as shown on the plan. Fabricate the 1/4-inch steel rod pieces for the top of the fuselage struts, and Hot Stuff and pin as indicated.

All points of bonding to the fiberglass should be lightly sanded. Here again, we use the gap filling Hot Stuff at joints, both the main peripheral tube parts and the 5/16-inch balsa inner bracing. When each side is completed, drill about one inch or so through each joint with a 1/16-inch drill, then screw in a piece of 2-56 threaded rod, Hot Stuff in place, and cut off to the required length. We then have adhesive-bonded-and-bolted joint sections, and in some cases, attach points for further pieces or rigging connections.

Next we form a tent type structure with the two sides, over the top view, with the wing connector fittings over the appropriate spot. This alignment is rather critical to future construction, so measure and align carefully. Lock in place with pins, etc., then apply Hot Stuff down the middle junction point. A couple of temporary inner braces, side to side, should be added to help keep the structure somewhat rigid.



Kimbrel Dormoy Bathtub

The Kimbrel Dormoy Bathtub Specifications

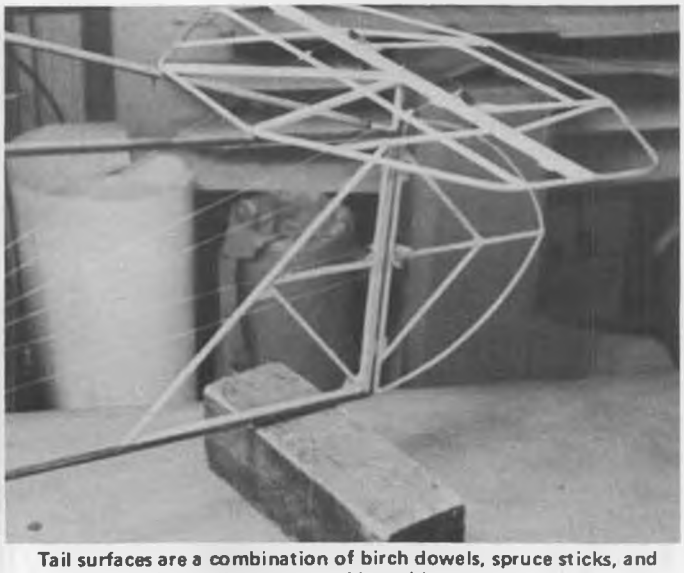
Length	13'7"
Height	6'8"
Wing Chord	42" (45" at ailerons)
Wing Area	84 sq. ft.
Span	24'
Empty Weight	302 lbs.
Gross Weight	540 lbs.
Airfoil	Clark Y

Construction — Wood wing, strut and wire braced, steel tube fuselage and tail, all fabric covered
Performance — So far, top speed, 65 mph; cruise, 55 mph; stall, 35 mph; rate of climb, 300 to 400 fpm; climb speed, 45 mph; takeoff run, 500 feet
Engine — 40 hp (1200cc) Volkswagen
Propeller — 53x30 Hegy
Fuel — Consumption, 2 gallons per hour; Capacity, 5.7 gallons
Landing Gear — Heavy duty 20" bicycle rims and spokes, homemade steel hubs, Oilite bronze bearings
Handling Characteristics — Normal, easy to fly, stable in pitch and yaw, normal stall, lightly built and not aerobatic
Improvements Planned — Cover wheels with fabric, put mag under cowl, find a more suitable prop
Cost — About $800

Drawing courtesy of Ultra-Lite Aircraft Journal

Dummy fuel tank on top of the wing is removable, giving access to the aileron servo.

Fuselage pod aft of the firewall is covered with Super Coverite; nose section is thin sheet aluminum, held on with screws.



Tail surfaces are a combination of birch dowels, spruce sticks, and aluminum tube outlines, actuated by cables.

Fabricate the main (lower) boom, including the landing gear and wing strut fittings. Fit carefully into the "V" shaped groove at the bottom of the fuselage. This groove should be rounded out some in order to more readily fit the lower boom. Now epoxy the boom into place. Use plenty of epoxy, smoothing the squeezout so that the boom is faired into the lower fuselage with the surplus epoxy.

The 1/2-inch firewall may now be cut out and fitted. Epoxy this into place after making saw cuts through the fiberglass shaft into the inner dowels at about 1/2-inch intervals in the area to be bonded.

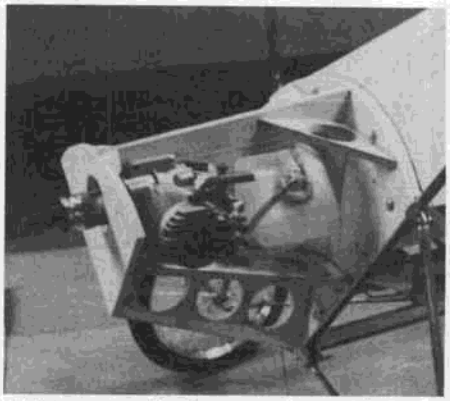
The fuselage structure can now be removed from the board, and the rear structure of dowel and aluminum tubing built up. The temporary brace between the rear main booms can be left intact until almost all of the construction is completed. This will give a good amount of extra rigidity while handling and working with further construction details.

Construct the rudder and fin and add the fin to the main boom, aligning it vertically with the center of the "V" structure. Sand the fiberglass boom flat, and through to the inner dowel in the area where the fin is bonded. Epoxy bond this area.

Fabricate the rear fin post fitting and loosely fit it to the fin dowel, but do not bond yet. With the structure upside down, carefully measure and fit the two upper booms. You will note that a section of threaded rod was left sticking out rearward at the top of each of the rear fuselage main wing struts. Drill a 3/32-inch or slightly larger hole in the front of each top boom, to fit over the projecting rods. Now, using epoxy in the rear fittings and predrilled front holes, put in the top booms.

The main skeletal structure is now completed; we just add to it from here on out. Make up the stab and elevator and fit per plan. The front or engine bearing section can now be made, consisting primarily of a 1/4-inch ply inner structure. This is a removable piece and is ultimately held in place with six 6-32 bolts, threaded into blind nuts in the main firewall. Epoxy all joints in this construction. Note that a hole must be cut on the right side through the rear front former and the firewall to accommodate the fuel tank. When completed, the entire inner front structure is epoxy coated.

Operating oleo-type landing gear involves a bit of metalwork . . . not too big a job. Hungerford wheels really add class.

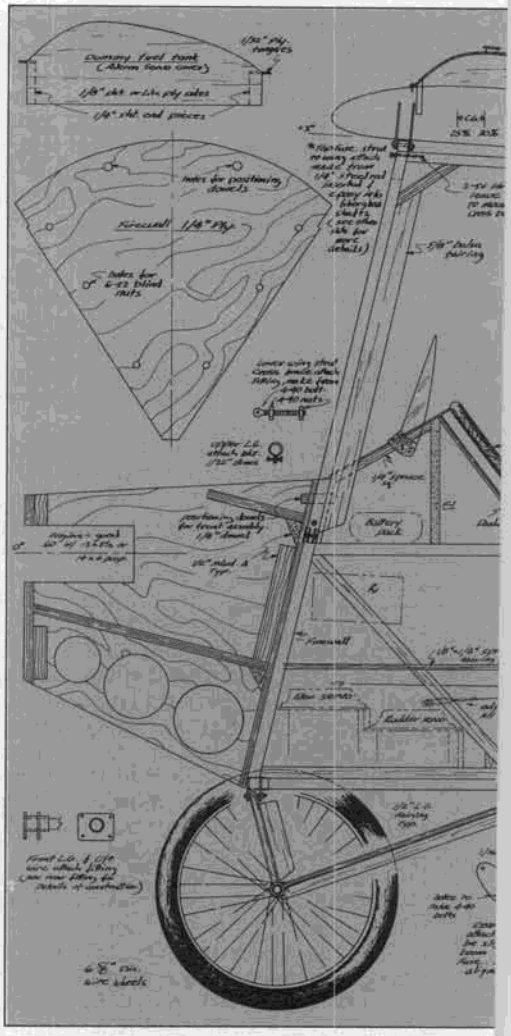


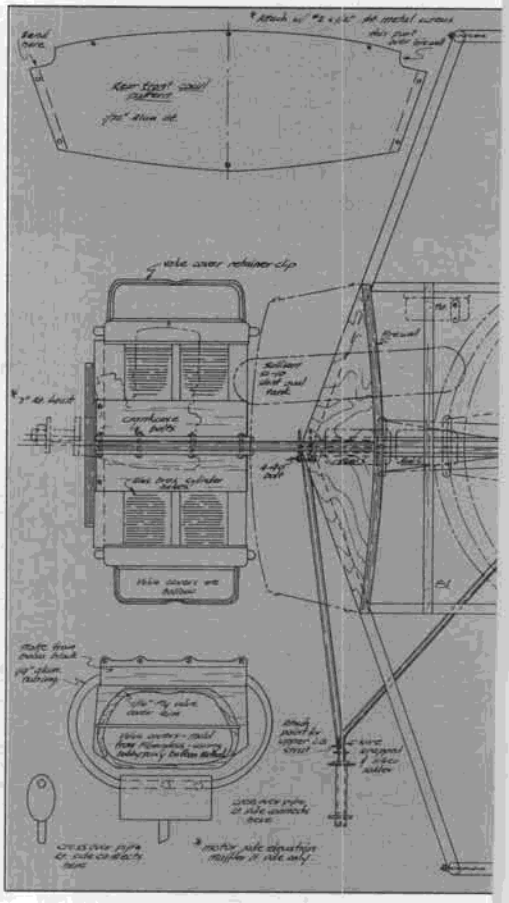
Entire nose section is removable, consists mostly of 1/4-in. ply. O.S. .60 4-cycle provides adequate power and sounds neat.

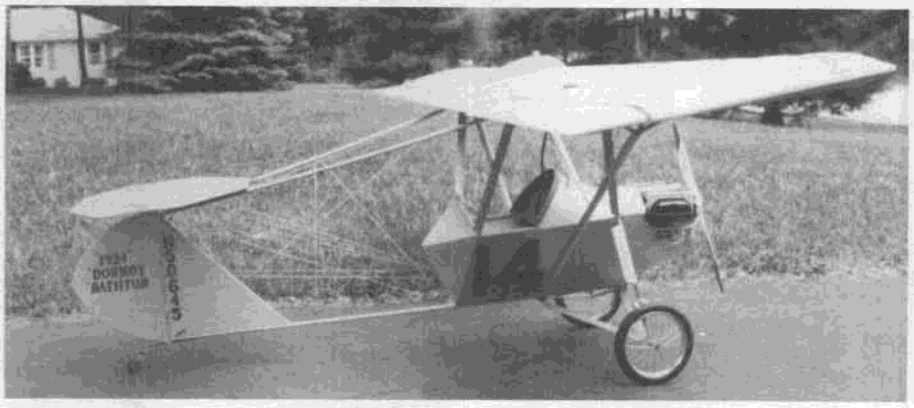
Finish the rest of the landing gear pieces now, and leave these mounted on the fuselage. This will enable you to finally keep the fuselage assembly sitting in an upright position as you work along. The fairings on the landing gear and fuselage struts should be made up and added now.

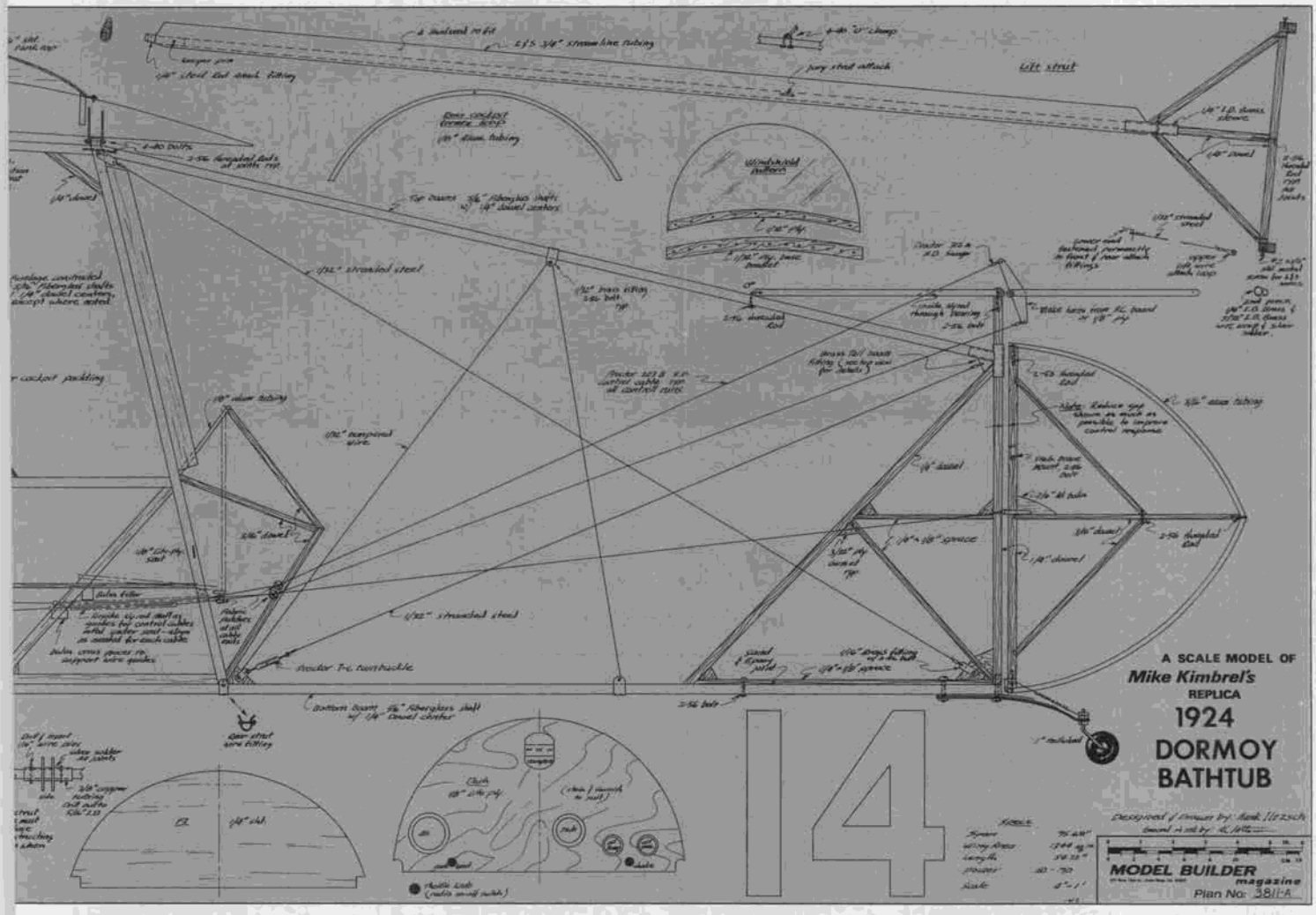
Make up the step type servo mounting as outlined on the plan, and mount inside the fuselage. Make up a ply plate for the top inside front on both fuselage sides. One of these will mount the engine servo, and the other is for the receiver.

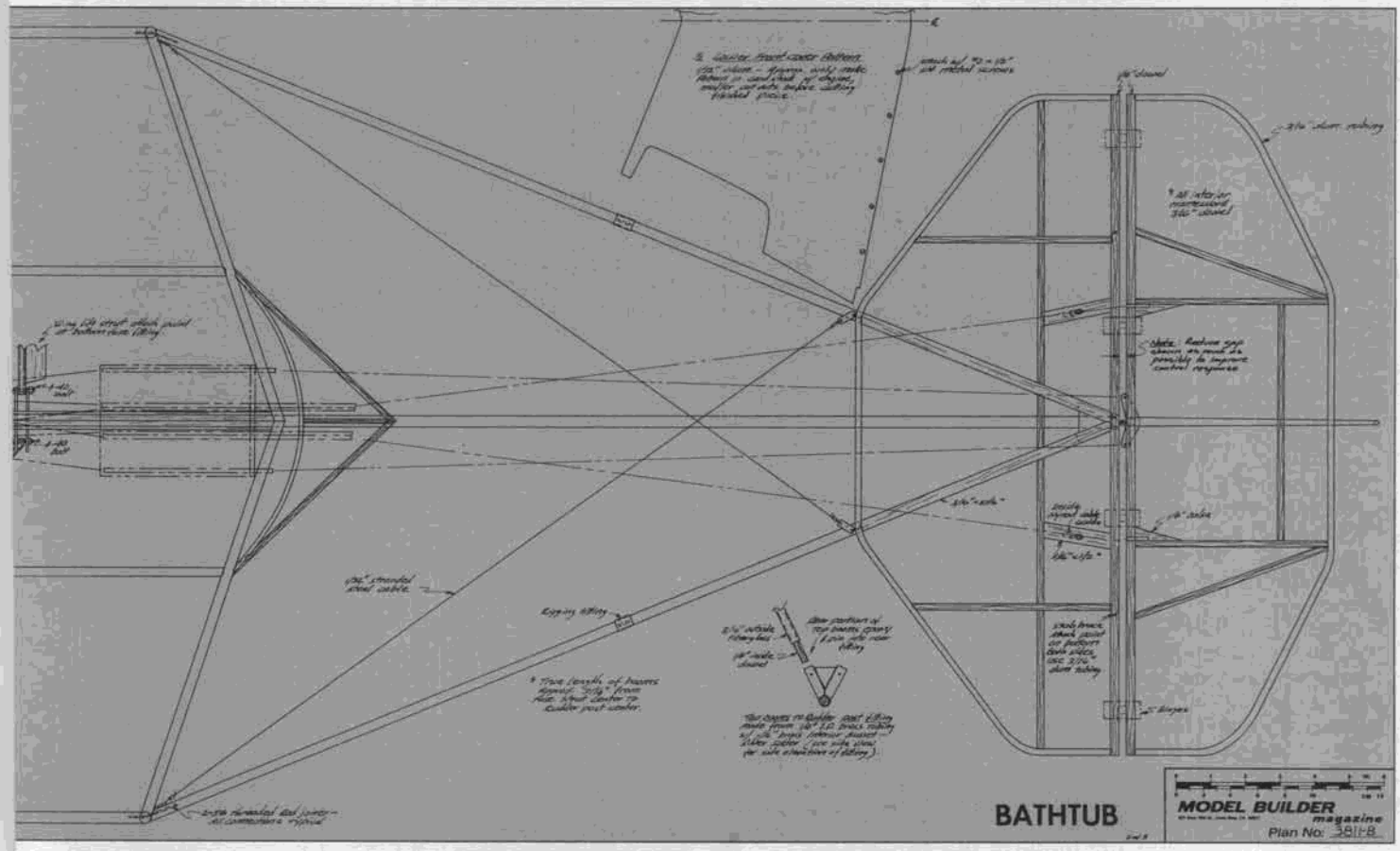
Continued on page 95








A SCALE MODEL OF
Mike Kimbrel's
REPLICA
1924
DORMOY
BATHTUB
14
MODEL BUILDER
magazine
Plan No: 381-A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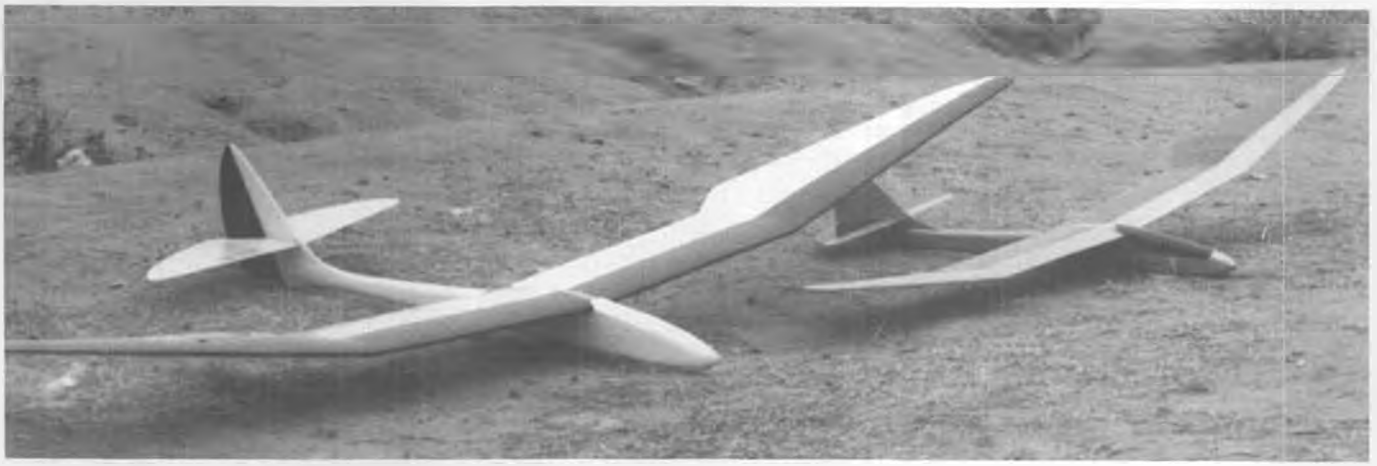


Mark's Models is now offering two sizes of the popular Bird of Time: the original 118-inch-span machine as designed by RCMB's contributing editor Dave Thornburg, and a new two-meter version. Weighs 26 ounces, with just under 600 square inches of wing area.

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY AUTHOR

• How many times have you wondered which sailplane to design, build, or buy? Each plane has some neat features, and some that are not so neat. The trick is to weigh these features against one another in order to measure the overall worth of each plane. Let me suggest a way to contrast scale ships against one another, to compare scale to high-performance sailplanes, aerobatic to thermal machines, those you have with those you would like to have . . . and even apples to oranges, if that's what turns you on.

The overall worth of any sailplane is a composite of its performance, the feasibility of attaining that performance, and the longevity of the performance, once realized. Each of these properties can be expressed in terms of subsidiary properties. For example, performance is quality, quantity, and timeliness. In turn, quality concerns appearance and uniqueness. Appearance can be expressed in terms of style (aesthetic value) and fidelity of scale duplication. Style consists of streamlining, color, and decorations. Scale concerns the configuration, materials, flight performance, and even handling quality.

The table on this and the next page indicates a rather comprehensive view of what R/C soaring is all about. Each aspect is expressed in terms of sub-aspects, down to the level that makes these directly measurable. For example, it's easier to rate the appearance of the model if you note that appearance is partly due to style, which, in turn, has separate identifiable factors. Of course, you can choose to judge at the higher level, but it is probably more instructive to first ask, "What does that mean?," then judge each model in terms of the more specific considerations.

Note that there are two aspects of uniqueness: models within your own collection and/or the chance you might see a similar one at the soaring site. Quantity refers to the different aspects of flight performance as well as the requirements for launch and landing. Then, too, there's the timeliness of performance.

Feasibility concerns the problem of

	Scaleship	Floater
10 Performance		
7 Quality		
10 Appearance		
10 Style (aesthetic value)		
10 Streamlining	10	5
7 Color	10	6
5 Decorations	10	7
4 Scale (replication fidelity)		
10 Configuration	10	0
2 Materials	4	0
6 Flight performance	8	0
1 Handling quality	9	0
5 Uniqueness		
9 In-house (in own collection)	10	8
1 Out-house (in others' hands)	9	1
2 Usefulness as a trainer	1	10
8 Quantity		
6 Efficiency		
10 Duration (minimum sink)	5	10
3 Distance (maximum L/D)	7	7
10 Control Response		
5 Immediacy (lack of lag)	2	8
8 Crispness (response near neutral)	8	10
10 Accuracy (repeatability)	10	10
9 Precision (lack of double neutral)	10	10
10 Sensitivity (maneuver-to-stick movement ratio)	9	10
4 Lack of cross-coupling (between roll and pitch, etc.)	10	8
7 Insensitive to temperature	2	2
5 Gust response		
10 Stability	10	10
5 Pitch	10	10
2 Roll stability, yaw stability	10	10
2 Speed		
1 Maximum	2	1
10 Range	3	2
10 Stall speed	8	10
5 Ballastability	0	9
3 Launch Requirement		
5 Equipment not required	2	9
1 Extra people not required	0	10
7 Range		
9 Visual	8	9
10 Radio control	10	10
10 Landing Requirement (in view of the plane)		
10 Open area	2	7
9 Terrain texture	2	5
5 Turbulence ("roller" or other terrain effects)	3	2
2 Timeliness		
6 Set-up time	5	6
3 Flight duration permitted (battery limit)	8	9

acquiring the model. Here, the first two aspects are not applicable if you already own the model. In that case, simply disregard them. Transportability, flying site availability, weather, and family tolerance of the model may impact on the feasibility of acquiring an R/C sailplane. Longevity concerns survivability, reliability, maintainability, repairability, and replaceability.

Now, all these features are probably not of equal importance to you. After all, to some extent, beauty is in the eye of the beholder. Let's indicate the importance of each feature (property, aspect, dimension, parameter, and so forth) and use this as a multiplying factor . . . a coefficient, if you will. Let's also indicate the degree of achievement on each of these features for each of the models under consideration. The importance weights in the table characterize *my* present point of view. They are probably very different from yours, and I reserve the right to change my view as time passes, and/or when there is a change in my situation. Note that all of the features must be treated in a positive sense. For example, a very inexpensive model is rated an 8, 9, or 10 on a 10-scale, while an expensive one may be a 2, 1, or even zero, if it's way beyond your budget.

7	Feasibility		
6	Acquisition time		
4	Building time required	1	3
1	Purchase time (wait for delivery)	7	10
8	Acquisition funding		
6	Purchase price	1	8
1	Cost of other components	10	10
1	Cost of required tools	8	10
4	Resale value	10	6
10	Transportability		
8	To flying sites	5	9
2	From manufacturer	8	10
10	Flying site availability		
10	Slope sites		
5	Height	10	10
6	Uniformity	10	10
10	Orientation with respect to the prevailing wind	9	9
9	Required landing area availability	9	10
8	Distance to site		
10	Driving time required	9	9
4	Gasoline cost	1	1
8	Flatland sites		
10	Open area	6	6
2	Orientation with respect to prevailing wind	8	8
9	Terrain texture	2	2
10	Weather at sites		
9	Predictability	9	9
5	Typical temperature	10	10
9	Suitable wind prevalence	8	8
10	Adequate visibility expected	9	9
8	Lack of precipitation expected	9	9
9	Family tolerance		
8	Home space belonging to plane	5	8
2	Cost of the plane	2	5
3	Longevity		
10	Survivability (environmental compatibility)		
10	Airborne (max G limit)		
10	Stress	3	9
7	Flutter resistance	8	10
3	Mid-air avoidance visibility	7	8
9	On-ground		
5	Stress of launch	6	9
5	Impact of landing	4	10
1	Tolerance to mishandling	2	8
9	Reliability		
10	Airborne equipment (radio, controls not binding, etc.)	10	10
7	Ground-based equipment		
10	Transmitted	10	10
1	Testing equipment	10	10
8	Launching equipment (when used for this plane)	8	8
3	Maintainability		
7	Airborne equipment	9	9
5	Ground-based equipment		
7	Transmitter	10	10
1	Test equipment	10	10
2	Launch equipment	3	3
7	Repairability		
10	Time required (convenience)	1	2
1	Material required	5	7
3	Skill required	2	5
2	Replaceability		
5	Sailplane	1	5
1	Components of sailplane	4	2
1	Radio control system	10	10
1	Component of radio control system	10	10

To illustrate, the two columns to the right of the properties describe the *degree of achievement* of a fine quarter-scale sailplane and an excellent floater. The former is fully streamlined, so it rates a 10. The latter is only moderately so, therefore it gets a 5. The floater makes no attempt at scale, thus the four zeros. Clearly, the scaleship is almost completely unsuitable as a trainer, while the floater is ideal. The remainder of the numbers speak for themselves.

Now for the arithmetic. The overall worth of each sailplane can be found by taking the weighted arithmetic mean across this hierarchy. For example, on our scaleship, take the product of the importance of streamlining (10) and the achievement of that aspect (10); add to this the importance of color (7) times the achievement of color (10) and in a similar manner 5 times 10 for decoration. Divide this sum by the sum of the importance weights across these three features (22). The result is 10. Now weigh this sum by the importance of style alone as contrasted with the sum of all features at that level in the hierarchy (style and scale); that is, multiply the sum by 10/14. The contribution to appearance of style is therefore 7.14 (on a 10-scale).

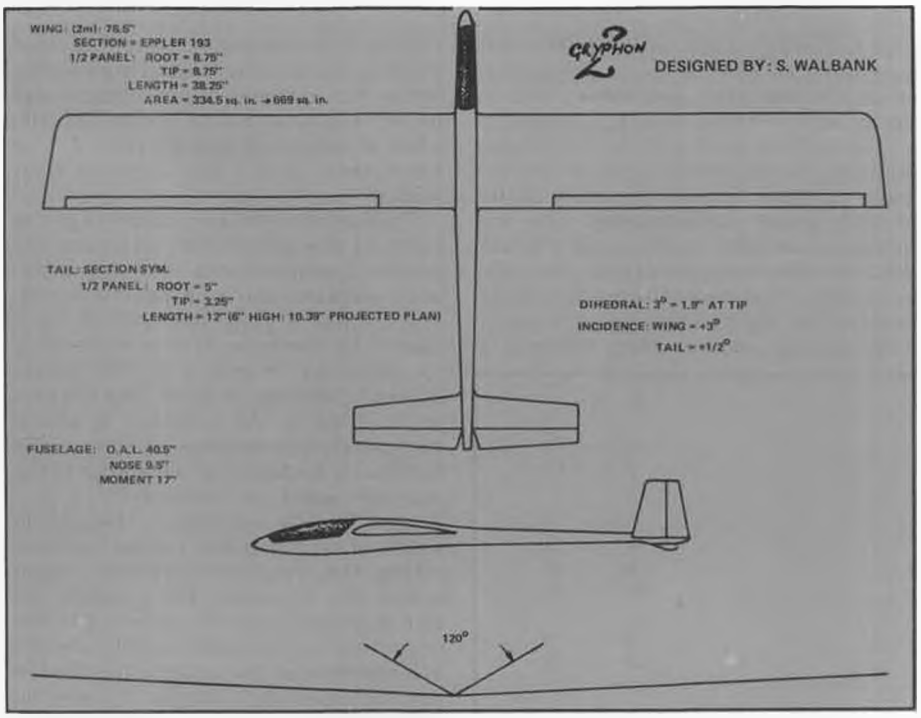
Now, multiply this value by the importance of appearance (10) in contrast with the other properties at that level [here uniqueness (5) and usefulness as a trainer (2)]. That is, multiply 7.14 by 10/17. The result, 4.20, is the contribution of style to quality of the scaleship. Now, find the contribution of style to performance by multiplying 4.20 by 7/17 [taking into account the importance of quality (7), quantity (8), and timeliness (2)]. The result is 1.73. Lastly, the contribution of these three style features (streamlining, color, and decoration) to overall worth is found by multiplying 1.73 by 10/20 [reflecting the importance of performance (10), feasibility (7), and longevity (3)], the result being 0.865.

Note that the composite weight of each operational feature is the product of the normalized weights of that feature and all higher levels. For example, the overall relative importance of streamlining is:

$$\left(\frac{10}{22}\right)\left(\frac{10}{14}\right)\left(\frac{10}{17}\right)\left(\frac{7}{17}\right)\left(\frac{10}{20}\right) = .039$$

On a scale of one, this translates to 3.9%. In other words, an increase of one unit in streamlining contributes .39 to overall worth.

The arithmetic is really straightforward. Within a few minutes, you can measure the contribution of any feature to any higher level and to the overall worth of the model. For this example, the overall final figure for the scaleship is 6.3, while that of the floater is 7.3. It's an interesting exercise to rate the ships you



own against one another at different levels and overall. Here is a way to clarify what value means to you. There is a lot more to say about the method, but this is all you need for a first cut. Now you can really compare different models, different combinations of planes, and even the worth of a new soaring site.

If you prefer other features than the ones I have chosen, fine and dandy. If you think I've missed something of general interest, please let me know. I have purposely omitted reference to contest winning in that this means so many different things to so many different people. What do you think?

A case in point: you can now evaluate a suggested redesign offered by Bob Barrett. He devised a T-tail for the Mark's Models "Wanderer 99" and claims that this modification has a number of benefits: 1) the beauty of a T-tail; 2) the aerodynamic advantage of having the stabilizer far from the wing turbulence; 3) the advantage of a full-flying stab; and 4) the ability to transport the sailplane in a carton measuring 6 by 10 by 50 inches.

Bob admitted that his T-tail is a little harder to build than the conventional stock tail. To prove that he has made a contribution, Bob won first place in the very first contest he entered with this plane. More power to him. By the way, if you want plans for this mod, send $1 and a self-addressed envelope to Bob Barrett, Messiah College, Grantham, PA 17027.

Did you know that Mark's Models offers a two-meter version of the Bird of Time? It looks like a little sister and flies in exactly the same way as the larger ship. The all-up weight is 26 ounces, and the wing covers almost 600 square inches. The kit offers an Eppler 205 airfoil at either eight or eleven percent thickness. At eight, it's fast and furious; at eleven, it's a floater. I have flown both the big Bird of Time and the two-meter version, and once launched, it is difficult to tell them apart. Here is a neat package for those who appreciate condensed beauty and thermal performance.

Sean Walbank, currently of the Lindisfarne College, Pakowhai Road, Hastings, New Zealand, is also interested in the two-meter class. He offers an update on his Gryphon that took part in the 1980 Two-Meter World Championship. According to Sean, four of these planes are now under construction in New Zealand. Looks like a clean design. You might like to try your hand at building this craft.

Let me introduce the Hyper/Locus, designed by Scott Jenkins of San Diego. This new configuration is intended for high-speed and large-scale aerobatic performance. Scott calculates that a dive from 2,000 feet will produce a 200 mph dash through the timing trap. The 130-inch wingspan covers 806 square inches with an aspect ratio of 21 to 1. The 7-1/4 inch wing root tapers to 4-1/4 inches at the tip. The result is a computed elliptic lift distribution. The wing tip of basswood avoids offering any more vertical surface than necessary, this to prevent disturbing the yaw as the plane slices through the wind shear. The airfoil is Scott's own design, almost symmetrical with a dip in the upper surface toward the trailing edge, which is razor sharp. He argues that you want to keep the boundary layer on the verge of separation. At that point there is minimum shear at the surface and therefore minimum skin friction. He computes the maximum lift coefficient to be 1.3.

The wing is structured of foam, with a carbon fiber full-depth single spar 5/16 of an inch wide. The surface is covered with 1/64-inch plywood, then glassed and sanded to be ripple-free. The ailerons are split and driven by a single servo. The split is necessary to allow flexing of the wings without binding of the ailerons.

The fuselage is made of PVC foam core, covered with a hexel weave, twelve ounces per square foot, multi-directional glass cloth in two layers. The blue foam used for forming the forward section is then eaten out by a solvent. A bellcrank is installed within the fin to ensure tight control of the full-flying stabilizer. Scott commented that the fourteen percent surface area is more than you might expect, but the greater surface area allows full control with smaller angular change and therefore less trim drag. The wing is set at +1°. The stabilizer is at −2°, thus there is a 3° decalage. The vertical fin projects below the fuselage to provide improved yaw damping at high speed. A steel tail skid projects from the caudal fin. A 3/8-inch stainless steel tube with an .065-inch wall supports the wings. A retractable 3-1/2 inch wheel will be operated by a separate servo. Other doors can be opened under the fuselage in order to drop the lead ballast before landing. (You should

For those who like to have something a little different, Bob Barrett is selling plans for his T-tail modification to the Wanderer 99. Details in text.

attach a parachute to ease the impact, Scott!) The Hyper/Locus weighs seven pounds empty, and you can add up to seven additional pounds in ballast. The radio receiver is installed behind the wing spars, since these are conductive and might otherwise interfere with radio reception.

I asked Scott how he plans to flight test this monster.

"First, you've got to hold it aloft while driving in an open car; that allows you to set up the trim. Then, you wait for the first forty-knot gale at Torrey Pines and heave it off the edge."

I look forward to hearing the "swish" of what promises to be a very interesting new speed soaring challenge.

• • •

Ian Turner's comments on the performance of undercambered, flat-bottom, and semi-symmetrical airfoils, included as part of this column in the September 1980 issue, elicited a couple of opposing views from two very highly regarded soaring ethusiasts, Blaine Rawdon and Woody Blanchard Jr. Here are their letters along with a follow-up letter from Ian.

"Dear Larry,

"I read with interest your September column with the information produced by Ian Turner. It is unfortunate that his interesting analysis is based on such poor assumptions, especially when real data is available in the modeling press. The effect of this information is to perpetuate the myths regarding airfoils.

"The assumed values for maximum lift coefficient and maximum L/D ratio slight all of the sections, but slight semi-symmetrical sections the most. Also, his analysis appears to disregard the issue of speed range, which is central to any discussion of airfoil sections for thermal soaring.

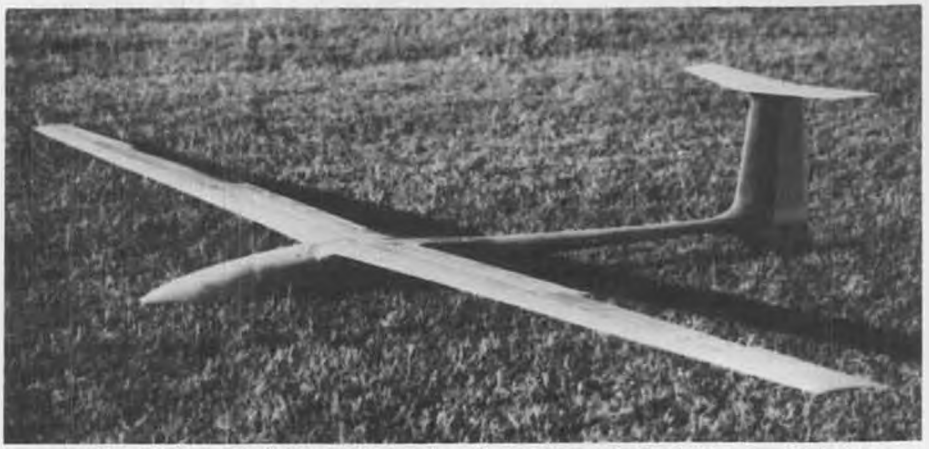
"From the first batch of measurements that the San Fernando Valley Silent Flyers made, one can draw some quantitative conclusions regarding airfoil sections. The report of these measurements was published in the August 1979 *Model Aviation*. We tested a series of models with wings all approximately 12% thick, but with camber ranging from 2 to 6%. Unfortunately, we also varied Reynolds number (Rn), but that did not tend to obscure the conclusions.

"With regard to maximum lift coefficient, we measured these values for airplanes in steady, controlled flight:

Plane	% camber	max CI	Rn
Eagle 128	6	1.31	83,000
Paragon	4	1.24	85,000
Sailaire	4	1.34	105,000
Mirage	3	0.88	76,000
Goose	2	0.86	111,000

"You can see that max CI falls with reduced camber, but not nearly to the degree that Turner indicates.

"Turner's biggest error is in assuming that low camber sections have worse glide ratios than high camber sections. He has forgotten that along with lower lift, the low camber sections also cause less drag. We found in our tests that best L/D correlates much better with Reynolds number than with camber.



Scott Jenkins likes 'em fast! His latest speed/aerobatic sailplane is the "Hyper/Locus," shown here ready for paint. Theoretically capable of 200 mph from a 2,000 foot dive.

"In fact, it was the Goose, with only 2% camber, that performed the best, with a glide ratio in the low twenties. The three planes in the 80,000 Reynolds number range all had glide ratios within 5 or 10% of each other.

"If I may offer an explanation for this unexpected result, I would have to say that it is a result of Reynolds number effects and induced drag. Everyone always talks about aspect ratio and induced drag, but they always seem to forget that there is a lift coefficient SQUARED in the numerator! If you are trying to make planes with equal induced drag, the one with the least camber will have the largest chord. Thus, for equal speed airplanes, the one with the low camber wing will fly at the higher Reynolds numbers. To reiterate in reverse, if you have equal weight airplanes that fly at equal speeds, they will have equal induced drag, but the low camber section will have the greatest chord, and thus the greatest Reynolds number, other things equal.

"Offsetting this effect is the lower profile drag *force* of the smaller chord, high CI wing, Rn effects ignored. In any case, for best L/D, it all seems to balance out.

"Now, let's get to the real meat of the issue: speed range. The reason we are using low camber sections is not for better peak performance (since it's *not* better), but rather for better *off-peak* performance. The essence of soaring is varying the speed. Full-sized pilots use greater than a two-to-one speed range when flying cross-country. I suspect that the better R/C pilots with modern planes are approaching this figure. Keep in mind that this requires a four-to-one ratio of the wing CI.

"Wing sections of a given thickness seem to have approximately equal bandwidth of low drag on an arithmetic scale, say over a range of maybe 0.7 CI for 12 % sections. When you are starting at 1.35, 0.7 down doesn't give you much of a ratio. When you start at 0.86, it sure does. This is the reason that good pilots enjoy low camber sections.

"Another tidbit from our tests is the linear relationship between camber and optimum (best L/D) CI. We found 2% best at 0.55, 3% at 0.64, 4% at 0.73, and 6% at 0.91. Now, this is going to vary with

Continued on page 78

A RADICAL PROPOSAL FOR SOARING CONTESTS

DAVE THORNBURG . . .

• I just finished reading Charlie Speer's coverage of the Soaring events at the 1980 Nationals in Dayton. It was a well-balanced article: he began by describing the camaraderie of a national event, the evening bull-sessions with "old friends" you meet only once or twice a year, the excitement of rubbing elbows with some of the big names in soaring, the trading of ideas, the swapping of lies.

He ended with the handwriting on the wall: the event drew over 200 entries, *and was plagued every day by a shortage of manpower.* Contestants, some of whom had traveled 2,500 miles to compete, had to "pitch in and set up the officials area, PA system, impound stations, and winches."

As I read Charlie's article I couldn't help thinking of the old SOAR Nationals that Dan Pruss and his accomplices in the Chicago area S.O.A.R. club ran for so many years, back in the early seventies. I attended the 1974 event, and it was grand . . . a true gathering of eagles. People came to SOAR from every corner of the country, the cream of America's competitive sailplaners, all the hotshots from the hinterlands, all the Grand Dragons of the soaring clan.

But when I went back in '75, it was clear that the end was at hand: there were the same eight or ten contest officials doing the same thankless tasks for three long hot summer days. And doing it for almost 200 contestants. The following year, 1976, the SOAR Nats died from overweight . . . and overwork.

Overwork . . . and *underpay.*

The manpower problem (overwork and underpay) plagues small contests as well. At this year's FAI Finals, out in L.A., a grand total of five people showed up consistently, all three days, to help run the contest that was to select America's world-class soaring team. Beyond doubt, the manpower shortage at this contest made a significant difference in the outcome of the meet. I can assure you, *I will never be a part of another team selection process that is run with volunteer labor.* We had no help to police line lengths, keep the field clear of unused winches, or process the official models. As CD, I was on the PA system constantly, begging for timers. Two of them were volunteers off the street, who had never seen a model airplane contest before!

The moral of all these stories seems plain: there are some soaring contests too big, or too important, to be run by volunteers. In short, the time has come to start paying our contest officials for their work.

Not at every contest, mind you. Not even at *most* contests. We need to make a clear distinction between the small, local, five-to-fifty-man contests that are still the backbone of competitive soaring, and the 100 to 200+ biggies such as the LSF Regionals and the AMA Nats. The small contests . . . the friendly, low-key, one-day events, the contests where every flier knows the CD personally and is glad to pitch in and help set up the winches, and doesn't much care whether the first flight group gets off at 9:00 sharp as scheduled . . . these contests we need to leave jolly well alone.

Label them AM for "amateur." Not because the pilots who enter them are amateurs, but because the officials who run them are unpaid volunteers. Because the CD and winchmaster and scorekeeper are also competitors, sandwiching their flights in between their official duties. Label these contests AM for amateur, and expect to pay the customary $2-$10 entry fees.

But when one of the biggies comes along, a regional or national event, an event that's expected to draw 100 or more fliers, then label it PRO and tack on an additional $20-$30 to the entry fee for the manpower fund.

What!? A $40 entry fee? Who's going to pay that kind of money to fly in a glider contest?

Answer: we are.

It's time we talked seriously about the cost of our entertainment, gentlemen. Forty dollars for a two-day contest works out to around $2 per on-the-field hour. Have you priced a two-day workshop lately? A two-day rock concert? Twenty hours on a handball court? "Experiential" entertainment, in which you actively participate, rather than just watch, costs money. The people who organize and orchestrate such entertainment may or may not get rich from it, but thet are not such fools as to do it for nothing. Ask any sociologist; volunteerism only works in small and relatively personal group situations.

We've been living in the past long enough, regarding the actual costs in time and human energy of sponsoring a major soaring event. When the sport was young, and everyone knew everyone else and was honored to be part of the small and elite and growing group of sailplaners, manning a contest was less difficult. Enthusiasm ran high among the newly-formed clubs, and each group took pride in how many entrants their contest drew. If you traveled a long distance to fly in a contest, you flattered the sponsors, and they thanked you sincerely for coming. Just the satisfaction of running a well-attended event was reward enough for the folk who put it on.

That golden age is gone forever. The contests that were consistently well-organized and expertly run, such as the SOAR Nats, grew bigger and more demanding every year, until they ultimately burned out the sponsoring club. How many times can you ask the same five to ten people to donate, absolutely free, a long weekend of damned hard work for the entertainment of an ever-growing group of relative strangers? Under these conditions, the "age-old problem of workers" that Charlie Speer talks about in his Nats coverage is only going to get worse and worse.

The solution is simple: pay the help, and pay them well.

Consider a two-day, 100-man contest. To run it well, to run it *professionally,* to run it in a manner that will build its reputation and make people want to come back next year, you need at least twelve experienced, dependable workers: four winchmasters, four timers, an impound official, two scorekeepers, and a CD. These twelve people are going to put in two man-days each, at $75 per day. Total cost: $1800. Collect $20 from each entrant as "manpower fee" and you have your $1800, plus $200 to pay the kids who retrieve the lines.

This system is to everyone's advantage. Let's look at it first from the point of view of the CD:

• Paid help can be expected to show up on time. If a winchmaster shows up late, he may find someone else sitting on his winch, someone who needs the money more than he does.

• Paid help can be expected to work harder. If they don't, they can find some other way to pay for their new radio system.

• Paid help can be bossed more effectively. If they're "on salary," there should be no shyness about asking them to do anything and everything necessary to the smooth running of the contest.

• Paid help can be expected to be more professional. They weren't suckered into this job, they're getting a professional wage for doing a professional job, and they have every right to take pride in their work.

• Paid help can be organized in advance. The reason most contests are so badly run is because the few people who do volunteer have no idea beforehand what their jobs are going to entail ("Sure, I'll be a timer . . . anybody got a stopwatch I can borrow? How do you read this thing?").

• Paid help can be expected to put in a full day. No more, "Yeah, I can help, but only till 10:00. I'm getting married at eleven."

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Pattern Flying

By DICK HANSON . . . Part 11: The Square Horizontal Eight.

• For openers this month, we have a few things to say concerning the flight programs now being used.

AMA Pattern competition is broken into classes intended to offer competition in various skill levels among participants who use equipment that is for the most part the same. I know that some people feel there is a tremendous difference in engines, airframes, radios, and accessories; *however*, if you examine the winning setups in any class you will see that they are quite similar.

Some competitors want to restrict equipment in order to "keeep things affordable," or "bring in new blood," or "make Novice for novices," etc. I say, "Bullfeathers." Anytime you introduce restraints or require retrogressive rules you defy a basic rule of modeling. What rule is that? I'm glad you asked. That rule is "Modelers are basically inquisitive people who like to try new things." We all know that a few rules are necessary, but a very disconcerting thing happens when certain people have to work within rules and other people work within a less restrictive atmosphere. When these groups get together, the latter group usually enjoys a competitive edge because they can do whatever is necessary to improve performance.

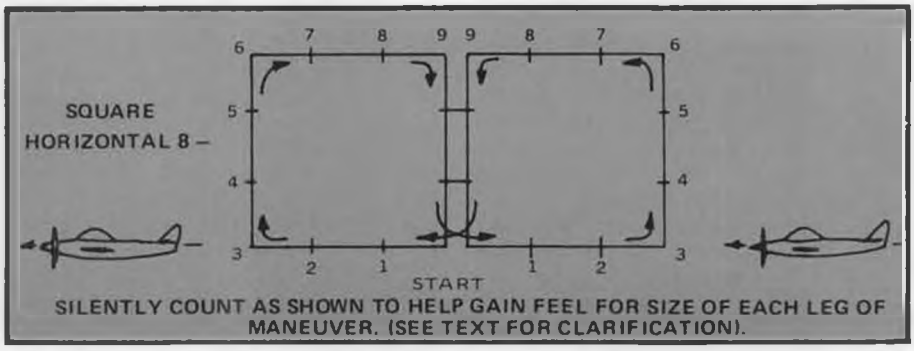
Now, what's the point of this rambling?

I believe that the rules for Masters class should basically be the rules used for *all* classes. The progression would then be through a classification based on a K factor of maneuvers performed. It would take some sorting out to arrive at a class breakdown, but something on the order of, say a 450-point class, a 300-point class, etc. might work. The advantages would be several. First, you would eliminate the "Novice" or "Master" titles which are a little bit of a sore spot with some fliers. Secondly, it could lead to a more rapid exposure of complex maneuvers for newer fliers who want the challenge and are capable of rapid learning. Also, I have noticed that the skill level between the top three fliers in a typical class (Novice, Advanced, etc.), is sometimes undetectable, and that style alone separates the scores. This can be maddening to the competitor. Why not let him change a loop for a roll, as Masters fliers do to improve their possible positions?

Notice that the Masters class includes many (16) of the maneuvers used in the lower classes. It also offers special patterns not used in those classes. The special ones are as follows: Reverse Cuban Eight, Horizontal Eight, Vertical Eight, Reverse Double Immelmann, Cobra Roll, Three Reverse Inside Loops, Avalanche, Two Rolls in opposite directions, Vertical Roll, Aileron Turn, Figure M, Inverted Spin, Square Horizontal Eight, Triangle Rolling Loop, Reverse Knife Edge, Reverse Point Roll, Reverse Top Hat, Square Loop with four 1/2-rolls, Two Snap Rolls in opposite directions, and Figure M with 1/4-rolls. So, we have 20 new maneuvers and 16 others which we already know. Now take your rulebook and read through the descriptions of the twenty new maneuvers, then ask yourself this question: "What's so special about Masters class maneuvers?"

The answer is that aside from the Avalanche, Two Rolls in opposite directions, Inverted Spin, Square Eight, Triangle Rolling Loop, Reverse Knife Edge, Reverse Point Roll, Square Loop with four 1/2-rolls and Two Snaps in opposite directions (a total of nine), most are the same or slight variations of known maneuvers used in all lower classes.

Now here comes the zinger. It is possible in the Masters class to put together a pattern under the 450-point, 14-maneuver rule that is not really any more difficult than the Expert pattern now being used. I don't think I'm the only one who has noticed this situation. I would love to hear from anybody who has strong feelings on changing the classification system. Methinks it's overdue.



SILENTLY COUNT AS SHOWN TO HELP GAIN FEEL FOR SIZE OF EACH LEG OF MANEUVER. (SEE TEXT FOR CLARIFICATION).

On to the flying portion of this month's writing. . .

Most folks who are presently flying in Masters class competition already have preconceived notions as to what constitutes a winning setup which will perform the maneuvers required. If you read through the maneuvers previously described you will see a growing need for a lightly loaded (low wing loading) airframe with the ability to accelerate from low speed without any wobble or torque reaction. There are different ways of approaching the problem:

1) Build the model lighter.
2) Get more power from the existing .60 size engine.
3) Build a larger model.
4) Build a smaller model.

Recognize that you are working within a set of rules that allow a total of 11 lbs. gross, powered by an engine of .61 cu. inch displacement. The 11 lb. rule is presently being pushed hard by some competitors, if not flagrantly violated by them. I expect to see it raised to 11 lbs. *dry weight* to conform with F.A.I. rules.

Don't look to see the .61 engine rule raised. If we give the present breed of .60 size engines a little thought we will see that they are capable of delivering tremendous power . . . but they must rev up to do it. The limiting factor is apparently the propeller lengths now being used. Our 11-inch props will not run above 20,000 rpm (for all practical purposes) but the engines will produce more power at these rpm's. The life span of our engines will drop a little at these speeds, however. The current *strong* engines run at approximately 15,000 rpm on the ground using average 11x7 props. Depending on the airframe used, these will run about 18,000 rpm in level flight.

Now, here's the problem. The props necessary to extract maximum engine power are too short to produce high thrust at low airspeed; the best I've seen is approximately eight to nine lbs. thrust (static). The answer appears to lie in several directions: geared engines (belt drives also), vari-pitch props, twin propeller engines, multi-cylinder arrangements, etc. Remember, you won't increase engine power with the geared setups, but you *will* increase efficiency at lower speeds.

Airframe size can now be increased BUT the weight cannot be increased, because even though the bigger airframe will carry more, the engine is still the same size (power) regardless of prop size. You simply have better low-speed performance.

The twin engine (twin propeller) design could be a real performer with enough research, because the propellers could be placed for maximum efficiency.

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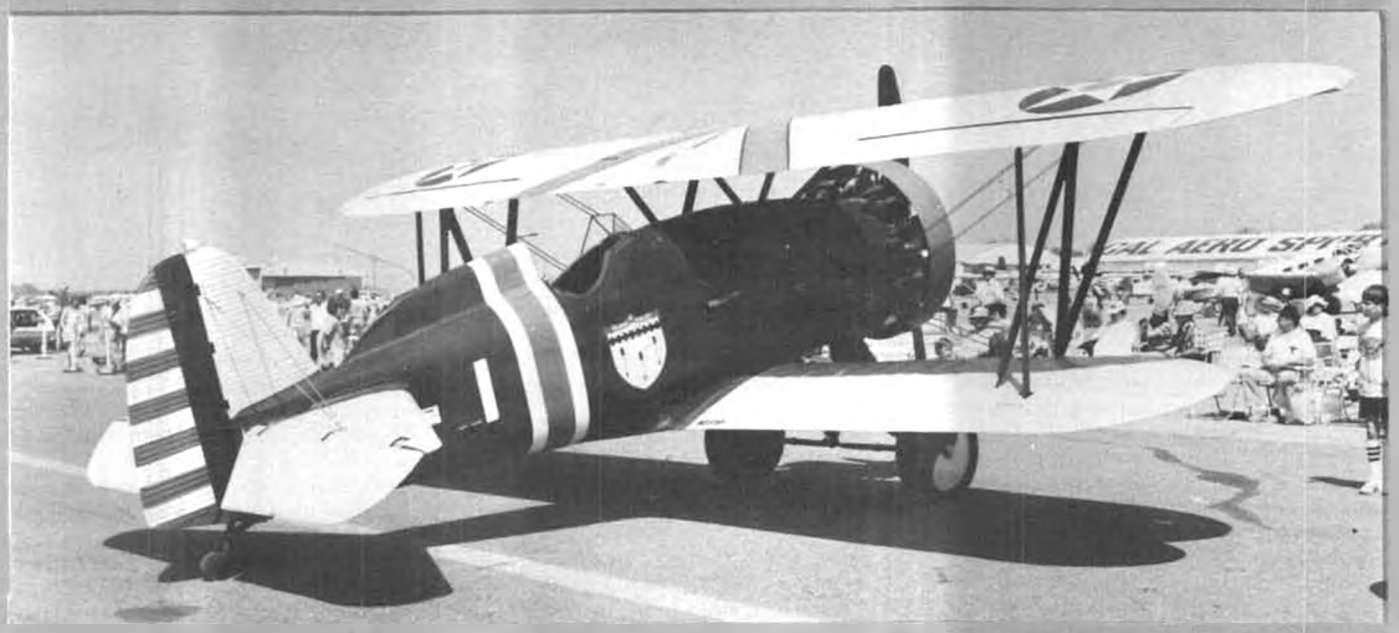


A flyable P-12E is on exhibit at the Planes of Fame Museum, Chino Airport, California. It has worn many different colors, including that of an F4B-3 with razorback headrest.

BOEING P-12E

PART TWO

By PETER WESTBURG

• P-12E's with the razorback headrests, called "Panama Conversion Kits," are often mistakenly identified as P-12F's. Possibly, some were. The 24th Pursuit Squadron flew from France Field in the Canal Zone, and the 1st Pursuit Group was stationed in the Philippine Islands. Because these squadrons flew over water, the Army Air Corps decided they ought to have life rafts; the rafts were incorporated in the headrests, resulting in the long razorback shape. Curiously, some of these razorbacks flew from Selfridge Field in Michigan and were fitted with skis for winter maneuvers in the Dakotas and sported a standing polar bear on the anti-drag ring.

An interesting footnote to the story of the P-12E is what happened to the original prototype, Model 218. After its test program, Boeing sold it to Nationalist China where it was flown by an American volunteer, Bob Short. On his first flight, he intercepted three Japanese fighters, shooting down two before he was downed by the third. The year was 1932, long before the Flying Tigers came into being.

Four Model 100's, similar to the P-12 and F4B-1, were sold to civilians. NS-21 went to the Bureau of Air Commerce (FAA); NX-872H was bought by Pratt & Whitney as a test airplane for improved Wasp and Hornet engines; the 3rd, 873H, was used by Boeing for testing before being sold to Paul Mantz; and NX-874H was sold to the Mitsui Co. in Japan.

The lone Model 100A was a special two-seater built for Howard Hughes, who further modified it before selling it to race pilot Art Goebel, who changed it back to a single-seater. Two Model 100E's like the P-12E were delivered to Siam (Thailand) and one supposedly remains in the museum in Bangkok.

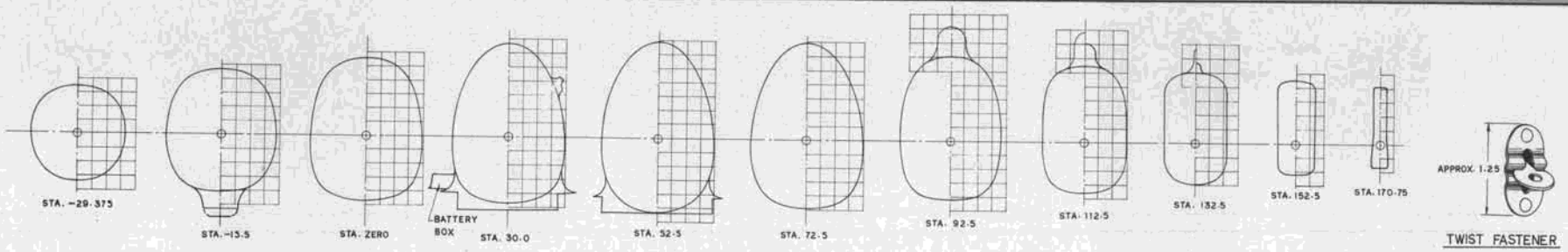
One 100F was purchased by Pratt & Whitney to test the 700 hp Wasp Jr. After a demonstration of a quick engine change and during a subsequent test flight, the pilot lost consciousness due to an oxygen system failure and the airplane fell into a spin. An adjustable weight in the aft fuselage, used to balance the various test engines, broke loose and jammed the flight controls. Plane and pilot were lost.

A flyable P-12E, AC 32-17, is hangared at the Planes of Fame Museum, Chino Airport, California, where anyone may see it. It has an uprated Wasp of 600 hp and a controllable pitch prop. Missing are the wing and cabane strut and axle fairings, and it has a razorback headrest. Any model maker with experience in fiberglass is invited to make fairings and a curved headrest for the airplane.

No better subject than that P-12E is available for modeling if coloring and marking is your thing. The variety is too great to be covered here. Two of the best sources for color and markings are Profile No. 2 and Dana Bell's *Air Force Colors, Vol. I; 1926-1942.* •

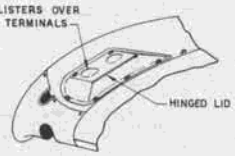
A 500-hp P&W Wasp powered the P-12E; prop was a Hamilton Standard adjustable pitch. Scoop aft of engine was for oil tank cooling, exit on opposite side.

"A jug of wine, a loaf of bread, and a flight of P-12E's."



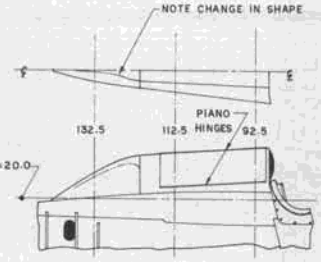
TWIST FASTENER

STREAMLINE WIRE SIZES				
SIZE	T	W	R_1	R_A
1/4-28	.087	.345	.522	.019
5/16-24	.135	.540	.810	.030

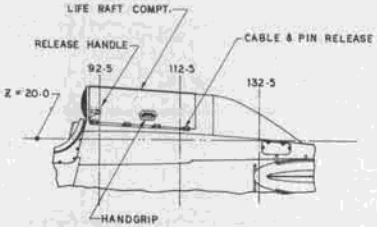


BATTERY BOX ON LEFT WING FAIRING

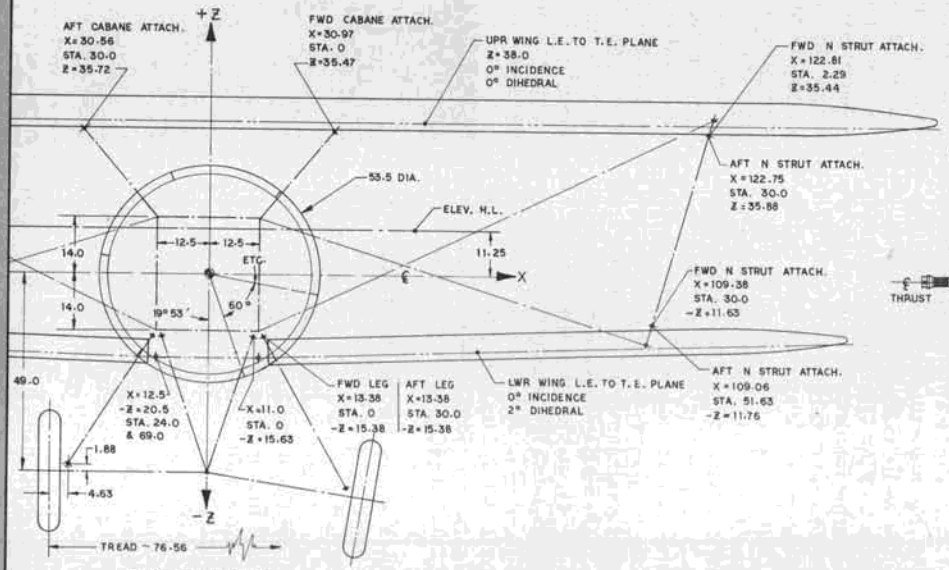
RUDDER CONTOUR	
Zr	Yr
-2.88	13.65
2.63	24.38
5.25	2.34
5.25	HINGE
15.81	23.65
19.72	HINGE
25.75	22.13
32.22	HINGE
38.38	18.81
44.72	HINGE
45.94	15.38
50.13	11.32



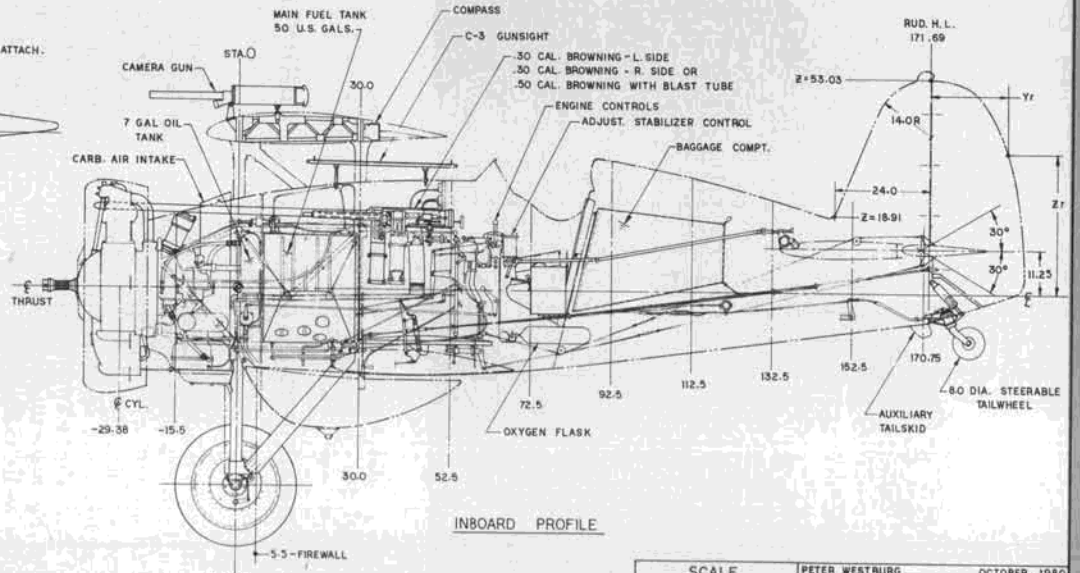
R. SIDE OF RAZORBACK HEADREST



L. SIDE OF RAZORBACK HEADREST



BASIC DIMENSIONS



INBOARD PROFILE

SCALE BAR 0 1 2 3 4 5 6 7 8 9 10 11 12

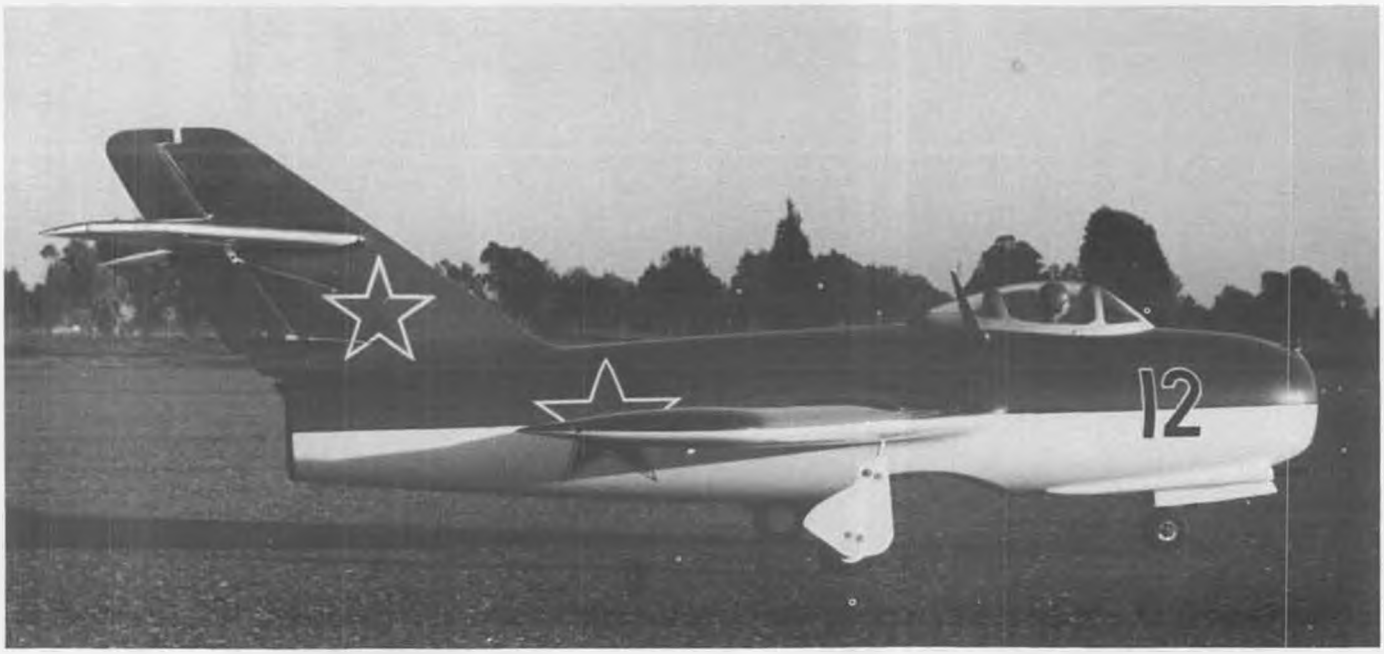
SCALE 1/12 SIZE .0833 = 1 IN. = 1 IN. = 1 FT.

PETER WESTBURG OCTOBER, 1980

BOEING P-12E

SHEET 2 OF 3

ORIGINAL DWG. SIZE = 28 X 40.



PRODUCT$ IN U$E

THE BYRON ORIGINALS MIG-15, by LARRY JOLLY

PHOTOS BY AUTHOR

• I think every modeler has a pet peeve. Mine is to see a scale model of a jet-powered aircraft with a prop stuck on the nose. I realize that when the motor is running you can't see the prop; what bothers me is the fact that most modelers tend to be ingenious and take on a challenge with enthusiasm. Putting a propeller on a jet is just an easy way out.

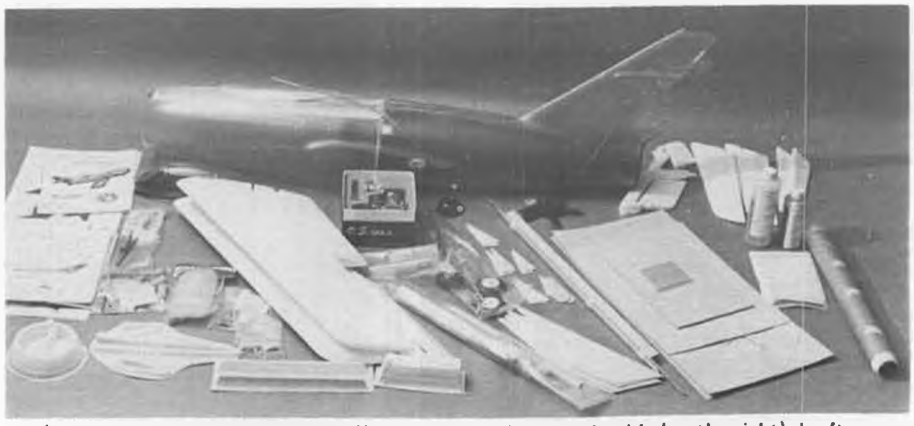
Then came the ducted fans. I remember the first scratch-built fan I saw fly; it took a racing .40 with a makeshift carburetor, hot racing fuel, consumed a glow plug per run, and it flew like a pig. That was almost the end for ducted fans as far as I was concerned. Then by chance, I saw the advertisement for the Byron MiG-15. It takes a .60 size motor, sport fuel, and weighs only 8-1/2 pounds. The MiG-15 seemed to make more sense all the time. I reasoned that since most .40 size models weigh around four to six pounds, nine or ten pounds seemed a lot for a .40 to haul around, but a .60 would be loafing at 8-1/2 pounds, especially with 600 square inches of wing area.

After completing the Byron MiG-15 I have nothing but enthusiasm for this product. Byron did it right. Their jet flies great . . . in fact, it flies very scale-like.

Let me share the first two flights with you. We finished the MiG late Saturday afternoon and, after a short picture session we drove to nearby Mile Square Park for the test flights. We had the MiG fueled up and the radio range checked in short order. The starting procedure for the MiG is very simple; on the second hit with the starter, the O.S. .61 V.F. came to life.

I taxied the MiG down the runway to the 150-foot marker. Having never flown a jet before, I wasn't sure about the throttle response or what to expect. I remember how neat the MiG looked, waiting for my command. I pushed the throttle forward and she started to roll. The acceleration was slower than with a propeller-driven craft, but when the airplane passed me it seemed ready to take off. Slight back pressure on the elevator brought the nose up and in the next second my MiG-15 was airborne. I put the jet into a gentle climbing right-hand circuit; by the time I had completed that first 180 degree turn, the airplane was about 200 feet up. The MiG seemed to need a bit of left aileron trim, but the amount of trim varied with the airspeed. Once trimmed, I decided to see what the MiG would do. Aileron response proved to be quick; rolls were great; four-points were no sweat; loops were large and round. Since the MiG-15 has a symmetrical airfoil, it doesn't know the difference between upright and inverted flight. I had read that jets have a lag time on throttle response; I didn't find this aspect of jet flight uncomfortable with regard to the MiG. I pointed the ship downwind, brought the throttle back, coasted through the base and floated her down the final to a smooth touchdown and rollout. The Byron MiG-15 really had me hooked.

Back in the pits, I checked the ship over. I found the aileron trim problem to be in the elevators. The MiG has split elevators, with the pushrod tied in with a Y-fitting. I found that one pushrod had a slight bind and, as a result one elevator got more throw than the other. This differential throw was sufficient to roll the plane. I decided to fly the MiG again, but first I readjusted the needle valve to lean the engine out. This time the MiG screamed down the runway; after a 100-foot roll she was ready to fly. This time the MiG left the ground with authority, maintaining a 30-degree climb easily. I made several high-speed passes and figured the MiG was speeding along at 80 mph. Later a radar gun confirmed the model was in the 90 mph range. With the leaner setting the MiG's good perfor-



Here's what you get . . . well, almost. The engine and fiberglassing kit (on the right) don't come in the box, but everything else does. A pretty impressive package for $136.55.

mance changed to fantastic. The airplane can be a real hot-dog, but watch over-the-top snaps, close to the ground; if coaxed, the MiG will spin.

Now let's talk about the construction phase. The MiG-15 comes in a large, well-packaged shipping box. The first time I looked in the box I was impressed by both the quality and quantity of materials in the kit. The fuselage caught my eye; it is high quality fiberglass and extremely light. All the pushrods are installed, as is the main bulkhead and fan unit. The rest of the construction consists of balsa or plywood reinforced Byro-foam. All the necessary hardware is enclosed in the kit.

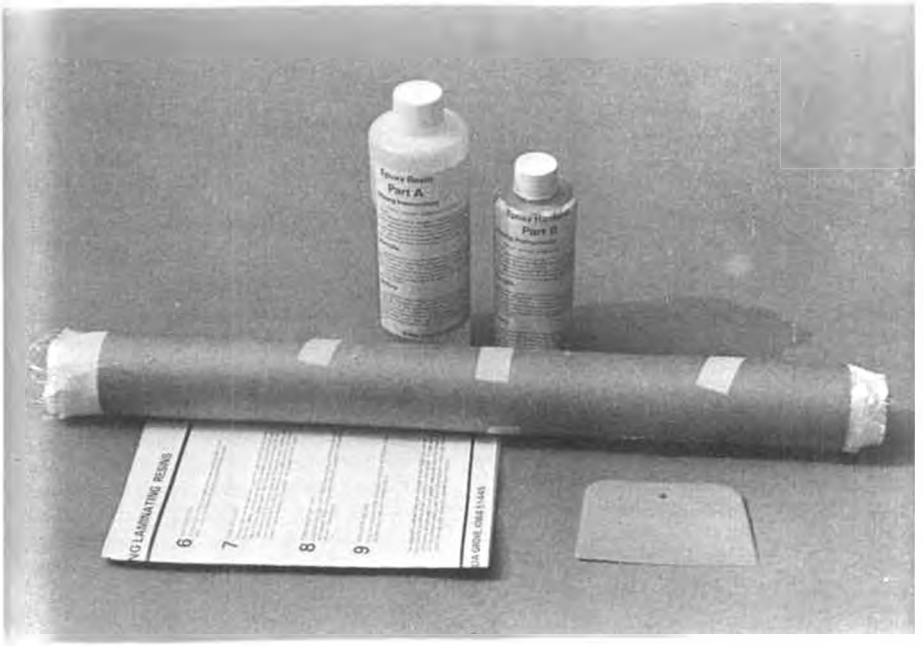
It's been said that the MiG-15 instruction manual leaves a little to be desired. I disagree; Byron's booklet is very informative, and I had no trouble following the construction format. The aircraft is built very logically; if you have problems, reread the booklet and try fitting the pieces, I think you'll find that the MiG goes together very easily.

Actual construction time for the MiG is very low. I spent most of my time finishing the model. The fuselage is painted, but the foam parts must be covered with Econokote or fiberglass, before painting. Depending on which of the four versions you choose to model, you wouldn't necessarily have to paint the Econokote. I chose the Russian aerobatic version, which is basically red on top and white on the bottom. Because I wanted a smooth, long-lasting finish, I glassed my model. Bear in mind, if you want to get in the air quickly, Econokote your model. If you want a contest type finish you just can't beat epoxy and fiberglass. I used Byron's optional glass kit; it consists of generous amounts of epoxy and fiberglass, and an excellent instruction booklet. The parts were covered with relative ease, and before long I was ready for primer.

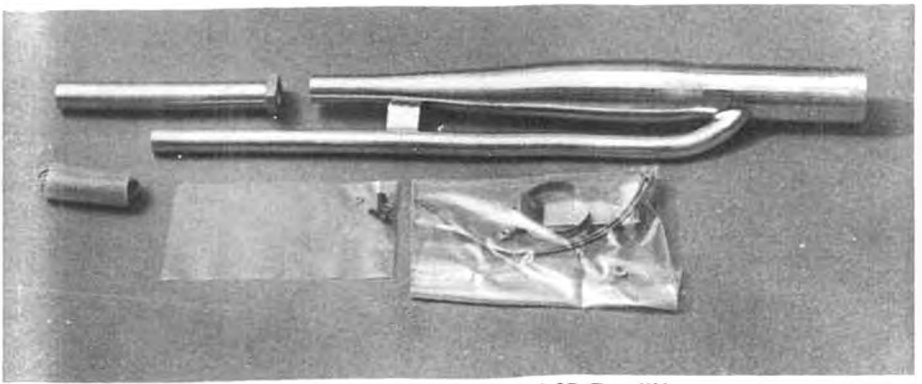
I used the K&B Superpoxy finishing system on the MiG. I'm very proud of the results, and I've received many compliments on its finish. I chose the O.S. Max .61 V.F. to power my model. The O.S., while not the most powerful motor tested by Byron, provides excellent power and reliability. The radio used was the new Airtronics XL series; it also was a good choice for the MiG, proving to be very reliable. I find putting the servo and pushrod in the best location and then adjusting the servo direction with the reversing switches very useful.

If you're thinking of getting into ducted fans, you just can't go wrong with the Byron MiG-15. The combination of this airplane, the O.S. Max .61 V.F., and the Airtronics XL system has proven to me that ducted fans need not be complicated or critical. In fact, the one word describing the MiG-15 would be "non-critical." This is an aircraft that the average radio control enthusiast can build, fly, and enjoy. Byron, my hat's off to you. I enjoyed the MiG so much, I am now constructing the Byron F-16. •

From left: Jim Jolly (who helped with construction), Dennis Brandt, reviewer and ace flier Larry Jolly, and Jim Nikitopoulos.



Byron's optional fiberglassing kit sells for $22.50. Adds weight, but makes the foam flying surfaces much less susceptible to "hangar rash," plus provides a good base for the paint.



Another option is the Byro-Jet tuned pipe system for $48.95. Ten different models are available to fit various engines; see Byron's ad on p. 68 and 69 of this issue.

FUEL LINES

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

• As promised last month, this is the first of an extended series of articles on engine maintenance. The objective is to show how to properly care for, clean, and repair ANY engine without the use of an elaborate and expensive array of special tools and machines. It's relatively easy to do if you have a well-equipped shop; however, the overwhelming majority of modelers do not. Hopefully, the series will show a person of average mechanical ability how to adapt, make, and use simple tools to get the job done.

That brings us to the first subject: tools. Some of them you'll have to buy, and some of them you'll make, but they're all quite ordinary. Take a look at the three accompanying photographs. You'll recognize most of the tools, especially Photo No. 1., which may appear at first glance to be a picture of a bunch of hammers! Now, please don't think that I'm some kind of a nut who delights in pounding on engines with hammers. These are not common hammers (which usually weigh about 25 ounces).

On the left is a rawhide mallet that weighs between two and three ounces. The neck of the handle is a scant 5/16-inch in diameter. The twelve-inch ruler in the photograph will provide you with a good idea of the other dimensions. Next is another mallet; this one has plastic faces and weighs six ounces. Each mallet costs about $7.00. However, these are premium quality. Certainly, quite adequate and less expensive ones are available. Check your local hardware store or Sears and Roebuck. You don't have to buy both of these mallets, but you will need at least one mallet. It should be light in weight and have faces made of a no-mar material, something that will not dent or damage metal.

Let's pause here for a moment to outline how the recommendations for tools will be presented. There will be a comment, as each tool or set is discussed, as to whether you'll need it, or if it's an optional, nice-to-have item. There'll also be a general price and source of supply listed. Finally, at the end of this article, there will be a list of sources for tools and catalogs.

On the right in our "hammer" picture, you'll see a small ball-peen hammer. You probably won't find this one in a typical hardware store, since it only weighs five ounces. Some good sources are suppliers for jewelry or hobby shops for lapidary and gem craft. Check the Yellow Pages. The price should be in the $4.00 range. If you fly 1/2A, you'll especially need this weight hammer for resetting the ball socket joint of the piston and connecting rod.

Next to the ball-peen is a steel bench block. It's nothing more than about a three-inch-square, 5/8 or 3/4-inch-thick piece of steel . . . with one exception: it must have a flat, smooth surface. Some people refer to it as a hammering block, and that's about what it is. It's also ideal for resetting ball-socket joints. Again, for $5.00 or so you can get one from a jeweler's supplier. Better still, hunt around a scrap yard or steel supplier. You'll probably get one free. Just be sure it's smooth and flat.

The last item in the photo, just under the steel block, is a 1/2A piston/rod reset tool, an absolute must for Cox engines. They're also available for .020 and .09 engines, $2.95 from Kustom Kraftsmanship. See an advertisement elsewhere in this issue.

Photo No. 2 shows a series of tools you can make quite inexpensively. Yes, regardless of what you may think at first, these are indeed quite useful tools. Believe me, I use them every day in working on engines. Across the top are various diameter hardwood dowels, a couple of pieces of maple engine beam mounts, and a flat square of 1/8-inch plywood.

On the lower left are short lengths of music wire. Both the dowels and music wire must have square, flat ends. Surely you'll be able to find some friend who will let you use his power sander and bench grinder to square off the ends. While you're at it, bend and grind up some pieces of music wire as shown in the lower right area of the picture. Look carefully at the shape of the ends of these. Each has its own particular use, as we'll see in later articles.

The dimensions of all of these homemade tools can be closely approximated from the ruler in the picture. You don't necessarily have to make all of these immediately. The point is that some most useful tools can be made very inexpensively, and you'll probably find yourself inventing other forms of tools. The only limit is your imagination. Think of all of these as push-and-pull tools,

Continued on page 81

Photo No. 1. "Don't force it, get a bigger hammer." Not to worry, these are very lightweight tools designed for precision work. Text tells where to get 'em.

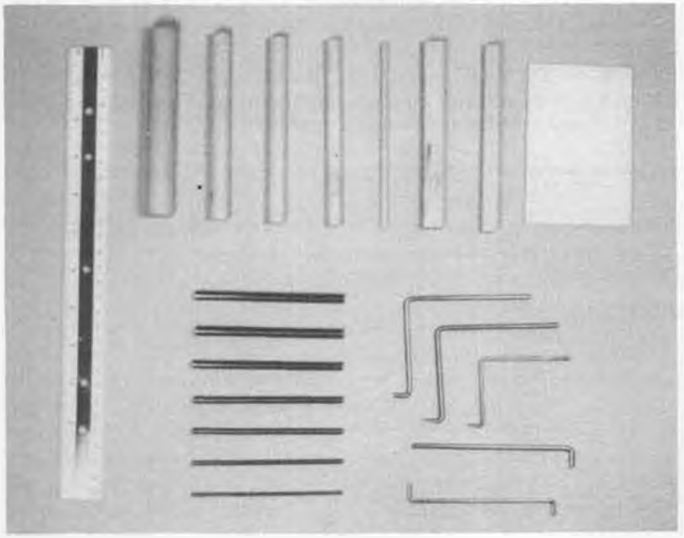


Photo No. 2. Here are a bunch of quite useful tools you can make yourself. Make them up as the need arises.

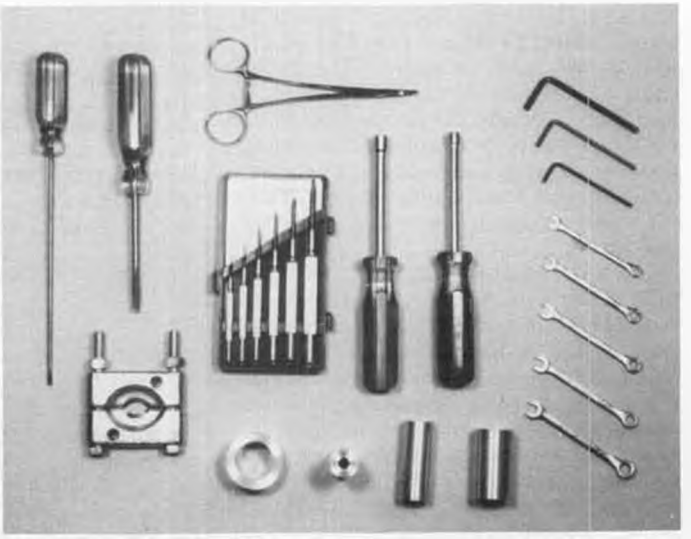


Photo No. 3. Just some of the various store-bought tools needed to do your own engine work. All high-quality stuff.

CHOPPER CHATTER

By RAY HOSTETLER

• The last two months have been the busiest (and most exciting) period of our lives. During that time we've experienced a move across the country to Long Beach, California, a new job, and a lot of new friends.

We must admit the real excitement is the new job, and that is flying full-size helicopters! Right now we're still in flight school at Pacific Wing and Rotor, so it'll be a while before we're actually flying for a living. But we love every minute of it, and in the months to come we'd like to report some of the similarities we find between the model and the full-size ship. But before we get into the subject material for this month, we will say that while there are differences from model to full-size, the similarities far outweigh the differences.

This month, we're going to examine collective pitch, and explain how to set it up properly in your helicopter.

Collective pitch is the raising and lowering of the angle of attack of *both* rotor blades at the same time, serving to increase or decrease the production of lift, respectively. This contrasts to cyclic pitch, where one blade *increases* and the other *decreases* angle of attack, essentially giving a lift imbalance and allowing right-left, fore-aft motion without increasing *total* lift itself.

Of course, fixed pitch helicopters increase or decrease total lift by speeding up or slowing down the rotor rpm, with no pitch change involved.

If set up properly, collective pitch is the "only way to fly." However, a properly set up fixed pitch machine will outfly a poorly set up collective bird. But with fixed and collective helicopters set up equally well, the collective chopper will easily outfly the fixed pitch chopper.

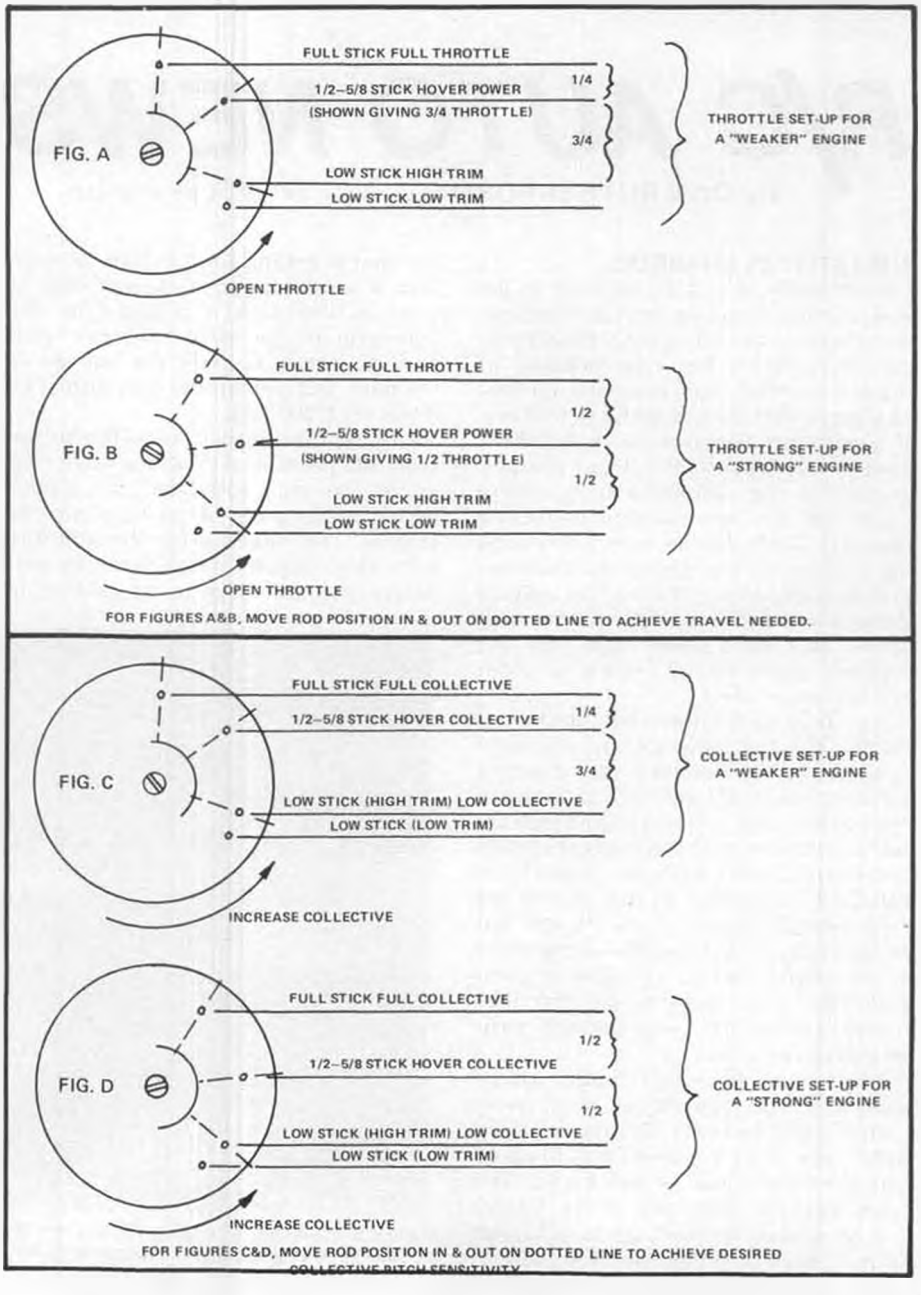
As an example, we talked with one fellow who had problems with his collective pitch helicopter. It would get light on the skids, bounce around, but would not fly. Upon initial examination the problem appeared. Collective pitch had been set up backwards; as throttle *increased*, collective pitch *decreased*. The chopper would get light, but as soon as he gave a little more throttle to lift to a hover, what pitch was remaining was taken out, and the helicopter settled back to earth. While this example is not intended to make light of the mistake made, it serves to show that *you must understand why and how your helicopter flies, then take the correct steps and sufficient care to set it up right.*

From the last example it is clear that as we increase pitch we must also increase throttle to overcome the increased drag that comes along with the increase in lift. The key to the perfect collective pitch setup is to provide the best possible *correlation of throttle with pitch*, to achieve a constant rotor speed in all areas of flight.

Since a true constant rotor speed is not possible without a governor or quasi-governor (which may be added with some increase in the complexity of the system), we have to accept some variance in rotor rpm, especially toward idle, where we have to disengage the clutch. To minimize the foregoing problem, the first rule of collective pitch setup is to *open the throttle as soon as possible to get rotor rpm up to operating speed.* You have probably read in the manuals: Engine shut-off at low throttle, low trim; engine idle at low throttle, half trim; clutch engage at low throttle, high trim. The *proper* way to set your idle is: At low throttle, low trim, engine idle just a shade below clutch engagement; at low throttle, half trim, clutch engaged and blades turning; at low throttle, high trim, blades rotating faster yet.

If you can shut off the engine in your collective pitch helicopter at low throttle, low trim, you are not bringing in the throttle fast enough. You should have to stoop over and physically shut off the engine at low throttle, low trim! In fact, some of the best flying ships we've had were set up so the clutch would not disengage at low throttle, low trim. This is going a little too far, because it is necessary to crawl on your belly

Continued on page 80



The latest in ni-cd chargers from JoMac. Obviously designed for electric R/C cars, but ought to find uses in all types of R/C modeling.

R/C AUTO NEWS

By DAN RUTHERFORD

PHOTOS BY AUTHOR

THE LATEST IN CHARGERS

Admittedly, it is a bit difficult to get very excited about an item as mundane and common as a charger for the electric cars, but JoMac has now released its model number 803 constant current charger, and it is a special bit of trickery. If your first reaction is that JoMac already has a constant current charger, as well as the resistance type, you're right, but this new number features a digital readout. You've seen racers hook up a whatever charger to the batteries and then also clip on the leads of a digital output voltmeter? Well, JoMac just added this extra piece right into the charger, along with a couple of other convenience items.

Just so you will know what the charger does without having to buy one sight unseen, I will describe the charging process, but I want to first caution you to read and totally understand all instructions contained with *any* charger used to fast-charge ni-cd batteries, and this is especially important in the case of the new JoMac charger. This charger has been designed to meet the demands of active racers, and so a couple of compromises have been made that lean toward getting 100% charges with maximum convenience.

Most of the time, this charger will be used to fast-charge six-cell ni-cd packs (sub-C cells) in the 1/12 cars. So, dead little pack in your hands, it is plugged into the output lead of the charger. The leads from the other side of the charger are of course hooked up to a 12-volt source, such as an automobile battery, but that is getting too obvious to mention, I would suppose. At any rate, as soon as the pack is plugged in, the voltmeter in the JoMac charger reads and constantly displays the voltage of the pack and (remember this) displays it down to 1/100 volt.

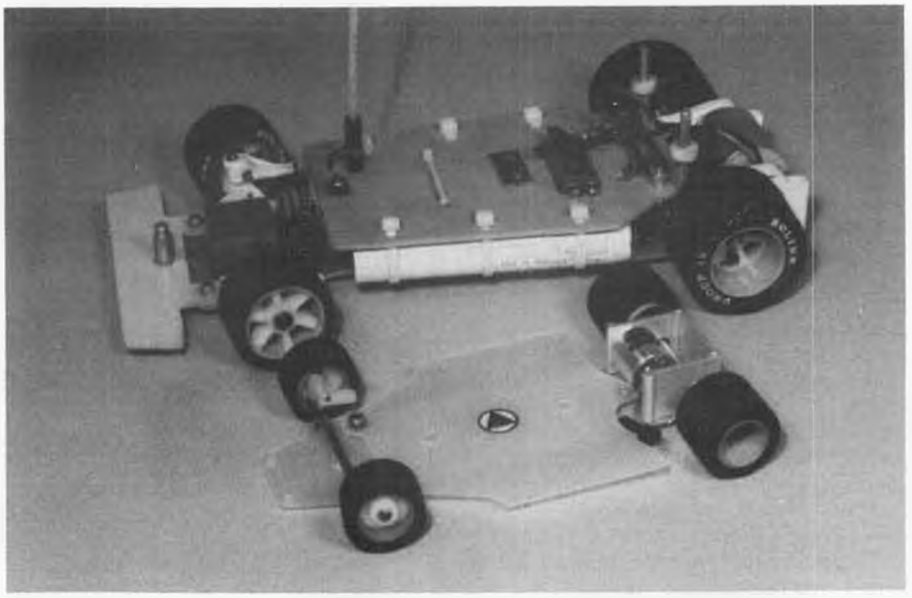
At this point, I usually press the button marked "press" (isn't it remarkable how all of this stuff just falls into place?) which brings a cut-off voltage into the display. This reading can be adjusted with the "adjust" knob, and here is where you will have to be careful. In normal fast-charge operation the digital readout voltmeter will be reading a *combination of the pack voltage and charger voltage*. During charge this reading will climb higher and higher, although fairly slowly during the last couple of minutes of charge. Don't ask that I explain it, but it has been found that our ni-cd batteries will be fully charged when this voltage peaks and that as soon as the voltage reading starts dropping, we are putting the batteries into an overcharge condition.

Using a digital readout voltmeter, this rise and fall in voltage can easily be monitored. You just stand there watching the meter, and as soon as the display shows a drop of .01 volt, you unhook everything and go race.

However, spending a lot of time watching a charger silently go about its work is not a whole lot of fun. So, with this charger you can dial in a cut-off voltage using the previously mentioned adjust and press buttons. Let's say that the pack being charged has consistently peaked at 10.34 volts. Remember, this is a combined reading of charger and pack voltage, which explains why it is so much higher than the expected 7.2 volts of the six-cell pack. And also remember that every pack is different, we are only using 10.34 volts as an example, this value can vary quite a bit.

But this pack does peak at 10.34 volts, so the cut-off voltage I would dial in would be 10.10, assuming that everything is normal as far as the pack is concerned. Actually, if I had some spare time I would probably dial in a cut-off of 9.8 volts, doing the last bit of charge at the two-amp rate, or if in a rush, I might even punch in a higher cut-off voltage, knowing that if called to the line in a hurry the pack would contain very close to a maximum charge.

In operation, as soon as the actual pack/charger voltage is equal to the preset cut-off voltage, the charger automatically terminates fast charge and



Delta's latest is this *1/18* scale electric car, photographed here next to a 1/12 BoLink car. More poop in text. If you think it looks small here, you should see it next to a 1/8 gas car . . .

switches to slow charge. The important thing to note here is that the charger only switches off when preset voltage is equalled. If this is set too high (in our example any voltage over 10.34 would be too high), the charger will never turn off; instead it will just keep pumping in the charge. Or, just as damaging, if for some reason the pack being charged cannot reach the usual voltage, again the charger won't kick itself off.

What I have been doing with this charger is to simply give any completely discharged packs a full 15-minute fast charge, the cut-off voltage set .20 volts below the expected peak, and in this case this cut-off is merely insurance against the 15-minute charge being too long. Unless something is seriously wrong, the 15-minute charge will never do any damage to the pack, but then it won't give it a full charge either.

When the built-in timer shuts the charger down I will run the timer back up to at least five minutes and set the cut-off voltage very close to what the actual peak is. As insurance, the timer is then set to the number of minutes it should take to get full charge. The idea is to constantly monitor the voltmeter, always ready to terminate fast-charge, yet to also have some assurance that distractions won't result in a cooked pack. Experience in using the charger is valuable, as you soon get a feel for what is going on and how long it takes to peak each battery pack.

Also note that what we have been talking about is using the charger to get maximum charge. This is only necessary for racing, and depending upon your area's length of heats and main events, may or may not be absolutely required. For just squirrelling around, absolute maximum charges are not needed, the odd chance of overcharging simply not being worth the extra few seconds of run time.

As you have probably figured out, the JoMac charger can also be used as a voltmeter; just solder test leads onto the appropriate connectors and you're in business. Equally obvious is the fact that the charger can fast-charge many battery packs used in other types of R/C modeling. In fact, it appears that R/C car racers have discovered a little trick in charging ni-cds (the peak voltage thing) that the other branches of R/C modeldom either could not discover or failed to utilize. Whatever the case, for the past couple of years I have been using other models of JoMac chargers, in conjunction with a whole slug of home-brew patch cords and a separate, hand-held digital readout voltmeter to fast-charge battery packs in all manner of flying R/C models and a number of different R/C systems. Now that JoMac has put the whole package into one box, they offer the only fast-charger I am aware of that *accurately* monitors pack voltage, and so is the only one that will give full charges.

DELTA 1/18 SCALE ELECTRIC CAR

Yes, that's right, a *1/18* scale R/C car. Possibly even more surprising, it's from Delta, previously known for being into 1/8 gas cars exclusively. There should be a picture someplace close. The car has running gear only assembled, all I had time for before taking pictures. At least that was how it seemed at the time. It turned out that finishing the car was just a matter of sticking the radio stuff (Rx, electronic speed control and one servo) in place with servo tape, likewise with the six-cell battery pack, and it was ready to race.

Race? Yes, ready to race; this thing is hardly a toy. I took the car over to our local indoor track, Race Car World, and the car worked quite well right off the bat. Not as fast as the average 1/12-scale six-cell car, but plenty quick nonetheless and handling like you would expect from any good race car. By the time you read this, Delta will no doubt have production pieces available. The one pictured is just like production cars even though actually a hand-made prototype. Anyway, contact Delta Manufacturing, 27 Race Car Court, Lorimor, IA 50149, or call (515) 763-2220 for further information. By the next column I will have a bunch more to say about this scale in general, the Delta 1/18 car in particular.

MRP (Model Racing Products) is molding replacement Lexan body shells for the popular MRC Rough Rider and Sand Scorcher off-road cars. Lighter than stock bodies, they are also stronger in most impacts and can be purchased either clear or painted.

The best book available for the R/C car racer, a super writing job by Bob Schleicher.

REQUIRED READING

Once involved in R/C car racing, most racers want to know as much about it as they can, yet it could take forever to learn even the basics from reading columns such as this. What is needed is a book that covers it all, giving you a good head start on things. Just such a book is available . . . actually has been for a year or so, but has now been released in an updated form, assuring you of the latest in information. More specifically, Robert Schleicher, author of *Model Car Racing*, had to do something concerning the differential units that

Continued on page 84

Photo No. 1. John Tidey scaled down the Miss America to suit an O.S. .25 motor, flew at the NACA Australian Vintage and Old Timer Competition. Good-flying combination.

PLUG SPARKS

By JOHN POND

• Credit for this month's lead item should go to John W. Tidey, President of NACA, for an excellent report on the first NACA Australian Vintage and Old Timer Competition. Held at the Salt Ash Drop Zone on October 12, the meet turned out to be an enthusiastic affair, albeit a little low in the number of entries for a meet of this size. Tidey says this was to be expected for the first meet when considering the distances involved, particularly in South Australia. Those who did attend the meet had a great time both from the standpoint of good competition and just plain out-and-out fun.

Picture No. 1 shows a Miss America scaled down to suit the power of an O.S. .25. Builder John Tidey, who resides at 36 Claremont Ave., Adamstown Heights, N.S.W. 2289, Australia, reports the combination is darn near perfect for R/C.

The first event on the R/C program (run to SAM rules) was the Texaco event. This was the very first time this event had ever been run in Australia, so everyone was pretty even when it came to being better than his rival. John states several magnificent models were present.

Photo No. 2 bears this out amply, as the Shereshaw Cloud Cruiser by Bruce Knight is an extremely well-built model. Bruce went on to prove that he not only builds gorgeous models but flies them to win! It wasn't until the last round of flights that the Miss America of Tidey finally caught up.

Les Gilbert was less fortunate with his big Lanzo Record Breaker (Photo No. 3), as he had only finished the model the night before. You couldn't blame Les for being reluctant to put in too much flying until he had the model fully trimmed out. It remained for Geoff Brown, flying a Plecan Simplex, to finally take third place.

The Old Timer R/C Limited Engine Run event, also run to SAM rules, was pretty much a carbon copy for the first two places, as the wind came up late in the afternoon, making it difficult for the lightly loaded models to maintain headway. Les Gilbert did pluck up enough courage for this event to pick up third place.

On the free flight side of things, three events were held: Vintage Wakefield, Vintage Power, and Old Timer Combined Gas. For the benefit of the American readers, the English and the Australians classify Vintage models as those prior to December 1952. Old Timer classifications are the same as SAM rules; i.e., prior to December 1942.

However, there appears to be some variation on the cutoff dates, as the Wakefield event was run on pre-1945 rules. Korda Wakefield models ruled the roost for spectacular flights and winning places, Art Butler and Barry Lee taking first and second respectively, with Neil Malloy using a Keilkraft Gypsy to win third.

In that line, although he didn't win, Photo No. 4 shows Angus Orchard with a rubber design known as "Old Standby" (looks suspiciously like a Korda design). This is a rather modern-looking design as compared to Photo No. 5, which features the Australian model "Sky Rover Sr.," rebuilt by Max Starick. Max, incidentally, found this model in basket case shape and has done an absolutely impeccable job of restoring the model. Best part is that preliminary flights indicate the Rover is actually competitive.

Results of the Vintage Power event reveal that quite a few models were brought out of the cupboard, so to speak. These models, flown to Illawara Rules (as promulgated by Dave Owens), had to conform to the age limit of December 1952. This allowed quite a few postwar models to be entered, such as Slicker, Tomboy, Sugarfoot, etc. Multiple entries were allowed, with the unique ending in standings that gave

Photo No. 2. Beautiful building job on Bruce Knight's Shereshaw Cloud Cruiser. Really motates with O.S. .60. Australian O.T. Champs.

Photo No. 3. The ubiquitous Lanzo Record Breaker, this two-channel version built by Les Gilbert. Flown in the Aussie O.T. Champs, Les finished it the night before the meet.

Photo No. 5. An Australian design, the "Sky Rover Sr.," carefully restored by Max Starich, O.T. columnist for *Airborne*, the model mag from Down Under.

Photo No. 4. Korda-ish "Old Standby" was flown at the Aussie Nats by Angus Orchard.

Dave Owens first with his Buzzard Bombshell and third with a Tomboy. The only one to prevent a complete shutout by Owens was Bruce Holmes, who took second place using an English design, a Slicker 42.

The O.T. Power event suffered from lack of official entries, as there were only four. Winners here were: 1st, Al Butter (Simplex); 2nd, John Tidey (Playboy); 3rd, Bruce Holmes (Sugarfoot); and 4th, Les Gilbert (Alpha Corsair). Photo No. 6 shows 4th placer Les with his Ed Beshar design. This twin-rudder design is gradually finding more and more acceptance in the free flight circles.

John Tidey completes his report by stating that all contestants thought the meet was nothing short of terrific. The field used for flying is simply out of this world, being two square kilometers of mowed grass. John says without a doubt it is the best field in the state. With such a field available and a definite competition set for next year employing the same events, there is no question that Old Timers are in Australia to stay. Great stuff!

ENGINE OF THE MONTH

In the August 1945 issue of *Model Airplane News*, a new engine appeared in the advertisements. This engine, the Ken .61, was aimed directly at the tremendous popularity of control line modeling.

The Kencraft Co., located at 225 N. Seventh St., Garden Grove, California, featured this new racing engine at $32.50 less coil and condenser. Weight was given at 17.5 ounces but later charts indicate the motor weighed 15.5 ounces.

Ken engines, when they first appeared in Southern California, were first tried in control line speed models. Even with their boasted "turbo valve," the performance was somewhat disappointing. The factory brochure indicated the turbo valve, although rarely needing adjustment, should be looked at if performance was not up to par.

Model Craftsman magazine ran a series of tests on all engines and found the Ken turned, on ignition, 5,650 rpm with a 14x8 propeller, 7,900 on a 14x6 prop, 7,000 on a 13x8, and 9,700 on a 9x10 prop. When compared to the contemporary speed king of the day, Ray Snow's "Hornet," the Ken motor suffered by comparison, as the Hornet turned 13,650 rpm on a 9x10 prop.

All tests, of course, were run on standard 3:1 mixes; hence, like in the case of the Forster .29, the Ken probably ran better on methanol. Actually, the performance obtained was quite creditable on ignition, but the engine was rather large and bulky. Worst of all, its overall performance did not compensate for the weight. Although a good engine in its day, it was simply outclassed by the Hornet and later the McCoy, in the speed circles.

The Ken engine featured an "oversquare" ratio of bore/stroke, with the bore of .937 and stroke of .875. *Model Airplane News* rated the motor at .60 horsepower at 14,000 rpm (using a flywheel). The *Model Craftsman* people reported 13,700 rpm utilizing a seven-ounce flywheel. Compare this with the Hornet at 14,750 rpm . . . better than a 1,000 rpm difference!

Although the Ken engine did lend itself to "hopping up," the competition for the motor market was just too rough

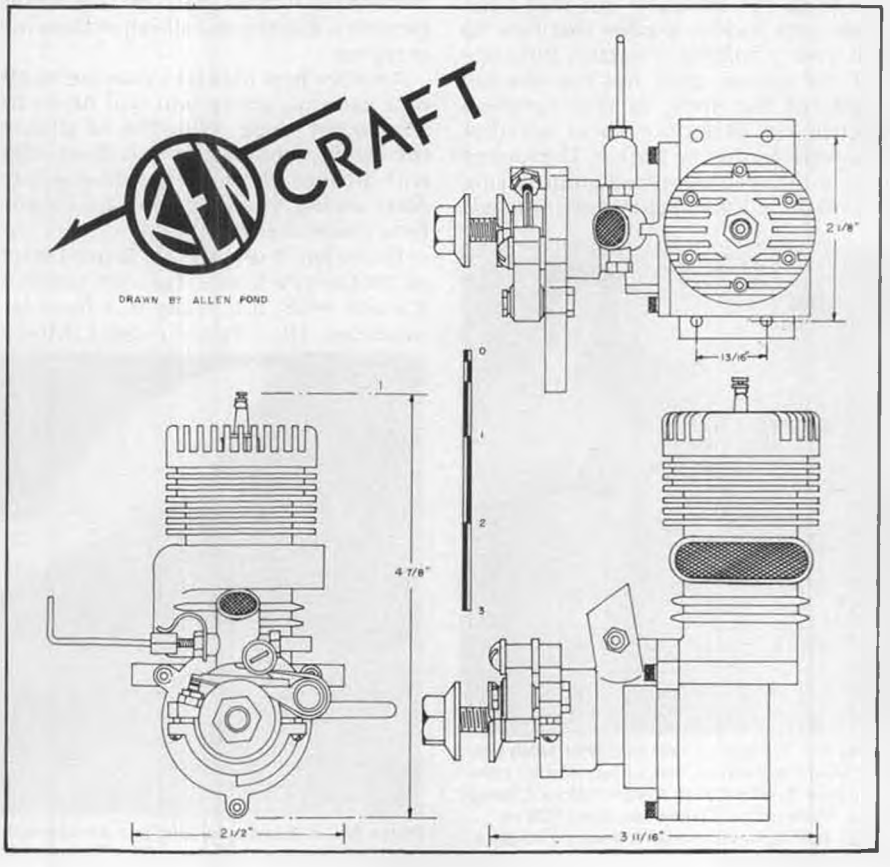


Photo No. 6. Les Gilbert also flew F/F with this Beshar design, the Alpha Corsair.

and another engine passed into oblivion.

A.M.L.A. DAZE

Photo No. 7 is one of those priceless pictures this columnist runs into every so often. In rummaging through the effects of Earl Vivell (model engines, planes, and equipment, first purchased by John Gracie, then sold off and the balance acquired by Karl Carlson), looking for old plans and information on antique engines, this photo turned up. Recognizing it immediately (Boy! Is this writer an old goat!), the photo was scheduled for publication.

The photo shows Joe Culver being congratulated by Junior Indoor winner Boyd Richardson. As can be seen, Boyd is holding the standard (for that time) single stick indoor pusher that flew so well. Joe is holding a tractor, but note that the rubber does not run the full length of the stick, as was common practice on all indoor sticks whether they were pusher or tractor. The idea of a tail boom revolutionized indoor flying and made indoor tractors very practical by eliminating the stall so prevalent in tractor models. Joe Culver won the Pacific Coast Indoor Eliminations easily and then went back to the A.M.L.A. National Championships to set a record of better than nine minutes, an unheard-of time! Once the ice was broken on tractors, records continued to be set every year.

Later on, the wing was moved to a parasol position to gain more stability, as the low-wing versions did have the problem of spinning in under full-power winds.

In the '40s, Joe Culver moved back East to take a job with Colt Mfg. Co. Seems like only yesterday that his son, Gene Culver, was out in California to go to the same college as Dad, Stanford University. The son was also interested in model airplanes and actually competed at the Northern California Free Flight Council meets.

If by chance Joe or some of his friends happen to read this column, we would be pleased to hear from you again.

Photo No. 7. Here's a real rare shot from the Earl Vivell collection. Joe Culver (right) congratulates Pacific Coast Junior Indoor Champ, Boyd Richardson. Culver was the 1929 regional A.M.L.A. winner and went on to set a new indoor record.

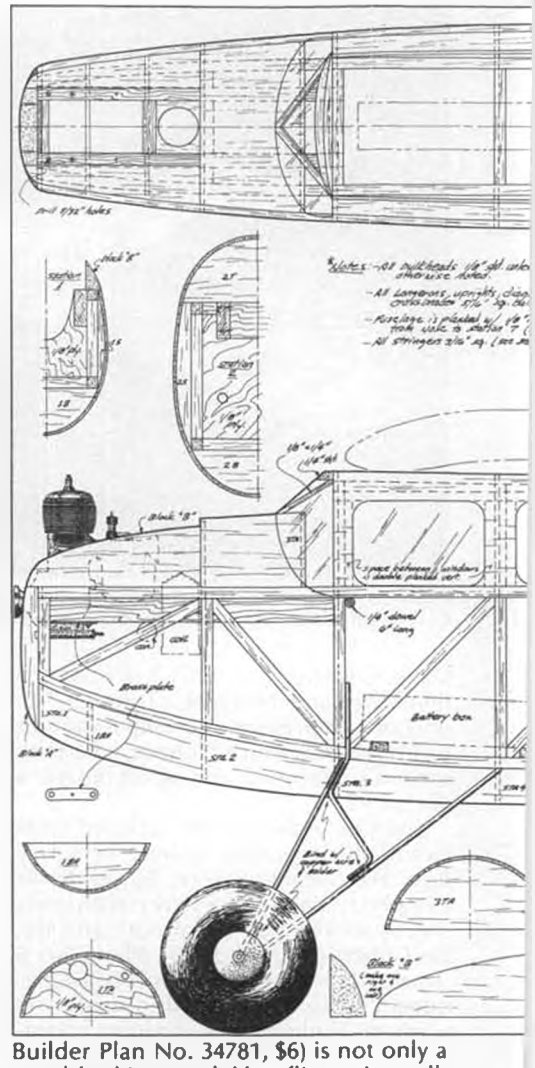
HOT STUFF AGAIN

This columnist is constantly amazed at the ideas that Bob Hunter ("Hot Stuff" originator) keeps coming up with. In a recent note to this reporter, Bob says you can get rid of that cloudy appearance on canopies, windows, or windshields. Actually, the discoloration is caused by the curing fumes of the cyanoacrylate glue. Up to now the removal has been an unsolvable problem.

However, Bob sez simply to put a drop of light oil (3-in-1 will do fine) on a piece of cotton or cloth, then pass lightly over the area. Voila! The fog effect disappears immediately! Best part of the whole process is that the discoloration does not reappear.

Another neat idea is to coat the inside of a canopy, where you will never be able to get inside. Wipe the oil all over the inside, then clean the bottom edge with alcohol where the bonding occurs. After setting, you won't find any cloudiness inside the canopy!

Photo No. 8 reveals that Bruce Lester, of 254 Glen Park Ave., Toronto, Ontario, Canada M6B 2E3, really is a first-class modeler. His "Torc" model (Model



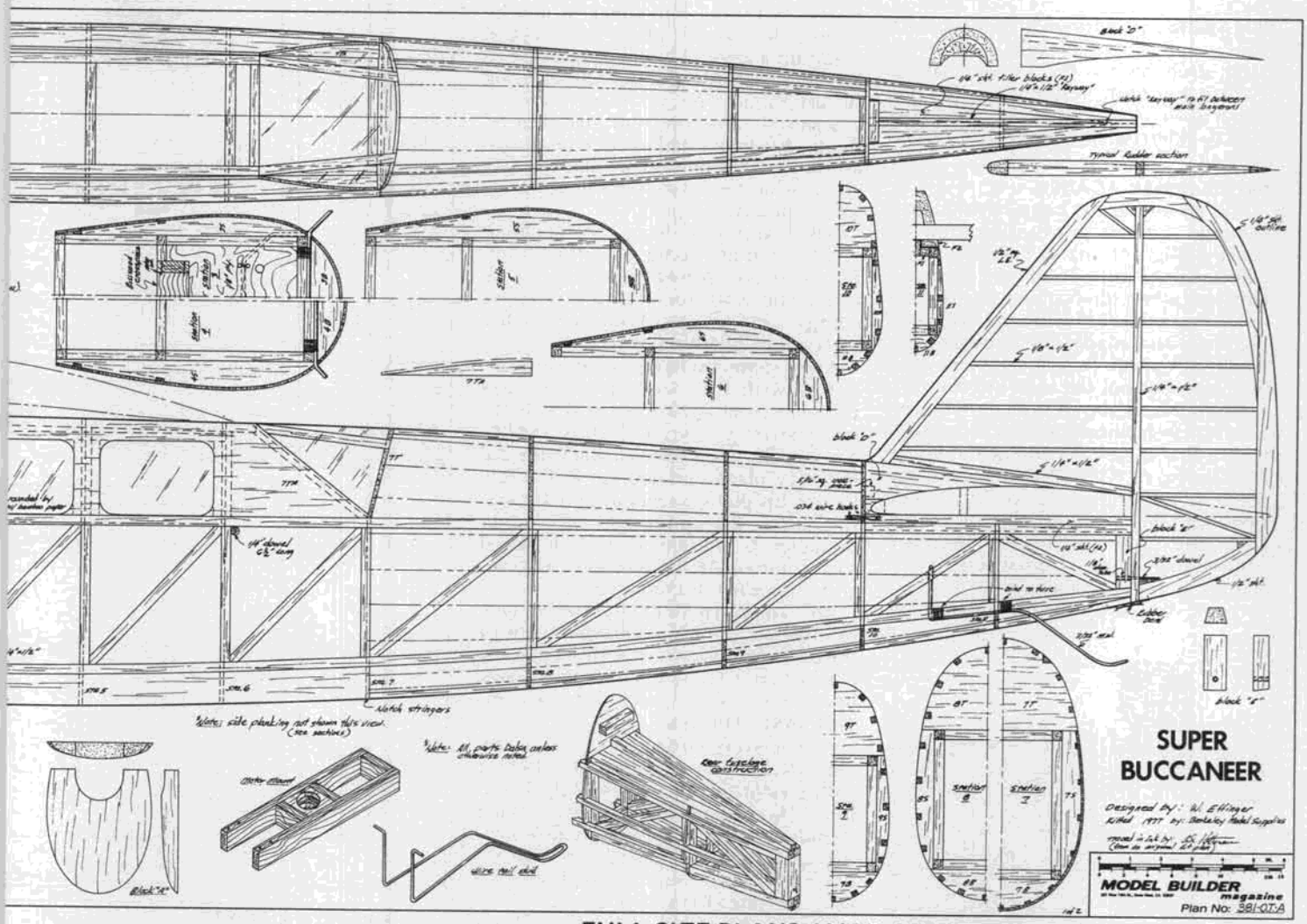
Builder Plan No. 34781, $6) is not only a good-looking model but flies quite well.

Bruce sez he is going to take another hard look at some of the old negatives he has and perhaps, with a little missionary work, he can produce some creditable pictures of those old Nationals competitors. He often visits Ray Hunter, the designer and manufacturer of the Hurricane motor, to reminisce about the good old days.

For those who are interested in what Ray is doing these days, he is a ham radio

Continued on page 42

Photo No. 8. Besides writing and photographing, Bruce Lester builds, too! He turned out this neat Old Timerish looking "Torc Trainer," from MB plans (No. 3478I, $6.00).



FULL SIZE PLANS AVAILABLE – SEE PAGE 100

Super Buccaneer

OLD TIMER Model of the Month

Designed by: Bill Effinger

Drawn by: Al Patterson

Text by: Phil Bernhardt

• Certainly one of the prettiest and most realistic-looking gas models to come out of the pre-WW-II era was Bill Effinger's "Super Buccaneer," the biggest of the seven different Buccaneer gas jobs kitted by Bill's company, the legendary Berkeley Model Supplies, during the middle and late '30s. The Super Buc was actually a redesigned, streamlined version of Effinger's highly successful original 84-inch Buccaneer. Rumor has it that another famous modeler, Ben Shereshaw, was primarily responsible for the redesign work, but we can't say for certain. If any of you readers can verify this, we'd be interested in hearing from you.

Photo No. 9. Scene from the 1937 Nats at Ft. Wayne Airport, Detroit, Michigan, shows William "Berkeley Bill" Effinger fitting the wing to his brand new Super Buccaneer. Power was a Brown Jr., although the original kit plans show an O&R .60. Another of Bruce Lester's original photos.

After getting involved in the O.T. movement in the late '60s, the first Super Buc this scribe can remember seeing was one built and flown by the young son of past SCIF member Jerry Johnson, who was the U.S. distributor for Taipan engines at the time. Can't remember the young fellow's name, but I do remem-

Continued on page 102

Plug Sparks . . *Continued from page 40*
operator, call letters VE3UR on side band, probably ten or 75 meters, as he used to run both frequencies. Ray has contacts all over the world, so if you want to get in touch with Ray, be a radio ham!

BRUCE LESTER AGAIN!

This columnist has been having a ball running the old prints submitted by Bruce Lester of Ontario, Canada. Bruce was fortunate enough to take a camera with him when the Nationals were held in Detroit and other cities in fairly close proximity to Canada. The photos he has taken, of course, have faded somewhat with age, but not the memories!

Photo No. 9 shows William Effinger, affectionately known as "Berkeley Bill," with a brand-new version of the Super Buccaneer, or Mk. 3 Buccaneer as we used to call the string of Buccaneer revisions. Bill acquired this nickname from the fact that he ran Berkeley Models (name taken from where he first started, Berkeley Place).

From very small beginnings, in his own back room, so to speak, where he offered Buccaneer plans for 50¢ and made up a rough kit, Bill progressed to the very sophisticated kit line catering to just about every phase of modeling you would want to get into. Like all good things, Bill finally had to close his doors, as it only takes one or two bad guesses about what the modelers will go for to bankrupt any company.

Bill disappeared from the modeling scene for quite some time thereafter. Rumor (never substantiated) had it he was doing work for a food processing company in Chicago. Quite recently, Bill surfaced in Atlanta, Georgia.

After some exchange of correspondence with Bill, we learned he has formed a company known as W.E. Technical Services, Inc., P.O. Box 7688-R, Atlanta, GA 30328, specializing in the old Berkeley plans updated for R/C. Only two of his plans qualify as Old Timers: the Super Buccaneer 88 and Super Brigadier 66. These have been designed to accommodate modern glow engines and three-channel radio sets.

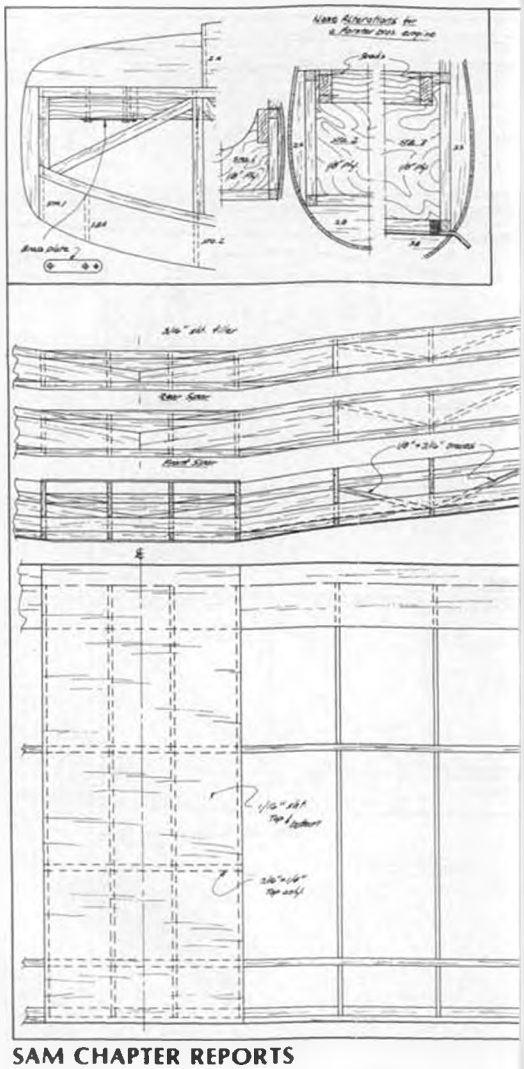
We can only wish Bill the best of luck in whatever he does. He has been one of the prime supporters of AMA in its early days when it really needed help. Now, he deserves all the support he can get.

Photo No. 10. Al Hellman with his Megow Ranger at Wright-Patterson AFB. He's the manager for the '81 SAM Champs at Taft.

1981 SAM CHAMPS

As everyone knows (or should), the 1981 SAM Championships will be held at Taft, California, on June 30, July 1, and July 2. According to SAM Western Vice President Al Hellman, who is also serving as Contest Manager, the Champs personnel are pretty well lined up, with 49'er member John Targos as R/C C.D. and SCIF Larry Clark as F/F C.D. Photo No. 10 is of our intrepid Contest Manager, Al Hellman, snapped at Wright-Patterson AFB.

For all the latest information on the SAM Champs, be sure you have renewed your SAM membership in order to receive that excellent newsletter, *SAM Speaks*. Full credit should be given to Jim Adams for all the unselfish work here. So-o-o, don't delay, get the membership dues in!! After all, for $10, it is the best buy in modeling!



SAM CHAPTER REPORTS

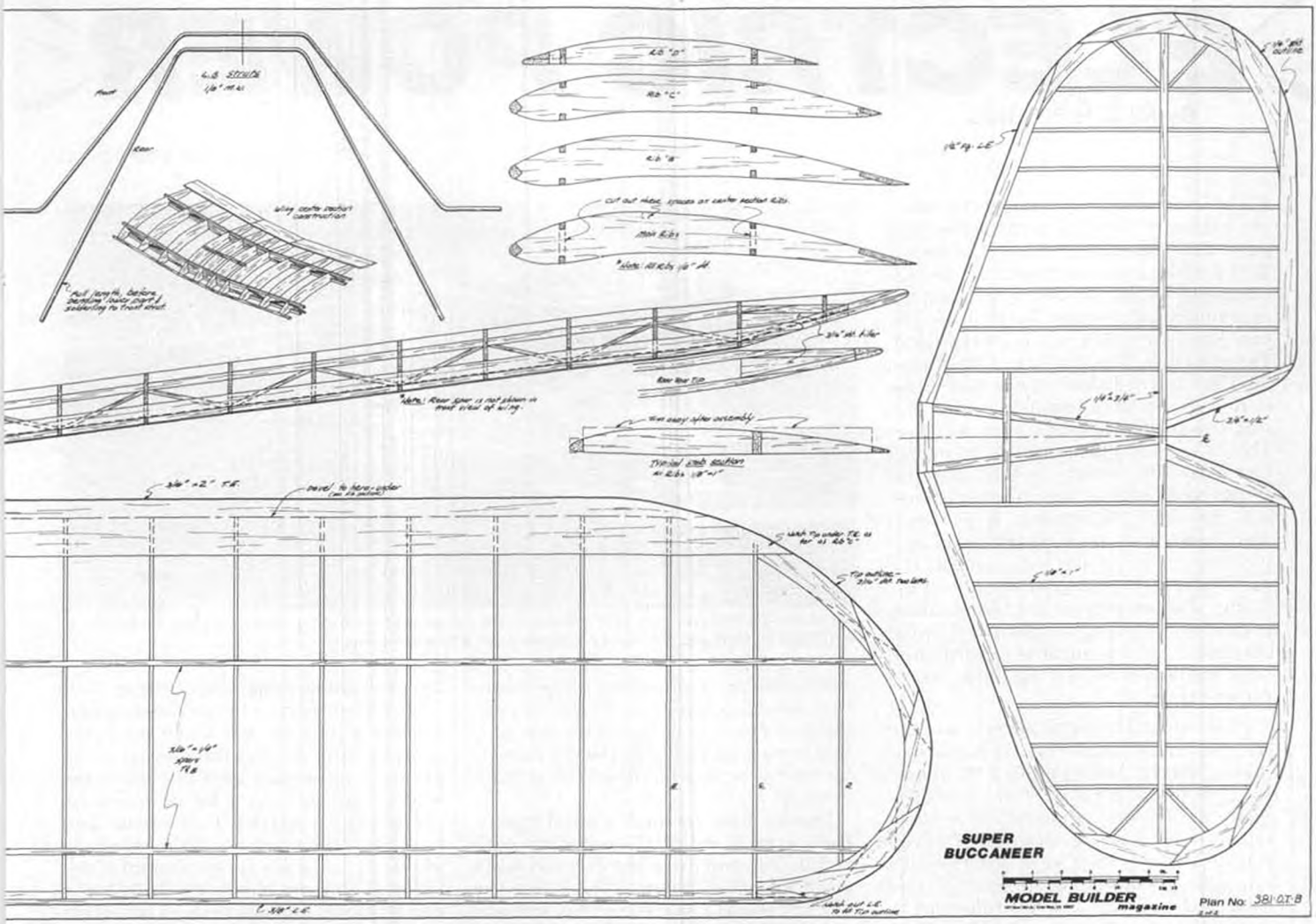
SAM 1

The Model Museum Flying Club (SAM 1) is still quite active, according to Les Payne, of 881 S. Josephine, Denver, Colorado. In looking ahead, your SAM President has been corresponding with Les in the hopes of once again holding a SAM Championship in his area in 1983. It would be most fitting to again return to Denver, where the first Championship was held.

SAM 3

Photo No. 11. In response to our KGS plan in the Dec. '80 issue, dyed-in-the-wool free flighter Ed Heyn submitted this photo of his KGS, built in 1966 and still flying well. Only mod was for the stab DT. A good competition ship sez Ed.

Photo No. 12. Bill Hale, COFFC honcho, presents C.I.A. "Informer" editor Harry Murphy with a well-deserved birthday cake.



FULL SIZE PLANS AVAILABLE – SEE PAGE 100

Not many fellows know it, but the SCIFS (Southern California Ignition Fliers) club is actually SAM 3. This club is one of the pioneers in the Old Timer movement, flying strictly free flight (with Taft as a site, what else?).

Ken Sykora, the editor of *The Flight Plug* newsletter, is known nationally for his sharp wit and penetrating observations of the Old Timer movement. Whether you agree with him or not, the SCIF newsletter is well worth receiving. You can get on the mailing list by sending $3.50 for a year to Ken Sykora, 6716 Noble Ave., Van Nuys, CA 91405.

Ken's latest editorial takes some of us to task for developing larger memberships in O.T. activities. This writer would be the first to agree that this activity wasn't started with the idea of competing with AMA, WAM, et al for members. No question about it, the O.T. movement began as an idea to get away from highly formalized modeling and to again enjoy the building and flying of models, particularly the oldies which seem to offer what everyone is looking for . . . plain out-and-out relaxed FUN!!

However, with more and more people coming into the game (all in search of the same thing), far be it for me to say "Whoa" to the expansion of the SAM movement. In fact, it has been the policy of this columnist to feel there is room for all. More plainly put, "the more, the merrier."

The latest contest report on the SCIF Texaco Annual (first one I've missed in a long time!) indicates the weather was a sticky 115° in October! No wonder the Easterners hate these contest reports. The most encouraging aspect of this meet was the back-to-back win in Texaco by the SCIF Junior, Jay Humelbaugh. He also won last year with the same Trenton Terror, powered with (get this)

Continued on page 92

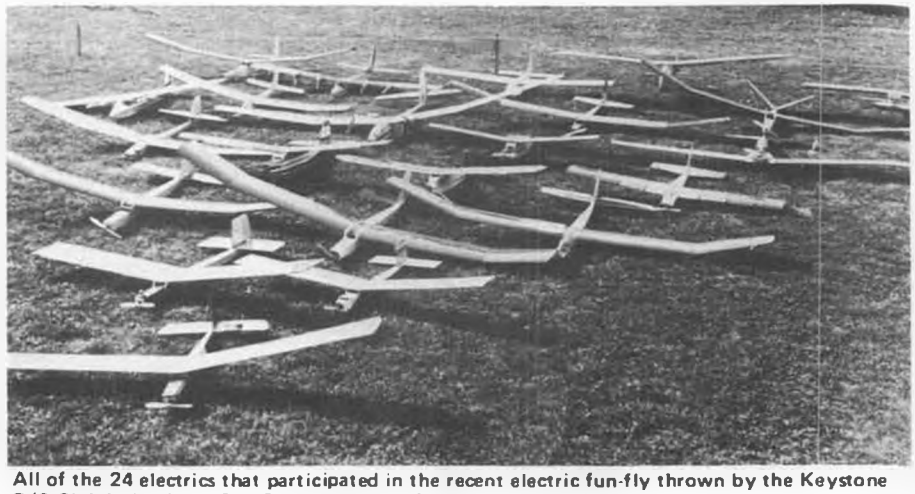
Photo No. 13. Chet Lanzo flew this R/C version of his old "Bomber" design at the 1980 Sam Champs in Ohio. Plans in the offing.

Photo No. 14. Sten Persson holding a 1938 Swedish Wakefield model called "Prim." Designed by Sune Stark, 1952 World Wakefield Champ.

ELECTRIC POWER

By MITCH POLING

PHOTOS BY BOB KOPSKI



All of the 24 electrics that participated in the recent electric fun-fly thrown by the Keystone R/C Club in Hatfield, PA. Quite a turnout for a first-time meet!

• There are very few contests for electric planes in the USA, and for the most part these have been all in California. Bob Kopski is not a person to be discouraged by that, and he organized the first annual electric fun-fly sponsored by the Keystone R/C club in Hatfield, Pennsylvania. The fun-fly was held Sept. 28, 1980, and even had an alternative rain date (Oct. 5). Such foresight is rare, and was rewarded with beautiful weather! This is a good illustration of Murphy's Law No. 100, which says to plan for things to go wrong, and sometimes they will go right. All electric R/C planes were welcome: scale, sport, aerobatic, old timer, motorglider, you name it! The event was intended to promote electric flying, with awards for the best-looking plane, the longest flight time, most aerobatic, and a surprise award. Bob sent me an excellent account, so I'll quote his report:

There were 24 electrics flown, and the weather was beautiful. While most planes shown belonged to KRC members, there was great interest among the many RC'ers who showed up as spectators. There is no question that they will return as fliers next year. Interestingly enough, a number of spectators said they had electrics but felt reluctant to bring them! What regrets! The event was basically a fun-fly with casual competition . . . no pressure and nice prizes, the latter courtesy of many folks in the hobby industry.

The KRC members flew for fun but not for prizes. Guest flier winners are as follows:

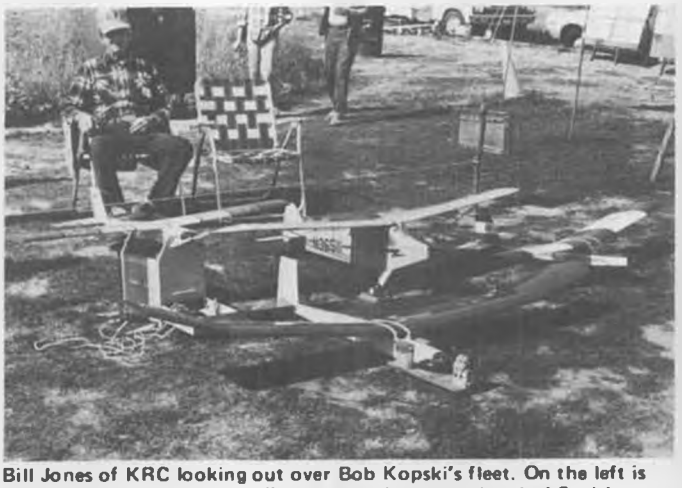
BEST-LOOKING MODEL
1) John Henderson (Original design motorglider)
2) Austin Gutman (Yellow Jacket)
3) Aurthur Garzon (Sweet Stik)
MOST AEROBATIC
1) Aurthur Garzon (Sweet Stik)
2) Austin Gutman (Yellow Jacket)
3) John Henderson (Motorglider)
LONGEST FLIGHT TIME
1) John Henderson (Motorglider)
2) Aurthur Garzon (Sweet Stik)
3) Austin Gutman (Yellow Jacket)

Obviously these three cleaned up, but there should be plenty of competition next year. I believe electric is only in its "seed" stage and that the next decade will see electric dominate. Interestingly enough, many KRC members who have no interest in electric worked all day as judges, etc. It was an absolute success in the FUN DEPT.!! These guys who are specialists in pattern, helicopters, etc. pitched right in and helped hard all day. Of course, there is a high percentage of KRC members who are electric fliers . . . about 14, who have at least 22 planes among them, and several other members who are building. Electric is contagious! Three years ago there was only ME! We are planning an Electric Fun-Fly for next year and I'll fill you in as plans develop.

Thanks, Bob, for such a good report. There is no question that someone with enthusiasm and drive like Bob can make a success of an event. I think that the KRC meet was a first in the USA, in that it was the first sponsored by a club. Up till now all meets have been sponsored by the model magazines, Astro Flight, and IMS. So, the KRC meet has made history! Let's take a look at some of the planes in the photos that John sent, and some of the interesting things about them.

John Henderson's motorglider design is quite attractive, and I like the take-apart features; it fits in the suitcase in the photo! I agree with John that this is the way to go, as I do a lot of traveling, including to Alaska, California, and Europe, and I always take along an electric. I always fly on commercial airlines, and my planes go in with the conventional luggage or in a bag that fits under the airline seat. This would be impossible without the take-apart feature, and the convenience is fantastic, with no hassle about odd and oversize boxes, luggage, etc. The planes are every bit as strong as the conventional con-

Very clever and good-looking electric sailplane by John Henderson. Plane folds, bends, breaks down, unplugs and fits in the carrying case shown, along with Tx and field gear. From left are Heinz Koerner, Gene Hall, John Henderson, and Ed Milburn.



Bill Jones of KRC looking out over Bob Kopski's fleet. On the left is the 075-powered "Euphoria" aerobatic ship, a semi-scale J-3 with Astro 15, an original design powered glider called "Whisper V," and Bob's PR model, the "Friendly One," on the right.

Only crash of the day was Heinz Koerner's powerful aerobatic model, powered by an Astro 075 on ten cells, 7X6 prop. Wing folded on a snap roll. Behind Heinz is a four engine 020 ship, an Astro 25 Silent Squire (rear), and twin 05 Windrifter.

struction, and repairs are easy . . . just take off the damaged piece and replace it or repair it separately. That is a whole lot simpler than wrestling with the whole plane to make a repair! Come to think of it, a column on how to make airplanes come apart (deliberately) might be a good idea.

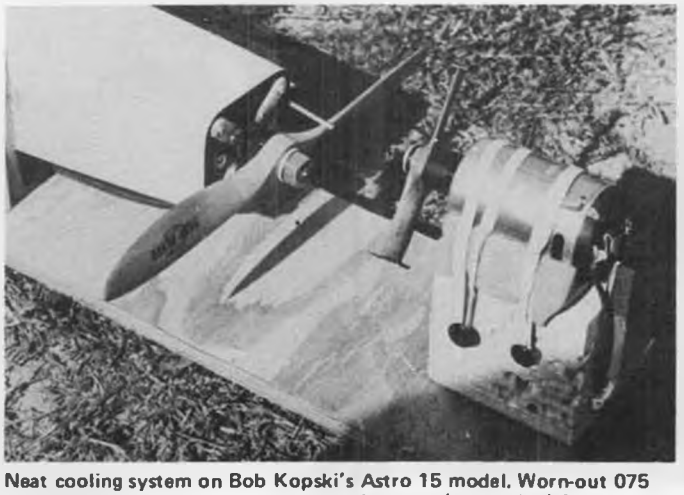
Bob Kopski's "Friendly One" looks really good, using an Astro 10 and 1.2 Ah cells for long flights (eight minutes motor run). Bob lets spectators fly it for fun and good public relations. It looks a little bit like a senior version of the 05 Astro Sport kitted by Astro Flight. If the looks are any indication, it must be an excellent flier. The "Euphoria" Astro 075 aerobatic plane looks good too. I don't know if Bob has drawn up plans for these.

I don't usually show crash pictures . . . after all, electrics never crash (I wish!), but Heinz Koerner's planes are so interesting that I just have to. The crashed plane is (was) his aerobatic Astro 075 model, using 10 cells and a 7x6 nylon prop. It is his design, and is a powerful flier, but the wing folded on a snap roll. I'm sure Heinz will have a new one in the air by now! Just behind Heinz is his original four-motor Astro 020 plane, which flies well. No specs were given, but I would guesstimate a six-ft. span and four lbs. flying weight. Heinz also has a twin Astro 05 Windrifter, and an Astro 25 powered Silent Squire (in the photo background). I have often thought of the Silent Squire as an electric, as it is a very sleek and capable slope soaring design for aerobatics, but haven't got "aroundtuit." It must be plenty hot with an Astro 25; I would guess about five lbs. all-up on the four-square-foot area wing. I have been doing a lot of flying lately with the Astro 25 and am impressed with its power and long flight times (eight to ten minutes, depending on the aerobatics).

Some of the photos show the clever cooling fans the KRC fliers use to keep the battery packs cool during charging. These are neat, and a sure way to get spectator attention, I'm sure! Since I live in the cool and wet Pacific Northwest, I haven't needed any cooling fans, but I remember a Boy Scout Jamboree I attended in Valley Forge, Pennsylvania, way back when, and it was scorching in July. I can see why the KRC fellows would use them.

One of the photos shows John Hickey's Bridi Soar Birdi flying over the field. At last, I can tell people that the Soar Birdi is a good plane for electric flight. I have had many people ask if it was, since it is a good design, easy to build, and is nicely priced. I just haven't had time to try it. Bob says that the Soar Birdi and the Astro 075 is an excellent combination, and that there are several in the KRC club, both with conventional and "V" tails.

The next contest I will report on is the IMS Show, on January 10 and 11, in Pasadena, California. This show will feature indoor electric scale, with categories for monoplanes, multiwings, and blimps. I have been building an entry, a Sopwith Tabloid, which will meet the rules of 24 ounces max and three ounces per square foot max. This has turned out to be a challenge, but quite possible and fun, too. I decided to build it the same way as the real one, with light structure and wire bracing (thread). The result is nearly scale, and a structure weight including landing gear of six ounces before covering, for a 50-inch span and 7-1/2 square feet wing area. The all-up flying weight will be between 20 to 22 ounces with an Astro 020 and Cannon Super-Mini radio. A few years ago I wouldn't have thought this possible. The neat thing about electrics is that there is always something new, and always a challenge. See you at the IMS Show! •



Neat cooling system on Bob Kopski's Astro 15 model. Worn-out 075 motor blows cooling air into battery air scoop (not visible) following a flight and/or during charge.

Cooling system on Kopski's J-3 Cub. This one uses a Chrysler window washer motor with Cox 3X1-1/4 (.010) prop. Clever idea, especially in warmer climes.

One-half of the "Powers That Be" at Flyline Models, Hurst Bowers (the other half is Herb Clukey), turned out this unusual Polikarpov PO-2 Russian military biplane. It's R/C, with three channels operating rudder, elevators, and throttle.

1/2A & 'Sport' SCENE

By LARRY RENGER

PHOTOS BY AUTHOR

• I received a long letter from Larry Mile of Mission, Kansas. He is an enthusiastic advocate of the .19 size engine, and the Fox .19 in particular. I can only quote from a few pertinent sections due to the overall length of his letter:

Modelers do every trick they are capable of to keep their planes as light as possible, then frequently stick a powerplant up front that is heavier than need be. In addition to the fact of low initial cash, long life, reliability, and availability of parts, Fox engines as a whole are oftentimes ounces less weight than competitive brands, a big plus for Mr. Fox's engines.

The only feature I have not liked about my Fox .19 C/L engines has been the rather spindly needle valve that is subject to vibration and is easily broken in the event of a crash. I have solved that problem by using the Fox needle valve assy. No. 14010 that is used on the .40 size engines and larger. Since the spray bar on this needle valve is longer than the one the .19 is supplied with, I use a couple of thick fiber washers or aluminum spacers to secure the spray bar. I also cut off the top half of the needle valve to produce a compact needle similar to the one used by the last World Champs Russian Combat Team.

Larry goes on to suggest that the engine would be a good choice for sport racing events. He also talks about the possibility for starting up an R/C Carrier event. The remainder of the letter deals with the fact that although there are a fair number of radio kits for the .19 size engine, there are really none in C/L. You can fly a few .15 size models very well with a .19 . . . Larry particularly mentioned the Jetco "Shark .15," the "Junior Flite Streak" by Top Flite, and the "Akromaster" by Sig. To Larry's way of thinking, the .19 size sport U/C is an ideal entry point for new modelers to get started. They needn't deal with the comparatively delicate 1/2A models, nor handle the behemoths that a .35 requires. Sadly, there are not enough kits available to make this convenient.

A few months ago I had a letter from George Lieb, in which he mentioned that he had lots of trouble with 1/2A U/C models until he learned a few tricks of the trade. Happily, George recently wrote again to pass along the combination of factors he used to design and build successful racing planes:

Didn't know you were going to print my letter. My first 1/2A reed-valve racers a few years ago were about the most unstable, hard-to-fly planes around, and I didn't know what was wrong. I thought all 1/2A's were that way, and there was nothing that could be done. Then in 1978 I accidentally found a combination that really works. Since then my pilot, Mike Doran, and myself have built a bunch of 1/2A's that all have certain features in common and fly great. Even though we didn't win (took 2nd and 3rd in Open), our planes flew as well as

Very nicely built Corsair, from a Guillows kit, was flown by Ralph Cooke at the 1980 Flightmasters Annual at Mile Square. Had some overheating problems with the cowled TD .020.

anything at the '79 Lincoln Nats. Lots of planes crashed there because of wind. We really didn't think it was too bad. Mike even did wheel touches and taxied for laps at full speed when his race was over. Our planes have lots of line tension on takeoff and in flight. They fly very level, and are barely affected by wind.

We have flown in winds greater than 30 mph, and he can always whip them back to the pits. We've had no crashes since 1978. The Klause "Lil Rodent" also flies very well. Here's the setup we use on all our 1/2A's: symmetrical wing airfoil (gives very little climbing in wind); wing as close to center-line as possible (high-wing planes tend to have less line tension); leadouts are swept forward to exit just behind the leading edge and the plane balanced so that when suspended by the leadouts, it hangs with the fuselage level. If the leading edge is swept back, leadouts are either right on the leading edge or slightly in front.

We use the Sig 1/2A bellcrank and control horn, 2-1/8 inches between leadouts, 1/2-inch elevator horn. The pushrod is in the inner bellcrank hole and outer horn hole. The horn is mounted on top of the elevator. No braces are used on the pushrod, so the controls are extra free; as racers don't fly inverted, this causes no problems. We always fly with a handle with about two-inch line spacing. The Sullivan handle (looks like a letter "D." LHR) *with the cable in the center holes works great. This gives very insensitive controls and makes them fly very smoothly. Our 3/32-inch landing gear wire does not bend easily, and allows fast landings without the plane springing back up again. We always use reverse pitch props, which gives excellent line tension on takeoff. It does limit the choice of props, but we like the security during the heat of a race.*

Now, that is what I would call a meaty letter. George is right-on about getting those control sensitivities reduced. Most people put much more control action in a small model (C/L or R/C) than they would dream of in a large one, and then they complain that small models are "squirrely." The trick is to look at the *angles* of control surface throw, not the measured deflection in inches. For example, 1/8-inch of throw on a Pattern .60 model aileron reduces to about 3/64 of an inch on an .049 model with ailerons of about 1/3 the chord of those on the big model. On C/L ships you have to compensate for the smaller bellcrank line spacing by moving the spacing in on your handle the same amount. Quite frankly, I usually have a problem getting the sensitivities low enough on most models! George also sent a photograph of two of his models. I'd love to print them but they are Polaroid color and won't reproduce. He uses a very long tail moment, about three wing chords, and the stab looks to be about 30% of the wing. Elevator area

Here's one we would have liked to see fly . . . and it reportedly flew very well. It's a 1913 Etrich Taube, constructed by Greg Davis of Canada. Flew at Flightmasters Annual.

is about 20% of the stab area. Judging from the short nose moments and the CG location George specified, the models must be very lightly built.

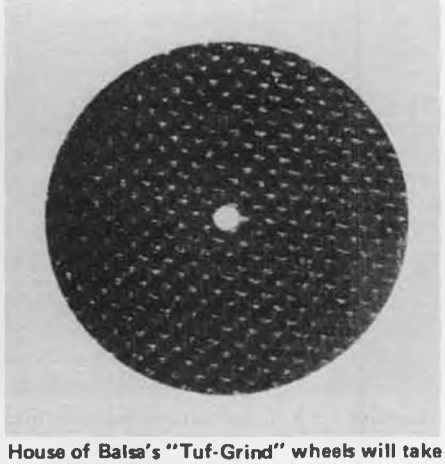
On to the models for the month! First up is the "Red Tailed Duck," a canard free flight by Jim McDermoth. I have watched this model fly and it is a very nice, docile sport model. Jim has used Jedelsky construction on the wing and stab for an all-wood model. Power is provided by a Tee Dee .020, and the high engine position keeps the engine clean, allows reasonable control of CG position, and controls any tendency to zoom under power.

At the Flightmaster's Annual a few months ago I got pictures of some top drawer scale models. Greg Davis came all the way down from Canada to fly his beautiful Taube. The model was scratch built from factory plans and powered by the Mills .75 (cc) diesel replica which is currently being imported from India. The model weighs about 15 ounces and spans 56 inches. Covering was silkspan, carefully stained to resemble fabric. The wheels were shock mounted in the identical manner as the real aircraft. Oh yes, the model flew very well.

Ralph Cooke is holding his version of just about everybody's favorite warbird, the Corsair. He built this one from the Guillows kit and put a Tee Dee .020 in it. Since he was swinging a large prop, and the engine was cowled, he had some engine problems that I would guess were due to overheating. I saw at least one good flight with the model, but later in the day I noticed that it had been crashed, though it looked repairable. Ralph builds very clean models, and if I remember correctly, he said this one only weighed seven ounces.

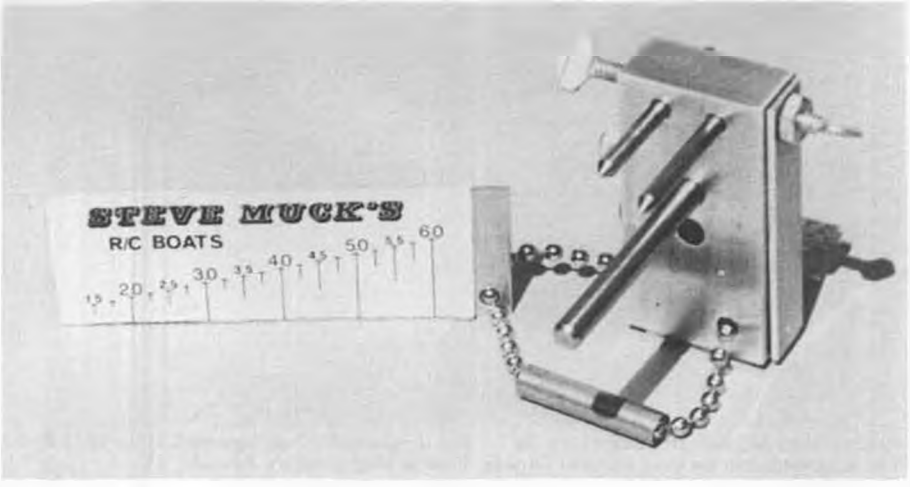
Last airplane for the month was not at the contest. It is a Russian PO-2, built by Hurst Bowers. Span is 48 inches and the model flies on three channels with a .15 in the engine compartment. In case you can't spot it, the engine is mounted inverted and looks to me as if it might be

Continued on page 83



House of Balsa's "Tuf-Grind" wheels will take a real beating without coming apart.

Sport F/F is alive and well in Los Angeles; Jim McDermoth's "Red Tailed Duck" is just one example. All-wood model uses Jedelsky construction on the wing and stab.



PRODUCT$ IN U$E

STEVE MUCK'S PROP PITCH GAUGE, by AL BERRY

PHOTOS BY AUTHOR

• What's your prop's pitch? Are you sure? If not, check it out with the simple and easy-to-use new prop pitch gauge from Steve Muck's R/C Boats.

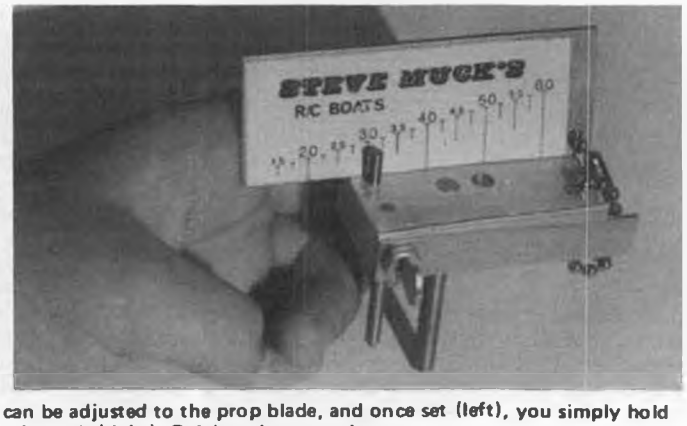
To start, let's define the word "pitch." Pitch is the theoretical distance that a prop would travel in a solid substance (with no slippage) after making one complete revolution. As you know, water is not a completely solid substance, and we do have a lot of slippage. You can obtain a theoretical speed in miles per hour with the following formula:

$$MPH = \frac{\text{rpm x prop pitch in inches}}{1056}$$

As for the pitch, you can use the Muck Pitch Gauge to determine the pitch of any prop. Here's how it works. The difference in length between pin A and pin B on the back side of the gauge block is measured with the accompanying preset scale; you just hold the scale up to the pin and it tells you the pitch in inches. You need no conversion charts, nor do you have to do any type of figuring. The gauge is so easy to use that no one should have any problems at all.

Once you have checked one blade of your prop, you can rotate the prop and check the other blade (or blades) to insure that each blade has the same pitch. This will let you adjust each blade to the same pitch for perfect alignment. The gauge will work on props with two or more blades, large or small. It also lets you check the leading and trailing edges to insure that one blade isn't forward or backward a little in relation to the other one. You can even check the individual blade length. This will show you if the prop has one blade longer or shorter than the other.

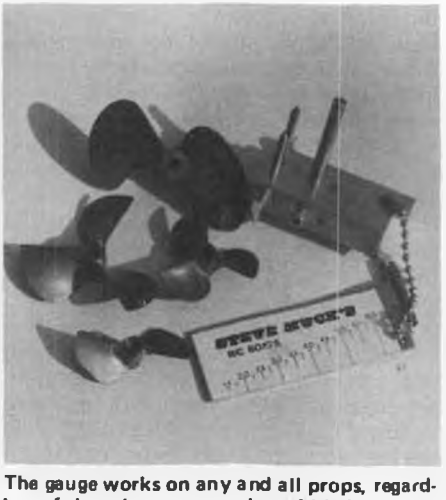
All in all, the Steve Muck Pitch Gauge will do everything that any boater should ever want . . . that is, as far as checking the prop goes. If you would like one and your local hobby shop is out, drop Steve a line at 6003 Daven Oaks Dr., Dallas, TX 75248, or phone (214) 661-1572. •



The Muck Pitch Gauge features steel pins in an aluminum block; the pins can be adjusted to the prop blade, and once set (left), you simply hold the attached preset scale up to the pin and take a direct reading of the prop's pitch (right). Quick and easy to do.

You can also check the runout of each blade to assure they are the same diameter.

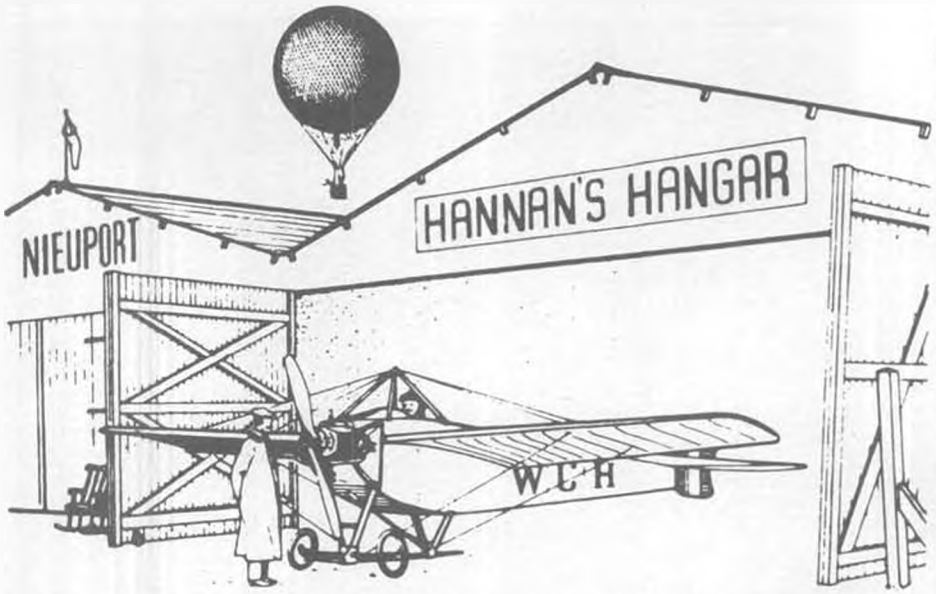
Checking the front and back prop edges for true alignment.



The gauge works on any and all props, regardless of size, shape, or number of blades.

FREE FLIGHT AND CONTROL LINE

This nostalgic photo, supplied by Pete Westburg, shows a Pan American Airways Sikorsky S-42B, flying in a westerly direction over the unfinished Golden Gate Bridge. As the bridge was not finished and opened until May, 1937, and Pan Am was using operational equipment to survey its Pacific routes two years prior to opening passenger service in 1937, it's pretty safe to estimate this photo as having been taken in late 1934 or early 1935. Anyone care to narrow it down?



"The great use of a life is to spend it for something that outlasts it."

Our columnist hasn't been the same since his balloon ride with lady aeronaut extraordinaire, Linda Price.

• The above quotation, by W. James, must have been taken seriously by Howard Hughes, who managed to do just that:

COMING OUT PARTY

The fabled Hughes flying boat, hidden in a drydock hangar since 1947, has at last emerged, having successfully escaped the totally ludicrous idea of being cut up into fragments. Television coverage of the event was lavish, and depicted invited guests sipping champagne while listening to the lyrics of a song "The Spruce Goose is Alive and Well," as some hundred workers and an equal number of public relations people attended to their respective functions. The enormous bird was towed by tugboats about 300 yards, then hoisted onto a cradle where it is expected to remain for some months while a suitable display facility near the Queen Mary is prepared.

By coincidence perhaps, another Howard Hughes project, "The Outlaw," starring Jane Russell, has also reappeared, this time as a television movie. We must conclude, after seeing both, that time has been far kinder to the aircraft than to the film!

We were in Long Beach a few days after the flying boat was exposed and managed to see it, even if only from a distance. A large bridge with a pedestrian walkway offers a good vantage point if one is willing to do a bit of hiking, and we felt it well worth the effort. Judging from the crowds, so did many others! Apparently most were not aviation enthusiasts, but merely curiosity seekers.

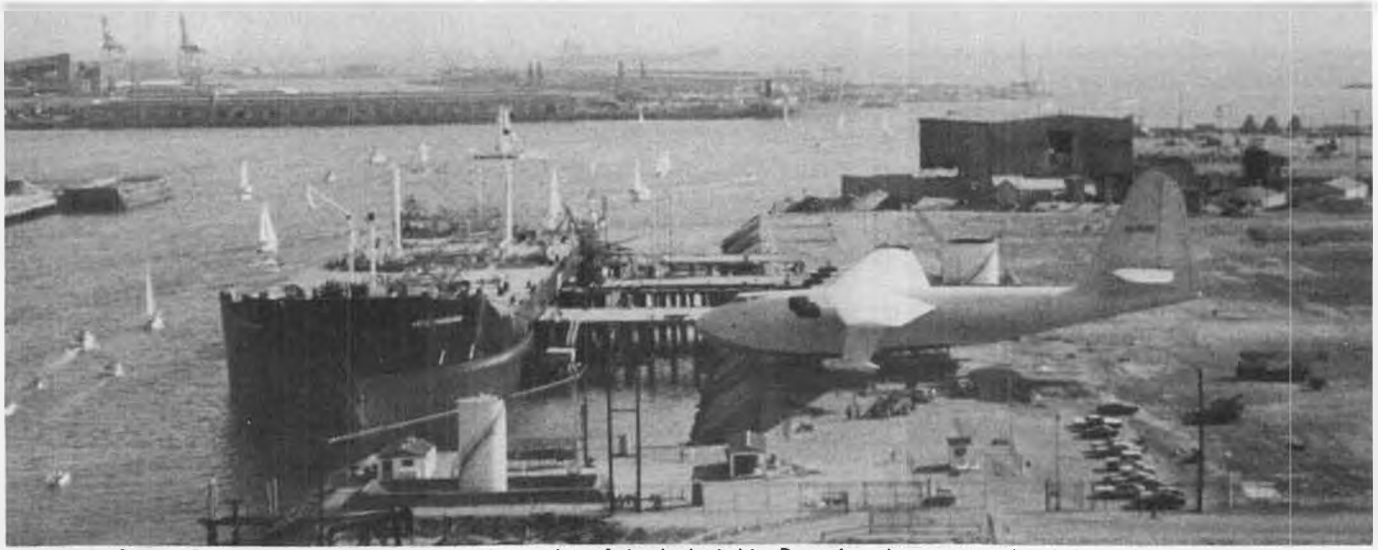
The aircraft appears rather cream-colored overall, rather than the anticipated silver, but perhaps the late afternoon sun contributed to the illusion. The propellers have been removed and the engine cowlings are wrapped in shrouds. Most impressive is the vertical tail jutting some 80 feet into the air . . . certainly there could be no directional stability problems with this one!

The total effect is one of remarkable grace and cleanliness. Except for the massive flap hinge fairings, it would be difficult to fault a single feature from an "eyeball engineering" standpoint. Wash-out is clearly evident in the wing panels, and all-in-all the craft has a "just right" look about it. We eagerly look forward to viewing it at closer range. Meanwhile, we're told that TWO R/C models of it are ready for flight testing!

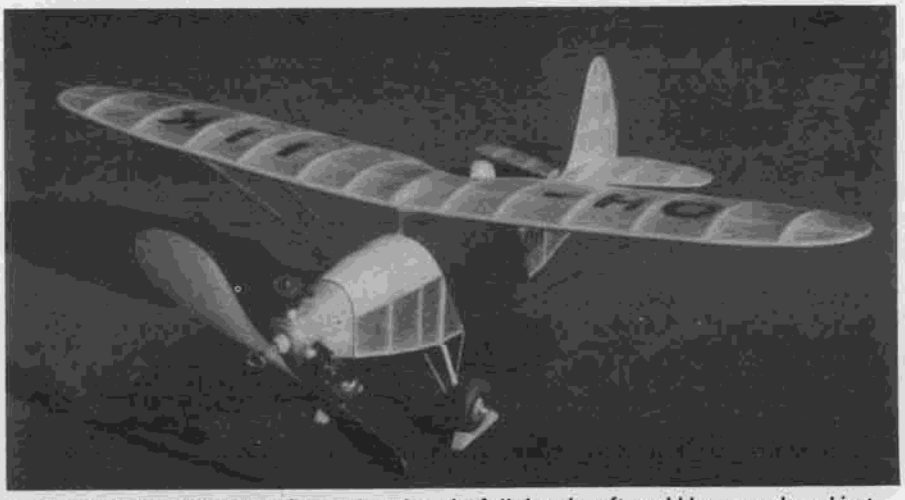
PROGRESS IN PEANUTS

At the opposite end of the scale, Hans Justus Meier, distinguished German model builder/author, offers his reaction to Peanut Scale: "It is in this field that progress in model aviation is shown in true perspective: the same old rubber strands, the same materials, the same subjects as thirty years ago, yet what wonderful performances are achieved with them, where earlier types were almost unable to fly."

Continued on page 72



At last, the Spruce Goose comes out! Compare its size to that of the docked ship. Props have been removed and the engines covered. The craft was formerly located in the structure behind it in the background. Photo taken by Bruce Carmichael.



PHOTOS BY FUDO TAKAGI

Ain't she a cutie? With a bit of re-engineering, the full-size aircraft could be a popular subject with today's ultralight crowd.

PEANUT SCALE

FINNISH VIRI

By WALT MOONEY . . . The Peanut Professor comes through again, this time with a quaint little single-seater fom the 1930s. Hmmm . . . how about a scaled-up version for Jumbo Rubber Scale?

• One of the unexpected and delightful aspects of these Peanut scale model articles has been the number of friendly letters that have come from all over the world. One of the correspondents is a Finnair DC-9 Captain, Kari Heikkala, with an interest in all types of aeromodelling. As part of our correspondence, he sent me the three-views for "VIRI." This little aeroplane was built in the late thirties and is somewhat similar in concept to the more familiar British "Comper Swift." The following several paragraphs are Captain Heikkala's translation of the story of VIRI, published in the Finnish aviation magazine *Ilmailu* in 1961.

In the afternoon of New Year's Day in 1938 a wild rumor was spread in Turku, Finland: an aircraft had crashed on the roof of a building right in the middle of town. The people who rushed to the scene found that it was not a rumor, but a fact. On the roof of a small wooden house were the remnants of a small aircraft with the broken fuselage hanging partly over the street. More rumors were told until the newspapers told the full story the next day. Mr. A. Neiminen, an engineer of the State Aircraft Factory, had arrived in Turku from Tampere the day before to pay a visit to his parents. On New Year's Day, at two o'clock in the afternoon, he took off from Artukainen airfield for his return trip. The takeoff and the initial flight were uneventful, but when the plane reached the town area its engine began to sputter. Suitable places for a forced landing were not available, so the flight ended on the roof of a house. In this house lived the parents of the pilot! Thus ended the story of VIRI, the representative of Finnish prewar sport aviation. It undoubtedly could have had possibilities for wider use.

In the middle of the 1930's, when the main part of the very modest fleet of sport planes consisted of worn-out Moth and Saaski planes, the Aviation Engineer's club raised the idea of building a small plane to be used mainly in aviation clubs. The plane should be suitable for Airbatisa, easy to build, and cheap to maintain. The technical chief of the State Aircraft Factory assumed the responsibility of the main designer.

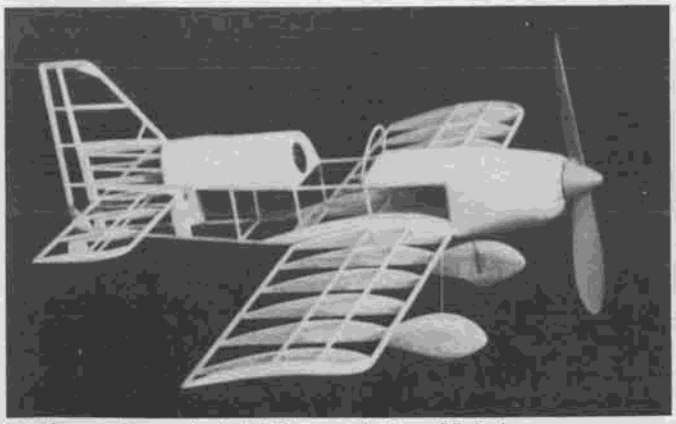
A 1/10 scale model was then built and tested in the laboratories of the Czechoslovakia State Aircraft Factory. The results showed that the plane could be expected to meet the designer's goals. Choosing an engine for VIRI was not an easy task, as we Finns did not have much experience with sport plane engines at that time. Already then the price was an important factor. Finally, an American engine was chosen, a Szekely Jr., three-cylinder, aircooled radial engine, developing 40 hp. Construction began in the first half of 1936, and on September 15 the plane was rolled out. Test flights were begun and the aircraft was registered on May 12, 1937, as OH-IIK, where India-India-Kilo stands for the owner, Ilmailuinginoorien Kerho, or Aviation Engineer's Club. The test flights gave mainly satisfactory results and the 20-odd civilian and military pilots who flew it mainly praised it as an aerobatic trainer, but it was not as stable as it could have been. However, VIRI became known as an aerobatic performer in the hands of Mr. Nieminen who flew it at several airshows around Finland.

It was of wooden construction throughout, with the fuselage and tailplane and fin covered with plywood and the rest covered with canvas. The instrument panel had rpm, oil pressure, speed, and altitude indicators, as well as a compass.

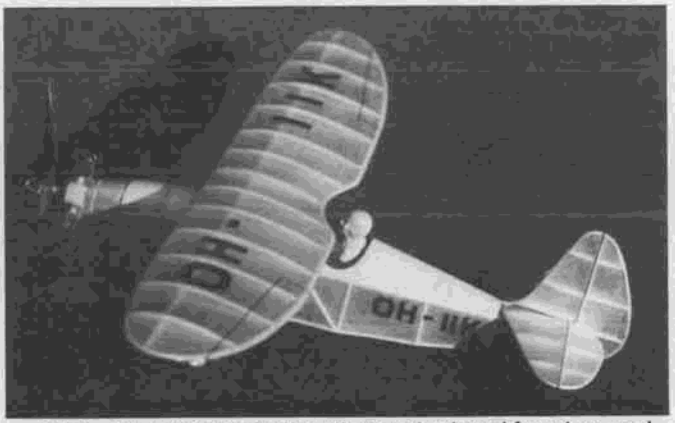
P.S. It had flown a total of 93 hours when it crashed. Its color was a brownish orange.

There are no new structural concepts in this model if you have been following the Peanut articles in **R/C Model Builder.** The pleasing shapes of the flying surfaces make the use of laminated outlines desirable as well as the use of sliced wing ribs to accommodate the elliptical taper. I used three pieces of

Continued on page 71



Walt's next Peanut is the BD-8 stunt airplane. Might have some dihedral by the time he's finished. Has mucho wing area.



Nicely curved wing and tail outlines are laminated from basswood strips, using white glue. Original model covered in orange tissue.

CUT SPAR FROM 1/16TH SHEET TO DIHEDRAL SHOWN IN FRONT VIEW.

1/16 BY 1/8 BALSA LEADING EDGE

LAMINATED BASSWOOD WING TIPS INTEGRAL THE TRAILING EDGE OF THE WING.

ALL RIBS ARE SLICED RIB ASSYS EXCEPT AT WING CENTER.

WING PLAN

TYPICAL SLICED RIB SHAPES FROM 1/32ND SHEET

CENTER RIB SHAPE (1/16TH)

FIRST FUSELAGE BAY CARVED FROM BLOCK BALSA.

TOP OF FUSELAGE IS COVERED WITH 1/32ND (OR THINNER) SHEET BALSA.

HORIZONTAL TAIL PLAN

SOLID BALSA PYLON.

REAR MOTOR PEG

FUSELAGE PLAN VIEW

TYPICAL TAIL RIB

THIS FORMER 1/16TH

FUSELAGE FORMERS ARE 1/32ND SHEET BALSA

DUMMY ENGINE MADE UP FROM WILLIAMS BROS. CYLINDARS.

VERTICAL AND HORIZONTAL TAIL OUTLINES ARE LAMINATED BASSWOOD.

SPAR PATTERN

1/16 BY 1/8

ALL 1/16TH SQUARES FOR STRUCTURE.

1/16TH BY 3/16TH

FRONT VIEW

SCALE PROPELLER

SUGGESTED FLYING PROPELLER SIZE.

MAIN FUSELAGE SIDE FRAMES SHOWN HATCHED.

FUSELAGE SIDE VIEW

TRUE STRUT SIZE SIZE.

BALSA DONUT WHEELS

NOTE LANDING GEAR WIRE PATTERN.

THE *Viri* A FINNISH HOMEBUILT "OH-IIK" PEANUT SCALE MODEL BY *Walt Mooney* 12-02-80

New kit from Peck-Polymers is the popular Lacey M-10, as designed by English Peanut Master, Butch Hadland. Not a beauty, but a real contest winner.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• Many of the F/F Scale meets around the country have other events besides scale. Some of these might include Embryo Endurance, No-Cal Scale (profile fuselage), or some other event that the local club may want. One may ask why, when there are so many different scale events which can be used in F/F Scale. I call this a change of pace, an opportunity to build a model that is not loaded with detail . . . a model which can be built quickly and flown competitively for fun.

I mention this only because I know there are times when we need a change from the exactness scale modeling dictates. This past summer I spent so much time and effort preparing for the F.A.C. Nationals that when I arrived home, I found that I didn't have my usual zeal for scale modeling. I bounced from one project to another, with little progress being made. I dislike to use the term "burned out," but that's exactly what happened.

I'm fortunate in that I have my biplane I can fly, and this gives me an opportunity to forget about most everything. Still, when I was home, I felt that I wanted to build something. For my change of pace I enjoy building old time rubber models. They have so much character, are easy to build, and are just beautiful to see flying!

If you get bogged down in your scale modeling, try building something else, something that you can see the end results on fairly quickly. I'll guarantee that you'll come back to scale modeling with more spunk!

★ ★ ★

Classic Scale Models is alive and well, with many new innovative ideas coming forth . . . most recently, the 1-1/2" = 1' 1911 Cessna. This model has been on the drawing board a long time, but the end result is worth waiting for. The drawings are good enough to frame with exquisite clarity. The vacuum-formed parts, which are many, are high quality, as is the rest of the kit. I'm partial to this old plane, and even though I have built four different 1911 Cessnas, this will be my fifth. The plane can be rubber, gas, or electric. At this point I'm not certain which way I'll power it, but one thing for sure, it will be a flier.

Peck-Polymers, P.O. Box 2498-MB, La Mesa, CA 92041, has just added a few more items to its already outstanding list of modeling supplies. They have added a new Peanut model, the ubiquitous Lacey. In the tradition of Peck kits, the quality is first class, and for those of you who want to win a Peanut Scale event, this is your kit. The model was designed by Butch Hadland of England, and is the model with which he won the English Peanut Scale Championship. This little jewel has 47 square inches of wing area! The price is $4.90.

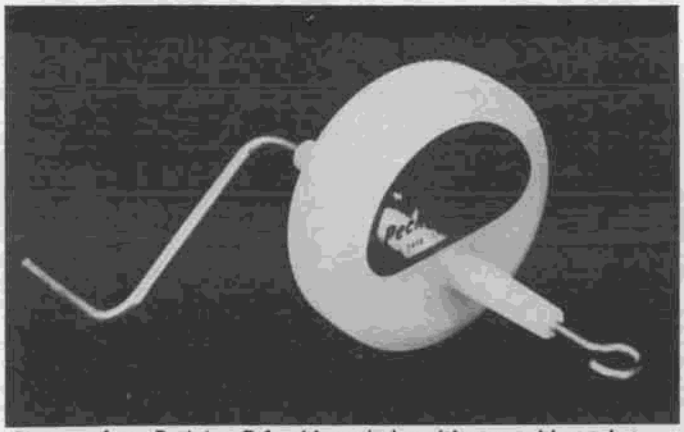
The next item from Peck is something all modelers should have on their workbench. Called "Sharpy," it's a flat piece of abrasive material which has two sides for keeping blades sharp. I've used stones before, with little success, so to be honest, I didn't expect this to be any different. I had an X-Acto knife with the dullest blade you've ever seen. Well, I have to tell you, *Sharpy works.* It can also be used for sharpening scissors and fishhooks. The price is only $11.95.

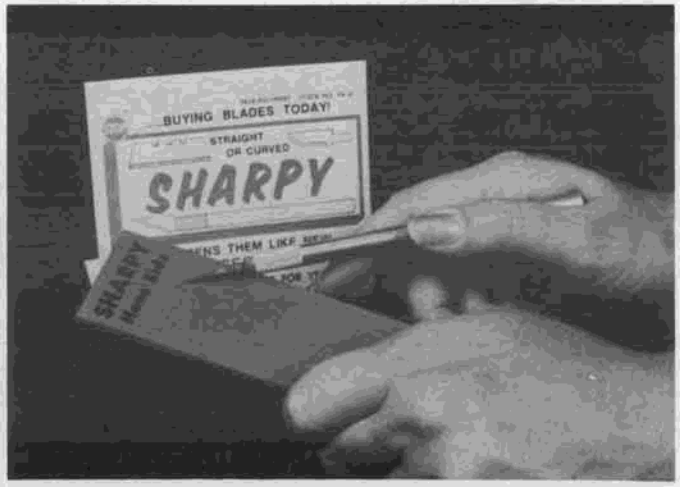
Lastly, Peck has a new 5:1 winder for Peanut Scale and other small rubber models. The cost is a very reasonable $3.95.

For many years, Oldtimer Models has been supplying modelers with many off-beat items. This operation was run by Jim Noonan of Wisconsin. Recently, however, the business was sold to well-known Flightmaster, Mike Mulligan. Mike has a ten-page catalog loaded with many modeling supplies you can't buy in R/C oriented hobby shops. Send to Mike for the latest catalog. The address is Oldtimer Models, P.O. Box 913, Westminster, CA 92683.

David Diels, P.O. Box 101, Woodville, OH 43469, has come up with a series of Peanut Scale drawings that may be of interest to you. The subjects chosen are not the familiar ones you've seen so often. His first five plans are as follows: FW Stosser ($1.50), which Dave suggests is not for the beginner; a Brewster SBN-1, a prewar Navy Dive Bomber ($1.75); a Vought V-143 prewar monoplane export fighter ($1.25); and the Boeing XF7B-1, a 1930's experimental Navy fighter ($2.00). Add 40¢ for postage

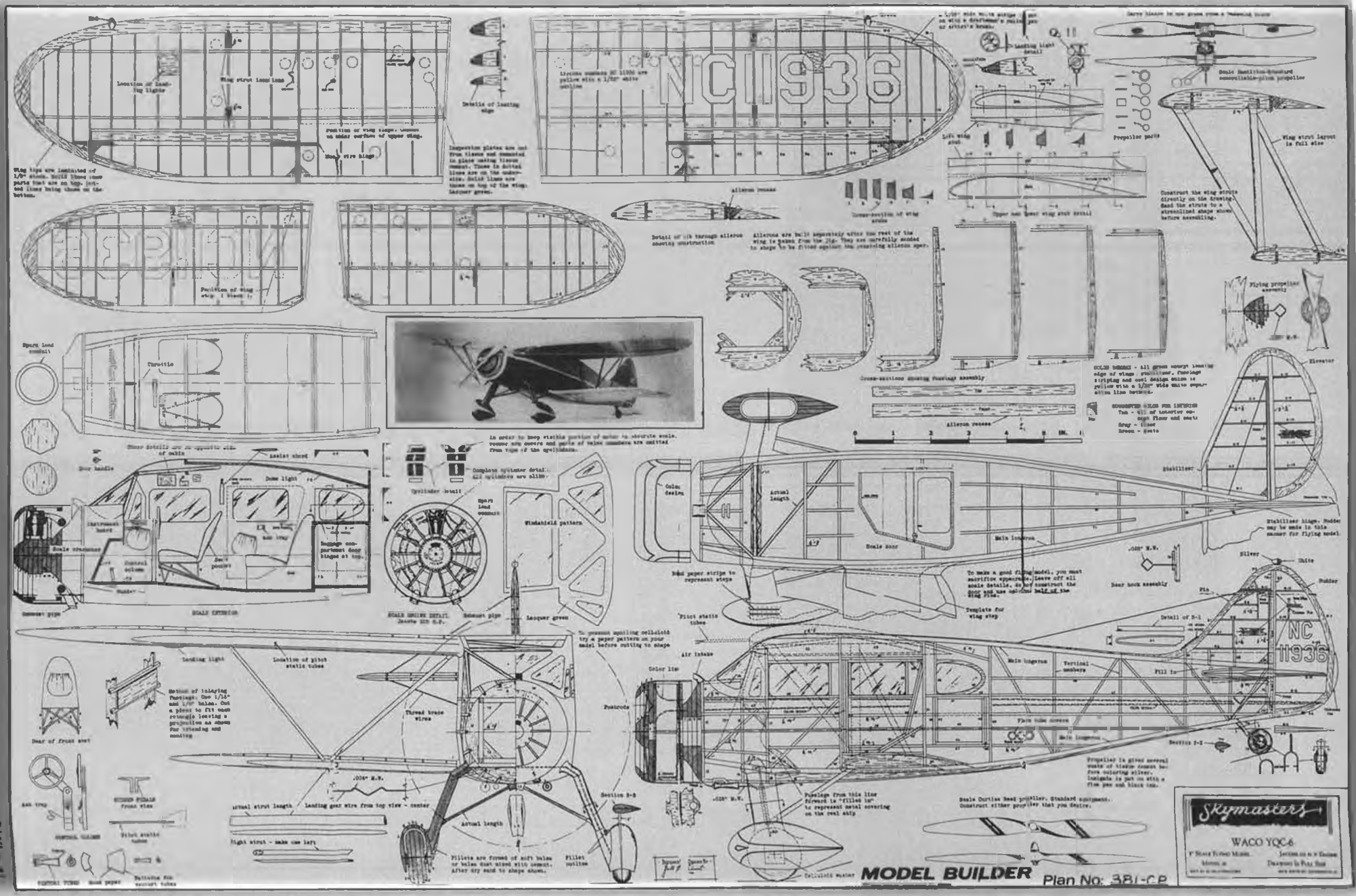
Continued on page 70





Also new from Peck is a 5:1 rubber winder with removable ratchet (above), and the "Sharpy," a two-sided honing stone destined to put model knife manufacturers out of business.

FULL SIZE PLANS AVAILABLE – SEE PAGE 100



Our first Collector Plan for the year comes to us by way of aviation enthusiast Carolyn Morris, Wharton, New Jersey. The model is a 3/4" = 1' Waco YQC-6, produced by the Skymasters Corp. of Cincinnati, Ohio, between 1936 and 1940. According to Jon Fitzgibbon, of Golden Age Reproductions, only 100 to 150 of these kits were made, and after two years of research, Ms. Morris believes hers, which was bought by her father and never built, may be the only one of its kind in existence. The plans are so well detailed, and are so accurate in outline (as confirmed by several leading authorities), that Ms. Morris was allowed membership in the National Waco Club, which is normally limited to Waco owners . . . and to one way of thinking, she IS a Waco owner, as the club does not specify how big the Waco has to be! Only 12 full-size YQC-6's were built, in 1936. Power was a 225-hp Jacobs L-4. Basically the same airplanes, but with different engines, were the ZQC-6 (285-hp Jacobs L-5) and AQC-6 (330-hp Jacobs L-6).

PHOTOS BY AUTHOR

HANDLEY PAGE 0/400

By BILL DENNIS . . . Multi-engine gas scale models are a rare sight these days; here's one that really performs, and *consistently*. Won the '78 and '79 British Nats, was 2nd at the '78 World Scale Championships.

• In 1972-73, one of England's foremost scale experts, Terry Manley, was experimenting with twin-engined F/F scale models. The first was a Vickers Vimy of 55-inch span, which I did not see fly, and then an HP 0/400. Terry entered this model at the 1973 British National Championships and it greatly impressed all who saw it. It was, however, a bit of a handful, being very sensitive to turn trim, and would not take off reliably, usually necessitating a hand launch.

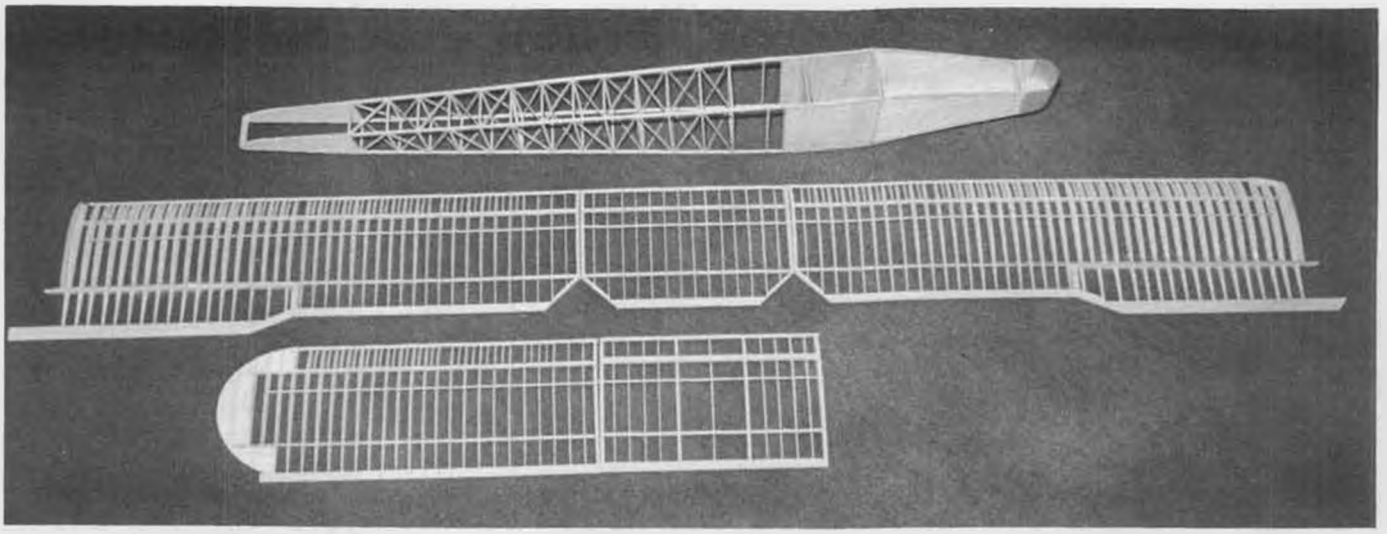
When I decided to have a go at a twin I discussed these problems with Terry, the main result being that on my model I fixed the two outer rudders, which are in the slipstream and hence have a great effect if moved, and used the central fin to adjust turn. This seems to have done the trick as the aircraft flew straight away with no trimming necessary, and is extremely stable. Large size and light wing loading also help in this direction. Approximately 50 successful flights have been made, mostly over rough terrain, and the model has won three out of the four contests in which it has been entered, including the 1978 and 1979 British National Championships.

As this photo shows, the 0/400 never fails to attract a crowd! Engines are Mills .075cc diesels, now being made in India and imported by Indy R/C. Reliable engines a must for this model.

Construction should present few problems to the reasonably experienced modeler. Flying performance makes the effort worthwhile and is extremely satisfying, especially when the model circles overhead with the engines running in unison. It goes without saying, of course, that the engine cut-out system must work every time, because if just one engine stops a crash is inevitable. For this reason I would not recommend the model to that breed of scale modeler who suffers great anxiety when his masterpiece is anywhere but in its box. However, once the systems are working properly, it is as easy to handle as any single-engined aircraft.

In the following construction notes I intend to highlight only those areas which may differ from standard techniques. The main structural members are from spruce, and the wings are located on wire dowels in brass tubes, giving a very strong and flexible structure.

It is most important to keep a constant eye on the weight; the original weighs 38 oz. A low wing loading results in a low flying speed and hence low inertia when landing. The main areas to watch in wood selection are wing ribs, tail



Here you can get an idea of the type of construction involved; not overly difficult, there just happens to be a lot of it. Wing center sections are permanently affixed to the fuselage, outer panels are removable for transport.

surfaces, and fuselage cross members.

The first essential step is to obtain two diesel engines (preferably Mills .75's) which can be relied on to maintain constant revolutions for minutes on end and run at the same speed.

WINGS

Prepare the trailing edges from the best, stiffest 1/8 sheet you can find and slot them 1/16 deep for the ribs. Pin the trailing edge and appropriate spar packing onto the plan. The ribs are threaded onto the two main spars, which should already have small holes drilled to accept the strut hooks. The whole assembly is pinned down over the spar packing, glued only at the trailing edge. When the ribs have been positioned in their correct stations, spot glue them to the spars with white glue from a syringe. Add the leading edge and the 1/8 x 1/16 spruce top spar; the function of the latter is to resist unwanted curved dihedral after covering. It lies 1/16 of an inch below the surface.

The wing can now be lifted, the gluing of the ribs completed and tips, hooks, tubes, etc. added. The rigging wires will eventually be looped over the outer strut hook, pass through the tube on the inboard hook, and be attached to the center section by small rubber bands. Thus, each wire acts as a lift wire in one bay and a landing wire in the other.

Make the holes for the wing joining tubes slightly oversize and glue them in place with the wing panels jigged up to the required 4° dihedral against the center section, using the wire rods to join them.

FUSELAGE

The covering of the fuselage is supported away from the cross members by 1/32 x 1/8 balsa strips glued onto the longerons, and by 1/32 sheet at the extreme nose and tail. Window frames, etc. also have to be built up 1/32 of an inch to maintain this depth.

Side frames are constructed up to former F3, using light wood for all cross members and diagonals. The sides are then easily assembled inverted over the plan, due to the straight top edge. The nose is constructed from 1/8 sheet and the two formers, but do not add the timer platform until later, as the engine nacelle jigs pass through at this point. Add some internal reinforcement where the nose section joins the main fuselage at F3.

TAIL SURFACES

The outline shape is cut from stiff but light 1/32 sheet, and the rib positions marked on each side. This is then pinned down and the 1/16 x 3/32 ribs and 1/16 sq. outlines added to each side in turn. It is a good idea to file a 1/32-inch notch in the tailplane/elevator spars to accept the aluminum hinges.

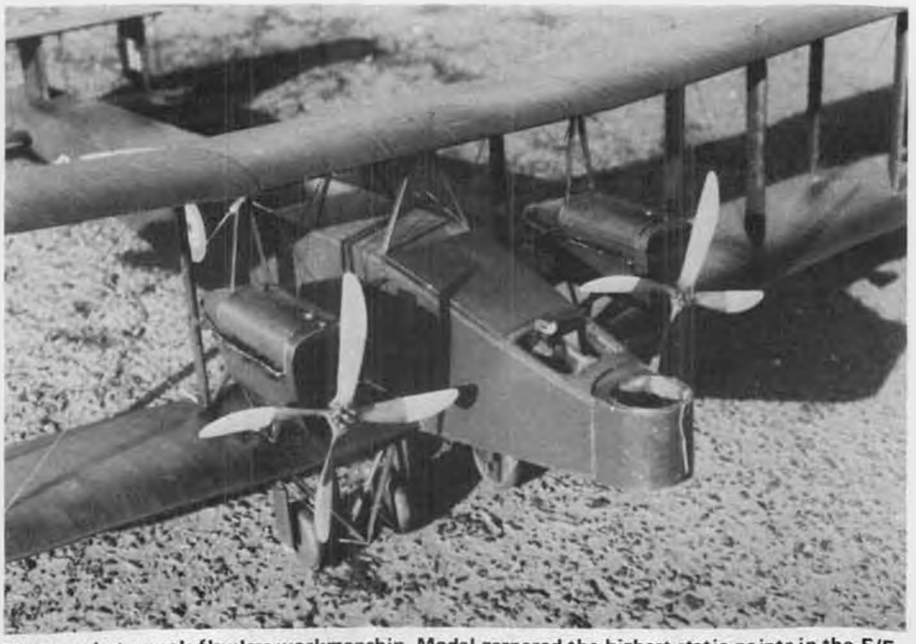
The whole structure is then sanded to an airfoil section, and it is possible to get quite a sharp edge on the spruce strips used. The lower tailplane passes through the fuselage, then elevators are added. The tail is assembled after covering, ensuring correct alignment of the outer rudders (parallel to fuselage axis) and tailplane incidence (both 0°).

CENTER SECTION

This is probably the most difficult part of the model; correct alignment is essential. A recent bad landing on rough ground necessitated a complete rebuild of this area, during the course of which I managed to rig the upper starboard wing with more incidence than the port. As a result, the model is now more difficult to trim for correct turn, needing large quantities (like 45°!) of rudder offset.

Assembly begins with the attachment of the lower center section to the fuselage, in which two slots of appropriate depth must be sawn for the main spars (the leading and trailing edges are removed in this area). Note that the front main spar is doubled up to withstand landing loads.

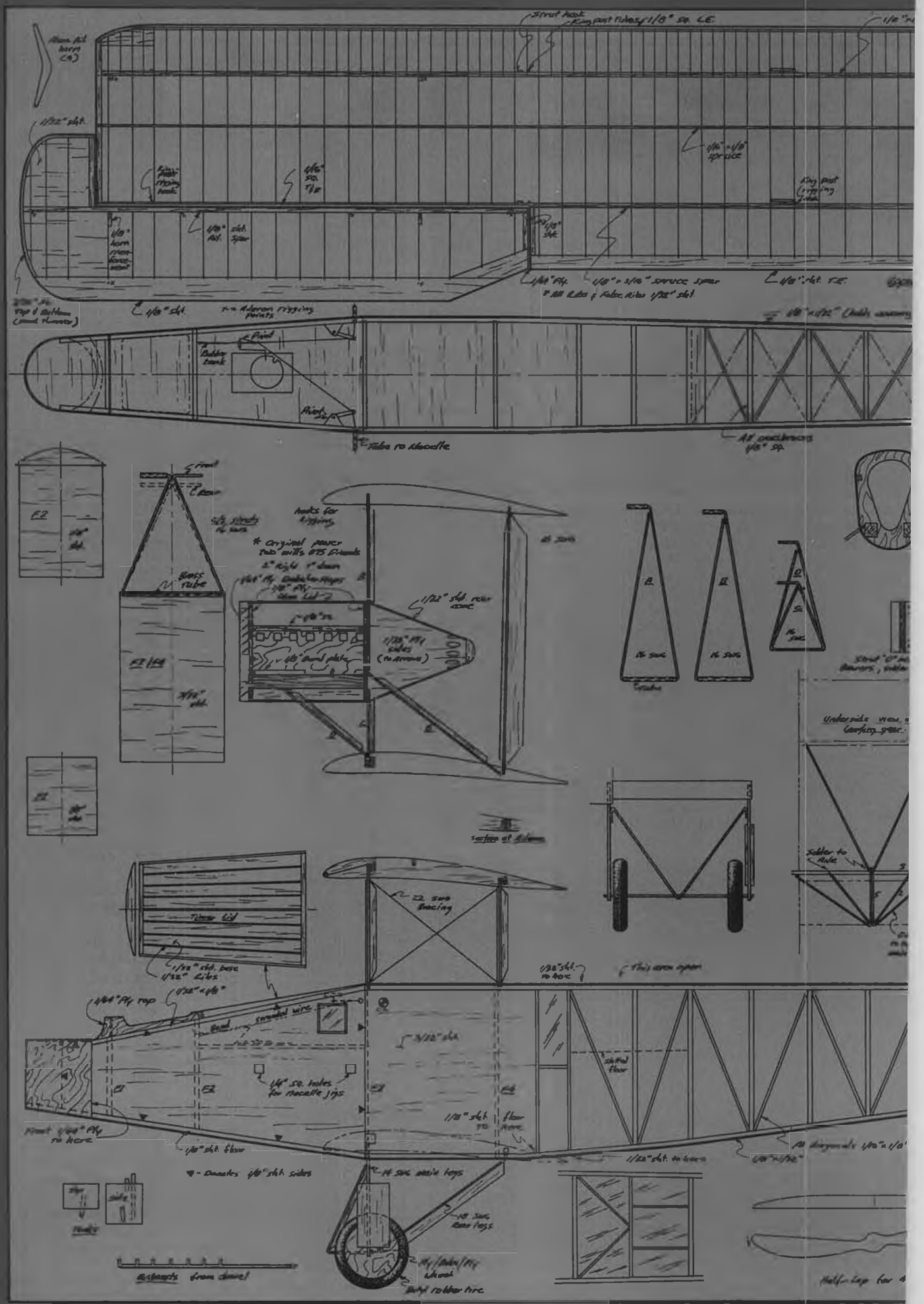
The basic engine nacelle structure is

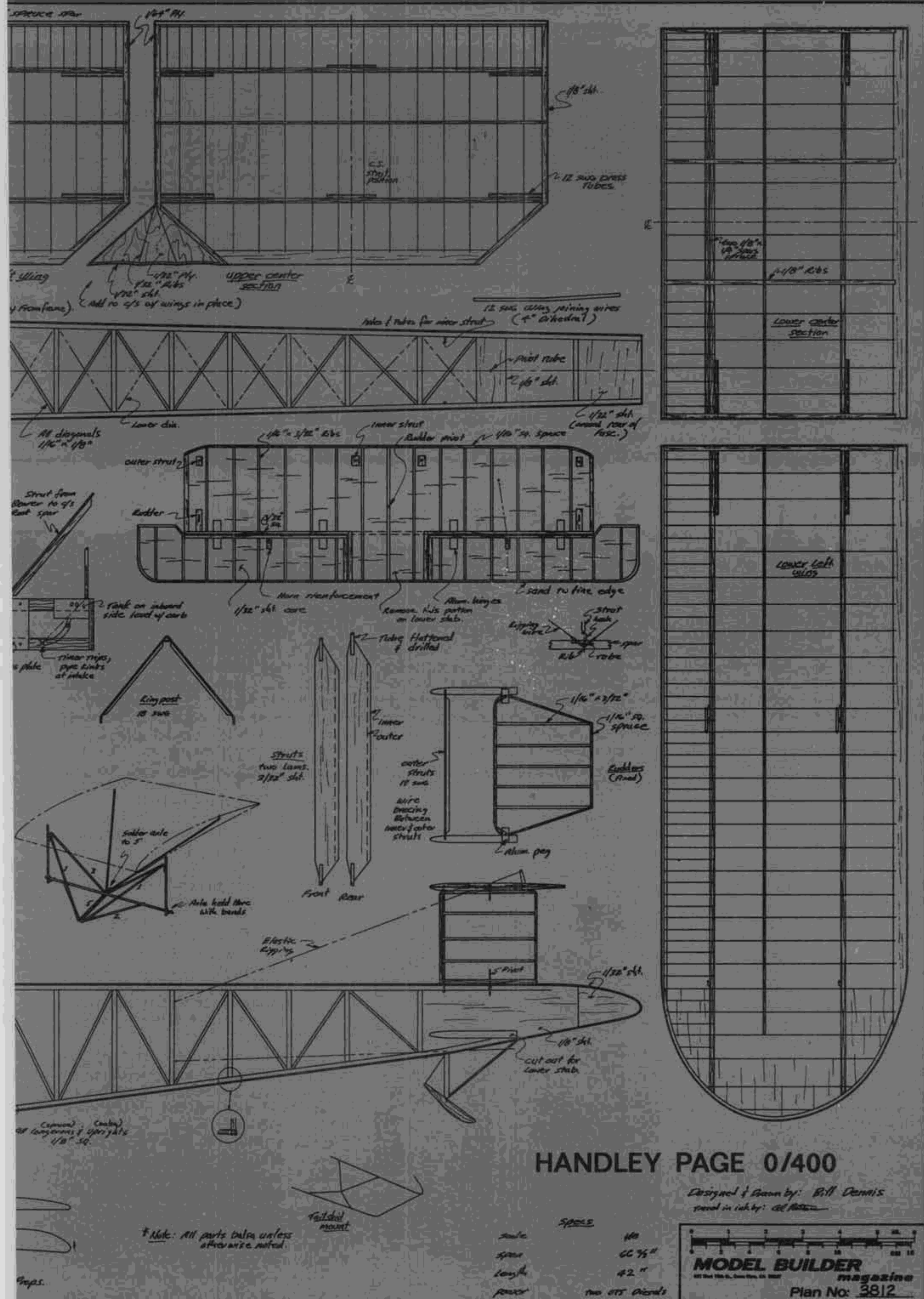


Close-up shot reveals flawless workmanship. Model garnered the highest static points in the F/F Scale event at the 1978 World Scale Champs at Woodvale, England.

Plans on next two pages.

Article continued on page 76





FULL SIZE PLANS AVAILABLE — SEE PAGE 100

Myles Lawrence about to launch for Steve Hills at Whittier Narrows, a popular Combat site in So. Cal.

The insides of Gator Perkins' FAI Team Racer, flown at the 1980 Nats.

PHOTOS BY CHARLIE JOHNSON

Control line

By "DIRTY DAN" RUTHERFORD

BLADDER GRABBER '80

For regular readers of the C/L column, even those who aren't so regular but have been reading this column through the years anyway, the words "Bladder Grabber" have come to be associated with a yearly Combat meet that is very competitive and features big-bucks stereo equipment for prizes. What the uninitiated think of when first coming across the words "Bladder Grabber," especially when they realize it has something to do with a toy airplane contest, is one of those things that makes writing about C/L a bit of monthly fun, even after all these years. . .

Anyway, the Bladder Grabber is indeed a biggie in the world of C/L Combat flying, and for BG '80, Bob Carver, now with the Carver Corporation, donated over $2700 worth of high-zoot stereo stuff for the top three places. For those who don't already know, Bob started the Phase Linear company, used to donate their stuff, and now has started the Carver Corporation. The tradition continues, just different sponsorship.

At BG '80, from the first few rounds on, it was obvious that Howard Rush had everything going his way. Combat meets are always difficult, if not impossible, to predict accurately, especially when there are a goodly number of top-notch fliers at a meet. But by the fourth round or so, which is about halfway through a typical BG, nobody was betting against Howard. Personally, I was hedging my bet, feeling that if Howard could manage to keep his one really good model in one piece, he just simply could not be beaten on that particular day. The model was working really well. It wasn't the type of machine that I like to fly, but it did suit Howard and his style extremely well. The motor was humming, but that isn't really a big factor as it isn't that hard for experienced fliers to come up with a runner in the way of motors.

But it was more than that . . . "that" being a working motor/model combination. Howard is one of those people who function best in a situation where the really important things, model and motor, are there and ready to go, no worries as to their performance. Yet he seems to need a bit of disarray around him . . . plugs still in packages, fuel "someplace," chicken stick lost half the time and, most importantly, being just a little behind the schedule most of the time. In this atmosphere he can hold at a certain level of excitement, nervousness, whatever you want to call it, and win match after match. However, if something really serious happens, such as having to use a borrowed model, or if things all go so well that there is nothing to do but stand around and worry, then Howard can, and will, get so nervous that he giggles and actually shakes!

Gil Reedy Points out the kill that ace flier and photographer Charlie Johnson scored with Phil Cartier's plane.

That didn't happen at this year's BG. The model lasted through the day, finally getting severely bent in a mid-air with Neal White's model almost immediately after Howard had won the final match with a clean kill on Neal. By the time this match was over Howard did finally go a little crazy, but I think he said something about that model having gone through ten or eleven tough matches, against very good competition, all with the only damage being a broken Y&O prop plus a bunch of string cuts in the leading edge of the foam model. The string cuts came from getting kills, of course, and only require a bit of tape to repair, so really can't be regarded as damage. In addition to the matches flown with this model, Howard no doubt turned in quite a few flights just showbizzing, so he was dialed into it like you can't believe.

Neal White came through with his best-ever showing at a BG, having been at most, maybe even all of the previous meets. Neal is one of the most consistently laid-back Combat fliers around, just takes things as they come along. Even a bit of bad luck or a suspect call only gets at most a shrug from Neal. This year he didn't do much shrugging. He lost only to Howard in early rounds, losing again in the final match. Only thing that bothers me at all about Neal is that he still flies them funny airplanes that don't have a straight line in any direction. For those with faulty memory

banks, Neal designed and had published in *American Modeler* the "Bosta," one of the most difficult to build and trim Combat designs known to man. Even covers them in silk, if you can imagine that. . .

Mike Petri, who had come in first in the '79 version of the BG, ended up in third on a gift flight. Actually it wasn't a flight at all; Mike and Bob Carver were to fly for third, but Bob conceded the match . . . something about not needing to prove he could beat Mike and what was he going to do with a piece of stereo equipment that he had already donated to the cause? As I recall, Mike's version of the story was just slightly different, still he toted off his prize, grinning all the way. And, in case you wonder, Mike and I are friends.

Still, just to put the friendship into a strained relationship, I can't resist mentioning that as Mike went to the circle, already down with one loss and due up against Neal White, the last thing he said to me was, "No problem, I've never lost to Neal." True then, yes, but no more, right, Mike?

During the meet there were some really super matches, which is common at Bladder Grabbers. One of the best was Mike Petri against Bill Varner; five full minutes of Combat, only one cut each and Mike took it on airtime. Best mid-air was between Stanley Youngblood and Bob Carver. Both models blew up in a huge way . . . nothing really unusual as far as Combat meets go, but you should know that Bob's model was a Rotation Station in balsa, built by Gene Pape to very high standards of workmanship and costing Bob $100 per model. A hunnert bucks to you and I, just another model out of a stack of them to Bob. I have a little trouble relating to that, but then it is all relative, I suppose. . .

In the past few years, the BG has been preceeded, on Saturday, with rather casually flown events. This year there was FAI Combat and Stunt. In FAI Combat, Stanley Youngblood was first,

Jed Kusik piloting . . . wait a minute, no wonder they lost in Poland, the pit man's supposed to wear the fueler!

Howard Rush second, Myles Lawrence third, and Neal White fourth. In Advanced/Expert Stunt, Paul Walker was first, Bob Emmett second, Max Thue third. Beginner/Intermediate was won by Tom Webb, Mike Bogan was second, Jim Fuller third.

WINNING WITH CONSISTENCY

That lead-in is misleading, I am afraid, as it isn't meant to refer to winning consistently, although that is the goal. Instead, it refers to using consistency as a tool in trying to win.

First, think back to contests you have attended, and to make the point easier, we will deal specifically with Combat meets. If you will recall, the winners at most meets have a fleet of identical models. Many of the losers cart out a mixed bag . . . some wooden models a foamie or two . . . some are so out of it that they may even have different motors, a couple of Fox Combat Specials mixed in with the odd Tigre or three. Some go so far as to even have different fuel systems, pacifiers here, bladders there; in the worst cases, bladders of different materials are used. If the goal is to lose early, having a varied assemblage of equipment is certainly the way to go.

Yes, I can think of a couple of times where contests were won using a grab-bag approach, right down to borrowing models, but these are only the odd cases. The chances of doing it contest after contest are very, very slim.

The most recent example of using consistent equipment to win with is the contest just mentioned, the '80 Bladder Grabber. Rush had just the one really super model (at least as far as I know; it is always hard to tell what he might have stashed away in his car), but it didn't get bent until the contest was over. That lone model was enough. Now that it is gone, or at least damaged enough that even if fixed will probably never be 100% like it was, it will be interesting to see if the basic design and construction techniques are good enough that every model off the board flies as well. My guess is that it will be difficult for Howard, or anybody else for that matter, to build tapered planform Combat models that are super-consistent. Brasher's Rotation Stations in foam have been outstanding in performance and of course they use tapered panels, but even Rich has had good and not-so-good models, with an odd one or two coming out poorly for some reason or another. The trick here was that Brasher would build more than enough models, using the best in contests and grudge-matching with the others.

I have never tried the tapered models, mainly because they are more trouble to build, when all efforts are being made to make my models as easy to build as possible. Another big aspect is this sneaky suspicion that tapered models are simply not as consistent in flying characteristics as rectangular, constant-chord models. So, even though my own Combat models, the Plastic Nasty design at least, may be very large and in some cases ugly to boot, they do combine good performance with ease of construction, but most important of all, the models fly identically.

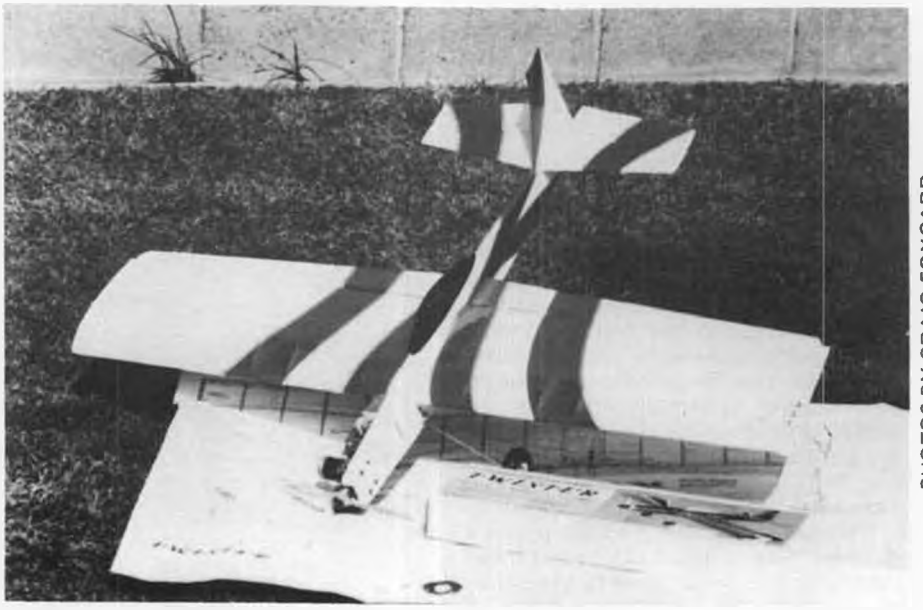
And so as you are now seriously thinking about building new equipment for the coming Combat season, keep the consistency thing in mind, build a bunch of models, all of the same design, fly the tar out of them and you'll be ready to win more matches then ever before.

ENGINE REWORK

Every so often a note or card comes floating across my desk, and that wafting piece of paper will likely as not be touting the sender as an engine rework artist. *Send money and I'll make you a winner. Let me know how fast you want to go and I'll tell you what it'll cost. Eighty zillion rpm and 15-plus hp from*

Continued on page 76

Deadly-looking Slow Combat ship with l-o-o-o-ng tail moment, seen at the '80 Nats. Note the interesting glow plug primer installed . . . the very latest in trick equipment.



PHOTOS BY CRAIG FOXGARD

PRODUCT$ IN U$E

SIG'S "TWISTER" C/L STUNTER, by JEAN ANDREWS

• For the modeler who is new to the field, or the old-time hobbyist who has gotten too short of wind and long of tooth to chase his free flights or carry an eight-pound, super-zoot, fourteen-channel R/C pattern ship around, may we make a modest suggestion?

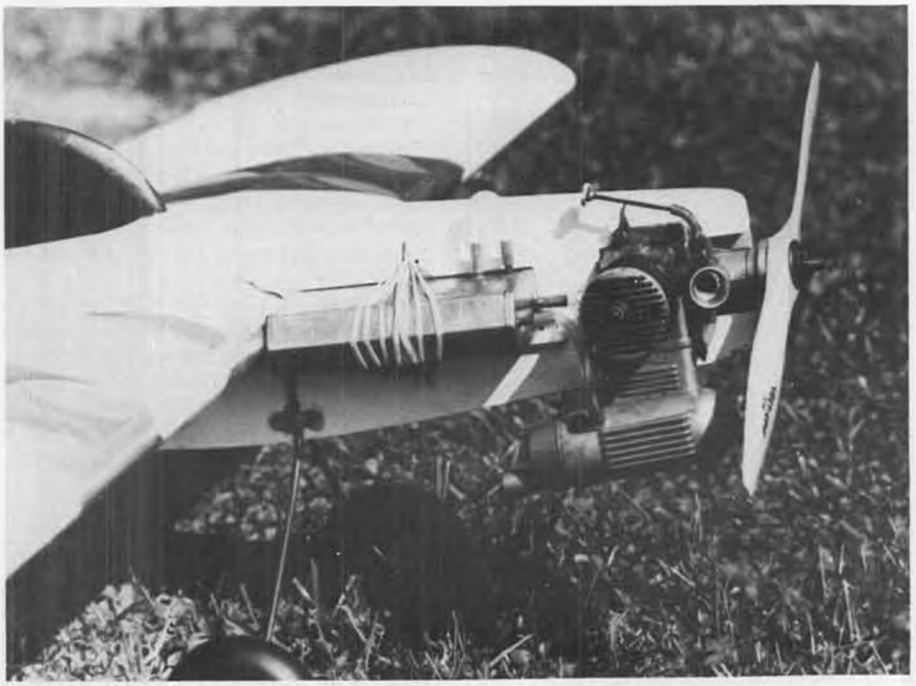
Instead of making your next project the same as the last ship, why not take a break and put together an airplane which is simple to build and maintain, flies slowly and smoothly enough for the beginner, and yet is responsive enough to satisfy all but the most discriminating of fliers? Of course, we are referring to Sig's "Twister," a control line stunt ship, designed by Mike Stott to have just exactly these characteristics.

This well-engineered and packaged kit is one of the best values on the market, and will require only a small dip into the extra cash reserve you keep in the back of your wallet that the wife doesn't know about. The outside label lists all the extra goodies you'll need to complete the airplane, and the whole purchase price of these items won't add up to the cost of the balsa alone in the kit!

If your experience with models consists of a few small U/C models and one or more of the plastic ready-to-fly's, the size of this ship may be intimidating. If you've been building F/F or R/C types and are just looking for a change of pace, the size may not be as much of a consideration. In either case, you will find the 48-inch wing just about right for an engine around the .35 size category. The model is large enough to give a good "feel" on the lines and seems to be happiest with this size motor.

Most modeling acquaintances will have an engine of this size laying around in a box somewhere, which you can probably grab for the price of a couple of six-packs. If you can't find a used motor in fairly good shape, go ahead and spring for a new Enya, Fox, O.S., Super Tigre, or whatever other brand of .35 sleeve-bearing engine you wish. Pop for a set of lines, 60 feet by .018, and an EZ-Just or equivalent handle. This hardware will last you for a long time and through many hours of flying enjoyment, so pick the good stuff.

We chose the Sig Twister because of its larger size, as compared to the Ringmasters and Flite Streaks and so forth, because of our more mature and gentlemanly (read "slower") reflexes. An old but friendly Enya .35 was dusted off, and we acquired a uni-flo tank from a friend who felt sorry for us in our venture.



Jean powers his Twister with an old model Enya .35, fitted with an O.S. muffler. Note the use of muffler pressure to provide a constant flow of fuel to the engine.

The Twister builds very quickly and easily from the full-sized plans and careful step-by-step instructions. On the good side, we can laud Sig for the excellent die-cutting, accurate band-sawing of the heavier balsa and plywood parts, the complete plans, and the hardware pack . . . everything necessary for the completion of the kit is in there except those hardware items specifically listed on the outside of the box. On the bad side, we found the wood selection, even for a mass-produced kit, to be somewhat less than satisfactory in some areas. For instance, one of the flap pieces was of rock-hard balsa, while the other was so pithy and soft it was unusable and had to be scrapped. While the wing ribs were easy to separate from the sheets, they were cut on a bias angle, requiring that they have their grain direction staggered during assembly.

Since the assembly instructions are extremely well-done, we won't go into a whole song-and-dance about how the airplane goes together. Instead, just a few points should be mentioned:

1) The mount for the bellcrank, in the center of the wing, is shown concentrating all the centrifugal loads of flight onto the bottom 1/4-inch balsa spar. This looked a little flimsy to us, so we beefed it up with the addition of a few scraps of 1/4-inch wood to spread the load over the center section sheeting. It's probably strong enough as shown on the plans, but the small amount of added wood made it much stronger.

2) A three-inch nylon bellcrank is supplied in the kit. We were a little worried about the lack of free move-

Continued on page 74

Schoolyard models are great fun, nice for attracting newcomers to F/F (see text). Columnist Hutch winds while eldest son Marc holds; younger son Michael looks dubious.

Clarence Mather's "Twiggy" is an ideal schoolyard model, easily built by beginners. Marc Hutchinson shows what it looks like.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

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

MODEL OF THE MONTH:
Sal Taibi's 1/2A Spacer

One of the most enjoyable parts of my recent recuperative period was joining the Nostalgia movement which I've been publicizing for the past two years. The vehicle for this accomplishment was a 1/2A version of Sal's "Spacer" design. I'd handsawed a few sets of ribs just before I moved, and Dave Linstrum had sent a set of full-sized plans, so I began construction as soon as I had the strength to crawl around the garage and locate them. Actually, this was the hardest part of the entire construction stage. Bob Stalick claimed a total of about five or six hours to get the model up to the covering stage, and he was being conservative! With modern adhesives like Hot Stuff and Super Jet, and the old-style simple construction of the '50s, building the Spacer was a pleasant throwback to the days when everybody started their model for the next contest on the preceeding Monday night. (Everybody except the eventual winners, of course, but then the fun was in the trying, wasn't it?)

Towards the end of the Nostalgia era, the Spacer design probably racked up more Nats wins than any other design, although its supremacy was severely challenged by the Ramrod in the late '50s. Looking at the results from recent Nostalgia contests, the Spacer is doing just as well 25 years later. I drew up the three-view from an original kit graciously loaned out by Don Dodd; it was intended to be included in my Nostalgia article in the June 1980 issue, but we ran out of space. You shouldn't have any trouble scaling up the Spacer's straight lines to full-size, and, as mentioned earlier, building it is a snap. (Full-size plans for the Class AB Spacer are available from John Pond, if you want something larger.) You shouldn't have any trouble having one ready for testing this spring. (Next month, we'll reprint Sal's flying instructions for the 1/2A Spacer!)

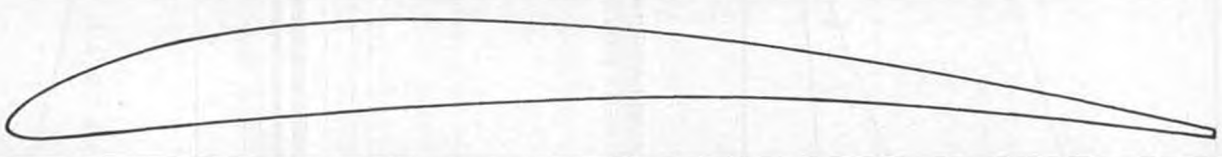
ATTRACTING NEW FREE FLIGHTERS

Free flight has more of a problem attracting newcomers than does radio control or control line, because fewer people are exposed to our brand of activity. We tend to operate out in the boondocks, far away from the general populace, for nearly all of our contests and test flying. It's no wonder, then, that the newcomers to our branch of the hobby tend mainly to be relatives of established fliers, or those who have been previously exposed through earlier modeling experience. If we are *truly* interested in attracting new blood to free flight, those who practice the art must make more of an effort to make our activity more visible.

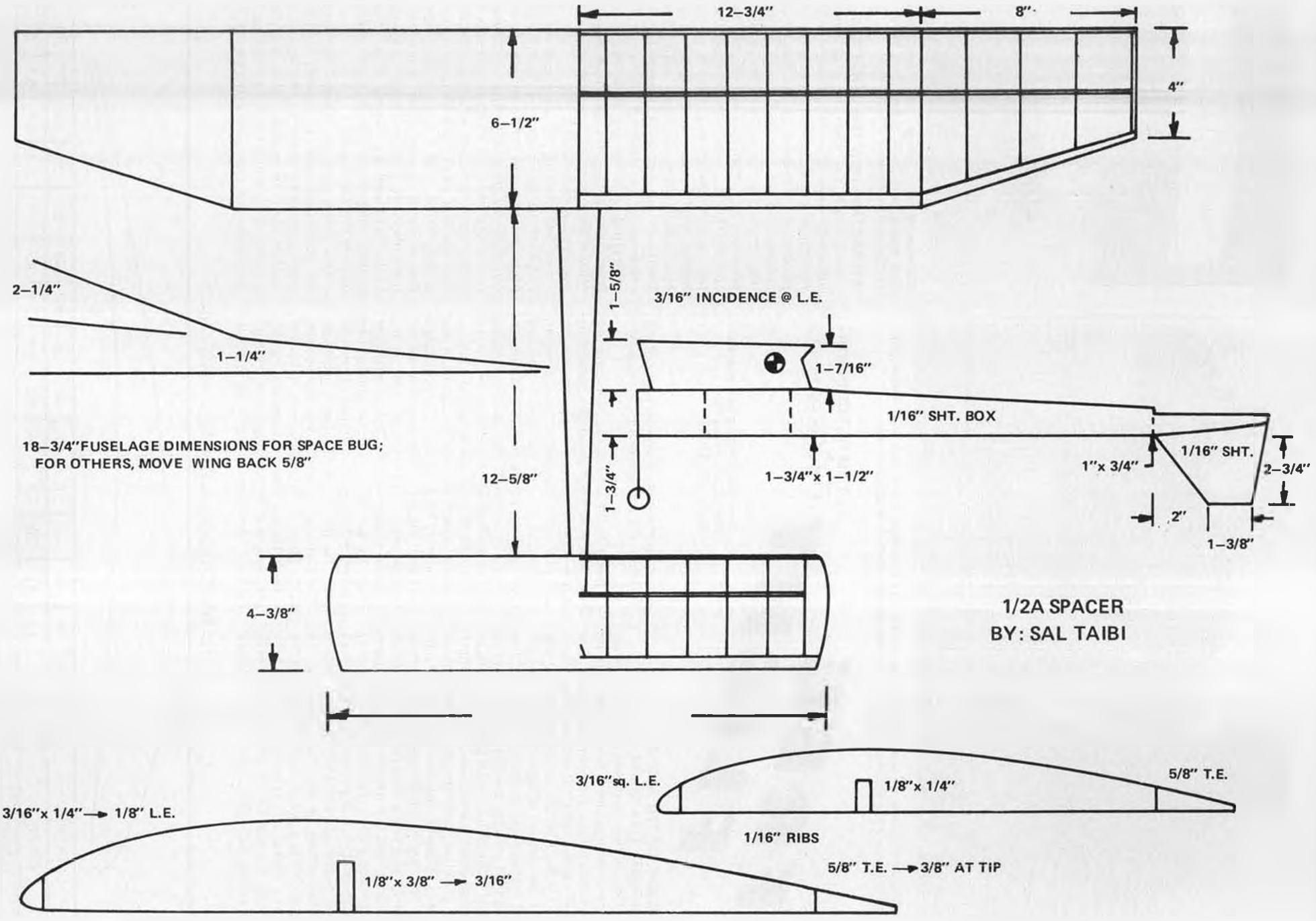
I'm NOT talking about giving more publicity to our contest activity! The high performance and complexity of our sophisticated competition machinery is more likely to scare off prospects than attract them. No, what we must do is show the general public that our activity exists, that it is enjoyable, and that it is not beyond their ability and pocketbook to pursue. This is not going to be achieved by having all of our activity take place 50 or more miles outside the city limits.

Our flying sites are isolated because the performance of our contest models is too great to allow them to be flown on smaller, more accessible fields. But the essence of free flight is not in the high performance possible with modern

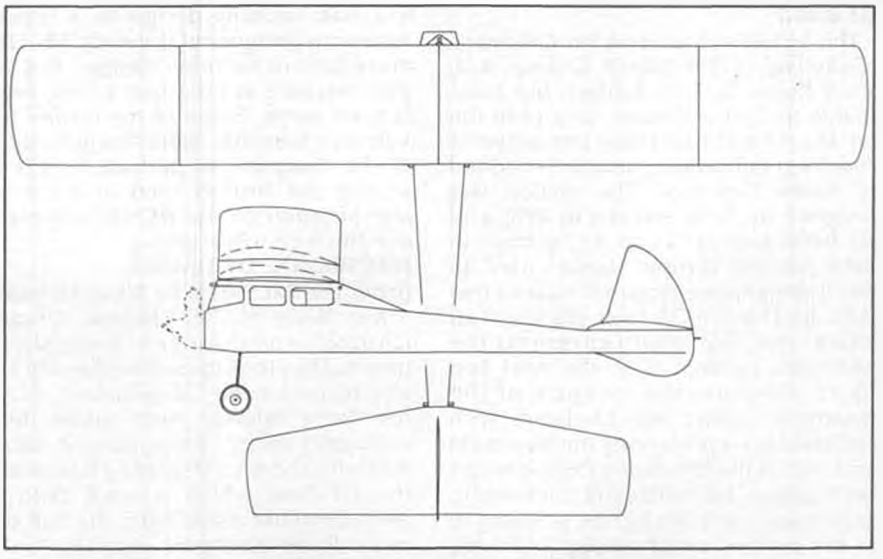
DARNED GOOD AIRFOIL – AH 6–40–7



STATION	0	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	100
UPPER	0.8	2.6	3.5	4.8	5.8	6.6	7.8	8.5	9.1	9.1	8.7	7.9	6.7	5.1	3.1	0.7
LOWER	0.8	0.1	0	0.1	0.25	0.5	1.05	1.65	2.6	3.2	3.4	3.4	3	2.3	1.3	0


12–3/4"
8"
4"
6–1/2"
2–1/4"
1–1/4"
1–5/8"
3/16" INCIDENCE @ L.E.
1–7/16"
1/16" SHT. BOX
1–3/4"x 1–1/2"
1"x 3/4"
1/16" SHT.
2–3/4"
2"
1–3/8"
18–3/4"FUSELAGE DIMENSIONS FOR SPACE BUG;
FOR OTHERS, MOVE WING BACK 5/8"
12–5/8"
1–3/4"
4–3/8"
1/2A SPACER
BY: SAL TAIBI
3/16"sq. L.E.
1/8"x 1/4"
5/8" T.E.
1/16" RIBS
3/16"x 1/4" → 1/8" L.E.
1/8"x 3/8" → 3/16"
5/8" T.E. → 3/8" AT TIP

Tony Italiano about to launch his somewhat modified No-Non-Cents Pennyplane. Sez it is about 1-1/2¢ heavy, flies nice, but not a winner. Photo by Eric Anderson.



MARCH MYSTERY MODEL

technology! I enjoy just watching them fly . . . the length of time in the air is irrelevant, unless it's a contest flight. Watching something you created (or at least adjusted and launched) climb up, then glide down smoothly, completely on its own, but depending on the flight instructions you gave it before launch . . . to me, *this* is the essence of free flight. Top-notch contest models go up higher and climb better, but small sport models of lesser performance can still display this feeling to the uninitiated. And such models don't need a large flying field. The neighborhood schoolyard is plenty big enough for hand-launch gliders and simple rubber stick models. So, if we're *really* serious about attracting newcomers to free flight, one way to start would be to do more flying of sport models in these local locations.

I have a box of schoolyard type models readily available every time I have the urge to go flying and don't feel like packing the car and driving to the nearest contest-type testing site. The box contains HLGs of various sizes and states of trim, a few simple rubber stick models like the Mather's Twiggy, plus a few ready-to-fly types like a Sleek Streek, Skeeter, or Super Glider. The only other equipment needed is a winder, extra rubber motors, clay, and a bottle of Super Jet. By the time I've made a few flights, a gang of neighborhood kids and/or parents has gathered. They are quickly put to use as winding assistants and retrievers, and given one of the extra models to fly afterwards. One such flying session exposes free flight to more people for the first time than a series of contests with hundreds of contestants. The next step, then, would be to offer the more interested types (adults or kids) some help in building similar models for the next flying session. We'll talk about the following steps in later months, but none of them will happen unless the first step is taken to expose the uninitiated to the joys of free flight.

Notice that all of my schoolyard models are of very simple construction. The idea is to show the crowd that simple models DO fly well, and make it look possible for them to build one, too. Scale models would have great appeal, but are too complex to be built quickly by the complete neophyte. No gas models are included, because I haven't found any with the right kind of performance qualities that would allow them to be flown in the limited area of a schoolyard. A true schoolyard gas model would need a slow climb, or enough stability to fly in tight circles for a minute or so without spiraling in, and a poor glide to prevent thermaling and let the flight stay on the field. Another reason for not using engine powered models is that somebody might complain, and you'd lose your convenient flying field. CO_2 and/or electric models might do OK, but I don't have any, and they're still a bit too complex to start with. ➤

Tom Heppler snapped this pic of John Blair holding George Perryman's "Gossamer Speckled Bird" at 1980 Heart of Dixie Champs. It's a Coupe, covered with condenser paper (ulp!), has a 90-second motor run.

Here's George Batiuk at the '78 Heart of Dixie Champs, getting ready to lose his Class B job with K&B .29 Series 64.

DARNED GOOD AIRFOIL:
AH 6-40-7

This airfoil was used on Per Grunnet's "Cirkeling" (1979 World Champ A/2, proxy flown by Tom Koster), but I was unable to find ordinates for it until the *Bat Sheet* reprinted those presented in *Voo Livre* (a Braxilian newsletter edited by Andre Gomide). The section was designed by Arne Hansen in 1950, and has been popular as an A/2 section in some parts of Europe. Hansen used an airfoil designation system similar to that used by the NACA four-digit airfoil series: the first digit represents the maximum camber (6%), the next two digits represent the location of the maximum camber (40% of chord), with the final digit representing the maximum thickness as the Benedek 6356 favored by the Russians, but with extra thickness to resist towing stresses better, as seems to be the current trend among A/2 fliers. Another interesting feature is that the top camber decreases by only 4% between the 40% and 80% stations, which Eric Lister says is the key to the top performance and low drag displayed by the Eppler sections used on R/C sailplanes. (Lister claims this dropoff should not exceed 5% for top performance. We'll be featuring some of his airfoils later.) Its proven performance at Taft should make it an airfoil to consider for serious A/2 flying. Gomide says it would make a nice Wakefield section, also.

MYSTERY MODEL OF THE MONTH

This issue's MM is NOT a Buzzard Bombshell with a Civy Boy rudder! But it is a Nats winning design by a famous American designer of the early '50s. He's more famous for other designs, but this ship retained at least part of the more famous name. Some of my former San Valeers clubmates were flying buddies of the designer, so perhaps they'll be among the first to send in a correct identification to the **RCMB** office and win the free subscription.

ELECTRONIC DT TIMERS
(from the Bat Sheet, by Steve Helmick)

Ken Bauer (627 E. Monroe, Orange, CA 92667) is producing electronic Nordic timers. They look to me like they are THE way to go for the "all-weather" A/2, if not for a calm-air (with zoom delay desirable) glider. How does it work? Basically, there's a steel plate fastened to the DT line, which is stuck onto an electromagnet made from the coil of a relay. Some electronic wizardry (an IC chip) times the current flow to the coil and shuts it down when DT time comes. A row of tiny rocker switches sets the DT time . . . they are assigned (various) times . . . and they automatically add together. In other words, punch 40 and 160 for 200 seconds, or if it is pretty windy, 10 and 160 for 170 seconds, etc. The rockers have a hole in them so you can slip a heavy monofilament pin through and lock in what you want, and lock out what you don't want. The first rocker switch in the row is just on/off.

Also, there is a micro-switch that you put in front of the towhook, and this allows the timer to reset when you return to straight tow. When you go into circle tow, the timer starts, which means only one circle (or less!) on a 10-second setting. But the timer starts when the model goes into circle tow mode, and the neat thing about this is that if you drop the towline or if the line breaks, the timer starts, and the model comes down. If the battery goes dead, the model DT's, too! There is less chance of setting the DT too short, because there are no grooves to count, as with a Seelig, and the timer will not speed up as the weather gets hotter. Ken recommends a nine-volt transistor radio battery for power, and weight is about 1.25 oz. with that battery. The timer itself is quite small and light, but the nose pod will probably have to be specially tailored for the Bauer timer.

Price is $25. I saw a sample that Jim Thornberry had, and my check is in the mail. I'll have pictures in a later column.

CUTTING TISSUE LETTERS AND NUMBERS

All competition models require your AMA number on the wings; FAI models need them on the stab and fuselage, too. You can take the easy way out and put on decals, but the traditional F/F treatment for tissue-covered surfaces is to cut out the numbers from black tissue. Here's how Louis Joyner suggests to do it, in the FFFliar newsletter (edited by Bill Mathews, 2172 S.W. 34th St., Apt. B, Gainesville, FL 32608):

At an art supply store, buy some press-

on vinyl leters in the approximate size you want, then mount on a contrasting color of cardboard. These numbers can then be copied on an office copy machine. Stack four or five sheets of tissue together, lay one of the copies on top and cut out with an Uber Skiver knife.

The vinyl letters are available in a range of sizes, from about 1/2 inch to 3 inches, and come in white, black, and red. The number of typefaces is, however, limited. Since you have to buy five of each letter or number, some possible uses for the extras are on model boxes, tool boxes, or mail boxes.

If you want a different typeface, buy some black rub-on letters. Use the largest size you can find. Rub the appropriate letters and numbers onto a piece of white paper, have it photocopied and enlarged or reduced to the correct size, and then make copies on a copy machine and cut out as described above.

To save time in the long run, cut out a big supply of numbers at one time and save them. (I usually do about 10-15 at a time, saving each letter in a waxed paper sleeve inside a ziploc sandwich bag. TH) *Cutting is easier if you use a small cutting board and turn it after each cut, so you can work in the most comfortable position.*

Apply the numbers using thinner after the wing (or whatever) has been given one coat of dope. This way the numbers will receive about as many coats of dope as the rest of the surface. On sheeted wings, you can apply the numbers first, then the tissue covering. There will be a slight difference in color this way. However, the surface will be smoother.

Japanese tissue is available now in every color EXCEPT black. However, I've found that black art tissue is acceptable for numbers and trim. When cutting out the letters, use a brand new No. 11 Uber Skiver blade. It's considered good form to cut out the inside portions of all numbers and letters first. Toshi Matsuda used to use a layer of waxed paper between the pattern and the tissue, to prevent slipping. Others have recommended a sheet of newspaper above and/or below the tissue stack, for the same reason. Tissue pinstripes can be cut in the same manner. I go by eye, cutting enough extra strips so I'll find enough that match width to complete the striping job. I've found that a black contrast strip between areas of contrasting colors really snaps up the appearance of the finished model. While you've got the knife out, you might also cut out a supply of black tissue stars, for placement over the inevitable punctures the model will receive.

THANKS!

To all who sent their get-well wishes!

To George Batiuk, Tom Heppler, Will Nakashima and Tony Italiano, who heeded my plea for photos! Some are printed this month, some are being saved for later. I could still use some more (especially of younger fliers, for my Jr./Sr. of the month feature), so send in any good black-and-white photos you'd like to see published. •

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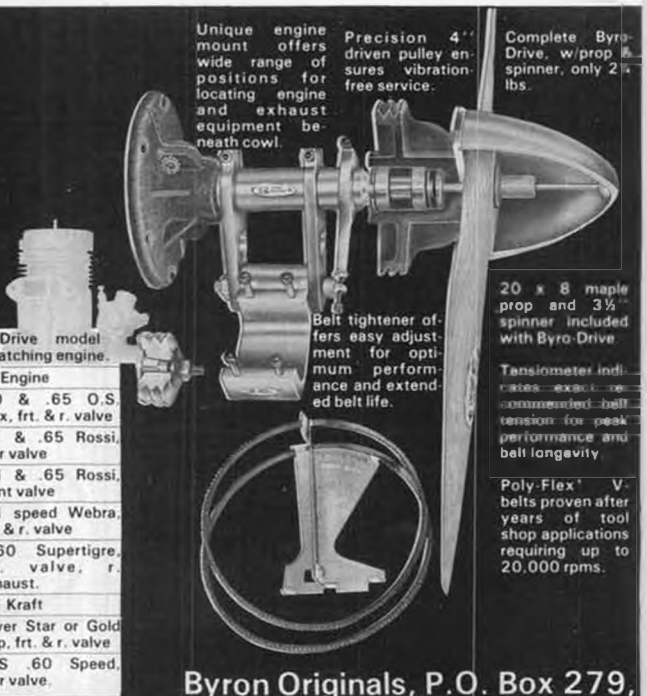

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F/F Scale . . . . *Continued from page 54*

and handling.

Dave has future plans on the board. His policy is to build and fly an example of each before putting them up for sale.

While on the subject of plans, well-known "plan man" and modeler, Paul Plecan, has come out with an innovative method of selling plans. He is selling plan packets at $4.00 each; or if you subscribe to his service for $15.00, you will receive five plan packets, bringing the cost down to only $3.00. The first packet contains the Pilatus Porter (30-inch span) and a sport F/F model called the "Tornado." Both are very high quality.

As a subscriber, you will automatically receive each packet when completed. If you desire more information, the address is Paul Plecan, 3023 Saratoga St., Riverside, CA 92503.

★ ★ ★

I want to talk a bit more about covering. Seems as though regardless of how careful I am covering a rudder or stab, wrinkles always manage to crop up. I have talked before about reinforcing different areas of the structure so that they do not "give" during the shrinking stage. Even with all this care, too often wrinkles still appear, ruining an otherwise acceptable covering job. This seems to occur regularly with perfectly flat flying surfaces.

Well, I have a remedy that I've known about for years, but have been too lazy to try. When it came time to cover the large, flat stab on my Peanut model of the 1911 Cessna, the first attempt looked like an indoor prop! The stab was made with 1/32 square basswood and balsa, which doesn't leave much room for error. I made another stab and covered this one as follows. I made a wooden frame using 1/8 x 1/2-inch balsa material. The length and width was a bit longer and wider than the size of the stab and rudder. A couple of cross members were added to keep the two sides from pulling in, but were placed below the edge of the side members.

Tissue was glued upside down on the frame (shiny side down) and left to dry. Since I wanted a natural linen look I sprayed the tissue with a mixture of water and Dr. Martin Dye, using an airbrush. When the tissue dried, it was nice and taut, and colored the way I wanted it. The stab and rudder were then white-glued onto the frame. When dry, the stab and rudder were trimmed, leaving a perfectly taut and flat surface. The other side was done the same. The flimsy structures remained perfectly straight! In fact, even after a trip to and from Dayton, with all the heat and humidity, they are still flat and true.

I believe that wrinkles and warping take place after water shrinking; therefore doping (especially with plasticized dope) has little adverse affect. After I covered the Cessna's stab and rudder using the frame, they were doped and pinned down flat to dry.

Several other frames can be made to accommodate different size structures. These, of course, can be used repeatedly; just remember to make them only a bit larger than the structure, otherwise you will be wasting tissue.

★ ★ ★

Next, I want to tell you about some metalized paper, and some of its uses in modeling. Somewhere out there is a source for this material, but I don't know where. Maybe someone out there can help. What this neat stuff is, is a lamination of paper and what appears to be aluminum. The overall thickness is about ten thousandths and the weight is fairly light.

I use this metalized paper on landing gear leg fairings. It's quicker than balsa, cleaner and looks great after painting. On my AVRO 504, it was used for all of the simulated metal panels, but I later found one drawback in this particular use. The fuel residue from the diesel engine seeped in between the paper and metal layers and caused the surface to wrinkle. Needless to say, I was slightly perturbed. Had I known this, I would have coated the backside with several coats of dope; I'm sure that would take care of this problem. Before applying the metalized paper onto the fuselage, I took a Scotch-Brite pad and rubbed across the surface in one direction only. This really gives the surface a metal look. Since these panels were painted, the rubbing provided an excellent "tooth" for the paint. I used R/C-56 glue for attachment to the fuselage.

One other item I made from this material was the external gas tank, which sets above the center of the wing on the 504. My first thought was to make the tank from balsa, but there is too much wood filling necessary to give the metal look. I decided that the best solution would be to make it out of the metalized paper. The first step was to find a hardwood dowel the same diameter as the tank. From this dowel, I cut three discs 1/16 inch thick. These were set aside until later. A portion of the dowel was waxed, then a piece for the main tank body was cut from the paper, just the right length and only a bit wider than necessary to wrap around the dowel. I burnished the sheet with the Scotch-Brite pad, then placed it metal side down on a magazine. With a ball-point pen, I made several impressions on the backside so that the end results appeared like rows of rivets on the metal side. This piece was then tightly wrapped around the waxed dowels and glued with Super Jet. (Obviously, not glued to the dowel, but on the seam as the paper is wrapped upon itself.) When this dried the paper tube was slid off of the dowel. The three discs previously cut were inserted into the tube, having one disc in the middle and one at either end. These also were glued into place.

The ends of the tank are cone-shaped. My first attempt was to turn them from the dowel in the lathe. I wasn't happy with the results, and when these were held next to the tank, the difference

between the two dissimilar materials convinced me not to use them. By using a circle cutter, I cut out a couple of circles from the metalized paper, then cut a pie-shaped wedge from these circles. A cone shape was formed. A few trials and errors were made until the right combination gave me the correct size and shaped cones. These cones were also burnished and glued with Super Jet onto the main tank. The seams of these cones were placed downward so that they would not show.

Where the cones attached to the main tank body, a neat little bead of R/C-56 glue was made, giving the appearance of a weld. I have to assume that this was the way the real tank was made. The final tank, when painted, looked pretty good. I had planned to photograph it for this column, but it was lost in one of the test flights in the barley field used for testing . . . something about Murphy!

★ ★ ★

Well, gang, there are more rule proposals for F/F rubber scale. These proposals are real beauties, and if passed, they will hinder the development of rubber scale. There's no point in spelling them out here, because only AMA members will be affected, and they have access to them in *Model Aviation*.

Whether you agree and disagree with them, at least let your scale representative know your feelings. With most of these reps being R/C oriented, they could give an automatic yes vote, since most of them do not know of our needs unless you let them know otherwise.

In closing this month's column, I want to give you the following dates for a few contests this new year. For those of you in and around Apollo, Pennsylvania, there is a 3rd Annual Indoor Peanut Fun-Fly. Strictly a fun-fly with no entry fees or prizes or trophies . . . just loads of fun. This will take place Feb. 8, 1981, at 12 p.m. to 4:00 p.m. at the Apollo Civic Center.

The Flightmasters schedule for '81 is as follows: On May 3rd will be the Semi-Annual at Mile Square; on June 14 there will be an R.O.W., hopefully back at Lake Elsinore. The big event, the Annual, is on Sept. 20th at Mile Square. Then probably another R.O.W. at Lake Elsinore, Oct. 14. The year ends with the Jumbo/Peanut, multi-engine contest on Dec. 6.

The Flying Aces newsletter has a new editor, and if any of you want to subscribe to this outstanding publication, send $9.00 to Editor Lynn Reichel, 3301 Cindy Lane, Erie, PA 16506. •

Peanut . . . . . . *Continued from page 51*

1/16x.020 basswood to make the wing tips and trailing edge as a single lamination. Wet the strips and shake off the excess water, then use white glue as a bonding agent between the strips. These can be bent around a cardboard or balsa form cut to the inside shape and size, or you can put a series of pins around the inside of the outline and use the pins as a form. At sharp bends the pins need to be placed no more than 1/8 inch apart to keep from breaking the thin basswood strips as they are bent. Tail surface outlines are made in a similar fashion. Let the outlines dry thoroughly on the forms before using them on an assembly.

The wing spar is cut out as a single piece from 1/16 sheet balsa, but could be spliced with dihedral braces to save wood. The tail spars are full depth and can be made to match the front view. Thick tail surfaces are a rarity on Peanuts, but they are scale for VIRI.

The top of the fuselage is covered with sheet balsa; 1/32 is called out but it is a good idea to sand it somewhat thinner. Four pieces were required to cope with the fuselage shape. These run between formers 1 and 2, 2 and 3, 3 and 6, and 6 and 8 respectively. These pieces are a cut-and-fit proposition. After cementing one piece in place, carefully bevel it where the next piece will be attached. Then the edge of the next piece must be carefully beveled to fit the first. Note that all the top covering butts against the top surface of the fuselage longerons and does not overlap them. The formers are all just a little narrower than the fuselage frame at their station to allow for this.

Use a soft, light piece of balsa for the pylon.

The struts on the model were cut out of 1/64 plywood, after which 1/32 sheet was added top and bottom and then

carved and sanded to the streamlined shape. Note the very short stub strut at each side of the fuselage where the main struts attach.

Balsa balloon type wheels for this model, 3/4-inch diameter at $.30 per pair, were obtained from Mike Mulligan's Old Timer Models, P.O. Box 913, Westminster, CA 92683. His 3/4-inch wheels are slightly oversize and, happily, just match our scale diameter.

Williams Bros. plastic cylinders were used as a basis for the dummy engine. The crankcase is block balsa with a plastic thrust button from Peck-Polymers. A plywood front face is built up from several layers of 1/64 plywood. The valve pushrods and rocker arms are simulated with bent pins. Inlet and exhaust pipes are approximately 5/64-inch diameter insulation taken from some electrical wire. This tubing was slit and used for the cockpit edging also.

AND OF COURSE, our illustrious editor says all models must have a pilot figure* (probably because he was raised before the days of Women's Lib and has always been frustrated because he couldn't play with dolls as a boy), so we carved a pilot figure out of styrofoam, painted it with plastic paints and installed it in the cockpit.

The model in the photos weighs 16 grams with a 14-inch loop of 3/32 rubber installed. It balances at a point about 3/16 of an inch in front of the spar and flies like it is somewhat nose heavy. Recommended balance position would be directly under the wing spar, but the one in the photos has not been flown with the balance point in that position yet. Have fun with your Finnish VIRI.

(*I was never told I couldn't play with dollies until after I got married. Never knew what I was missing until it was too late.) •

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

AND ON THE SAME SUBJECT

French builder Georges Chaulet, reflecting upon his recent visit to a Southern California indoor flying session: "I did appreciate very much the sympathetic ambiance in the gymnasium. Peanutists are peaceful and gentle people, and it is a pleasure to meet with them."

THOUGHT FOR THE DAY

"You know as well as I do . . . if we were not always looking forward to completion of a project we would start one just so we would have to look forward to that! Keeps one flexible and in good operation." Herb Kelley.

STRIPPERS, ANYONE?

Nope, not that kind . . . just for balsa wood. Gene Dubois, 14 Budano Drive, Acushnet, MA 02743, manufactures two types. One is suitable for wood up to 1/16 inch in thickness, while the other can handle sizes as large as 1/4 inch. Our preliminary tests indicate a sturdy and efficient design. Cutting your own strips from sheet balsa offers two advantages: First, one can exercise better quality control of wood density, so vital when trying for matched components, such as longerons or spars. Second, the cost of the strips is considerably less than commercially available stock. For more information, contact Gene Dubois and ask about his other products too.

END PLAY

Richard Miller, former Editor of *Soaring* magazine and originator of the VTO free flight column in *Model Airplane News*, has recently published a paper dealing with the inefficiencies of aircraft wing tips. Although only five pages in length, the dissertation is brimming with thought-provoking commentary about aerodynamic characteristics which strongly affect every aircraft type, from microfilm models to jet airliners. Written with rare insight and a sense of humor, this paper raises questions that demand answers . . . and points the way to possible solutions. As Miller puts it: "The wing tip has not received the care it deserves. Quite to the contrary, in fact: While areas inconsequential by comparison have been worked over time and again, the end of the wing has simply been left, so to speak, hanging in the wind."

A copy of this paper is available for $2.00 cash or postage stamps and a large pre-addressed envelope: Richard Miller, 1368 Rock Springs Road, Escondido, CA 92025.

TURBOTANK CO_2

Some months ago we featured a photograph of the new Telco "Turbotank" CO_2 engine. Thanks to Ed Toner, U.S. distributor, we have now examined one first-hand. Immediately apparent is the fuel tank, which is mounted directly to the back of the engine crankcase, reducing the usual long and delicate fuel pipe to about an inch in length. The tank itself is of special design, incorporating a unique core material which it is claimed enables it to hold over twice as much CO_2 as the usual Telco tank. Additionally, the tank is equipped with a "vortex chamber" which is said to spin-dry the fuel to ensure only gaseous CO_2 reaching the engine. The tank is mounted in such a manner that it may be easily rotated to permit the engine to be oriented with the cylinder upright, inverted, or horizontal.

Comparison with an earlier Telco engine reveals numerous detail changes in addition to the more obvious ones. Whereas the early Telco featured a black cylinder, the new example is brightly polished and incorporates a greater number of fins. Telco engines employ a cam-type crankshaft bearing which controls engine speed, rather than the more common variable cylinder. That is to say, the crankshaft is raised or lowered in relation to the cylinder head, rather than vice-versa. Early Telcos were hampered by an inefficient adjusting wrench and operating disc, but the new example

is much improved with a more positive hex-shaped part and a thicker wrench.

Power outputs two to three times higher than standard Telcos are claimed for the Turbotank, as well as duration extensions sufficient to permit indoor free flight, control line and ultralight R/C model flying. Apparently the only negative factor is a slight increase in weight . . . about 20 grams as compared with 14 grams of the standard engine, a small price to pay for such remarkable gains.

Price and ordering information may be obtained from Buzzer Models, P.O. Box 124, Howell, NJ 07731.

14 YEARS OF WINGS

The Northrop Flying Wing model contest was recently conducted at Mile Square Park, marking its 14th year. This series of meets has been particularly satisfying to participants because of their low-key, non-pressure spirit. Fun and good fellowship is the first order of business, but in the bargain one has the rare opportunity of seeing truly unique flying machines in action. Many of the contestants have been present for nearly all of the wing events, and it is suspected that some of their models have also! However, new faces (and new designs) are making inroads against the Old Guard (and elderly models). Variety adds to the pleasure with classes for free flight gas, towline, rubber, and electric, plus R/C. Our congratulations to the management of this most refreshing contest, and we hope to see you again next year!

FLYING IS FLYING

Several mentions of ballooning in the "Hangar," including Tom Nallen's lyrical account of his first ride, brought a surprising amount of favorable mail. And while we usually try to avoid "adventures of the author" items, we felt this experience deserved sharing:

BAPTISM UNDER FIRE

Why would anyone in their right mind want to arise at 3:30 a.m. on a Sunday morning and drive for hours in fog and darkness through unfamiliar territory to an obscure location near Perris, California? How about an invitation from a lovely blonde aeronaut to join her for a flight in a hot-air balloon! At least that was the plan.

After finally locating the specified intersection, absolutely nothing could be seen in any direction. But then, a pickup truck hove into dim view, and with a wicker basket in the back . . . a sure sign of a balloonist. We followed it into a field just as the first glimmer of daybreak appeared, revealing several other balloon crews all awaiting improved visibility.

Our crew, meeting as a group for the first time, consisted of balloon owner/pilot Linda; Diane, semi-experienced helper; a bright-eyed and alert youngster of about twelve; and two rank novices, including yours truly. Six a.m. was the scheduled time of launch and we were all raring to go. Alas, Mother Nature wasn't and we began to wonder if the fog would ever lift. The object of such an early start, of course, is to avoid wind gusts, which are even more distressing to balloonists than to modelers.

Seven a.m. and still fog . . . calm, though (moreso than our nerves). Eight a.m. and the veil began to lift, along with our spirits. Another crew, eager to go, began preparing their balloon for flight, while we watched with more than casual interest, since we "first-timers" were expected to learn the routine immediately. Soon a second crew sprang into action, and with that our "Commander" gave the order to start unloading our balloon equipment. Although relatively new to the sport, Linda radiated enthusiasm and confidence, contageous even to those of us who were still wondering what we were trying to do. My own background included a fair amount of aircraft ground-handling experience, but my knowledge of lighter-than-air craft was almost nil . . . which became quite obvious when trying to carry out assigned tasks. Another of our crew, however, was equally inept, so we could at least share embarrassment! Filling a hot-air balloon is not an easy task. The envelope must be removed from its canvas bag and arrayed on the ground properly, shroud lines must be attached to the basket, and the propane burner installed.

The initial filling of the envelope involves the use of an engine-driven fan, which swells the balloon to a fair percentage of its volume, but still leaves it reposing rather helplessly on its side. The next, much more exciting step, requires someone to enter the balloon with a propane-fueled weed-burner, which heats the trapped air, causing the envelope to rise to a more nearly vertical position. Then the basket-mounted main burner is lit, belching forth a huge tongue of flame, sounding much like a Dyna-Jet engine when the "blast valve" is opened. The heated air swells the balloon to a ripe fullness, and it is ready for flight.

By now everyone was holding on to the basket to keep it down. Linda conducted her final checks, then motioned me aboard. The tiny traditional wicker basket is sturdy and nicely padded around its periphery, which is somehow reassuring, as is the "friendly fit" of the fuel tanks, instruments, pilot, and passenger within its confines.

With a blast of throttle and "all hands let go," we were off and accelerating upward with deceptive smoothness . . . rapidly gaining altitude with an almost imperceptible sense of motion. It seemed not so much that we were rising, but rather that the ground was falling away beneath us. One of the most impressive aspects of balloon flight is the remarkable acoustical sensations. In between the authoritative audio blasts of the burner, all is stillness. Dogs barking and conversations from earthbound mortals carry up with startling clarity, the result of moving at exactly the same speed as the air.

We gently wafted over the fascinating Orange Empire Railway Museum, enjoying a wonderful and unique top view of the rolling stock below. Gradually we drifted over a larger empty field and, suspended at about 350 feet altitude, had the opportunity to realize a long-held whim . . . that of tossing out some tiny balsa gliders! The first, not quite correctly adjusted, entered a tight-to-the-right spiral and descended to the ground in about 45 seconds. Glider number two boomeranged back to the launcher like a movie running backwards! The next try resulted in a perfect flight of approximately 90 seconds duration. Not bad, considering the damp air. The junior member of our ground crew adroitly recovered both models, which were later given to him for his efforts at anti-litterbugging.

I suggested to Linda that had we been near a thermal, the gliders might have performed better. She shook her head and explained that unlike model aeroplanists, balloonists prefer *NOT* to encounter thermals. It seems they can drag balloons spinning upwards in an alarming manner to excessive altitudes, and are difficult to escape! Live and learn.

At last our idyllic aerial adventure was drawing to a close . . . rather like having to wake up from a dream about flying without the need of an aircraft. A suitable landing site was beneath us, and with great precision, Linda brought her marvelous balloon to a gentle landing. Our total time aloft was about 44 minutes, yet it seemed only moments. Certainly I felt much younger than when we left the earth! Truly a fantasy fulfilled.

Bill Hannan, Box A, Escondido, CA 92025. •

Twister . . . . . *Continued from page 62*

ment of the bellcrank once installed on its mounting plate, so substituted a three-inch metal Hi Johnson bellcrank for it. Personal prejudice again, probably.

3) Although the plans and instructions call for the flaps to be installed after the wing has been mounted to the fuselage, it is virtually impossible to line up the flaps properly if these instructions are followed. Instead, we suggest

that the wing cut-out be enlarged so that the completed wing, with flaps installed and hinged, can be slid into place. This leads to a little more work, but will eliminate the possibility of an aileron effect creeping in.

The ship shown was given a rather spartan finish, by today's control line stunt standards. The fuselage and empennage were filled with Aero-Gloss sanding sealer, covered with the silkspan supplied in the kit, and finished with Aero-Gloss Swift White and Stearman Red. The wing was covered with white Monokote, then trimmed with transparent red.

The landing gear was mounted exactly as shown on the plans, but the cotton-pickin' 4-40 screws supplied with the kit weren't quite long enough to reach completely through the wood sides of the fuselage. Do yourself a favor and get some longer screws to mount the gear with the nylon bracket supplied, then cut off the excess. It will be well worth the money, and you can probably use the screws someplace else later anyway.

Lastly, the ship does not come with an adjustable lead-out guide. We went ahead and built one, under the philosophy of nothing ventured, nothing gained. We had never even seen one of these critters before, so ours probably weighs about five pounds more than it should. Anyway, we ultimately ended up with the lead-outs positioned where shown on the plans, so all we gained out of it was a little more soldering practice.

So far, we've had a ball flying the airplane. Control line gives the pilot more "feel" as to what the machine is doing than any other form of model guidance. With the balance point where shown on the plans, the first flight showed the ability of the model to fly slowly enough to allow us to correct most of our control mistakes before getting close to the ground. We hadn't flown control line for about four years before the first flight of our Twister. On the first flight we were doing consecutive inside and outside loops, horizontal and vertical eights, inverted wingovers, and just generally horsing around. The airplane feels good on the lines, with enough pull to let you know there's a real flying machine out there, and goes pretty much where we ask it to go. It does seem to stagger a little on square turns, but whether this is because of the weight of the airplane or because we haven't really gotten it completely dialed in yet is a good question.

In summation, then, we can heartily recommend the Sig Twister to anyone who is getting a little jaded and tired of the same old stuff. At its price it is a fine value and an excellent airplane which will return many enjoyable flights for the investment of time and money it requires. One thing, though; Leave the "Figure Nine" maneuver to me . . . someday I'm going to master it! •

C/L . . . . . *Continued from page 61*

your TD .049, just $49.95 in check, money order or food stamps. . .

You see, when George Aldrich closed up shop to stir the mixing vat full time, a void was left in the engine rework business. A rather large void, evidently, not from the physical size of George but from the fact that he did a lot of engine work, in fact did it full time and as his only source of income . . . at least that is how the story goes as told to me. So, in the past couple of years or so there have been several people try to jump into the rework business. I am not sure why, as of all the ways there are to make money, working over some dork's engine just so he can set it too lean and burn it down and then bad-mouth the reworker sounds like one of the least pleasant. Still, these rework people persist, and a very great percentage of the time I either ignore the notes or wait to see what happens in the next few months. If the guy is ripping people or service is crummy, I generally hear about it.

However, there is a good side to the story, and that is where Gene Hempel, P&G Metal Shop, 301 North Yale Dr., Garland, TX 75042, comes in. Just over a year ago I heard from Gene, two simple mimeographed price sheets, one for chrome and honing work on any size motor, the other for the .049 services and products Gene has. Since then I have not heard a bad word about P&G's work. And yes, I checked with some people who are using engines that Hempel worked on. Most enthusiastic reports come from those in Mouse Racing; they say the TD .049 with a chromed crankshaft and the case honed to fit the chromey crank lasts real well and runs fast besides.

If you are interested in chrome work of most any kind, honing to fit the newly chromed parts, or TD .049 trick stuff along with a few other little things having to do with going faster, I would suggest that you either write to Gene at the above address or call him at (214) 272-5210. ●

0/400 . . . . . *Continued from page 57*

prepared, comprising the two formers, engine bearers, and 1/8 sq. top rails. The bearers are temporarily glued to two 1/4 square strips which are passed right through the fuselage. Thus, the engine mounts are held in the correct position while everything else is assembled around them. Attach all the supports which pass to the lower center section. Incidentally, I use a couple of spots of 5-minute epoxy at this stage for each part, which can be ground away if a mistake is made, later gluing properly with slow-setting epoxy.

The upper center section is positioned on the center struts and the two rear outer struts, with temporary wooden jury struts at the leading and trailing edges to maintain incidence. When completely satisfied that all is correct, glue it in place, then add the upper nacelle stays. The engine nacelle jigs can now be removed and their structure completed. The rear nacelle cones are of 1/32 sheet formed around a balsa mold. Radiator rims are simply a strip of aluminum wrapped around the front former, and radiator shutters are from 1/64 ply. The detachable cowling lids are aluminum, held in place by large press studs.

ENGINE CUTOUTS

The system used is very simple (crude?) but is reliable once properly set up . . . it takes a little time to get the various wire and fuel line lengths correct. When the timer trips, the wires pull, via bellcranks, on the fuel lines, causing them to kink at the engine intake, stopping the motors instantly. The wire loops are located on the fuel lines by inserting short lengths of brass tube midway.

COVERING

The airframe is covered with light-weight tissue and given one coat of dope. It is best to rub a candle over the fuselage cross members to prevent the covering from adhering. The model is then double covered with silk. Each panel is cut to size and rinsed in water to remove the hard finish. After carefully ironing the silk, it is laid dry over the tissue and dope is brushed through, taking care to avoid air bubbles. These have a habit of appearing at the last minute, so keep an eye on the job until it

is completely dry.

The fabric lacing on the fuselage is reproduced by using a sewing machine to sew a zig-zag line on heavy-weight tissue. This is cut into a narrow strip and doped in place.

I finish my models in matt cellulose dope, which does not need proofing against mineral oil based diesel fuel, or even castor oil based fuel if it is cleaned off occasionally with ether.

TRIMMING

Check for warps and get the balance point in the right place . . . it may seem a little far forward, but it does remove all stalling and ground looping problems. Find a gentle, well-grassed slope and get the glide right. You will probably find it is OK, with no elevator adjustment necessary. The central fin is temporarily shimmed in place with thin ply and eventually fixed with spots of silicone rubber.

The engine starting procedure is as follows:

1) Start the port engine, allow it to thoroughly warm up, and stop it.

2) Start the starboard engine, adjust, and restart the port. Tune the engines until they are "beating" at intervals of 1/2 second or less.

3) Top up the tanks and replace the cowling lids.

4) Start the timer, replace the lid, and release the model.

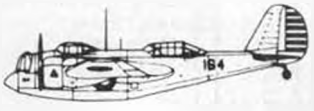
On the first power flight I was naturally apprehensive, so I put the propellers on backwards to reduce thrust. Anticipating a powered glide into the grass, I was surprised when the model climbed to 30 feet on a straight flight path before the engines cut for a perfect transition and glide. No trimming was required at all. When a few more rigging wires and details had been added I was able to turn the props the right way around.

Finally, a word about documentation for the contest minded. The model was designed primarily for competition work and so is, as far as I know, dimensionally accurate. The scale is 1/18, which gives a wingspan of approximately 67 inches. The main scale drawing used was from *Bomber and Reconnaissance Aircraft of the 1914-18 War*, published by Harleyford Books of England. Unfortunately, this book is now out of print, so you may have to hunt around for a copy, or contact your library.

Another drawing, from *Model Airplane News*, shows excellent constructional detail, but is not very accurate in outline.

Photographs are fairly common, showing 0/400's in a variety of schemes, including postwar transport roles.

Good luck with your model. Any particular problems may be forwarded to me via **RCMB.** •



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

aspect ratio and Rn, but it may be useful for a first cut. If I had to make a guess how thickness would affect these figures, I would say that thinner sections would be at slightly lower values and thicker ones at higher values. Regards, Blaine Rawdon."

"Dear Larry:

"With reference to your column in the September, 1980 **R/C Model Builder:**

"As a semi-retired aerodynamicist who (a) loves R/C sailplanes and (b) is very impressed by the polars *and the actual performance of the Eppler 374 at a Reynolds number of 100,000,* I must point out some gross errors in the Eppler 374 study performed by an Ian Turner.

"Refer to the enclosed Eppler 374 polars and note that at a Reynolds number of 100,000, Cl max=0.95; also be advised that to calculate L/D, we must first convert these polar data to a wing of finite aspect ratio. We do this by adding *induced drag*, Cdi, to the polar value of Cd. Cdi = $(Cl^2)/[\ (AR)]$.

"Doing this, we find that for a wing of AR = 10, at Cl max = 0.95, L/D = .95/(.021 + .029) = 19; at Cl = 0.8, L/D = .8/(.016 + .020) = 22.2.

"Mr. Turner says that Cl max = 0.5, and Cl/Cd max = 10, for a wing having only an AR of 10:1.

"You'll note that by correcting Mr. Turner's number, the Eppler 374 will look *better* than the other compared sections in all his tables, instead of *worse*. Within the past month, based on these findings, along with a bunch of *actual flying* at Rn = 100,000, I've recommended this section to a number of people, including Stan Watson, Paul Wedeking, Dwight Holly, Herb Stokely, Bob Champaine and Austin Leftwich. Please consider correcting the very gross false impression that will be created by your September, 1980 article. Regards, Woody Blanchard, Jr."

Now let's hear what Ian has to say about all this.

"Dear Larry,

"I've read the comments of Blaine Rawdon and Woody Blanchard Jr. concerning my article which you published in the September **RCMB,** and I'd like to respond to both letters and perhaps enjoy a continued dialogue with knowledgeable fliers.

"First, the intent of my article was to illustrate some of the fundamental and first order characteristics of some of the three generic wing section types used in today's sailplanes to enable a sailplane designer or flier to better understand the resulting behavior of his design.

"Second, since I could not find specific experimental results for all three wing section types (at Reynolds numbers of

100,000), I chose values for CI from a variety of publications which seemed typical of the values for such sections at this very sensitive Reynolds number.

"Finally, my calculations assumed a sailplane of identical shape factor except for the wing section, and I used drag values extracted directly from Sighand Hoerner's excellent treatise on drag which, although published in 1951, is still considered by many to be a relevant and classic work. Extrapolations for the drag values as the Reynolds number varied for each of the considered model flying conditions were also based on Hoerner's work. The whole exercise was non-trivial, and using my TI 58C crammed full with routines, the calculations took 40 hours!

"With this background, let me address Blaine's comments and excellent experiments. His results seem to indicate that he and I have a serious case of agreement!

"Blaine's measured values for CI are all higher than those which I used but are roughly in the same proportion. If I were to inject them into my theoretical model I'm sure my conclusions would have been little changed. His experimental results were taken at widely differing Reynolds numbers which would seriously change the glide ratio, and his conclusion about the Goose may well be that bigger is better to some degree.

"Blaine's technique is one of the best that I have come across and the diligence applied to this experiment must be highly praised. To reduce the variables and to really uncover some substantial data, this experimental technique should be applied to a model of identical shape factors but using a variety of wing sections. This would really provide some interesting data.

"Blaine's final remarks refer to the range of usefulness of a section, which I did not address in this particular article. I agree entirely with his statements in that flat-bottomed and semi-symmetrical sections offer a wide range of operating CI values without seriously varying the sink rate of the sailplane.

"Woody Blanchard's remarks refer to my use of a 0.5 value of the max CI value of the Eppler 374 section. He correctly points out that Eppler's *calculated* value is 0.95 at a Reynolds number of 100,000.

"Without trying to defend my guessed value, let me point out that although Eppler's magnificent program has demonstrated good correlation between theory and experiment at Reynolds numbers of 200,000 and 400,000, it has not been as successful at Reynolds numbers of 100,000 and less. His experiments have not been able to substantiate his high predicted values of max CI and in addition, the shape of the calculated drag polar is grossly different from

the experimental.

"With this lack of correlation I felt justified in using a value of Cl lower than that calculated. However, in my enthusiasm to illustrate the behavioral differences between the sections, I now realize that I chose a value which certainly understates the capability of the 374 to some extent. If I were to raise my guess to, say, 0.65, it would make semi-symmetrical sections a better compromise than I indicated, but before I crank out the calculations again I intend to search for more concrete values for Cl for all the section types at this Reynolds number! I will keep in touch about this and maybe Blaine will perform more of his excellent experiments and provide more data for this purpose.

"In conclusion, I would like to say that under very moderate wind conditions, undercambered sections, when designed into a purpose-built sailplane, can provide spectacular thermal performance. To this end I have designed and built what I call my 'Minimum Sink' sailplane. It is a four ounce per square foot, 100-inch design with optimized aspect ratio, etc., etc., and in calm and very light wind conditions this plane has *averaged* about 20 minutes per launch. While this would not be competitive in realistic conditions (the wings could not take a full strength hi-start launch, for example), it surely caused a lot of interest and frustration amongst other club members when it was either the only plane aloft or worse still, going up in a soft thermal with everyone else coming down!

"As to the Eppler 374 section, I believe that its behavior may well be a little better than most other sections of similar camber and thickness; however, this difference will certainly be small and could easily be masked by model design, building quality, and flier ability. It must surely possess similar generic characteristics to similar sections. I would urge the reader not to believe that any one section possesses some magic that makes it vastly superior to others under all conditions. It is the section correctly applied to the correct design, intended for a certain application, that results in an effective sailplane. Sincerely, Ian Turner."

See you next month. ●

Choppers . . . . *Continued from page 35*

under the whirling rotor blades to pinch off the fuel line to stop the chopper, and it puts added strain on the clutch during starting.

Once the idle is properly set just below clutch engagement at low throttle, low trim, we look for liftoff at half or five-eighths stick (high trim), whatever throttle it takes, and full throttle (high trim) at full stick. By bringing in the throttle as soon as possible we are achieving a nearly constant rotor speed for a longer period of time, thus giving smoother collective pitch changes. We are also getting better cyclic control on descents to landing because our blades are still turning near normal rpm, and because of this, we have less mixing (or tail rotor) changes to worry about, since torque is staying more constant.

We stated earlier that the perfect setup was to provide the best possible correlation of throttle and pitch. We've covered half of the subject (throttle positioning throughout the full range of throttle travel). As we discuss pitch, keep in mind that *no matter how the collective pitch is set up, the throttle arrangement we explained always stays the same.*

We have to speak about pitch in relative terms, because pitch varies with each helicopter's weight and the altitude at which it is flown above sea level. For our examples, we will hover at +5° pitch, which will be half to five-eighths stick on the transmitter.

The greater our collective pitch travel is, the more sensitive the feel will become. If we fly from −3° at idle to +5° at hover, and +10° at full throttle, we are likely to have a very sensitive helicopter when collective pitch is changed (13° total collective). Going to the other extreme, if we have +3° at idle, +5° at hover, and +7° at full throttle, the helicopter will respond rather gently to collective pitch changes. (Assuming we continued this trend, we would eventually have a fixed pitch situation where

lift is purely dependent on rotor speed.)

Now, if we were flying full-size helicopters, we could let the pilot add or decrease throttle as necessary to maintain blade speed in either of the above examples. Unfortunately, we have to depend on servo throws and work from arcs of the servo. What we end up with is that the first example (13°) will maintain a more constant blade speed than the second (4°), the reason being that as we approach idle we want the least drag possible (say 0°) because less drag will allow us to maintain a higher blade speed. Two degrees pitch at idle gives higher drag and a slower rotor rpm, the exact situation we are trying to avoid.

What you must do is experiment a bit and determine the most collective throw you can use without getting it too touchy. As another example, we were flying a setup last winter that had a good deal of collective pitch and nearly constant blade speed. It would almost fall out of the sky on full low throttle descents, and we could "jump" it off the pad to a hover. We flew it this way for a few weeks until we tired of the concentration it demanded for precision hovering. So we reduced overall collective throw by a few degrees and compromised blade speed and "hot dog" performance for ease of flying.

An additional aspect of pitch is the amount of pitch below hover and the amount above hover. As we said before, the number of degrees below hover (i.e. -1° to +5°) will influence blade speed on descents and determine the quickness of the descent. Basically, you can determine what feels best for your style and set it up that way. The degrees above hover will be determined by the strength of your particular engine. If you have a wheezy engine you won't want to run 10° of pitch at full throttle; you'll have to settle for 7° or 8° at that point. Conversely, if you have a strong engine you'll have to put enough pitch at the top end to prevent excessive overspeeding of the rotor disc.

In regard to actual execution of what we've just explained, the throttle and collective pitch adjustments must be located independently of each other. In a Jet Ranger, use two servos, one for collective and one for throttle. In a Heli-Boy, use the linkage that allows the throttle rod to be moved separately of the collective rod, even though they use the same servo.

Use servo *wheels* with many holes (*a la* Kavan). Never use "T" arms because they don't offer any flexibility using different arcs. If you can't find a wheel output arm with lots of holes, drill your own, it's not difficult to do. We've included some sketches that show how to make best use of the various arcs on the wheel for desired setups. Study them and you'll know where to start from on your helicopter.

In conclusion, open the throttle barrel as soon as possible to get the blades rotating as fast as possible at low throttle settings. From idle to hover, use the largest pitch change you can without getting it too touchy. From hover to full throttle, use the degrees of pitch that your engine asks for . . . enough to prevent overspeeding, but not so much that rotor speed decreases upon application of full throttle.

To keep you thinking, we can also vary this blade speed-pitch sensitivity compromise by using different types of rotor blades. Maybe we'll look at that next time. •

Fuel Lines . . . *Continued from page 34*

and you'll begin to get an idea of a few of their many possible uses. Yes, but what about that dumb piece of plywood? Well, pieces like that are great for cushioning the backplate surface of a crankcase when you use a mallet to initially free a crankshaft from a case, etc.

The final picture (No. 3) contains practically all store-bought tools. First, let's talk about the screwdrivers. A good screwdriver is an absolute must! Unfortunately, a really good one is almost impossible to find. There are a great many screwdrivers on the market, but just about all of them are junk. They're junk because the tips are not hard enough, and they are not precision ground. An exception to this is the set of six small screwdrivers shown in the plastic case, about $5.00 from K&S Engineering. For heftier grips, try to locate some electrician's thin-blade (cabinet tip) screwdrivers made by Hunter Tools. Stock numbers 30320, 1/8-inch tip, and 30328, 3/16-inch tip, are shown in the upper left of the picture. Less than $2.00 each. Above all, remember that the blade tip must fit the screw slot exactly.

In addition to screwdrivers, you may want to buy some nut drivers and hex drivers. The 3/16 and 1/4-inch nut drivers in the center of the picture are commonly used sizes. They're less than $2.00 each and they're optional but nice. Hex drivers are also optional. Hunter has a nice fractional set of five for about $12.00, stock number 12105C (5N-C).

Assuming you opt to use this amount of money for other "must" tools, you will need some Allen wrenches as shown on the upper right. They're in the 50¢ range at Sears and Roebuck. Buy the fractional or metric sizes to fit the machine screws of your engines.

While you're at Sears, look at the small combination "ignition wrench" sets in either standard or metric sizes. Ten-wrench sets are about $10.00. A couple of these small box and open-end wrenches are shown on the right. Some Sears stores sell them individually, as do good auto parts stores. One or two to fit your engines are a must to properly grip small nuts such as those on carburetors or needle valve assemblies.

Another very desirable tool is a pair of curved nose forceps. They're really great for holding wristpin retainer clips. Electronic/radio shops have them, $5.00 to $10.00 depending on quality.

Included in the picture is a bearing puller (lower left corner). If you have a rear bearing that's stuck on a crankshaft you'll need one of these. I'd suggest that you hold off buying this tool until the need arises, then take your crank and stuck bearing with you to an auto parts store. They'll sell you the right size tool for about $5.00 or less.

Those things that look like very thick-walled sleeve bearings in the bottom center of the picture are machined from aluminum. They're used to drive ball bearings onto crankshafts. You can make some from hardwood doweling also. I'll tell you how to use another makeshift tool in the future article on ball bearings.

That about covers the tools you'll need to work on your engines, except for one which was not included in the pictures because of its disproportionate size. This is a "must" tool: a propane torch. You can buy a propane cylinder and pencil flame burner for about $8.00 at most any hardware store.

There will be other things you'll need such as steel wool, toothbrushes, detergents, WD-40, etc., but they'll be discussed as needed in each forthcoming article.

By now, you may have concluded that I really goofed by not including a single pair of pliers! You're right, I didn't! Intentionally! More engines have been abused by pliers than probably any other tool. After repairing literally thousands of engines, the thought sometimes occurs to me that the first tool many modelers grab is a pair of vise-grip pliers. An animated engine would have to say "Ouch!" at the mere mention of pliers. Now, this is no claim to absolutely refusing to use pliers, such as needle nose, during engine work. However, the use is extremely judicious. In fact, tweezers usually work better. You might want to include a pair in your tool chest.

Let's close this engine tool review with some sources of tools and tool catalogs.

Sears and Roebuck Power and Hand Tool Catalog (Free)

Brookstone Hard-to-find Tools (Free)
127 Vose Farm Road
Petersborough, NH 03458

Hunter Tools (Catalog 95000, Free)
3575 Hempland Road
Lancaster, PA 17604

K&S Engineering (25¢)
6917 59th Street
Chicago, IL 60638

Tools, Supplies & Equipment for
Craftsman (Catalog 795, $2.00)
Ernest Weiss Co.
Jewelry Mart
607 South Hill Street
Los Angeles, CA 90014

I suggest writing for each of these catalogs. Don't cross off the last one because of the $2.00 fee. It's a superb catalog. Be sure to ask for a current price list with this catalog.

Next month, we'll start taking engines apart. •

Sport Scene . . *Continued from page 47*

an O.S. Max .15. Hurst seems to have a limitless supply of these magnificent models tucked away! I suspect that he could triple the size of Flyline's catalog (if it were judged financially feasible) without having to design anything new.

Our final photograph this month is a really neat product you should consider. I have, use, and enjoy my Dremel tools, but one accessory in particular has been a problem. The small, abrasive cutoff wheels they sell are brittle. I think they are even dangerous if you fail to use eye protection. To the rescue comes House of Balsa with its "Tuf-Grind" grinding wheels. These are some sort of carbide impregnated fiber laminate which just won't break. Don Dombrowski demonstrated their capabilities to me by cutting through a 3/8-inch drill shaft. You can cut with the edge or use it to shape and grind on the face. You still better use eye protection whenever you use *any* power tool, however. Any high-speed tool will throw grit, and even your workpiece if mishandled. The way you find out that it is mishandled is if it is thrown, and then it is too late to put your glasses on. Anyway, these wheels look like a genuine step forward in modeling tools and have a wide variety of possible uses.

Larry Renger, c/o RCMB, 621 W. 19th St., Costa Mesa, CA 92627. •

Pylon . . . . . *Continued from page 17*

everyone, but coupled with Murphy's Law and dumb-thumb brain fade, in two days the lucky (?) number of 13 was taken from the ranks of the 45 models that started. Jim Maki's beautiful Polecat, which won the best finish award at the Nats, is now sleeping with the gods. Dennis O'Brien's brand-new gold leaf Polecat with airbrushed murals had an encounter of the other kind with Bob Violet's Polecat at pylon No. 1. Two Polecats coming together don't make a Polekitty. No victors! Bill Williamson with his brand-new super LR-1A is still scratching his head, trying to overcome the gravity of pylon racing. Bruce Richmond must have built-in magnets in his new Polecat, as he found metal on the runway just after rounding No. 2 pylon. Other crashes in between, and last but not least, Bill Hager certainly must have a feeling now for the number 13, as he ended all of the gods' tricks on Form I pilots in the last flyoff heat in the contest! All of the goodies (few) were extracted from the sweepings of these overly rekitted planes and will emerge again to do battle in another brand-new bird.

Old racers never quit, they just go on and on and on. On Saturday (Sunday was a gentle day) this writer, on the line taking photographs, witnessed three planes make a beautiful takeoff, when suddenly, about three feet off the ground, two were directly replanted back on their landing gear, as abruptly as

they took off. More zeros-ville. Shortly after this, there was a pilot's meeting to decide whether to continue or wait for the wind to subside. Now I ask you, have you ever seen a Form I racer quit? The race went on. This is not to say all was bad. Contrary to what it sounds like, only some (13) had bad luck. Others had Lady Luck, skillfully piloting their aircraft, heat after heat, landing after landing, knifing through the wind, all day Saturday to race again on Sunday.

After Saturday's racing, the victors (all pilots are victors, only some planes remain at rest) returned to the Ramada Inn for the yearly evening banquet and presentation of awards to the top five point leaders for the year and the best finished Form I of the Championship race. It began with the usual bending of elbows and ears, followed by an excellent meal of great variety, leading to the awards of the evening. The best static finish award was given to Dave Latsha for his Polecat, followed by awards given to the top year-end point leaders. The first five were: 1st Dave Shadel, 2nd Tom Christopher, 3rd Tom Castellano, 4th Gary Hover, and 5th Dave Keats.

Much too soon, the following morning came with the usual grunts in the motel hallway, "See you at the field." Once again everything became stone sober . . . full race! . . . go for it! It's now or never! Another great day of Form I racing. The good side of Mother Nature. A perfect day. All day! The pits screaming with the exotic sound of Form I engines and undertones of "Did you see me pass him?" . . . "I knew I could go fast, if only I didn't have two zeros." . . . "If I keep this up, I will be in the top five." . . . "Who cares, I'll get them next year." . . . "Why didn't I turn the switch on my glo plug driver?" . . . "I could have won that heat." . . . and the soundless prayer of Tom Christopher, just one more time. And Tom Christopher emerged the number one NMPRA Formula I racer for the 1980 Championship. It's all over for another year.

The top 20:

1) Tom Christopher
2) Greg Doe
3) Dave Shadel
4) John McDermott
5) Brian Richmond
6) Dave Pearce
7) Bill Grove
8) Laird Owens
9) Glen Sicotti
10) Bob Wallace
11) Bob Reuther
12) Lew Hipkins
13) Dave Latsha
14) Robert Schuster
15) Bill Hager
16) Gary Hover
17) Bill Preis
18) Ken Hulik
19) Tom Nay
20) Gail Jacobson

R/C Cars . . . . *Continued from page 37*

have so completely taken over in R/C car racing. While at it, he also revised a couple of other sections, as well as adding a few comments about R/C vehicles just recently released.

So, to pick up what I regard as an excellent book on R/C cars, ask at your shop or raceway for *Model Car Racing*. If not available, write to Chilton Book Company, Radnor, PA. The book costs $5.95, including another $1.00 for postage and handling. And, yes, that is the complete address for Chilton . . . Radnor must be a very small town. . .

NEW DIFF FROM THORP

John Thorp now has available a ball-type diff designed especially for the Associated RC300. I have one and it is installed on our RC300, but we have not yet run the car with the Thorp diff as of this writing. All I can say for sure is that the Thorp diff did go on the car a lot easier that Associated's own gear-type diff. In the pure conjecture category, I suspect that, compared to the geared diff, the limited slip adjustment will be easier, the setting less likely to change, and that overall reliability will go up.

Best news is the price: only $85.00, ready to go on the car, including a pair of Thorp rear wheels, mounted with ready-to-race, trued rubber. I have had really excellent results with the Delta ball-type diffs, so if you are considering adding a diff to your RC300, John Thorp might just have the item you need.

John also has a new 1/12-scale electric car rolling chassis, fitted with ball bearings all around, his own diff, glass chassis, aluminum power pod, and so on. I'll have more about the car in next month's column. In the meantime, for more information you can contact Thorp Manufacturing, 380 South East End, Unit H, Pomona, CA 91766, or call (714) 622-6518. •

Pattern . . . . . . *Continued from page 29*

I look to see some strong evolutionary work in the next few years, if the trend toward more complex maneuvers continues. For the present, I still feel that light weight and neutral flight characteristics are the most important factors in design.

Enough daydreaming, now let's take

MANTIS... It's Alive!

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- **CONTAINS NO METRIC PARTS** – Spare Parts Are Readily Available!
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a new maneuver and look at it closely.

THE SQUARE HORIZONTAL EIGHT

Look at the sketch and read the rules in the book. We start this maneuver low (50 feet) and look for a reference point for the center. Try to hold perfectly still and move only your head when following the flight path. This will help keep the loops oriented and equally sized.

Try counting to yourself slowly (one-thousand-one etc.) as you pass the center of the judges' view. On the count of three, pull up and climb vertically till the count of six, then pull to inverted and cut power quickly to low throttle. At the count of nine pull into a vertical dive and when you reach the starting altitude, push to inverted and apply full power. Don't wait for the count of twelve before this last corner! Start counting again and push to a vertical climb on the count of three and again to level flight on the count of six. If all goes well, at the count of nine you will be back at the center and ready for the quick power cut and a vertical dive. Recovery is again at the starting altitude. The reason for the counting is to give you a comparison of size vs. time on each leg of the maneuver. If your plane has bad acceleration you had best keep the corners wide and try for a smooth look . . . also keep the speed up. If possible, always go for the largest size maneuver you can fit into the frame. The limiting factor is usually (you guessed it) low speed thrust available.

The most prevalent mistake in this maneuver is a failure to insure that the wings are exactly level prior to each turn and immediately after each turn. If you fail to hold the wings level, the headings will definitely wander. Use rudder, not aileron, to hold wind drift if at all possible. An exception to this is that you can slightly tilt the wings on the climbing portions to counteract side drift from a crosswind. This will point the plane into the wind when you pull to horizontal if you tilted the wings the correct way. Correct immediately to level the wings. This may sound tricky, but if you try it a few times you'll like it.

Next month we will try to hold our discussion to flying. Thanks for being a good listener.

Dick Hansen, 5269 Lucky Clover Lane, Murray, UT 84107. •

1 to 1 Scale . . *Continued from page 11*

Certainly this has got to be one of the most exotic aircraft ever built. Don's version is 1"=1' scale. This results in a model some eight feet long, with a 55.5-inch wingspan.

The other particulars of this effort include two K&B 7.5 engines turning Midwest fans. The estimated weight upon completion is 16 pounds, to be carried by some 1800 square inches of area. The structure that you see in the photos will be covered with a balsa skin, then two-oz. and 3/4-oz. cloth. Rhom retracts have been installed and Don expects to use eleven servos to make everything work.

Don has completed some excellent documentation for the project, and without a doubt, one quotation from the material fits the SR-71 beautifully. It is referred to as "menace personified." We'll look forward to filling you in on later chapters of this story.

MORE STUFF AND THINGS

Just a profound "thank you" to the number of people who have written over the past year, letting me know that these monthly excursions into whatever it is that we do have been enjoyed or useful. I was especially interested in the several who took time to write about the manner in which we covered the Ottawa experience.

Another thought of interest was the volume of mail that came concerning Skip Mast's C-130. There must be a bunch of people out there with a lot of spare engines and a balsa wood jungle in their backyard. At any rate, thank you for your concern and support.

A POINT TO PONDER

Every now and then a thought surfaces in the scale community concerning some of us who continue to campaign the same old precision scale models year after year. Generally, when this thought is expressed it is followed by the statement that "there ought to be a rule . . ." You know, one win and out, no more than two years, etc., etc., etc.

I suspect that it's natural that I tend not

to subscribe to the idea. I'm confused because the reason that is often given is that new models need to be infused into the system. Why this might be true is a mystery to me. Surely it can't be that someone has created the ultimate model and nobody can possibly win against it. If a model is competitive, the time element should be of no consequence. When the better model comes along it will win, period. I suspect there might be one somewhere, but I can't think of any competitive sports or hobbies that rule the top competitor out because he or she is still winning. Let's see; Pittsburgh won the Super Bowl last year, therefore they are required to start over with a new team this year. The golfer and his clubs, the bowler and his ball, the dog owner and his pet pooch, or the car owner and his 1920 Whatchamacallit.

Aside from the fact that it takes a year or more to creat a new model for competition, there are some other ironies in the suggestion. Frequently, scale modelers are accused of not knowing their models and that they are unable to fly them well because they don't know them. Perhaps we should say to our pattern brethren that they must change models each year because they are getting too good with the model or style they have been using.

A second irony that occurs stems from the fact that whenever I read about this concern, it is applied to Precision models only. If you look around you'll find a sizable number of models that have been campaigned for quite a few years. Perhaps those who would like to limit the competitive life of a scale model would wish to include *all* scale models? Also, you'll discover many modelers who specialize in building a specific model subject more than one time. This occurs not only in the kit field but scratch-built area as well. Come to think of it, when a modeler shows up with his Widget 10 and relates that it is not the same one he campaigned last year, what do we do with the rule then?

Well, so much for emotion. The name of the game is competition, and that is building a better mousetrap and using it better than your competition. All you do is build a better model than the one that the other guy is currently winning with. When one looks at the continual and ever-escalating evolution in the scale field, you'll never convince me that phasing out models will not happen naturally when they are no longer competitive. The argument that limiting the competitive life of a model would bring new models into the system at a faster rate, is suspect to me. How many persons are there who are willing to put several years of research and a couple more building a model, knowing that if it wins a contest or so it must be shelved, never to compete again? That's a whale of an investment in time, energy, and money.

Lastly, it seems to me that when I hear this comment concerning limiting the competitive life of a model, it most often comes from either (A) persons who have never built one for competition, or (B) persons who like to watch them or take pictures of them.

Then again, I might be (A) all wet, or (B) too prejudiced. Anybody want to sound off on that?

HAVE YOU TRIED?

Your local hardware store will likely have an assortment of flexible sanding pads that help knock off those high spots that creep into your building. They mold nicely to the contour of an airfoil and curved fuselage side. Some are rather thick and not as flexible as I'd like, so I slit them in half and thin them down a bit.

Looking for a long, straight sanding block? Try the bottom surface of a piece of cabinet door track. You can buy a roll of sandpaper and contact cement it to the aluminum. It's great for truing leading edges that have wandered too far out of plumb.

Buy a package of spring type wooden clothespins for your wife and then borrow some for your workbench! They make dandy clamps, but remember to put a scrap of wood over the parts to be clamped to not only help distribute the pressure, but to make sure you don't dent the important surfaces. And don't forget that they can be trimmed into custom shapes very easily with your handy model knife.

You say that your building table is over the hill? Check that local lumber yard for an interior hollow-core door. Don't buy a first rate, brand spanking new one because almost always the yard will have a second or two hanging around that they will sell for a buck or so. Check to make certain that they are true, straight, and flat. Also make certain that they are true wood and not one of the wood substitutes of a masonite type, since you just can't push pins into some of them (unless you are King Kong). The "table" will last for several years, and remember, there are two sides to use.

While you are in the same store, pick up a nice big piece of soft foam. A three-inch-thick piece is fine, maybe two or three feet square. When you get down to the final sanding period, place it on your workbench to prevent building in creases, dents, and the like. An old throw rug can help too!

AND ON TO '81

As we begin a new year we can look forward to a continued expansion of the wonderful world of R/C scale. New trends and challenging subjects help to make it so. Kit offerings are reaching very highly sophisticated levels, making it possible for modelers of even moderate experience to produce a super model that will fly well and satisfy every need.

As we look at subjects like Tom Cook's beautiful F-4 twin ducted fan project and consider Don Allen's SR-71, we realize that the parameters once set for the hobby/sport have dissolved and that the horizons beckon from a distance. The longing look at some types of aircraft that at one time might only reach the dreaming stage can now be brought to fruition.

Events, both formal contests and the less complicated but most satisfying fly-ins, continue to multiply. They have become well-thought-out and well-attended programs that serve to whet not only the appetite of the modeler but the general public as well. The Southern

California Scale Squadron through the hard work of its membership and several other clubs around the country, have produced a viable, workable plan for national competition. Their expansion of the idea in 1981 bodes well for all modelers, whether they be viewer or competitor. This year they will end with a tournament in Kentucky.

As the scale snowball lumbers on, each of us involved in the scene can only hope that we can maintain the enthusiasm and purity required to keep scale growing. Whether it be competition or sport that our scale efforts are directed toward, let's resolve to keep it an interesting, challenging portion of the hobby/sport.

Bob Underwood, 4109 Concord Oaks Dr., St. Louis, MO 63128. •

Giant . . . . . *Continued from page 15*

been one to baby a plane, and a Cub, doing bang-around-the-sky maneuvers at scale speed is just plain pretty. Loops, rolls, stall turns, snap rolls that turn into spins after about 1-1/2 revolutions (same as the real thing would do) . . . not the kind of flying some white-knuckled student would do, but definitely within the full-sized plane's capabilities in the hands of any aerobatic pilot.

Anyway, after this tomfoolery, it was time for the icing on the cake. A touch-and, oops, 'scuse me, SPLASH-and-go. Wheel onto downwind, reduce power, turn base, final turn, level out in a perfect glide path to touch down right in front of us. Ten feet high, start to gently flare . . . three feet, flare a little m-o-r-e . . . one foot, m-o-r-e back . . . six inches, FULL back, and from six inches plop gently on in, as pretty a full-stall splash-down as any full-scale pilot ever did. (Applause, "Aw-right's," "Thas purty-purty's.") Stuck-up pilot, condescending smirk on face, chest expanding, pushes throttle forward and eases off the up-elevator to "show the troops how it's done again."

Spray flying, up on the step, (pilot's sneer widening), high speed, rocking gently forward, full power now, float forward sections touching, really moving now . . . KERSPLASH!!! A terrific geyser of flying water completely obliterates the plane! WHATTHEH---!!

When the spray clears there is the ridiculous vision of the plane floating perfectly straight up on its nose, supported by the wing and the float tips. Total shock registers on pilot's face, color drains out, chest deflates explosively (pride goeth before a fall!), and after a few seconds, he whimpers, "What did I hit?"

"Nothin', you turkey, you just forgot to hold up-elevator, and the float tips dug in!" Long silence. "Oh."

A quickie retrieval and inspection reveals no damage whatsoever, and just a little water in the cabin. Of course, the engine is totally waterlogged, and we quickly learn one more thing about a Quadra. It WON'T run when it's wet. The ignition system must be totally dry before it will run, and that means a total teardown and blowing out. Spark plug, plug lead, coil, and points must be completely blown dry, and the engine completely blown free of any water in the crankcase and cylinder. Not at all difficult, but definitely necessary immediately.

While Ken and I tended the drying out, Paul fired up and taxied out. It was immediately apparent that a water rudder is an absolute necessity on these big birds. Even on a calm day like this, Ken's L-4 was totally unresponsive to the air rudder. It went straight, period. Paul's Champ, with a nice big water rudder and no float sub-fins, turned very nicely within its own wingspan.

After taxiing around a bit, checking out the water handling characteristics, Paul turned into the wind and added power. He added power in several steps, with the result of one of the prettiest, slowly accelerating, spray-flying takeoff runs any model has ever made. The floats could be heard slapping the slight swell, and after about a 75-yard run, a little additional up lifted the floats clear of the water. The Champ, water streaming off the rear of the floats, climbed out to another picture-perfect test flight. Neither Ken's nor Paul's plane required the slightest change on these flights, with the exception of a little more up-

elevator trim on Paul's.

After the obligatory feeling-out and camera passes, it was Paul's turn to show how it's done. Set up on downwind, base, final, onto the approach just right, just a little steep and fast, "Gonna be a long flare-ou . . . "KAWHAM!! "My God, she's 20 feet high again!" "POWER!!" "Hey Paul, you forgot to flare!" "You're telling ME!"

The next approach is a whole bunch more cautious, and is perfectly executed. Taxi back to shore and slightly gunning the engine at the last second gently skids the floats about halfway up onto the sand.

Post-flight inspection after that super-hard bounce showed absolutely no problems at all. This was mute testimony to the ruggedness of Paul's floats, his mounting system, and to his highly refined modifying of the basic Nosen kit. It was also a dramatic statement of the forgiving nature of seaplane flying. Had the same kind of impact happened on land, the gear would have probably been left on the end of the runway, and other structural damage. With floats, the plane was just catapulted back into the air.

After having both provided me with a tremendous amount of entertainment on their respective first flights (remember, my bird wasn't finished yet, so I wasn't in a position to offer them revenge), Ken and Paul settled down to some serious fun. Ken's model dried out with no problems, and he resumed flying. Both guys started showing what good pilots they really are, and I spent the rest of the afternoon watching and photographing scenes that would bring tears to the eyes of even the most hard-to-please modeler.

All I can say is that you should have been there. A jewel of a lake reflecting miniature aircraft making long, graceful takeoffs and touchdowns, one after the other. The mirror surface of the lake being gently creased by the float-tails tip-toeing onto the water, followed by a long, graceful slide culminating in a shower of sunlit diamonds as the plane slows and slips off the step. The shower slowly subsiding until the plane is just gliding peacefully through the water at a tick-over idle with all the grace of a white swan on a lily-pad pond.

Then the roar of power, heavy spray flying until the plane climbs up on the float steps, delicately balancing there, climbing to flying speed. The spray here becomes a gossamer veil shooting sideways, sparkling as the drops shatter the surface behind the plane. After the floats gently part company with the water's surface, water streams off the rear of them, sparkling diamonds that dimple the lake surface long after the liftoff point. The effect is that of water softly letting go of the plane, then tenderly waving "Good-bye . . ."

A beautiful day, a beautiful lake, three good friends, two magnificent planes in total isolation without a single political consideration in the entire world. No flying site problems, no hassling neighbors to worry about, no frequency problems, no aircraft trouble, and just enough hilarious mistakes to add spice to the day. Absolutely spectacular late-afternoon light turning every spray drop into a sparkling diamond, and the lake surface into a shimmering mirror. The day finishing up in totally successful flights, and a tired but thoroughly happy group taking all planes home intact without repairs to be made. Modelling distilled down to its purest, most enjoyable form. By far the most totally enjoyable, satisfying day's modeling that I have had in the last five years . . . Even if that fellow Runestrand did finally hand me his transmitter only 30 seconds before the engine ran out of gas on the last flight of the day!

★ ★ ★

Flying seaplanes is a refreshing change of pace from our normal flying, and with a little thought, most of the planes we are flying today can be modified so that they can be flown either way, simply by switching back and forth from wheels to floats. For most planes, the wheels can be removed from their axles and floats attached on those axles. A rear mount then goes from the float rear attach point to a mount on the fuselage. There

are literally dozens of different methods of doing this, so I have to leave this up to you. An entire book would be required to detail these.

When you mount your floats, regardless of method, only three things are really important. First, the float mount must be *rigid*. "Shock absorbing" float mounts that allow the floats to wobble will cause extremely poor water performance.

Second, the float angle is important. With your floats sitting on a hard surface, resting on the steps and tails of the floats, the airplane must be at slightly more than a normal takeoff angle. This will normally mean that with the wing chordline at 0°, the float centerline (water line at rest) will be 2-3° negative, or front tips down. If this angle is too flat (float tips too high), the plane will not be able to rotate enough on the float steps to get to takeoff attitude. If it is too great, then the fronts of the floats hang down, looking bad and causing poor aerodynamic effects.

Third, the float step should be one to two inches *ahead* of the aircraft C.G. Too far forward, and the plane will be skittish and directionally unstable when running on the step at high speed. The plane will tend to waterloop. Too far back, and it requires excessive up elevator to keep the front float tips from digging in, as Ken's did on his second takeoff attempt. This is one spectacular maneuver!

Float plans are available from Sid Morgan Plans, 13157 Ormond Dr., Belleville, MI 48111, or Taylorcraft, Ltd., 216 Willow Ave., Roseville, CA 95678, for $5.50 per set, postpaid. These are scale floats for nine-foot Cubs and Champs, or any similar size plane up to about 27 lbs. total weight. The Balsa USA Float Kit is a slightly slimmed-down float, good for planes up to about 20 lbs. T&D Fiberglass, 30925 Block, Garden City, MI 48135, has a set of fiberglass floats with extensive molded-in detailing. These are a little heavy, but would be OK on a lighter, powerful plane like Ken's. They are the same size as the Morgan floats.

If you readers show enough interest, possibly a separate float-flying article could be written later, going into good detail of the techniques. With all the flying site problems these days, seaplane flying offers some tremendous advantages and some real refreshing changes of pace. Try it, you'll like it!

★ ★ ★

Fellas, this report is already over the allotted length, so I have to end this quick. The emergency battery backup system I mentioned in my January column is about finished, about two more weeks' worth of work at this writing. And, in the next column I will stop dreaming about past glories and give an update on the current crop of landing gear designs. There is some pretty impressive designing being done. I will also talk about some slightly unusual tools that are completely indispensable once you use them.

One last thing. The International Miniature Aircraft Association is now in the process of holding nominations for its first slate of elected officers. We'd like to hear from YOU for nomination recommendations. Give me a call, *evenings only*, at (916) 786-2725 for this or any other questions. Also, I'd like to run some of YOUR pictures, comments, etc., and those can be sent to me at 216 Willow Ave., Roseville, CA 95678. I can use any kind of picture except color prints, and slides/negatives will be returned. For a written reply, please include the ol' S.A.S.E.

JOIN THE I.M.A.A.! •

R/C World . . . *Continued from page 13*

immediately turns a former fun event enjoyed by the grass roots, "Sunday" fliers, into a dead serious, win-at-all-costs, experts-only dog fight. Once nationalized, the fun-racers will have to go in search of another new category.

R/C Soaring has been allowed to sit on its own laurels for another two-year period, with only one "loose-ends" proposal. This one, which passed the initial vote by 9-2, would allow the Standard Class glider to use either aileron or rudder for directional control, but not both, coupled or otherwise.

It was unanimously agreed by the board that Sport Aerobatics needed a clear definition of an attempt, and of an official flight. Not so simple to vote on were two more proposals for Sport Aerobatics. Both were so involved and contained so many proposals within proposals, that most board members (8-3) probably just threw up their hands and said "OK," as we did.

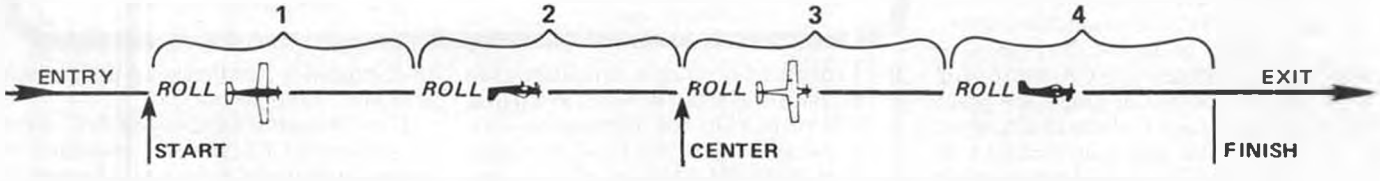
Even though it's the oldest R/C event in existence, Pattern still manages to invite its share of proposed changes in each rules period. This time, it received no less than 46 proposals out of the total of 59!

Most of the pattern proposals came from one individual, and though his background in the event is somewhat limited in time, he has proven that a fresh look at old and "established" rules can often times bring up previously hidden areas of dead weight and confusion. In some instances, however, years of experience have long ago proved that some "new" ideas were not

so practical when put to actual use.

One proposal with which we heartily agree (and so did the board, 8-3) calls for equal exposure between judges and contestants. Adoption of this measure would all but eliminate the misconceived joys of contestant judging.

Rolls, the Slow Roll, and 3 Horizontal Rolls. Although we agreed that the definition was needed, we strongly disagreed with the description given, which more or less put the model in the same position for each maneuver. Okay for the continuous rolls but not for the point rolls. In the point rolls, the model partially rolls and stops in an attitude, then partially rolls again and stops, etc., the required number of times. Graphically, it appears as shown in the sketch. Each portion of the complete 4 or 8-Point Roll consists of rotation plus a moment of straight, horizontal flight. At the end of the inverted moment of flight, the model has completed 2 (or 4) of the segments of the complete maneuver. The last point includes the rotation to upright *and* a moment (same length as the others) of straight flight . . . *followed by* the straight and level exit! Keep in mind . . . that last portion of straight flight is *two* things . . . it's the last *point* of the maneuver *and* the straight and level finish, as in every maneuver. Remember, the straight and level entry is *not* a part of the actual maneuver, nor is the straight and level exit. Therefore, the center of point rolls is *not* in the *middle* of the inverted flight, but at the *end* of the inverted flight, just as the wings break into the next rolling segment. Think about it!



Another significant proposal eliminates flight time limits, agreed to by a bare margin of 6 to 5. This really makes sense, as once the timed engine start is accomplished, and with a maneuver required on each pass, controlled flight time is practically automatic. Would save a lot of extra work at the flight line.

Two proposals from long-time pattern flier Bob Noll, make sense. One is to eliminate the automatic progression from Expert to Master, making it voluntary to join the Masters level. Most R/C fliers will never reach the skill level required to really compete in the Masters class. The proposer feels they should be allowed to stay in Expert and remain competitive, without having to devote the time and travel required to be competitive in Masters.

In his other proposal, Bob suggests deleting Pre-Novice, but at the same time, requiring that the Novice event be flown with fixed (or unretracted) landing gear, and no tuned pipe. This one barely made it, but we hope it gets more support.

A proposal that earned only three supporting votes, and of course lost, was to eliminate the entire Section 38 deal-

Continued on page 102

Plug Sparks . . *Continued from page 43*

a Genie .29!!

With 38 entries, results looked something like this:

TEXACO
1) Jay Humelbaugh (Trenton Terror/Genie) 29:33
2) Terry O'Meara (Scram/Cannon .35) 26:02
3) Art Watkins (Buccaneer/Madewell) 23:53

PYLON ABC
1) Bruce Chandler (Aero Champ/Black Knight .10) 12:45
2) Terry O'Meara (Alert/Torpedo .29) 10:29
3) Wes Weathers (Playboy/Black Knight .15) 6:42

CABIN ABC

1) Larry Clark (Miss Delaware/O&R .60)	8:43
2) Andy Faykun (Dodger/O&R .23)	7:16
3) Bruce Chandler (?/Cox)	5:07

COMMERCIAL RUBBER

1) Wade Wiley (Gordon Light)	7:30
2) Andy Faykun (Orr Chief)	7:17
3) Ken Sykora (Sparky)	(!) :03

O.T. RUBBER

1) L. Dewitt (Jeffries)	14:47
2) Wade Wiley (Casano)	9:07
3) M. Mikkelson (Naudzries)	8:20

The Commercial Rubber results show that Ken Sykora has found how to make a Sparky climb vertically at 120 mph. Trick is to make sure it does not contact the ground. Haw-w!

SAM 7

The *Yankee Newsletter* reports that three SAM 7 contests in a row have suffered from winds of 30 mph or better. Is that ever rough on the free flight models!

As a matter of fact, as Tom Lucas sez, if you thought June was breezy, then July 16 it just plain BLEW! With 11 entrants, no official flights were posted in the Cabin Gas or Pylon Gas events. The glider and rubber events were fairly well entered, but on the average only two per event finished out their flights. Our hero, George Armstead, proved to be the real die-hard modeler as he busted up his entire stable of models built during the winter! Ouch!

The East Coast Champs was another contest plagued with heavy winds. Those who flew on Sunday enjoyed a perfect day. Is there a moral here somewhere? Jack Whittles goes on to say the Twin Pusher event was the best of all from a spectator standpoint. Danny Sheelds, with his stentorian voice, could be clearly understood a half-mile away with his instructions of, "Gentlemen, wind your motors," and finally, "One-Two-Three-Launch!" Mike Poorman outlasted five other twin pushers to win.

Rather than publish the results of the East Coast Champs, we would like to feature some comments by Ed Heyn, 30 Marion Ave., Norwood, MA 02062, to wit:

Have been meaning to write for some time now, but there always seems to be a ship to finish for the next contest. I have been reading your column in **R/C** *(ugh)* **Model Builder** *for quite some time and except for the emphasis on R/C, I think it's great. As a 100% free flighter, it does seem as though we get the short end of the publicity stick.*

This columnist would like to interject right here that as he has repeatedly noted, his column is no better than his sources. With the majority of the material submitted being R/C oriented, it is no real surprise to find the column this way. There is simply no way to print news of free flight activities if you don't have it!

Photo No. 11 shows Major (ret.) Ed Heyn with his KGS. He goes on to say:

What prompted me to write was the presentation of the KGS plans in the December 1980 **RCMB** *issue. I have been flying a KGS for some time; in fact, this particular KGS was built in 1966! It is presently being recovered, as the finish is deteriorating. The KGS has been one of the most consistent flying machines. It maintains its trim and flies the same pattern wherever flown. At the moment it is powered with an O.S. .20 glow as I do not have an ignition motor to fit it, plus SAM 7 does allow glow with properly handicapped motor run.*

The only change I have made in the construction was to incorporate the bottom portion of the rudder below the stabilizer into the sub-rudder. This allowed for a flat stab mount and provided a hard point for the bottom D-T peg and snuffer tube. As you say, the planked fuselage takes a little longer, but mine still looks good after 14 years of flying. I recommend the KGS as a good competition ship.

SAM 8

As reported, we are so far behind on Chapter reports that this columnist is culling the best info (in his opinion) from a flock of SAM 8 newsletters so kindly sent by Tom Cope, 23262 S.E. 57th St., Issaquah, WA 98027.

One gem of information worth passing on comes from SAM 8 member Bob Petro, of Coeur d'Alene, Idaho, who makes the following remarks:

Just finished reading the July SAM 8 newsletter and was pleased to see the Snuffy VI plans. Clarence Haught built one a couple of years ago and powered it with a .15 glow engine. It was a good flier but was inconsistent under power, which was the inherent problem of this design.

I remember when the design first appeared. Seems like everyone in Detroit built one and all had the same squirrelly climb because the small cross-section would allow the fuselage to twist. Some fellows tried internal bracing (Toft used planking) and some used double covering with Japanese tissue. The real cure was discovered by an unknown genius who cut silk on a bias for each quarter of the cross-section, getting an opposing grain effect. That did it! After that, the model couldn't be beat in its class.

Now how about that? Now you can be the first on your block to build a Snuffy VI as designed by Bob Toft.

Bob Schafer reports the SAM 8 O.T. meet featured quite a few broken wings, with Gene Bartell's Playboy getting nailed by a passing twister, Hugo Lung ruining the wing of his Orwick powered sailplane, and Ed Snowdon broke a wing during a D-T as the tail was only popped up at 30 degrees (45 degrees recommended). The model spun all the way down.

Regardless, everyone had a good time, with Hugo Lung's Zipper claiming first in Pylon and also high time of the day. Clarence Bull won the Gas Cabin and .020 Replica events, followed by Tom Alden in Rubber.

At this time, this columnist has to call a halt to SAM Chapter reports as he is rapidly running out of space. However, be of good cheer, we will continue with the news next month, as good news is never stale. We hope to feature more reports from SAM 8, 13, 18, 21, 27, 30, 32, 39, 40, 41, and 49. Whew! Are you getting the idea?

Before moving on to the next subject, we would like to feature a couple of photos from the Midwest. Photo No. 12 shows Harry Murphy, Editor of the Central Indiana Aeromodellers (CIA) newsletter, *Informer*, receiving a birthday cake from Bill Hale of the "Flying Frisbee Corps," more properly known as the Central Ohio Free Flight Club (COFFC).

"Dirty Harry" has done more than his share in writings to help publicize and restore Old Timer flying to a place of prominence in the various Midwest contests. With Wright-Patterson AFB available for six meets a year (through the generosity of COFFC), this has proved to be a tremendous shot in the arm for all free flight activity. In fact, it has encouraged other clubs to stage meets of their own, with the result that overall interest in Old Timers (particularly free flight) has been undergoing a renaissance of competition type meets.

The cake couldn't have gone to a better guy! The boys really appreciate his efforts!

Photo No. 13 depicts Chet Lanzo, of 1485 Lester Rd., Valley City, OH 44280, with his little-known pre-1938 design called the "Bomber." Actually, the model is nothing more than a diamond fuselage employing the same wing and tail layout of the Lanzo Record Breaker.

Last reports from Chester indicated plans would be ready sometime after the SAM Champs. Quite a few fellows are still waiting. How about it, Chet?

FOREIGN DIGEST

This section seems to gain in popularity as this columnist continues to hear from all parts of the world on Old Timer activities.

SWEDEN

We are indebted to Sven-Olov Linden, Hovstavagen 15, 70363 Orebro, Sweden, for sending us the latest issue of *Old Timer*, the official newsletter of the Swedish O.T. Club. Even if you can't read Swedish, the publication is full of illustrations, drawings, and cartoons that leave very little to the imagination. Well worth getting!

Sven-Olov also sends Photo No. 14, showing Sten Persson with a 1938 Swedish rubber model called "Prim." The original Prim was designed by the two Stark brothers, of whom Sune Stark was the first World Wakefield Champion in 1952. Sten, himself, is a well-known engine collector with worldwide contacts. He is also a very active flier, competing in most of the Swedish O.T. Contests.

SOUTH AFRICA

Received the latest issue of *Wings Over Africa*, which is an old line aviation magazine of 39 years vintage. The October issue carries a beautiful writeup on Old Timer activity, entitled "The Ancients are Active."

The article is basically the same as was featured some time back in this column, utilizing some of the same photos. The important point of the article is that it announces the tenth meet of the two-year-old O.T. movement! Can't say this is not catching on in South Africa! We hope to be able to continue with reports from South Africa.

ENGLAND

According to Ben Buckle, 9 Isley Crescent Highworth, Wiltshire, England, a new SAM Chapter is being formed. Actually, this comes as no surprise as SAM 35, as organized by Dave Baker, had over 135 members. The Chapter was decidedly unwieldy!

Ben hopes to take the standard *SAM Speaks* publication, add on their club activities, and reprint the entire newsletter. Sounds like SAM will be getting even more publicity in merrie olde England!

Also heard from Alex Imrie, 66 Tuffnells Way, Harpenden, Herts AL5 3HG, England, a noted WW-I researcher and writer, who has written a rather impressive article on Maxwell Bassett's Miss Philly VI claiming the original design was called V. If we can find room in a future column or an extra article for that matter, we will feature the findings by Alex. Real interesting stuff!!

AUSTRALIA

The Old Timer movement in Australia is also starting to take off like a scalded

cat. Max Starick, who writes for *Airborne* magazine in a column, "For Old Time Sakes," indicates that get-togethers, informat meets, and the real National events are taking on bigger attendance every year.

As we mentioned before, Mervin Buckmaster, Editor and Publisher of *Airborne*, is an Old Timer enthusiast himself. He freely admits he gets the best response from the readers on the O.T. column in his magazine. Do we love that!

Biggest problem Merv has been having is getting someone to draw plans for him that are suitable for publication and full-size reproduction for plan distribution. This columnist promised to help out and then promptly got himself swamped with other duties. However, we still have hopes Buckmaster will eventually start to feature Old Timer plans.

THE WRAP-UP

We used some of Bill Baker's comments before, so pardon us if we get repetitious. We simply can't resist some of Baker's observations about SAM and the SAM Championships, to wit:

The photos of Joe Konefes and Joe Konefes' brother, Ed, in your recent column on the SAM Champs in **R/C Model Builder** *reminded me of something I overheard that struck me as funny. Thought I would share it with you.*

Joe Konefes went up to the timing-registration desk where Bob Larsh, Contest Manager, was located. Upon seeing Joe, Bob exclaimed, "I know who you are. You're Ed Konefes' brother!"

This struck me as funny as people were falling all over themselves most of the day meeting Joe Konefes of Buzzard Bombshell fame. All day long, Ed was Joe's brother. Turn-about! Anyway, the best part of the fun at the SAM Champs was being able to meet the celebrities connected with the SAM movement like Wally Simmers, the Konefes brothers, Chet Lanzo, plus others I can't remember.

I got Chet Lanzo to autograph the propeller on my Lanzo Stick. That was a mistake because now I am afraid to risk flying it, and that prop is a good one!

Now how about that? This is the kind of stuff I like to publish, as some of the modelers stand in absolute awe of the real famous designers/fliers, when in reality, they are just like any other modeler enjoying this hobby. They are always glad to hear and/or talk to you. No fooling! •

Dormoy . . . . . *Continued from page 22*

The front cockpit cowl is a removable structure, made up with formers and 1/32 ply. Form this in place over the front of the fuselage, tack gluing the formers in place until the ply skin is formed and trimmed to shape. This piece is to be held in place at the front with two short 1/2-inch dowels which also align the engine section to the firewall. At the rear, use a couple of small "L" shaped metal pieces attached to the underside of the dash and fastened with a couple of No. 2 x 3/8 sheet metal screws into the side dowels.

Now build the wing. Make it either in one piece, or in two sections and join at the center. There is no dihedral, so you need a good eight-foot flat surface to build or join on. When completed, the wing must be mated to the fuselage booms. Take plenty of time here. Make up the attach fittings, which go on either side of the main wing spars at two locations on each side. The inner two are done first. Bolt the fittings to the top of the fuselage booms. Put the wing on so that the fittings are on either side of the front and rear wing spars, on an outward slant. There are 1/4-inch ply plates between the spars at each of these locations. With the main lower boom level with the building surface, hold the wing temporarily with small clamps at each attach point. Center the wing by measuring the wing-tip-to-fin-post distances, and at the same time, set in a 3° positive incidence in the wing, measured at the bottom of the wing. This gives an effective net incidence of around 5°, relative to the stab and thrust line. When you are sure all is right, drill through the mounting brackets and the ply mounting plates with a 9/64-inch drill. Then, using 4-40 bolts, secure the mounting brackets permanently to the wing.

Leave the wing in place, and make up

the lift struts from streamlined aluminum tubing, dowel, brass, and steel, as per plan. Bolt the lower end of each strut to the fuselage fitting on each side, then repeat the previously used technique to fix the outboard end of the strut to the wing. Watch to see that you do not have any difference in wing incidence from center to tip, as well as being certain that the entire wing is level.

Make up the jury struts. These must also be watched for effect on wing alignment. They attach at the wing with removable clevis ends. With this arrangement, the lift struts will ultimately stay attached to the wing at their outboard mounting, thus removal or installing the wing involves four jury strut clamps, two strut-to-fuselage bolts, and four wing-to-fuselage bolts. The struts are folded back into the wing center for storage and transportation.

After completion of these and all remaining obvious small items, you are ready to cover and finish. Super Coverite was my choice. This is used on all open structures, as well as wrapped around the fairings on the fuselage struts and the landing gear. Give everything to be covered a good coat of Balsarite. If you used the aluminum tubing around the tail surfaces, buff the aluminum with No. 240 sandpaper before coating with the Balsarite. Lap inside of the tubing with the first surface covered, then a good overlap with the second. This has proven to give very good bonding at these points.

Cover the aileron gap with fabric, at least on the upper surface. I did not do this initially, and aileron response was sluggish. After covering the gap, aileron response was substantially improved, becoming quicker and more positive.

Prime the fairings and any uncovered parts such as the front cockpit cowling with automotive primer, sanding between coats till smooth. For the final finish, I used Aerogloss silver with a small amount of flatting agent added, and sprayed it on. A couple of final coats of sprayed-on, slightly flatted clear dope will make the finish more resistant to smears from fuel and cleaning. Numbers and letters are flat black.

After finishing, assemble the parts and you are ready for the rigging. This consists of a number of 1/32-inch stranded steel cables or solid wire, all indicated on the plans. Several brass fittings will have to be procured or made up for the various attachment points.

The lift strut wires run parallel to the lift strut, from the fittings at the fuselage to the outboard ends of the struts. These are the only removable pieces of the wire rigging. These wires are attached permanently to the fuselage fittings, but at the outboard ends, a small loop of about 1/4-inch diameter is made and fitted over the end of No. 2 sheet metal screws projecting about 1/8 inch out of the fore and aft ends of the upper spar attachment piece. Rig these just snug. Removal is accomplished by taking out the fuselage-to-strut bolt and dropping it out of the bottom of the fitting. This relaxes the tension on the lift wires, enabling you to lift the loop over the head of the screw. Remember, on reassembly, to loop these over the screw heads first, then put the strut and wires under slight tension while fitting the attach bolt.

The front cowling is sheet aluminum, the kind found in most hardware stores. It is rather inexpensive and one sheet will make parts for several planes. Make up cardboard templates or patterns for these pieces and fit before cutting out the finished part from the sheet aluminum. These pieces are held in place with a number of No. 2 x 1/2-inch sheet metal screws.

The dummy engine is made up and fitted at this time. This is a removable component and serves as an access hatch to the engine and the fuel system.

The control cables run under the seat, directly from the servo arms, through pieces of nylon tube (which serve as guide pieces), then on to the various control horns. I suggest using extended length arms at the servos in order to assure sufficient throw at the control surfaces. The aileron connector wire runs through a simulated fuel line of rubber tubing, up into the aileron servo housed in the fuel tank. The fuel tank is removable, giving access to the servo for connection and service.

Get yourself a 1/3-scale pilot to fill that cockpit, as the plane looks very lonesome in the air without one.

The total weight, balanced, with pilot, should come out in the 12-13 lb. range, giving a wing loading of around 20 oz., a very respectable figure for a plane this size. A balance point favoring the 25% mark seems to be the best, even though the full-scale flies at 29-33% of the chord.

Flying the Bathtub is a bit different than I had expected. I have been flying a 1/4-scale Aeronca C-3 with about the same overall specs as this model and had looked for very similar flying characteristics.

The plane tracks nicely without much rudder correction. The tail comes up fairly fast (it doesn't have far to move), then it will run all day on the mains until you give a touch of up. It does take a good 100-150 feet of run to get flying speed when winds are light. All those wires and struts have a considerable drag penalty.

Once airborne, its behavior is unlike anything I have flown. It is slow, and sensitive to all controls except rudder (?). To execute a good turn requires coordinated rudder, elevator, and ailerons. Initial attempts to turn only with rudder produced only a slow deviation from course; when full rudder is applied, the plane may do a fast spin. It appears that the lack of fuselage side area contributes to the somewhat unusual flight characteristics. Because it is draggy, landings are best made with some power on until very close to the ground, then flare and chop the throttle. Rollout is surprisingly short.

In any event, in the air the plane is a sight to behold. Just fly it around and enjoy it. The full-scale, after all, is not too swift, and is not considered to be aerobatic in any sense.

If you build the plane, feel free to write with any questions regarding the model. Let me know how yours came out and how it looks. Let's communicate, you guys out there, it's how we scalers progress in the art. Ideas, both positive and negative, are what we thrive on.

I would like to thank Mike Kimbrel for his wonderful cooperation on this project, supplying me with an abundance of information with which to design and build this replica of a replica.

My thanks also to my many friends of the South Shore RCC, for their help and encouragement during early flight testing of the bird.

Thanks to Fulton Hungerford for his marvelous wheels, without which the plane would not have come to pass.

REFERENCES:

Historical: Air Progress, Spring and Fall 1959, Spring 1960, February 1968.

Full-Scale Drawings: Mike Kimbrel, 1333 Garrard Creek Rd., Oakville, WA 98568.

Wheels: F.H. Wheels, 1770 Lilac Circle, Titusville, FL 32780.

Steel Rigging Cable (1/32): Balsa USA, P.O. Box 164, Marinette, WI 54143. •

Radical . . . . . *Continued from page 28*

The advantages to the helper are obvious. If he's being paid, he can justify (to himself and his family) the spending of two 8-12 hour days at the flying field. The money he brings home is no king's ransom, but at least it's a tangible "thank you" for his efforts. Let's face it: paid jobs simply carry more prestige than volunteer jobs do. And if he's a Junior, struggling to support an increasingly expensive hobby/sport . . . well, just ask the next fourteen-year-old you meet how he'd like to earn $150 some weekend.

And finally, the advantages to the contestant himself:

- He can expect, for his money, a more professionally-run contest.
- He can legitimately complain about shortcomings.
- He can kick back and enjoy the contest without the sense of guilt that accompanies any under-manned contest ("I guess I should go out there and volunteer to sit on a winch, but . . .").

★ ★ ★

The longterm effects of a PRO-AM division in our contest system should be twofold. First, it should promote, in every section of the country, relatively stable manpower pools: small groups of people with a reputation for being reliable, professional contest workers, people who don't particularly care to compete in the big events, but take pride in their ability to run them well . . . *and who are paid for their skills.*

The second effect of a PRO-AM program should be the eventual rise to prominence of another truly *national* soaring contest, comparable to the old SOAR Nats in status. This requires more stability than the AMA Nationals provides; before I pop for a round-trip plane fare to Ogallala or God-knows-where, I want to know what the contest is going to be worth it. No eighty-mile round-trips to the pilot's meeting, no helping set up the winches every morning so we can get the flying off to a late start. No pleading for timers over the loudspeaker. To hell with that kind of stuff . . . that's amateur.

So the next question is: who's going to be the first group to sponsor a PRO contest, a contest with a $40 entry fee, paid officials, first-class accommodations all around? It won't be an overnight success: the first time around you may draw only locals. But if you do it right . . . and word-of-mouth is still the best advertising in a sport as small as ours . . . your reputation will grow. The hotshots will come out of hiding, knowing that the high entry fees will keep the field from getting too crowded, and you'll soon have yourself another gathering of eagles, another contest with a national reputation.

You'll be able to train your help in advance, and count on them to show up. Everyone involved will know exactly what his or her duties are going to be; everyone will have proven his competence in one or two AM contests well before the biggie. You'll know exactly how much help you need (and how much you can afford) the minute the last advance entry fee rolls in. Each winchmaster can be in charge of his winch; each timer his own stopwatch and landing circle markers; the scoremaster his calculator and the scorecards . . . no reason why the CD should have to carry all the paraphenalia back and forth each day. You're all professionals doing a professional job, now . . . no more wishy-washy volunteers. No more begging and pleading for help, no more kid-glove techniques with the personnel. At last you've got the power, the economic power, to do the job right, to show the soaring fraternity how a contest ought to be run. A really PRO contest . . . it's something we've needed for years now, and you and your group can pull it off!

Any volunteers?

Dave Thornburg, 236 Pennsylvania Ave. N.E., Albuquerque, NM 87108. •

Letters . . . . . *Continued from page 7*

Trails Sportster and Brooklyn Dodger this way. My 13-year-old son covered his Berkeley Brigadier the same way. (We are both SAM members in UK.)

Douglas Tennant
Macclesfield, Cheshire, England

Dear Bill,

I was intrigued by the piece on turning in the wind (RCMB, October), and was more than three-quarters convinced by the analogy of the aircraft-carrier sailing down a 30-knot wind at exactly 30 knots.

Yes, aircraft do circle in their own still air, irrespective of the wind. In theory, that is!

With the Northern Virginia R/C Club's carrier in mind, I was trim-flying a new Open (Unlimited) rubber job the other day at London's now-disused Croydon Airport.

On about two-thirds maximum turns, a slight power-stall developed. Nothing unusual about that. But the stalling tendency showed itself only as the model headed into the wind at each turn.

There was no ground effect, since the model was way up. The windspeed differential at launch (first noted, I believe, by Frank Zaic in one of the yearbooks) was long past and the model was flying in its very own "still" air. It must have landed at your feet on that aircraft-carrier.

Yet why did it stall only into the wind? I write as a primitive free-flighter, but feel that those observations will be of interest, even to pattern fliers.

P.S. If you want a good subject for Old Timer of the Month, try Hank Cole's "Smoothie." I've been flying one all season over here, and I can tell you that it really is a winner, both in looks and performance. I can let you have some words on it if you like.

Yours sincerely,
Peter Michel
Orpington, Kent, England

Here we go again with the downwind turn, only in disguise. Somewhere in here, we have to examine the difference between wind, a moving air mass, and air movement within an air mass.

Dear Bill,

The November Mystery Model . . . surely this is Leon Shulman's Banshee! I can agree that this design was popular in England at the end of the '40s . . . performed well with an Elfin 1.8cc diesel, which was one of the best motors in its class at that time . . . based on the Arden .09 I should think.

The motor on the Bowden Wasp shown in photo 10 of 'Plug Sparks' . . . this is a Frog 100, of 1cc and a diesel once again. Frog, or International Model Aircraft, to give them their proper name, was one of the first to provide motive power in England after the war, starting with its 175 (1.75cc) petrol, sorry, gas motor, which was quickly followed by the 100. The 100 was my first introduction to powered flight around 1946-47, bolted on the cutoff nose of a Wakefield model, which incidentally was also a Frog product. One thing that still remains in my mind regarding the Frog 100 is that a smashed motor would be repaired or even replaced for the grand sum of seven shillings and six pence . . . about $1 in today's currency.

I have obviously given away both my age and background with the above comments. Over the past 35 or more years, I have enjoyed all the various phases of model aircraft which have come along. While strictly R/C these days, the wide coverage given in your publication to all areas of the sport is still of great interest. My compliments to the chefs!

Yours truly,
John Hipwell
Calgary, Alberta, Canada

Dear RCMB,

You will doubtless receive a minimum of 43,756, all correct identifications that the November Mystery Model was a Shulman Banshee, but I'll bet you will only receive one that includes a photocopy from the original 1948 Aeromodeller Annual; this had the result of completely changing the then 'purist' attitude in U.K. powered-model design. S'funny, that now, with SAM, that 'purist' attitude has eventually returned, along with a lot of other nostalgic things like trouser turn-ups and stocking seams and silent black-and-white films . . . or is the TV set on the blink again?

I look forward to my free subscription with conviction, as I have just observed two magpies sitting on the same branch on a tree in the garden, which is an Irish 'goodie' augury-wise, and in any case, the word Banshee is of pure

INDEX TO ADVERTISERS

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Gaelic origin, though the definition ("a woman of the fairies") may by now be open to misinterpretation!

I actually have two copies of the 1948 Annual, and would trade for a copy of 'The Lightplane' by Underwood and Collings if anybody is interested. I also have a complete Aeromodeller file since 1935 . . not for sale, but I could possibly arrange the occasional photocopy for aficianados of the early birds!

Sincerely,
John Carroll
Blackrock, Co. Dublin, Ireland

Your answer, John, was number 43,755, and since number 43,756 thought the M/M was Taibi's "Hornet," that puts you dead last among those who were correct! One of those two magpies must have been an undernourished pigeon.

If anyone is interested in John's trading offer, send us your stamped, sealed envelope, and we'll forward it to him.

Please note:

This renewal is to go in effect ONLY IF *service begins with the February 1981 issue.*

If this is not possible, please return my check.

With this price increase, **Model Builder** *is the most expensive of all of the modeling magazines. It is also my nomination for the magazine I can most easily do without.*

R.A.L.
Orange, California

All of which proves the old adage that "Genius is never appreciated in its own back yard." •

Counter . . . . *Continued from page 10*

rpm. Fuel consumption is claimed to be an ounce every two or three minutes, depending on the prop and throttle setting. The actual conversion is a do-it-yourself operation, consisting simply of changing the head . . . a three-minute job at best.

Other diesel conversion heads available include ones for the Cox .020 and .049/.051; O.S. Max .10, .25, .40, .60/.61, and .90; Super Tigre .21X, .35/G-21 .35, and G .60 Bluehead ABC ring; Fox .15, .45 B.B., and .60 Eagle II; Webra .91; Enya .19X; and K&B 3.5. Davis also sells diesel fuel in pints, quarts, and gallons, along with "Super Flex" fuel line, a highly flexible and abrasion resistant neoprene fuel line for use with the larger-than-1/2A size diesel conversions.

Best bet would be to send an S.A.S.E. and ask for the literature on all of D.D.D.'s products. Write to Davis Diesel Development, P.O. Box 141, Milford, CT 06460.

★ ★ ★

Dynamic Models is now producing a 5/8"=1' scale one-piece fiberglass hull of a typical steam trawler used during the 1910-1940 era. Trawlers of this type were used for fishing and, in wartime, were

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used for convoy patrol duties and even as minesweepers, due to their wood construction.

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Accessories available for the trawler include the large ventilators molded in fiberglass, a vacuum-formed plastic skiff, brass gallows (trawler frames), stanchions, searchlights, chocks, cleats, etc., etc. Your best bet is to send $2 for Dynamic's new 36-page catalog and manual, sent first class mail, which shows the trawler and 19 other fiberglass hulls and kits ranging in length from 26 to 86 inches, as well as all the numerous large scale accessories available for them. That $2 is refundable on your first order, too. Write to Dynamic Models, Drawer "C," Port Jefferson Station, NY 11776.

★ ★ ★

"Big Al" Berry, who did the review for us on the Steve Muck Prop Pitch Gauge on page 48 of this issue, sends word that his outfit, R/C B. Products, is now offering a high-performance venturi as a retrofit item for the K&B 3.5 inboard and outboard and the 7.5 inboard. The venturi features a 9.5mm bore (.374 inches) that works with or without pressure, and a special twin-hole spray bar. The body is anodized aluminum, and you even get your choice of colors . . . blue, red, or black.

For price and availability info, contact Big Al at R/C B. Products, 1623 Missouri Ave., Chickasha, OK 73018.

★ ★ ★

Bill Evans R/C Aircraft is producing a new type of muffler engineered specifically for the popular K&B 3.5. This piece is unlike anything we've seen before, consisting simply of a tube, closed at both ends, with a series of narrow slots for the exhaust exit. It's small, light, and mounts to the engine with plenty of clearance between it and the firewall. The compact size makes this muffler an excellent choice for all types of models, especially small R/C helicopters.

Retail price is $12.95, at your dealer or direct. If ordering direct, add $1 for shipping. Bill Evans R/C Aircraft, 20825-½ Roscoe Blvd., Canoga Park, CA 91306. ●

R/C World . . . *Continued from page 92*

ing with AMA Pattern, and to use instead, the FAI Pattern rules. A novice flier in this particular proposal, was supposed to pick his own maneuvers that would total a maximum K-factor total of 250. Wow . . . some novice!

Every time the rules proposals go through their cycle of three voting steps, with publication before and between, the contest board members hope to hear from their constituents, the members in their district, expressing their likes, dislikes, and opinions about the proposals . . . and every time, they hear from them *AFTER* the proposals have been voted in . . . or out. As dues-paying members, most of you receive that (ulp) *other* publication, which produces complete rundowns of the rules proposals, along with the way the board voted on them. Please, help your board member. Write to him. The addresses are published in *M.A.* just about every month. Those of you who actually compete should, in particular, express your opinions to your contest board representative. Speak *now*, or forever fly according to the rules you had nothing to say about! ●

Super Buc . . . *Continued from page 41*

ber the airplane . . . a real pretty ship, covered in light blue silk and trimmed in white. Someone else had started building the fuselage, then gave it to the younger Johnson to finish up when it was found that the structure had a built-in curve that would do a banana proud. Of course, it goes without saying that the kid entered it in several Texaco events at Taft and garnered more than his share of trophies with that "crooked" airplane . . . mute testimony to the airplane's forgiving, rock-stable flying qualities.

Construction of the model is fairly conventional . . . there's just a lot of it. From all the planking and stringers, one would be inclined to believe that maybe Shereshaw did have a hand in the redesign after all. The airfoil is evidently a zip-zip section, moderately thin and highly undercambered. Because of the thin wing, the diagonals between the top and bottom spars are an absolute must; or, as an alternate, you could substitute 1/16 sheet balsa vertical-grain shear webs. Spruce spars, maybe enlarged to 1/4-inch square, would be a good idea if building the model for R/C.

The Super Buccaneer spans 90 inches, has about 1200 square inches of wing area, is 57 inches long, and will probably weigh at least five pounds as a free flight,

more with R/C . . . this airplane is a flying lumberyard. Speaking of R/C, the existing tail surface spars would be perfect locations for hinging the control surfaces. For SAM R/C events, a .53 is the largest legal size glow or converted glow engine allowable. An R/C version with something like an O.S. 4-cycle up front would make a terrific sport flier; you could shoot touch-and-goes all day long and it would never get dull. . .

The photo that accompanies this write-up was sent by John Pond, as part of his March column; a lucky coincidence, as we were just about to start searching for a Super Buc photo from past issues of **MB.** The photo shows designer Bill Effinger himself, assembling the original prototype Super Buc at the 1937 Nats in Detroit. Bruce Lester, of Ontario, Canada, who has been supplying Pond with those neat old photos that have appeared in recent issues of **RCMB,** also supplied this one. Thanks, Bruce, you couldn't have sent it at a more opportune time!

Best of luck to those who decide to undertake the Super Buccaneer project. We hope you enjoy it. •

Workbench . . *Continued from page 6*

obtained by sending a large stamped, addressed envelope to Joe Klause, address above.

Nominal displacement .15 cu. in.
Bore and stroke .575 in.
Investment cast crankcase.
Front intake. Rear exhaust.
12mm crankshaft.
ABC sleeve and piston.
Advanced design Schnuerle porting.
Bronze bushing connecting rod.
Weight approximately 6 ounces.
Various head configurations available.
Various R/C carburetors available.

"YOU DON'T SAY" DEPT.

In the National Association of Zimbabwe Aeromodelers Newsletter, South Africa, we read that Chris Sweatman, well-known hobby shop owner in Cape Town, S.A., won an Open Pylon race with his "Middle Stik." On the last lap his radio conked out, the model hit the ground at a shallow angle, which action, as it shot back into the air, kicked the radio back on again, enabling him to turn the far pylon and cross the finish line. The wooden prop was not even scratched!

★ ★ ★

Our wildest coincidence in 1980 . . . In the planning stage for this issue, during early December, we made the decision to feature Bill Effinger's famous "Super Buccaneer" as the "Old Timer of the Month." As usual, our next chore was to dig up a suitable photo of a Super Buc from one of our past issues. Then, only days later, we received John Pond's material for his "Plug Sparks" column in this issue. You guessed it . . . from the batch of photos John sent for the column, out popped one from the fabulous collection of Canadian Bruce Lester, of Bill Effinger at the 1937 Nats with his latest model, the Super Buccaneer!

★ ★ ★

Among those of you who are fans of the Johnnie Carson show, we wonder how many have noticed what we feel is an amazing resemblance between music arranger and sometimes leader of the band, Tommy Newsome, and the photo of Gene Husting that heads up his R/C car column in *RCM.*

BILL BURKS MAXES OUT

The following letter was just received from Al Strickland, now living in Lake Havasu City, Arizona.

On Sunday, December 14, 1980, modeling lost a staunch supporter, and I lost one of my oldest and closest friends. Major William E. Burks (USAF retired) passed away.

Bill was born in Gadsden, Alabama, July 23, 1925. His childhood was spent in Montgomery, Alabama, and his young adulthood in Birmingham. During his early years he became a top-notch modeler, flying free flight and control line. Before he was out of high school, he formed a habit that continued throughout his life, winning contests.

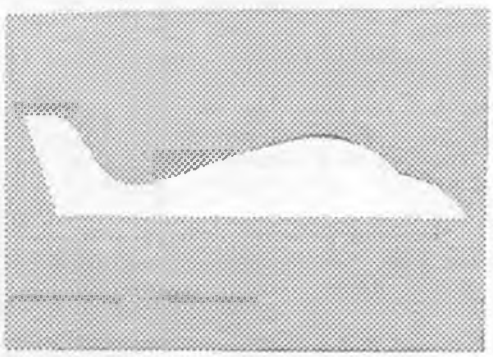
I remember an incident that occurred in 1946, shortly after we were discharged from the old Army Air Corps. We entered the Alabama State Miniature Air Carnival, in Birmingham. Top prizes at this contest were five trips to the Nationals, held that year in Wichita, Kansas. Bill and I won trips, and he went on to win first place in Class "A" Open Free Flight at the Nats. He flew a "Zombie" designed by Leon Shulman, powered with a Bantam that I had hopped up. After the day's flying, Leon Shulman and Ben Shereshaw (Ben made the Bantam at that time) came around to our room and took us to dinner. For the two of us, that was the high point of the Nats.

Bill continued his winning ways at model contests for the next couple of years, before he reenlisted to continue flying full scale aircraft for Uncle Sam. His military career took him all over the world, and he continued to fly models whenever possible.

After he retired from the Air Force in 1966, Bill settled his family in Dallas, Texas. There he used the skills learned in the Air Force, and opened a successful flying school. He taught corporate pilots who were flying conventional engined aircraft, to fly executive jet aircraft.

About five years ago, Bill had a series of heart attacks that ended his full scale flying. After his recovery Carolyn (Mrs. Burks) started building and flying free flight models with Bill. Needless to say, with a teacher of his caliber, Carolyn became a real competitor in a short time. The Burks became a familiar pair at free flight contests from California to Florida.

Last Sunday, (as this is being written) just after the close of a contest in Fort Worth, Bill and Carolyn were sitting under their portable shelter, taking it easy for a few minutes before packing for the trip home. A few minutes earlier



they had learned that Bill had won first place. Carolyn had started to say, "Well Willie, you did it again." Before she could finish the sentence, Bill slumped forward off his seat with a fatal heart attack.

Bill will leave fond memories with hundreds of his modeling friends all over the world.

If there is a brighter side of his passing, it is summed up in a remark that Carolyn made when she called to tell me of Bill's death. "Well, Strick, he died doing what he enjoyed most, none of us could ask for more." To this I say Amen.

We met Bill and Carolyn for the first time several years ago at Taft, California, during one of the NFFS Championships, when attracted by the sight of a very girl-type modeler who prepped, cranked up, and released a hot 1/2A ship in a very professional manner. The following hour was spent with a very devoted couple who were thoroughly immersed in the serious business of competitive free flight, yet doing it in a relaxed and humorous manner that disguised their effectiveness. We wish the very best to Carolyn in adapting to the new lifestyle she must now assume.

PEANUT LIST

In a recent "...Three If By Air" column, we promised to publish a complete list of all the Peanut plans published in **Model Builder.** Larry Renger, our "Half-A & Sport Scene" columnist, put the list together for us, and we present it herewith. Most of the plans are still available by purchasing the appropriate back issue. Some are also available from our most prolific Peanut designer, Walt Mooney, by ordering his "Bag of Peanuts," as advertised. Peanut plans not available from Walt Mooney or from issues that are out of stock, may be ordered through our plans service, at $1 each, postpaid. We will provide these from our complete file of all back issues of the magazine.

9-10/71	Jodel Mascaret	Walt Mooney
11/71	Fokker D-VI	Mooney
12/71	Laird LC-DC	Mooney
1/72	Ord-Hume O-H 7	Mooney
2/72	Ford Flivver	Mooney
3-4/72	Bucker Jungmann	Mooney
5/72	Fokker V-23	Mooney
6/72	3 Profiles: D.H. Chipmunk, Yak-18PM, Speed Spitfire	Mooney
7/72	AVRO "G" Biplane	Bill Hannan
8/72	Taylorcraft w/floats	Mooney
10/72	Bellanca Light Tractor	Don Butman
11/72	Skyraider	Mooney
12/72	Stahlwerk	Mooney
1/73	Ole Tiger racer	Mooney
2-3/73	Travelaire 2000	Don Butman
4/73	Evans VP-2	Mooney
5/73	Monocoupe 110 Special	Mooney/Pardoe
6/73	Huntington H-12	Mooney
7/73	Microplano Veloz	Mooney
8/73	Bleriot Canard	W.C. Young
9/73	Mr. Mulligan	Hank Nixon
10/73	Piper Vagabond	Mooney
11/73	Waco SRE	Mooney
12/73	Speed Spitfire	Mooney
1/74	DeHavilland DH-6	Mooney
2/74	Culver "Dart" GW	Mooney
3/74	SE-5	Mooney
4/74	Stinson Trimotor	Don Butman
5/74	Miles Sparrowhawk	Mooney
6/74	Wickner "Wicko"	Mooney
7/74	Wittman VW Racer	Mooney
8/74	Macchi MB 308 Idro	Mooney
9-10/74	Renard R-17	Mooney
11/74	Curtiss Seagull	Pres Bruning
12/74	Stinson Reliant	Megow plans
1/75	AVRO 534 C	Mooney
2/75	Avions "La Cigale"	Mooney
3/75	"Redhead" Racer	Ted Vogel
4/75	Robin HR 100 "Tiara"	Mooney
5/75	1908 Bleriot IV	Mooney
6/75	B.A.T. Baboon	Mooney
7/75	P-47D Thunderbolt	D. Norman
8/75	Castaibert IV	Mooney
9/75	Jodel D. II	Rex Powell
10/75	1912 Blackburn	John Blair
11/75	OKAY	Don Butman
12/75	Roland D-VIII	Ed Heyn
1/76	Davis DA-5A	Mooney
2/76	Lanier Paraplane	Don Brown
3/76	Spad XIII	John Walker
4/76	Saab "Safari"	Monty Groves
5/76	Lockspeiser LDA-01	John Walker
6/76	Hergt Monoplane	Mooney
7/76	Bell Airabonita	Mooney
8/76	Ol' Ironsides (homebuilt)	Mooney
9/76	Hirondelle Monoplane	J.F. Frugoli
10/76	Udet U-12	Mooney
11/76	Nakajima KI-27a	Mooney
12/76	Spirit of St. Louis	D. Norman
1/77	Lederlin Flying Flea	Mooney
2/77	Tupolev ANT-2	Mooney
3/77	Sorrell Hyperbipe	Pres Bruning
4/77	Aeronca 0-58A/L-3A	Mooney
5/77	Aviatik-Berg C-1	Ed Heyn
6/77	Western "Meteor"	Al Lidberg
7/77	Morane-Saulnier racer	Mooney
8/77	Fletcher FL-23	Charles Schaaf
9/77	Halberstadt D-II	John Walker
10/77	Loire 46	Don Butman
11/77	"Rivets" racer	Mark Drela
12/77	F4U-1 Corsair	Mark Drela
1/78	Folkerts SK-3	Kurt Enkenhus
2/78	Lemberger LD-20b	Mooney
3-4/78	Found Bros. "Centennial"	Mooney
5/78	Upton Baby Ace	Mooney
6/78	Siemens-Schuckert E-1	Mooney
7/78	Swedish Thulin-K	Mooney
8/78	1913 Deperdussin	Al Lidberg
9/78	Sopwith Pup	John Blair
10/78	Vari-Viggen	Steve Gardner
11/78	Ikarus IK-2	Mooney
12/78	Vari-Eze	Hank Nixon
1/79	Cierva Autogyro	Don Drury
2/79	Dornier "Libelle"	Mooney
3/79	Bristol "Red Devil"	Mooney
4/79	Republic XP-47H	Pres Bruning
5/79	Euler D-2	Mooney
6/79	Pegna P.C. 1	John Walker
7/79	Bellanca Aries T-250	Mooney
8/79	Monocoupe 110 Special	Butch Hadland
9/79	EAA Baby Ace	John Blair
10/79	Lublin R-XII	Mooney
11/79	Martin-Baker MB-5	Mark Drela
12/79	Chiribiri N. 5	Mooney
1/80	Alco Sport	Bernard Shulman
2/80	POGO (Owl Racer)	Mooney
3/80	Quail (homebuilt)	Mooney
4/80	P-40E Warhawk	Steve Gardner
5/80	Stearman 4E	Tom Cadogan
6/80	Cessna Cardinal RG	Nick DeCarlis
7/80	Gourdou-Leseurre C1	Mooney
8/80	Farman 1000	Mooney
9/80	Hanriot H-19	Mooney
10/80	Marquart Charger	Don Butman
11/80	Jodel Mascaret	Mooney
12/80	Embraer "Impanema"	Mooney
1/81	Aero-Torpille	J.F. Frugoli

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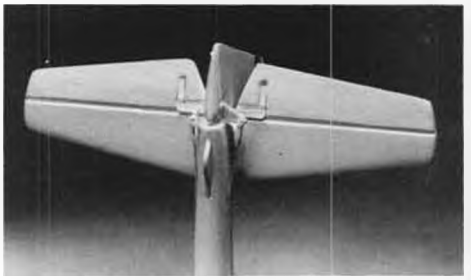

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Model shown here has been finished in color for photographic purposes.

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