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On the cover

When the J-3 Cub received its draft notice the L-4 Grasshopper variant was the result. The "G.I. Cub" pictured on our cover was adapted by Rich Uravitch from the Top Flite J-3 kit. Kodachrome by Rich Uravitch.



September 1982

Vol. 85, No. 9/542

Aircraft features

- 21 **Combo/Hans Hochradel**
The author combines the best features of many popular biplanes
- 26 **PMP's Thermal 73/Bob Hunt**
An FM Product Review: An excellent starting point for 2-Meter flying
- 26 **PMP's Challenger/John Goldman**
An FM Product Review: A step up in performance with "T" tail and eppler airfoil
- 30 **Ace R/C's Datamaster/Bob Aberle**
An FM Product Review: Ace enters the digital pulse meter market
- 34 **Top Flite's J-3 Cub/Rich Uravitch**
An FM Product Review: Simple mods to stock kit yields a dramatic L-4 conversion
- 38 **Fakeout/Dom Palumbo**
A sleek sport pattern craft for 40-45 size engines
- 42 **FM Clinic/Ron Farkas**
For a perfect wing seat try silicone
- 44 **Bostonian "T" Craft/Larry Kruse**
Inspired by the Taylorcraft, this is a fine Bostonian entrant
- 47 **Hot Bent Wood/Dave Rees**
The "hot" ticket to better F/F scale model construction
- 50 **Flyin' Things for Fledglings/Earl VanGorder**
More news from the gang
- 52 **R/C Sport Scale/Rich Uravitch**
Developing scale flying models from plastic kits
- 53 **R/C Sport/Ron Farkas**
Fix that wreck
- 54 **R/C Soaring/Bob Crane**
The soaring library
- 55 **F/F Sport/Dave Rees**
Make a CO₂ charger holster
- 56 **C/L Combat/Phil Cartier**
The cost of Combat
- 57 **C/L Stunt/Bob Hunt**
The triangle is the maneuver of the month

R/C model car racing

- 60 **Novak's NES-1A Servo/Bob Aberle**
An FM Product Review: A worthy successor to the Bantam Midget
- 62 **R/C Auto Clinic/Jack Russell**
Tips on everything from bodies to tire preparations

R/C model boating

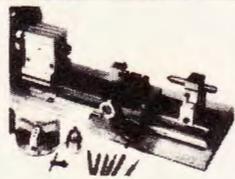
- 67 **Steve Muck's Spartan Streaker/Vic Macaluso**
An FM Product Review: The latest outboard hull for the K&B 7.5
- 70 **R/C Scale Boats/Art Bauer**
An intro to FM's newest column
- 71 **1983 Mini America's Cup report/Rich Palmer**
A progress report on next years R/C sailing classic
- 72 **R/C Sport Boats/Vic Macaluso**
More painting tips from FM's Rembrandt with an airbrush

Departments

- | | |
|-----------------|---------------------|
| 3 Editorial | 74 Letter Rip |
| 8 Flying Report | 78 Timetable |
| 20 Air Mail | 80 Classified |
| 33 Tool Chest | 81 Dealer Directory |
| 64 Pit Report | 82 Ad Index |

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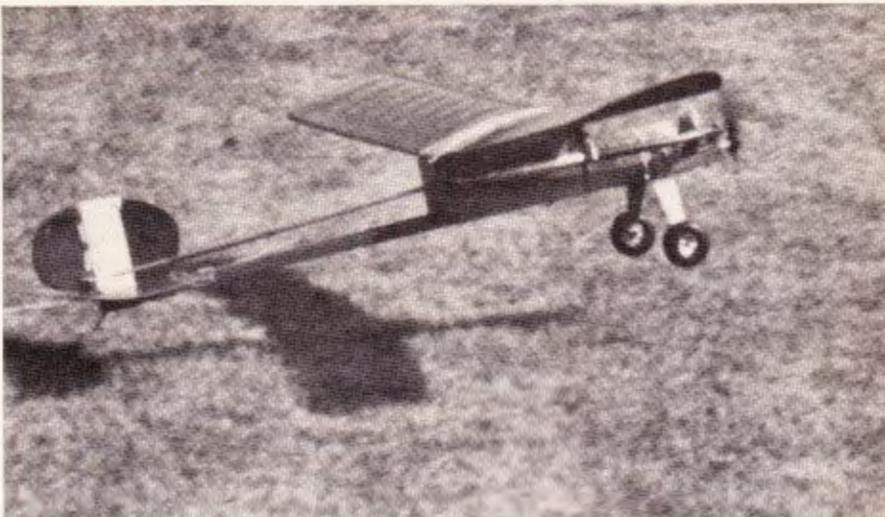
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editorial



Vince Garguilo's Balsa U.S.A. Swizzle Stick breaks ground for another "fun fly" mission. Modifications include tuned pipe and dural gear. Low key events put the fun back in the hobby.

Trends are funny things. No one seems to know just who sets them, but everyone tends to follow them without question. Perhaps we are a bit like the lemming, willing to follow a strong lead just so long as the leader appears to know where he is heading.

The trends in this hobby are set by you, the modeler. Sure, there are some who are more visible by virtue of their competitive expertise, and they probably set the lion's share of these trends for the years ahead, but there are other methods of setting trends. Occasionally the classic follower will say, "Enough, I'm going my own way for awhile." Generally these breaks from the pack are caused by a touch of boredom. Flying the same type of ship year after year through the same maneuvers with the same size motor, etc. This type of grass roots non-conformity is perhaps the most recent and refreshing trend of all.

One of the breeding grounds for such trends are clubs. Groups of bored flyers are getting their heads together and are coming up with some interesting ideas. I'm fortunate enough to receive many of the club newsletters each month, and although time doesn't permit a detailed reading of each one, I try whenever possible to go through them searching for the unusual. I have to tell you, the unusual is becoming the trend!

One has only to look at the sheer number of "trainer" kits on the market and then calculate the number of new flyers entering the hobby to realize that the two hardly correlate. Where are all of these trainer and beginner type planes being used? The answer lies in the club's solution to the boredom problem; trainers make great "Fun Fly" planes. Each club seems to have settled on its own special homebrewed events and, in most cases, one kit design is chosen as the official club fun fly ship, assuring that everyone starts out on a nearly equal footing. In most cases the engines are regulated too. The events run the gamut from simple spot land-

ing contests to extremely elaborate "mission" type events where the flyer must accomplish a number of tasks during one flight. I can't recall which newsletter I read about it in, but my favorite event idea is "Bomb the C.D." (Contest Director). In this contest each plane is equipped with a plastic foam cup which is fastened to the top of the fuselage via rubber bands. In this cup rests an egg. The Contest Director is required to sit on a chair in the middle of the field while his fellow club members take turns flying across the field, at a very safe altitude, and either rolling or looping the plane to release the egg from the cup in an attempt to lay one on their buddy.

Another ingenious event is "Poker Landing". Five circles of ten feet diameter are laid out at the end of the runway. These are placed end to end. The closest circle to the end is marked Ace, the next King, then Queen, Jack and finally Ten. Each contestant is allowed five landing attempts. His score for each landing is determined by which circle his plane's wheels touches down in. The idea of course is to assemble the best poker hand. Neat eh?

I belong to the Roxbury Model Airplane Club (RAMAC) and we have our own bit of insanity. Swizzle Stick Combat has been run here for the past three years with attendance growing each year. The idea is simple. A thirty foot long crepe paper streamer is attached to the plane. Two planes fly at once and the pilots try to cut each others streamer for a "kill". This action goes on for five minutes or until a kill is scored. Believe me there is action aplenty. I'll have more on this in a future issue.

So it seems that a new trend has been born a trend away from the "official" events, the traditional competition framework, and most importantly a trend away from boredom. The only limiting factor is your club's collective imagination. And, if in a few year's time we find that we're in another rut, we'll get out of that one too—BOB HUNT.

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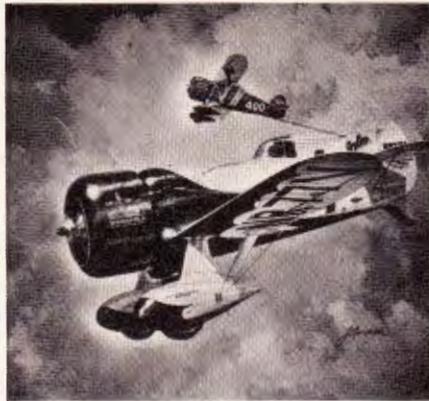


PHOTO: WILLIAMS BROS., INC.

Return

The Springfield (Massachusetts) Museum of Natural Science is conducting a fund drive to collect enough money to return the world's only replica of the 1931 Thompson Trophy winner, "The City of Springfield", back to its hometown. Contributors to the fund are eligible for color reproductions of the Gee Bee Model "Z", City of Springfield racer, as well as "T" shirts, tie tacs and lapel pins. Contributions should go to: Gee Bee Memorial Fund, P.O. Box 1489, Springfield, MA 01101.



Kraft News

Kraft Systems has formed a separate Hobby Products Group and appointed Ray Forbes as group Vice President. Forbes instituted the successful dealer-direct program ten months ago and will now oversee R/C product line expansion and better customer service. In addition to his new duties, Forbes will continue to be concerned with the marketing function of the company.

R/C Crop Dusting

The United States Department of Agriculture is looking to knock off cabbage loopers and they're using R/C planes to do in the little buggers, er, bugs. Entomologist K. Duane Biever, of the U.S.D.A. lab in Columbia, Missouri, came up with the idea of spraying cabbage plants with a virus which infects only



the pesky little loopers. Since crop dusting has been so successful, why not try it with an R/C plane.

The virus is sprayed from a Stick-type model and will hopefully stop the spread of the cabbage looper. The local R/C club provided the aeronautic expertise, while the U.S.D.A. provided the virus spray. Who knows where all this will lead? Some enterprising individual may start the first R/C crop dusting service. Fly your R/C ship and get paid for it at the same time. Anybody out there need to have their tomatoes dusted?—



AIRTRONICS, 12160 Woodruff Avenue, Downey, CA 90241, introduces the new Monarch .05 R/C Trainer. The Monarch .05 is an ideal first plane for the novice. Designed for the new Cox Dragonfly .049 or any other tank mounted .049, the plane will fly with either a two or three channel radio. The polyhedral wing and large tail surfaces give the model hands-off stability, while the flat bottomed airfoil and light wing loading allow the plane to fly at extremely slow speeds, providing the inexperienced pilot time to react correctly to a variety of flight situations. The Monarch .05 features precision machined and sanded parts (no die cutting), hand selected

wood, deluxe hardware packages for complete airframes, full size rolled plans and detailed instruction book, extensive prefabrication and self-jigging construction. For more information write to the above address.



CANNON R/C SYSTEMS, 13400-26 Saticoy Street, North Hollywood, CA 91605, is importing the latest G-Mark engines. These engines are of a standard .15 size single cylinder configuration and a .30 size twin opposed. Both engines utilize a front rotary valve, Schneurle porting, dual ball bearings, slide carb and integral muffler. The .15 is priced at \$79.95 and the .30 Twin is \$174.95. For more information write to the above address.



CHARLIE'S R/C GOODIES, P.O. Box 192, Van Nuys, CA 91408, offers a new R/C safety cap in two high visibility colors, with emblazoned numbers to match any 72 MHz frequency. One size fits all. It's like a frequency flag for your noggin! Regularly costing \$8.95, these hats are now priced at a special low price of \$6.50 plus \$1.50 shipping. Don't forget to specify your frequency.

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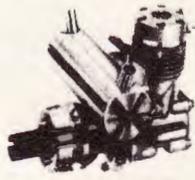
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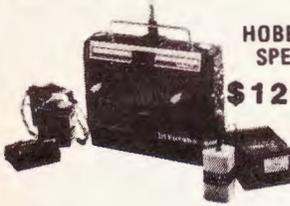
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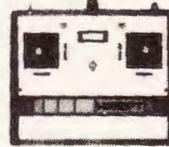
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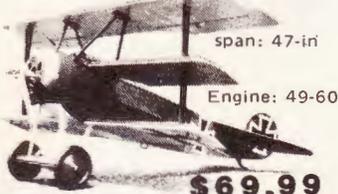


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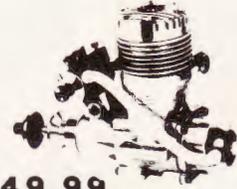
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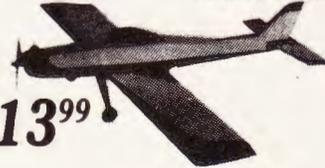
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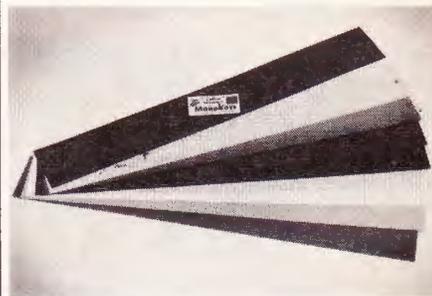
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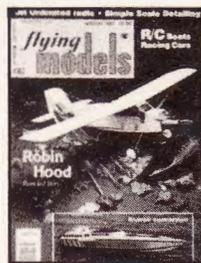
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The FM staff of writers, designers and reviewers are world renowned experts in their fields. They bring you the most trusted, informative and useful reviews in the hobby — reviews that help make choices and save dollars.

Here's a partial list of the news we've brought you during the past year.*



- 36 Aircraft Construction Features with plans
- 171 Airplane Product Announcements
- 10 Plane Kit Reviews



- 7 Airplane How-to Features
- 2 Accessory Reviews
- 13 Radio Review Features
- 5 Electronics How-to Features

- 4 Electronics (non-Radio) Reviews
- 6 Engine Review Features
- Book Reviews
- 12 Boat Reviews



- 59 Boat Product Reviews
- 15 Boat How-to Features
- 6 R/C Car & Accessory Reviews



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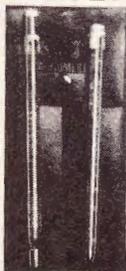
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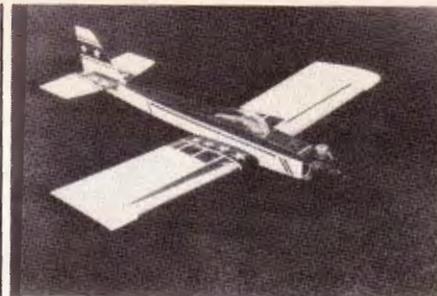
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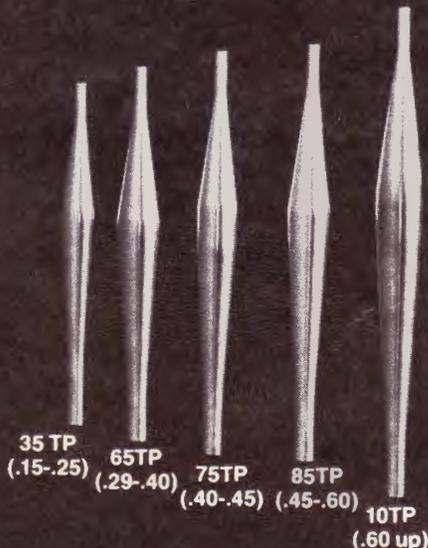
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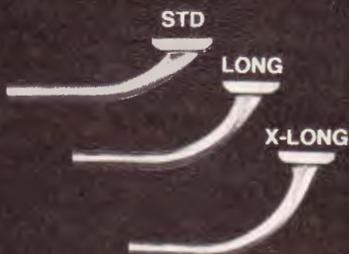
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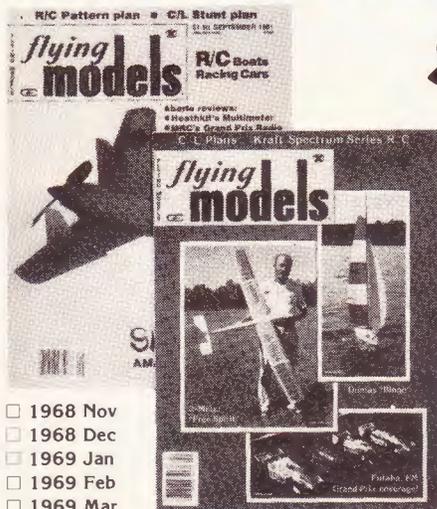
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LEISURE DYNAMICS, LAKESIDE/COX DIVISION, 4400 West 78th Street, Minneapolis, MN 55435, introduces the new .049 Dragonfly engine. The Dragonfly is a sports-tuned R/C engine designed for the hobbyist with performance in mind. The new engine has improved bypass porting in the cylinder, with two extra bypass grooves added for extra power. There is a new design throttle/sleeve assembly. The cylinder is now side mounted, out of the way of the venturi/needle valve. The tank has been extended to allow free movement of the clunk fuel pick-up. The Dragonfly mounting holes fit the same hole pattern as the Babe Bee, QRC and Black Widow engines. For more information write to the above address.

air mail

New hear this

April marked my thirty-eighth year of playing with "toy" airplanes, and in the last little while I have run across a sad fact which ties in with my profession as a hearing specialist: more and more of my buddies are paying the piper for their carelessness.

In this case the piper happens to be me . . .

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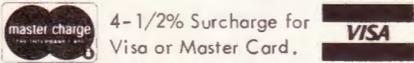
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The earplugs themselves are called "Noise Braker" and are custom made for hearing aid specialists by Hocks Laboratories, P.O. Box 14400, Portland, OR 97214. Our offices sell these earplugs for \$37.50 per set, excluding local tax, though prices may vary.

The slight inconvenience involved in sitting while a hearing aid specialist takes impressions of both ears is certainly worth it from the standpoint of saving your hearing. And if you need further incentive to purchase this very effective, inexpensive protection, the hearing aids required for damaged ears sell for \$450-\$795 per ear!

Hearing aids are marvelous little devices . . . but you will never hear as well with an aid

as you would if you protected your natural hearing.

Even if you now have a hearing loss sufficient to warrant the use of a hearing aid, the damage to your hearing continues if you don't protect what you have left.

ED TURNER
 Laramie, Wyoming

Different is best

Congratulations on your article "Five Cylinder Stick" in your July issue.

I purchased one of the first four cycle .60 engines available then couldn't figure out what airplane to put it into. The Hobby Lobby "Senior Telemaster" seemed to be the only kit on the market at the time that would accept it, but, the Telemaster wouldn't fit into my "unsanforized" new car. Finally, I decided to put it into a Midwest "Super Esquire", but the furnished cowl would not fit. I have since purchased the Saito FA-30, FA-40, FA-80 Tein, and the O.S. Gemini Twins. All of these engines require reworking of the nose areas of most standard kits. However, until reading the above mentioned article, I did not realize how far from the "norm" you can go and get a flyable aircraft.

To me personally, this was the most valuable article I have ever read in any model publication. I shall not hesitate to modify and experiment in the future.

GLEN BOEPPLE, SR.
 Charleston, W. Virginia

We're glad Dick Sarpolus' article made such a positive impression on you, Glen. In many ways modeling is a very conservative hobby which tends to slow down experimentation and new ideas. If there are any other modelers out there who are trying new and different ideas, we would be happy to hear from them.

We're sure they laughed at the first person to put other than a .35 engine in a controlline stunter. Just like they laughed at the first person who took the dihedral and polyhedral out of his R/C soarer so he could install flaps an ailerons which would allow him to fly in thermals and do close to 100 m.p.h. on the speed course.

If we can get more folks thinking about progress, rather than copying this week's hot ship this hobby can really go places. Any more creative thinkers out there?—EDS. ☺

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PHOTOGRAPHY HANS HOCHRADEL AND BOB HUNT

Combo

By Hans Hochradel

Features from many outstanding biplane designs are to be found in this nimble handling ship.

The reason for designing and building Combo was that it was hard to find what I wanted in existing designs. Combo is a combination of the best of several biplanes. Many aspects of appearance, design and construction reflect the leading biplanes currently on the market. Combo's closest cousin is the Smith Miniplane by Sig Manufacturing. This model is *not* a Miniplane. It may look like a Miniplane and have some parts and building similarities but that's it. A quick review of the technical data for Combo and the specifications for the Miniplane will show a great deal of difference. The flying characteristics are also completely different. Combo has clean simple lines of design. This philosophy follows in the building and flying characteristics.

A list of unique features of Combo follows: 1.) Six 1/4-20 nylon bolts hold down both wings; 2.) Du-Bro ball link snaps to hold the interplane struts; 3.) Sig Smith Miniplane Cowling; 4.) Hidden Semco Pitt's style muffler; 5.) Bridi dural aluminum landing gear with Gee Bee wheel pants; 6.) One piece alu-

minum sheet cabane struts (no wires); 7.) Robert's Super Fueler; 8.) C.B. Associate tail wheel assembly.

This model is for the average flyer, and above average builder. If you've mastered take-offs and landings, but are having trouble with three consecutive rolls your flying ability is more than adequate. If you enjoy building models that look like full size aircraft and not a cross between Star Wars and high speed freight trains this is the model for you. Building this model is not for the rank novice builder. You should have a few successful trainers under your belt and be familiar with building terminology and procedures. If you hear yourself saying "no matter how many times I cut this piece, it's still too small," this is not the model for you.

For all hot shot pilots reading this, yes a .60 size engine will fit under the cowling, and the airframe is strong enough to handle the stress. However, believe me, a good .40 size engine has more than enough power. Remember, "scale" flying speed is a desirable element in a model. If you want a biplane bullet,

this is not the model for you.

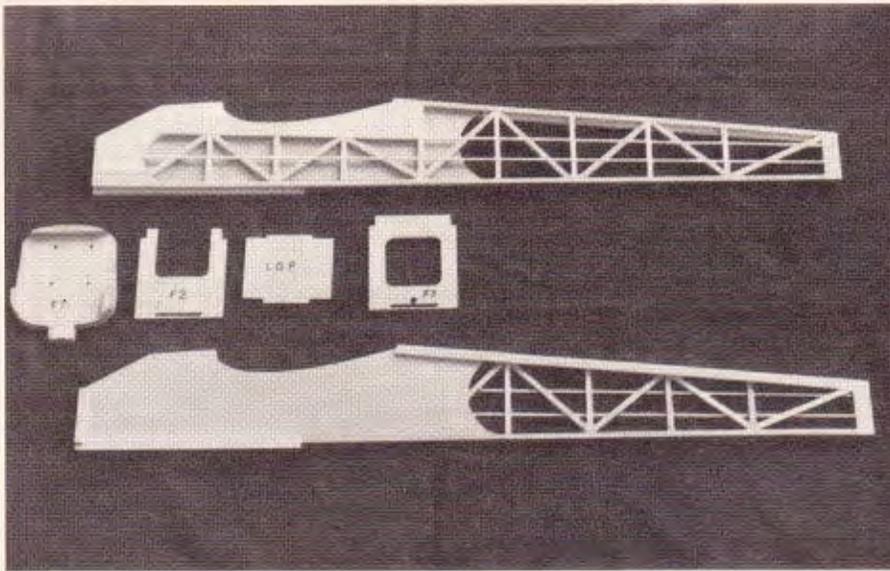
A word about acrobatics and crowd pleasing flying on Sunday afternoons may be in order. This model is definitely a crowd pleaser in looks and acrobatic ability. However, this model flies what is known as lite acrobatics. The master of this type of flying is Duane Cole of Texas. He flies a full-scale Taylor craft through some beautiful acrobatics. This type of acrobatics lacks vertical maneuvers, outside maneuvers, and tight maneuvers. So, you ask, what's left? (Or, what's so great about lite acrobatics?) Beautiful stall turns, diving for speed for nice round slow loops, unbelievable barrel rolls, and spins (like you see at airshows) are what's left. This is not a pattern aircraft, but it is crowd pleasing, realistic looking, and an easy flying biplane.

The prototype weighed just under six pounds, and with wheel pants on rough grass and no wind took-off in about 25 feet. Flying speed was about 35 miles per hour. This biplane flies like a trainer and landings are a pleasure. Being critical and listing the complaints of other flyers who have flown Combo, the elevator is slightly too sensitive and the ailerons are not sensitive enough.

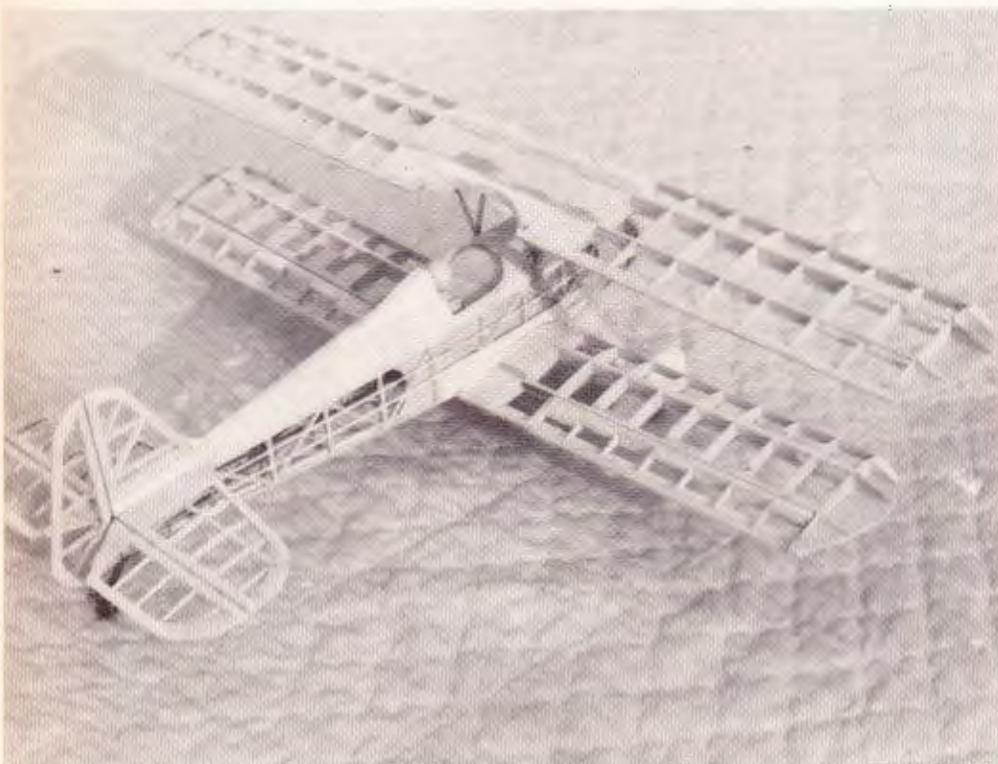
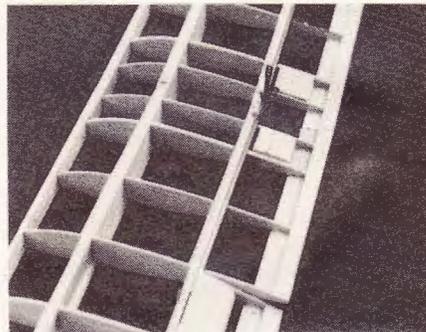
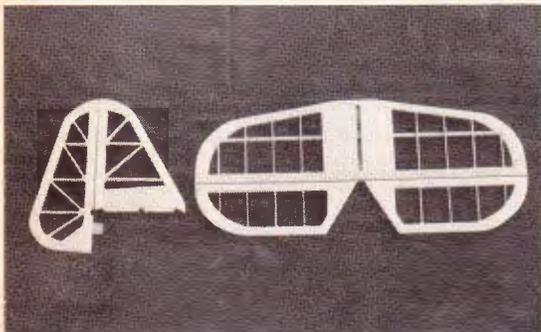
To sum up beginners will be able to fly Combo, but should not attempt to build Combo. Some previous building experience is warranted, especially in a scratch built model that is a biplane. If you have read this far in this article you are the type of modeler that is willing to put the time and effort into a project like this and obtain all the rewards. Not the least of which is having a model beautifully different than the others at your flying field and one with crowd pleasing acrobatic ability.

Construction

Construction of the model follows established proven building procedures and tech-



Completed fuselage sides with formers ready for gluing (above). Outside surface at top, inside at bottom. Tail surfaces ready to be glued to fuselage (below left). Note hinge at lower portion of rudder which attaches to fuse. Bottom wing under construction (below right). Note control horns and trailing edge.



Combo airframe finished, awaiting covering. Note the size of the ailerons. Despite their size, plane is not overly sensitive. Even though it is not scale, the Combo looks like a real, full size biplane. Pretty.

niques. Therefore, this portion of the article will not be a step by step description of how to build a Combo. For the most part the steps are obvious if this is other than your first or second building attempt. This phase of the article will concentrate on the procedures and techniques unique to Combo and also cover in detail the features built into the design.

Wing

Using $\frac{1}{16}$ " balsa, cut out all the wing ribs as per the plans. Remember, some ribs are smaller under the center wing sheeting. The main spans are $\frac{1}{4}$ " spruce with end grain $\frac{1}{16}$ " balsa webs. This is similar to model sailplane construction. The webs start bear the end of the plywood doublers and extend to the interplane strut mounting blocks. The secondary spars are $\frac{3}{16}$ " balsa. Don't attempt to pin the spruce spars, they will split, use weights or clamps. The main spar has $\frac{1}{16}$ " plywood doublers front and rear. The secondary spar has one $\frac{1}{16}$ " plywood doubler. That adds up to $\frac{3}{16}$ " of plywood doubling the center section of the wing. Also, add a small piece of $\frac{1}{16}$ " plywood on the rear of the leading edge, and at the end of construction sheet the center section with $\frac{1}{16}$ " balsa sheet. Furthermore, use fiberglass tape on the center section of the bottom wing.

Let's talk about the interplane struts. Cut them out as per the plans from $\frac{1}{8}$ " plywood. The wings should have mounting blocks, made from $\frac{3}{8}$ " square spruce about 1' long, glued in place. Use either 90° small brackets with screws or DuBro Ball Links (no. #180) (\$.85 each, 8 required) to hold the struts to the wing. The prototype used a 1", 2-56 bolt with a washer coming up thru the cabane mounting blocks on the wings with a 2-56 blind nut. The female end of the ball link was then screwed onto the 2-56 bolt. The ball portion of the ball link is screwed to the interplane strut using $\frac{1}{4}$ " \times 4-40 bolt. The advantage of this method is that they "snap" on and off.

Top and bottom wings are built more or less the same. The bottom wing is shorter and has dihedral, while the top wing is flat. The major differences are highlighted below.

Top wing

The center section of the top wing must be understood prior to building. The basic design allows the cabane to be reset into the bottom of the wing. The center section also allows for the four bolts that hold the wing. Refer to the detail sketch on the plans and the photographs in the article. The area behind the secondary spar to the trailing edge is filled with balsa scraps. Next, cut the semi-circle over the cockpit as per the plans.

Bottom wing

The ailerons are separated from the wing when it is nearly completed. Remember, the ailerons are *top hinged*. Install the torque rods and hinges *not* in the center line of the aileron but very close to the top. The reason for this is appearance (reduces unsightly gap) and it helps eliminate aileron flutter. The bottom wing is bolted on in the conventional manner, two bolts and a $\frac{5}{16}$ " dowel in the

leading edge mating a $\frac{5}{16}$ " hole in the fuselage former.

Fuselage

The best way to start is with the plastic cowling. The cowling is from Sig Manufacturing, Smith Miniplane Cowling Sh-564 (\$4.65). Use plastic model cement to glue the halves together. Measure your engine, prop hub to back plate. Get a set of Sig Universal Aluminum Engine Mounts Sh-478 (\$1.89). Figure out how much of the cowling you need. In the prototype about one inch was cut off the rear of the cowling. Now check your cowling against the outline of F-1 front and F-1 rear. Please notice F-1 front is slightly smaller than F-1 rear. Once F-1 is completed get a 2" spinner and put the nose assembly together to find all the necessary holes including holes in the aluminum engine mounts, engine mounting holes, throttle linkage, and tank holes in F-1, and glow plug, needle valve and fueling access in the cowling. The prototype used a Robert Fueller, 8 oz. Sullivan tank and a Semco Pitts Muffler SE-PJ-202 Medium. In the building remember to make a left and right side when adding the $\frac{1}{16}$ " plywood fuselage doubler. Use epoxy to laminate plywood. (Water base glue will warp parts)

The landing gear is a Bridi Models, dural hardened aluminum bracket L-3 with 3" Dubro wheels and Gee Bee wheel pants. The whole assembly is held on to the fuselage with 4-40 \times $\frac{1}{2}$ nylon bolts by Ace. This saves a lot of rebuilding after the inevitable "hard" landing. Also, the prototype used a 1" tail wheel on a C.B. Associates CB-TA-510 wheel bracket (\$9.10).

Empennage

The plans give all the necessary information. Both the stabilizer-elevator and fin-rudder are built "flat". The stabilizer-elevator is then sanded to an airfoil on the top only. The fin-rudder is sanded on both sides to obtain the airfoil. Sand gently, don't break the ribs. Build the stabilizer-elevator together, then sand, cut apart and hinge. Same procedure applies to the fin-rudder assembly.

Covering and finish

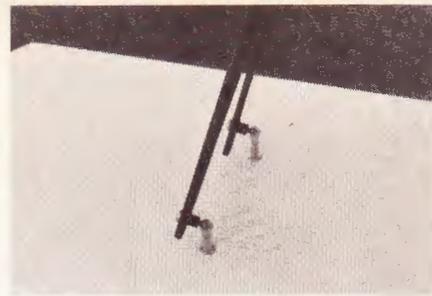
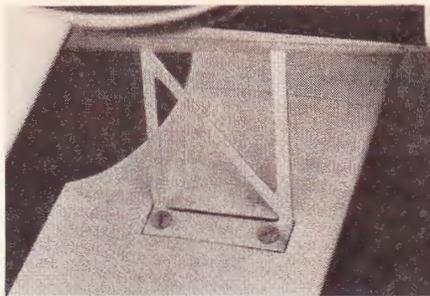
The prototype was covered with white peroglass Coverite and the trim colors were K & B Super Poxxy (brushed on). Use your favorite combination, just remember the model should be kept as light as possible especially in the tail area. The prototype used a Prather 2 oz. nose weight for balance.

My biggest criticism of this model is the paint scheme: "It looks just like a Sig Miniplane." I've heard that comment so many times that I'm thinking of retrimming the ship in a different scheme. Therefore, with a little research perhaps you can find another "scale" paint job to copy.

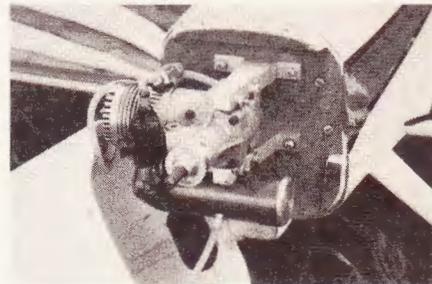
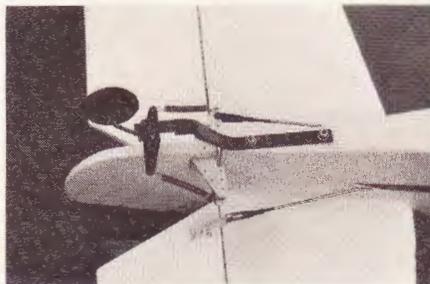
Flying

The flat bottom wing airfoil creates a great deal of lift and makes for a stable flying model. The prototype had no excessive "ballooning" tendency and flew very well inverted.

FLYING MODELS



One piece aluminum cabane is attached to wing with nylon bolts (above left). Makes for easy construction. Ball joints simplify installation of wing struts (above right). C.B. Associates tail wheel assembly was used on Combo (below left). Easy, functional way to go. K&B 40 uses Semco Pitts muffler (below right). The muffler fits inside Sig's Smith Miniplane cowling. In fact, Combo does resemble the Miniplane a little.



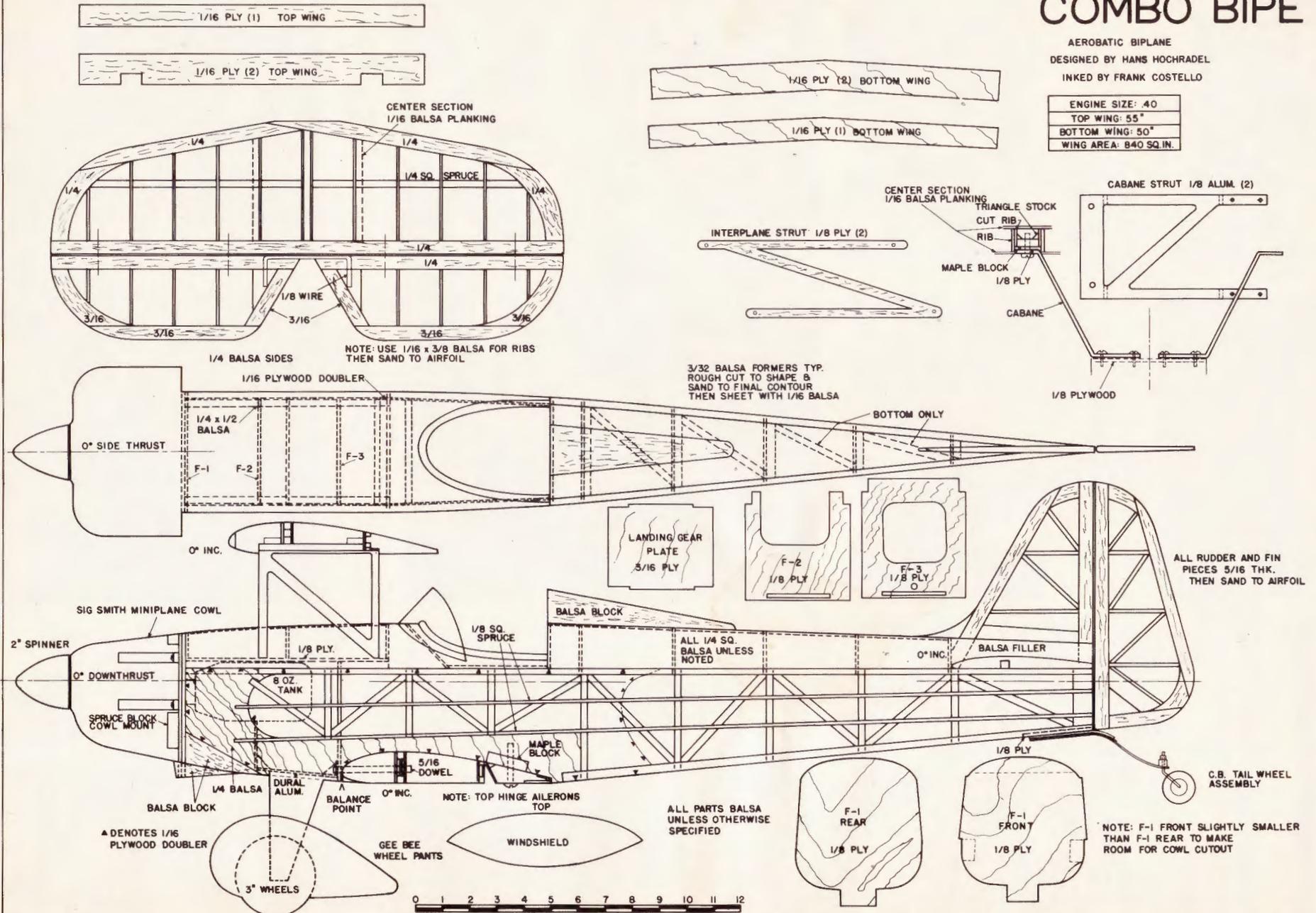
Author makes engine and radio check before sending the Combo off into the wild blue (above). Smooth take-offs and rock steady flight characteristics are what the Combo's all about (below).



COMBO BIPE

AEROBATIC BIPLANE
DESIGNED BY HANS HOCHRADEL
INKED BY FRANK COSTELLO

ENGINE SIZE: 40
TOP WING: 55"
BOTTOM WING: 50"
WING AREA: 840 SQ. IN.



Balance the model as per the plans. The leading edge of the bottom wing is a good place to start, then adjust to your preference after a couple of flights. The batteries go under the tank.

The control surface throws on the prototype were as follows: ailerons $\frac{3}{4}$ " up and down, rudder $\frac{3}{4}$ " left and right, elevator $\frac{3}{8}$ " up and down. All incidence is 0° , no engine thrust, and no washout either.

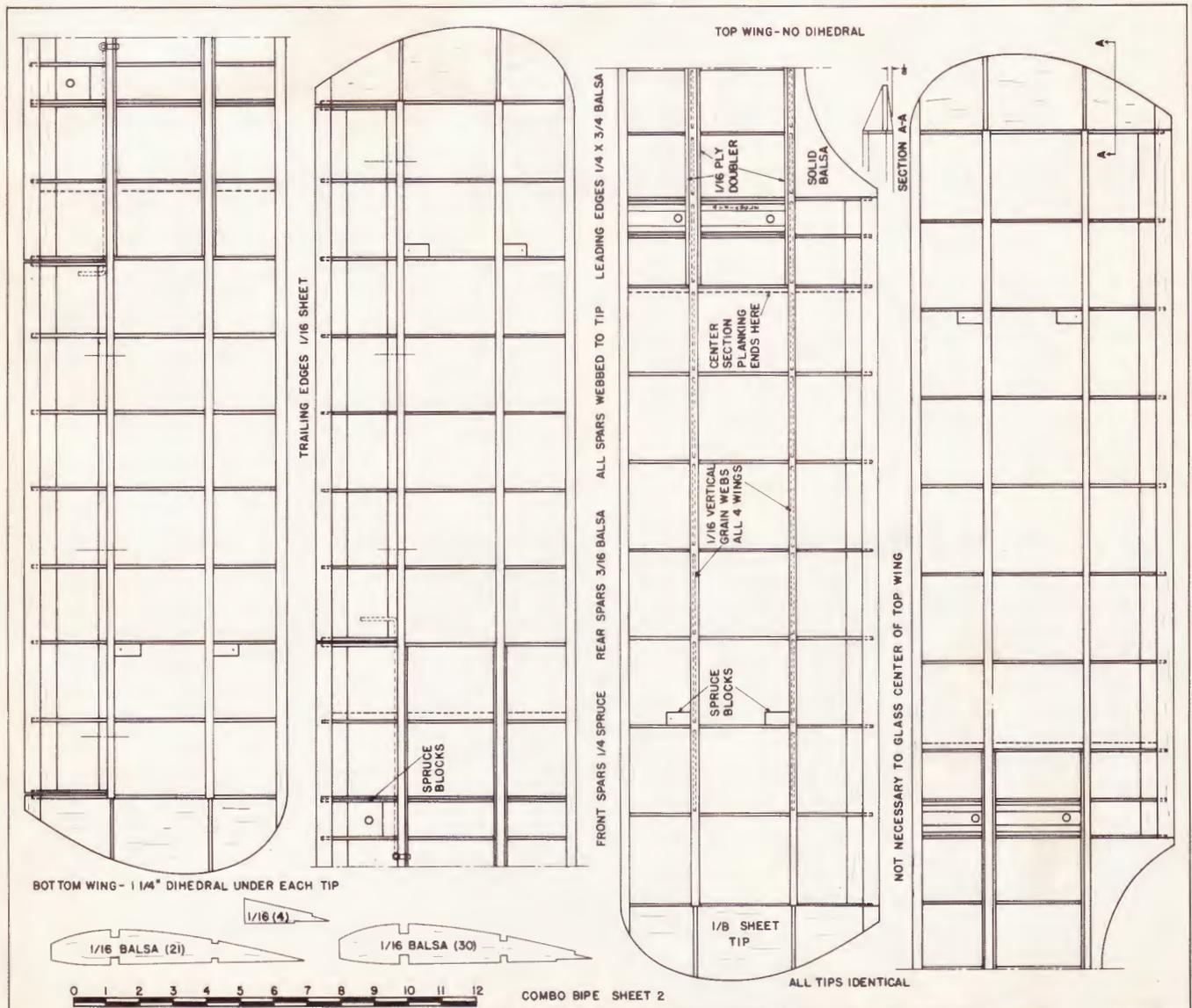
The prototype weighed just under six pounds and used an old tired K & B .40 engine. Flying performance was excellent. After about 20 flights and doing many acrobatic maneuvers including spins and outside loops, I felt that a little more power might be nice, but then again the scale appearance of the acrobatics would be lost.

A hint on tail-dragger take-offs. Start the take-off roll holding a little up and a little right rudder in the transmitter sticks. Steer the model gently with the rudder. Wait until flying speed is obtained then slowly add up elevator.

Happy landings.



No, it's not a Smith Miniplane! That message in the public interest provided by the author. The Combo is actually a conglomeration of a number of ideas which have worked out very well. Combo's a fine flying ship.



Thermal 73



By Bob Hunt

PHOTOGRAPHY: BOB HUNT

Having been an R/C flyer for just a bit less than a year now, I'm still experiencing my share of first impressions on the various aspects of the sport and types of flying available. Recently I've been introduced to R/C soaring by way of a new product from a new company, Precision Model Products, 21489 Cold Springs Lane, Diamond Bar, CA 91765, with Mr. Peter Neuer at the helm, has entered the R/C Soaring market with two kits in the popular

2-Meter class size. The first of these is the Thermal 73 which is the subject of this review. Basically a Soaring trainer, the Thermal 73 incorporates a Clark Y type airfoil in a standard configuration package which is designed with the newcomer in mind as we shall see.

The other offering from PMP is a more advanced, competition type, sailplane featuring an Eppler 205 airfoil and a "T" tail. The "Challenger" is the obvious next-step for the

neophyte soarer once he has mastered the more basic Thermal 73. For this reason we have decided to present both of these fine kits in sequential reviews. John Goldman is our local sailplane expert, and I've asked him to do the honors with the Challenger.

Cracking the lid

I've always been impressed with good packaging and labeling on kits and the Thermal 73 scores a "10" in this respect. A beautiful four color picture of the ship graces the top of the kit box giving a shot of inspiration to get a-buildin'. Further inspection reveals a set of highly detailed, rolled, plans, high grade balsa, ply and hardwoods (with the proper densities for the various applications), a complete hardware package and a set of polypropylene control rods and sleeves. These control rods have been tested for dimensional stability across a wide temperature range. They do not grow or shrink as the weather changes. Certainly a plus when you finally get the ship trimmed out!

A personal gripe has always been kits which supply only plans and no instruction booklet giving the sequence of construction. The Thermal 73 kit contains a fine six page, illustrated booklet.

Construction

Following the instruction booklet, the fuselage is the first item to take shape. The fuse sides are die-cut from $\frac{3}{32}$ " balsa. These are of firm density, as the fuselage takes much of the abuse in sailplaning. Plywood formers

Precision Model Products

All of a sudden there seems to be a new popular interest in sailplanes. In the past year, there has been quite a number of new kit releases on the market, predominantly in the 2 meter class. A vast majority of these are of the floater/trainer type. For the modeler looking for a high performance sailplane in the 2 meter class, the Challenger by Precision Model Products, is the answer.

The Challenger is a much better looking

sailplane than most available. Its full canopy, "T"-tail with full flying stabilizer and rounded fuselage set it apart from the boxy soarers. The "T"-tail design keeps the stabilizer out of any turbulence from the wing, thereby insuring very good pitch control.

This airplane has the ability to slowly ride marginal lift, but has plenty of speed to get out of those inevitable sink areas. (Why is it there always seems to be more sink areas than lift areas whenever I get to the flying

field?) The Eppler 205 airfoil is being used on more new sailplanes because of its wide speed range capability. Speed capability equates with penetration. This airplane can be flown down wind and get back when others are afraid to venture anywhere but up wind, for fear of not making it back to the field. This allows the pilot a much larger area to search for lift.

Construction is fairly easy and straightforward, but I don't recommend it for beginners. The use of lite ply (poplar plywood) for the fuse sides, formers, and part of the bottom ensures ease of construction as well as strength. The die cutting is as good and accurate as I've ever seen. It's a joy to find parts like these that fit accurately and don't require clean-up. The instructions even include complete layout diagrams for all the additional parts which are not already die cut.

The fuselage must be built square and true. I use a small machinists square to assure the formers and the wing mount area are square to the sides.

Be sure the sides are absolutely parallel and the front former square before bringing the sides together on the remaining formers. Balsa triangular stock runs the full length of the bottom of the fuse. This must be trimmed at the tail to accept the vertical fin.

The nose block is pine for strength and should be glued in place next. The lite ply bottom can now be fitted to the front. I personally prefer to use the slower setting glues (not cyanos) for wood other than balsa. The way the fuselage is constructed provides $\frac{1}{8}$ "

PHOTOGRAPHY: JOHN GOLDMAN AND BOB HUNT

Challenger



By John Goldman



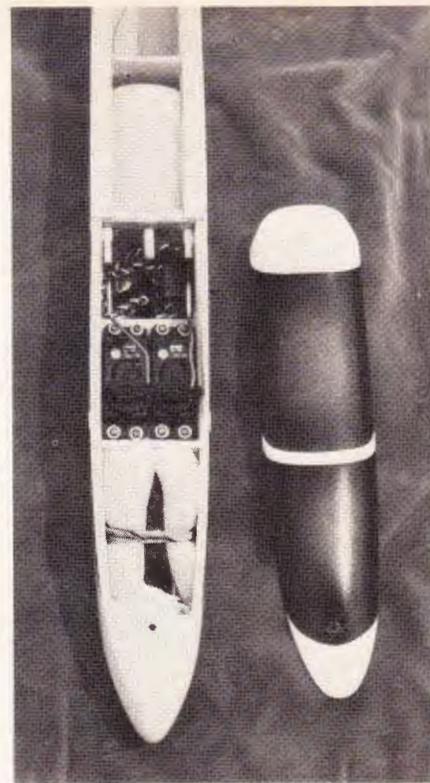
Pushrods and control hardware are included in the Thermal 73 kit (above). Canopy of Thermal 73 was painted on for realistic effect (below). Sleek.



and poplar ply doublers are added to the front section of the fuse making an extremely solid unit. Balsa formers are used aft of the wing assembly mount for light weight. A poplar ply forward fuselage bottom takes the brunt of those less than perfect landings. The remainder of the fuselage is planked with balsa in the normal crossgrain manner. The pushrods sleeves are installed prior to closing the fuselage, and after the addition of the balsa top hatch, the fuselage is carved and sanded to a smooth round crosssection. The entire fuselage was constructed in two hours using Hot Stuff Super "T".

Next up is the stabilizer, elevator, rudder and fin assemblies. These are constructed, directly over the full-size plans, from supplied strip stock. Nothing complicated here at all, but be careful to make nice tight fitting joints for all the strength possible.

The heart of a sailplane is the wing. Unless it is very strong, light and straight, the desired flight characteristics will not be achieved. The Thermal 73's wing is, by virtue of the flat bottom airfoil, very easy to construct. The design assured light weight, leaving only strength as the unanswered question. The wing center section is built around two 1/16" plywood dihedral braces which butt up against the top and bottom sheeting. These braces are glued to a spruce spar which runs between them. A shear web is glued to the top of the spruce spar between the braces and after the remainder of the ribs are installed another spruce spar is fitted to the top of the assembly. This type of con-

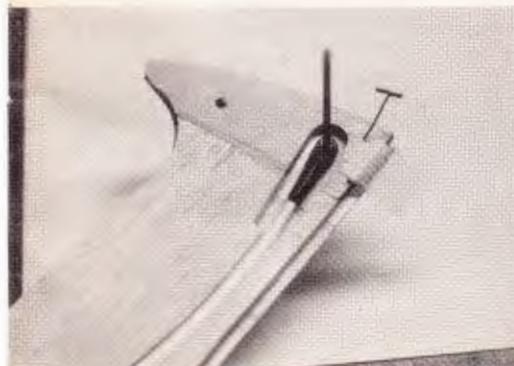


Neat radio installation is a must with the "73" since fuse space is limited. MRC's Vector 4 radio was chosen for use in the 73. Good glider radio.

These new sailplane offerings can take you from beginner to expert status in R/C soaring. Two very well engineered kits.



Both P.M.P. sailplanes use dowel for wing hold-down. This is Challenger wing (above). T-Tail controls for Challenger (below). Internal pushrod.



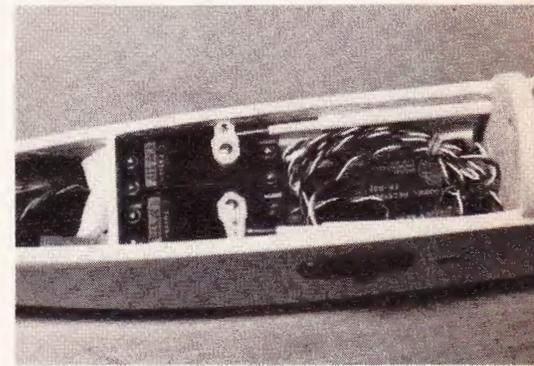
plywood on both sides and bottom of the front end where the radio gear is going to go, and gets the rough treatment on landing.

Rather than using the supplied tow hook with the wood screw end, I used a piece of 4-40 push rod bent to an "L" shape and installed it with a blind nut on the inside. (Note: do not put the bend at the threads, it will break.) In a way it was a gamble that the tow hook would have to be moved, but I found out that where the plans say it should go is correct. Put it there and forget it. With the blind nut and jamb nut, the tow hook cannot rotate.

The instructions call for installing the antenna tube on the left side and rudder pushrod on the right. Since I inherently circle left, I switched sides so I would be mostly pulling on the rudder control horn rather than pushing on it. In this way the resultant forces on the hinges tend to push them in rather than pull them out. The rudder pushrod tube was preformed by warming it in hot water, holding it to the desired shape and allowing it to cool. Be careful not to squeeze the tube so the pushrod will not slide freely. The antenna tube will be trimmed off flush before finishing.

The vertical fin is fabricated next with its hardware for the flying stab. Part of one rudder hinge must be cut away to clear the pushrod.

The whole vertical fin and pushrod housing may be glued using the gap filling type CA such as Hot Stuff Super-T. It works fine here on the nylon and balsa. The fin must be in-



Futaba radio installation in Challenger (above). Plan carefully, space is at a premium. Completed T-Tail (below). Clean design works very well.



Thermal 73



struction is extremely strong. The only drawback is that the wing is built in one piece making transportation a bit more difficult than with a two piece design. The parts fit throughout the wing construction is excel-

lent as is the die-cutting. A preshaped balsa trailing edge is employed, but the leading edge must be carved and sanded once it is installed. This is not a difficult chore at all. Precut shear webs are fitted between the

spruce spars throughout the span of the inner wing panels. Three thirty-seconds balsa diagonal braces complete the inner panels.

The outer panels have only a top spruce spar which extends past the innermost rib and is later glued to the front of the two spars in the inner panel to achieve a polyhedral brace. A very simple and effective attachment! Soft balsa wingtips are installed and carved to shape to complete the wing.

Finish

The wing was covered with transparent orange MonoKote™ to show off the wing structure. The tail feathers were covered with white Monokote, and the fuselage was painted with white Hobbypoxy paint. I decided to add a painted-on canopy for a bit of realism, and the Thermal was then assembled for a session of "hangar flying".

Radio Installation

I decided on MRC's new Vector 4, four channel system for guidance. Bob Aberle reviewed this system in the June 1982 issue of FLYING MODELS. Among Bob's findings on the Vector was above average servo centering accuracy. The MRC MR-110 servos were a bit of a snug fit between the fuselage sides, but not a problem. The four channel receiver is a small one by comparison with some others and it was installed under the wing saddle and wrapped in soft foam for protection as was the 500 MAH square battery pack which was mounted in the space provided in the very front of the fuselage. With everything aboard, the design C/G was achieved with the addition of 1/4 ounce in the nose. The

Precision Model Products

Challenger



John Goldman sends P.M.P.'s Challenger on another thermal journey (left). John poses with Challenger between flights (above). Challenger is competition oriented soarer. Pleasing profile of Challenger (below).



receiver antenna was routed through the fuselage for appearance sake, and all was in readiness for the maiden flight. The finished weight was 23 ounces, which is right on target according to the designer.

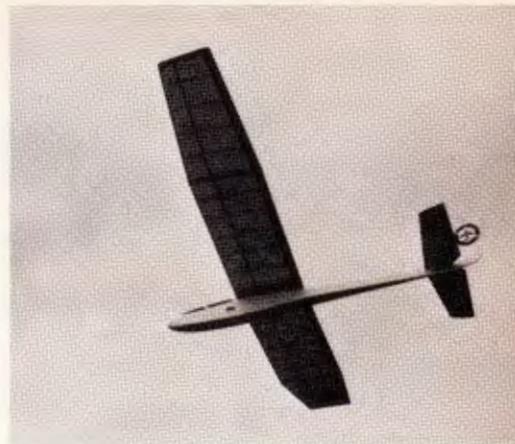
Flying

After the "insurance" photos were taken, the first test glides indicated that all was as should be and a trip on the Hi-Start would be next. Paul Clements' Kitty Hawk Models, R.R. 2, Paoli, IN 47454, supplied us with a standard Hi-Start which came complete and ready to launch with high grade surgical tubing, nylon cord, parachute and ring hardware, all stored on an easy to use plastic reel. It has proven to be a trouble free, quality device.

Frank Costello did the honors for the first flight, and the Thermal 73 towed absolutely straight with the release being smooth and stable. The tow hook location as shown on the plans proved to be perfect.

I took over for the second flight and found the ship to be extremely docile and predictable. The Thermal 73 was designed as a floater, but it showed the capability to penetrate in a fairly stiff wind. This is important for the beginner who may let the plane go too far downwind while learning.

I have since put over 200 flights on the Thermal 73 without incident. Spot landings are a breeze with this design due to its slow flight capability and, given only moderate lift conditions, the Thermal 73 has turned in flights of considerable duration. All in all, the design achieves its goal of being a perfect beginner's sailplane with a bit to spare. ☐



Editor hi-starts Thermal 73 on its way to "hat sucker" (top left). Thermal 73 hunting for thermals (top right). 73 at rest with MRC radio (above). A fine first glider.

stalled absolutely square to the wing mount area. The fin is made up of balsa sheets sandwiched together to form a plywood. Grain direction is very important here to keep the fin straight and vertical with no warps. Since we have a flying stab airplane, any misalignment or warp in the fin will affect the stabilator.

After gluing the fin in, the rear portions of the fuselage may be planked. The planking is typical cross grain. Again, be careful not to put a twist into the fuselage. At this point the fuselage and fin may be shaped.

The flying stab is built on top of the plans. Be sure to build a right and left side. The four sticks which hold the brass tubing should all be drilled at the same time to be certain of alignment. The stab pieces are held to the fin by a friction fit between the $\frac{1}{16}$ " steel rods and the brass tubes. Slightly squeeze the brass tubes and try the $\frac{1}{16}$ " rods for proper friction fit before gluing the tubes into the stab halves. During flight there really is no force to pull the stab halves off the rods, so the fit doesn't have to be super tight.

The rudder construction is typical and built over the plans.

Utmost care is required when building the wing to keep it straight and true. Although some twists may be taken out after the wing is covered, it's best to build it as straight as you can to begin with. The whole top leading edge is sheeted to yield a rigid wing which minimizes distortion during flight. The rib die cutting was very accurate and clean, and minimal touch up is required.

Placement of the mounting pin is critical to assure proper alignment of the wing to the fuselage. I recommend fitting the wing to the

fuse and gluing the pin to the wing using the fuselage former as a jig. The hardest part of the wing construction is sanding the blocks to the proper contour to fair to the canopy and the fuse.

I tinted the canopy using Rit dark blue dye. The dark blue turns the canopy a nice shade of grey.

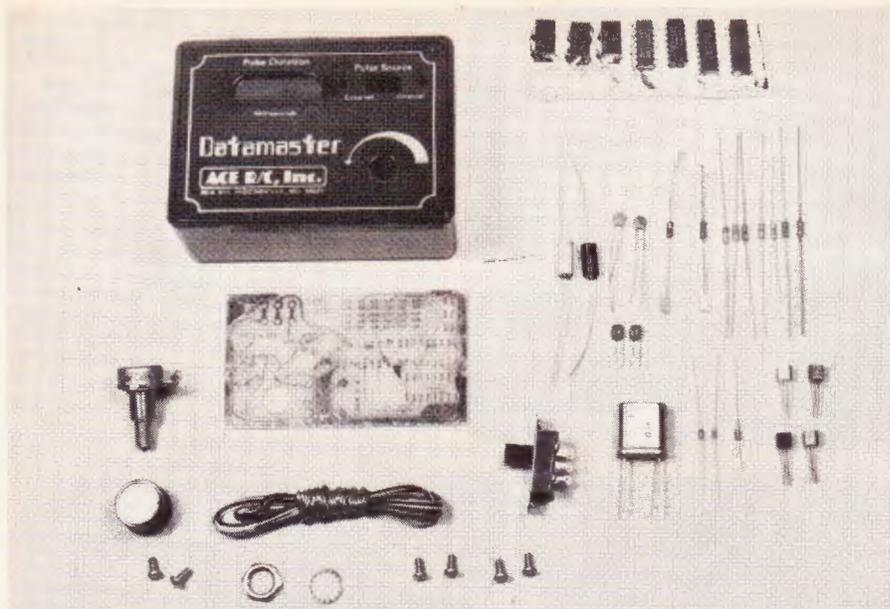
Even though this airplane has a real canopy, there is plenty of room for standard size radio gear. My installation with 4-AA batteries up front, two Futaba S-23 servos, a 3 channel receiver, switch and charging jack all fit snugly but comfortably under the canopy.

I finished my airplane all in Monokote, even the fuselage. It's not too difficult if you take your time.

After balancing, actually the balancing was done at home during radio installation, and a few test glides from my hand, I went right to the high start. The first launch and subsequent launches were truly spectacular. Straight up and unhook with the high start absolutely vertical. It's nice to hear the parachute pop as you come off the hook.

This airplane will turn very flat in marginal lift to keep as much wing area in the lift as possible, or you can stand it on a wing tip for an express ride up in a boomer. On breezy days when the floaters are all hovering over the field, you'll be out on your search for lift, up or down wind, for you'll have the speed and penetration capability they don't have. ☐





PHOTOGRAPHY: BOB ABERLE

The Ace Datamaster comes in either kit form or completely assembled. Assembly time for the kit version is approximately four hours (above). A good first kit project for the R/C hobbyist.

An FM Product Review:

Ace R/C's Datamaster

By Bob Aberle

A combination digital pulse meter and a servo driver in easy-to-build kit form.

The new ACE R/C Datamaster falls into the category of R/C test equipment. It actually provides two functions: Digital Pulse Meter and Servo Driver. Before starting, let me supply some administrative information. The Datamaster is available from ACE R/C Inc., Box 511H, Higginsville, Missouri 64037, in kit form (catalog no. 22G20) for \$39.95 and fully assembled (catalog no. 22G20C) for a list price of \$49.95.

Digital Pulse Meters (or D.P.M.'s) are gradually becoming popular in the R/C hobby. The first DPM circuit, designed by Long Island modeler, Ken Jesser, appeared in a September, 1979 *R/C Modeler* article. A parts kit of that circuit has been offered for several years, but certainly not well advertised. Last year I reviewed the Estes Skyaligner (FLYING MODELS, November 1981, pages 42-43). This DPM unit is sold in kit form only for \$50.00, but again has not been actively marketed. ACE R/C has taken a serious step forward in the DPM market with the introduction of their Datamaster.

What is a DPM and why would you want to own and use one? The position of a typical R/C proportional servo is controlled by the

width of a pulse. As the pulse width of a particular channel is increased or decreased (as is the case when you move the transmitter control sticks) the servo will respond with specific movements. Each R/C system has a characteristic neutral pulse width position. In most cases this will be 1.4 to 1.5 milliseconds (M.S.), although several "odd" systems have been known to be as high as 1.90 M.S. A typical R/C channel might give the following readings: full left (in the case of the rudder or aileron channel function) 1.90 M.S.; neutral 1.50 M.S. and at full right 1.10 M.S. The total control throw excursion would be 1.90 to 1.10 or 0.80 M.S. Remember, this is a characteristic reading. Unless you make an adjustment at the transmitter or the servo, you will always obtain that same pulse width reading, for that particular channel of that particular R/C system. Now why do we want to know this? Many of our modern R/C transmitters now have special control features, such as: dual rates; exponential rate; travel limit or end point adjustments and mixing controls. By using a DPM you will be able to establish a list or table of pulse width readings for each channel on a given airplane (car, boat or whatever). Should you want to use

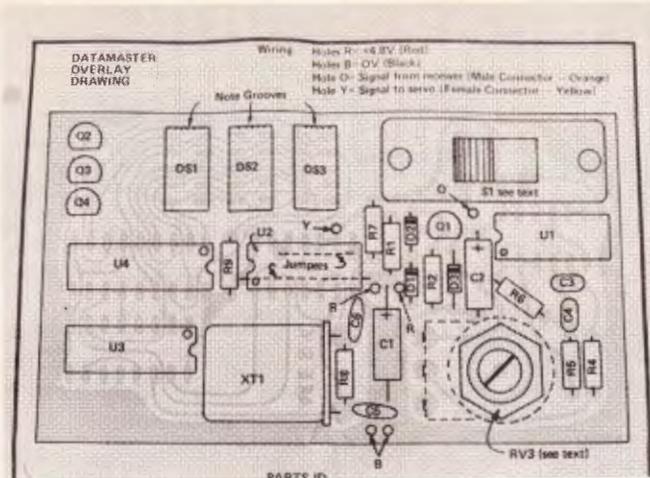
one common transmitter and several airborne flight packs, it is a relatively easy job to set up the proper control (servo) positions for each model without the need for mechanical measurements or flight tests. You can also use the Datamaster to individually calibrate your servos to an exact neutral position and adjust the linearity such that you obtain equal travel in both directions.

As an extra bonus ACE R/C has included a servo driver circuit within the Datamaster. This is actually a pulse width generator which can drive the servo without the need for a transmitter and receiver.

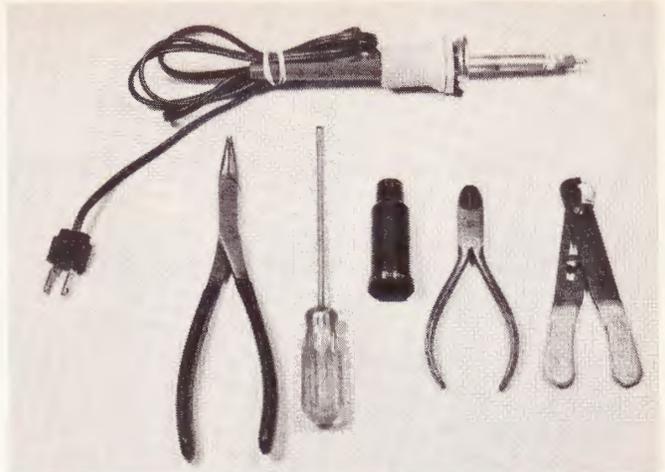
Although you can purchase the Datamaster fully assembled, I felt a review of the kit version would prove more informative for our readers. The kit itself centers around a single printed circuit board measuring roughly 4 inches by 2³/₄ inches. Essentially the full build up of this kit involves the assembly of components to the P/C board. For information the board contains: 6 capacitors; 3 diodes; 9 resistors; 4 transistors; 4 integrated circuits (I.C.'s); 3 L.E.D. displays; a special 1.0 MHz crystal and a DPDT slide switch. Assembling these components can be a relatively easy job, especially if you read, before hand, the ACE R/C supplied, "Kit Builders Hints". This extra set of instructions provides some good tips on component identification (which can be difficult at times) and soldering. I found polarity marks on certain I.C.'s to be quite difficult to interpret. To make sure I didn't insert an I.C. improperly I painted a small white dot over each polarity mark. Be careful also of the fact that one of the four diodes is a different type (D-3). Also one of the four transistors is a different type (Q-1). Don't forget the two jumper connections which are located underneath I.C. (U-2). For soldering I would suggest, as I have so often, the Ungar No. 777 handle with a No. 1235 37¹/₂ watt element and a No. PL-340 ³/₆₄ inch spade tip. If you can't find this in a local electronics or hardware store, you might try ACE R/C directly; it is listed in their catalog. More than enough of the right kind of solder was provided in my kit.

Overall time for assembly, for me, and that included my usual photography work, was about four hours. There are some very tight areas to get a soldering iron into. You wouldn't stand much chance of success without the recommended soldering iron. If you end up with some bridged solder connections you can still use "solder wick" to help remove the excess solder. Radio Shack stores carry this wick (Radio Shack part no. 64-2090, which lists for \$1.49). Solder bridging in this circuit will prevent proper operation, but is likely not to blow anything up. So with a little extra patience and with the help of a magnifying glass (and the solder wick), you should get a working unit. If you build this circuit with a minimum of trouble you should have sufficient skills to go ahead and assemble flight hardware (transmitters, receivers and servos).

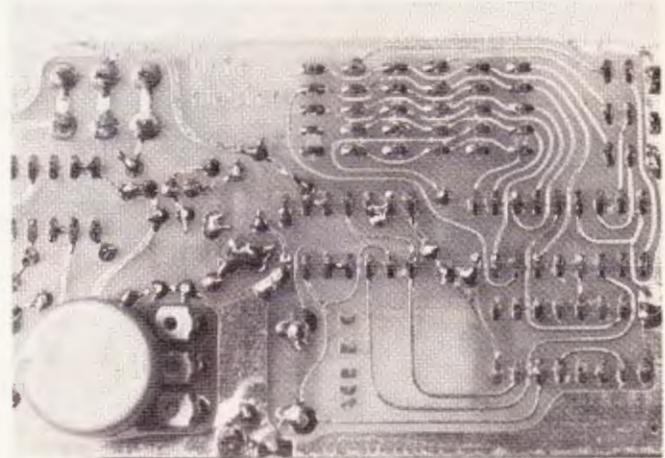
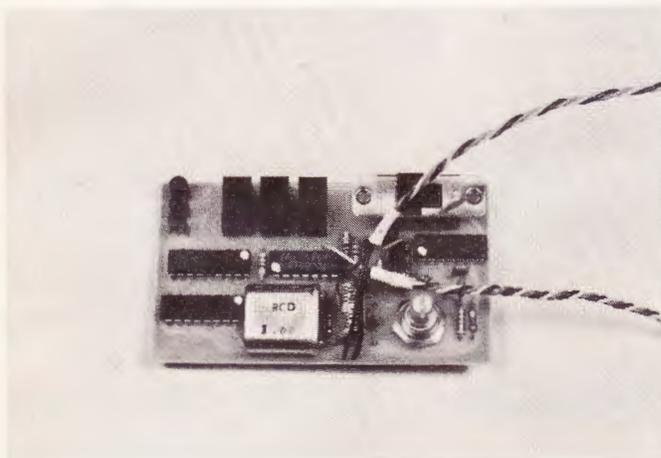
One point of qualification when using this DPM. It will handle only positive pulse R/C systems. About all systems now available are positive pulse. The notable exception being the pre-1982 ProLine systems and some



A photo copy (above) of the main, and only, component overlay assembly drawing as supplied with the excellent instruction sheets. Component side of p.c. board (below). White dots painted on I.C.'s by Bob check polarity.



Basic tools necessary for kit construction (above). Soldering iron and correct tip are most critical items. Solder provided with kit. Foil side of Datamaster p.c. board (below). Take care to avoid solder bridges.



EK Logictrol sets of many years ago.

Final assembly of the Datamaster involves the hookup of two cables. Wire is provided for the cabling, but connectors must be purchased separately. For my application I chose a set of Deans 3 pin connectors since they would interface with the majority of my own personal R/C equipment. Another suggestion is to purchase an aileron extension cable for your particular R/C system. Cut that cable in half and make one (the female) the servo connector and the other (male) the connection to the receiver (or battery depending on the model of operation). The entire Datamaster is contained in a black plastic case measuring 4 inches long \times 2 $\frac{7}{8}$ inches wide \times 1 $\frac{5}{8}$ inches deep (plus the height of the control knob). There really isn't any calibration required. The entire circuit gets its accuracy by virtue of the internal 1.0 MHz crystal.

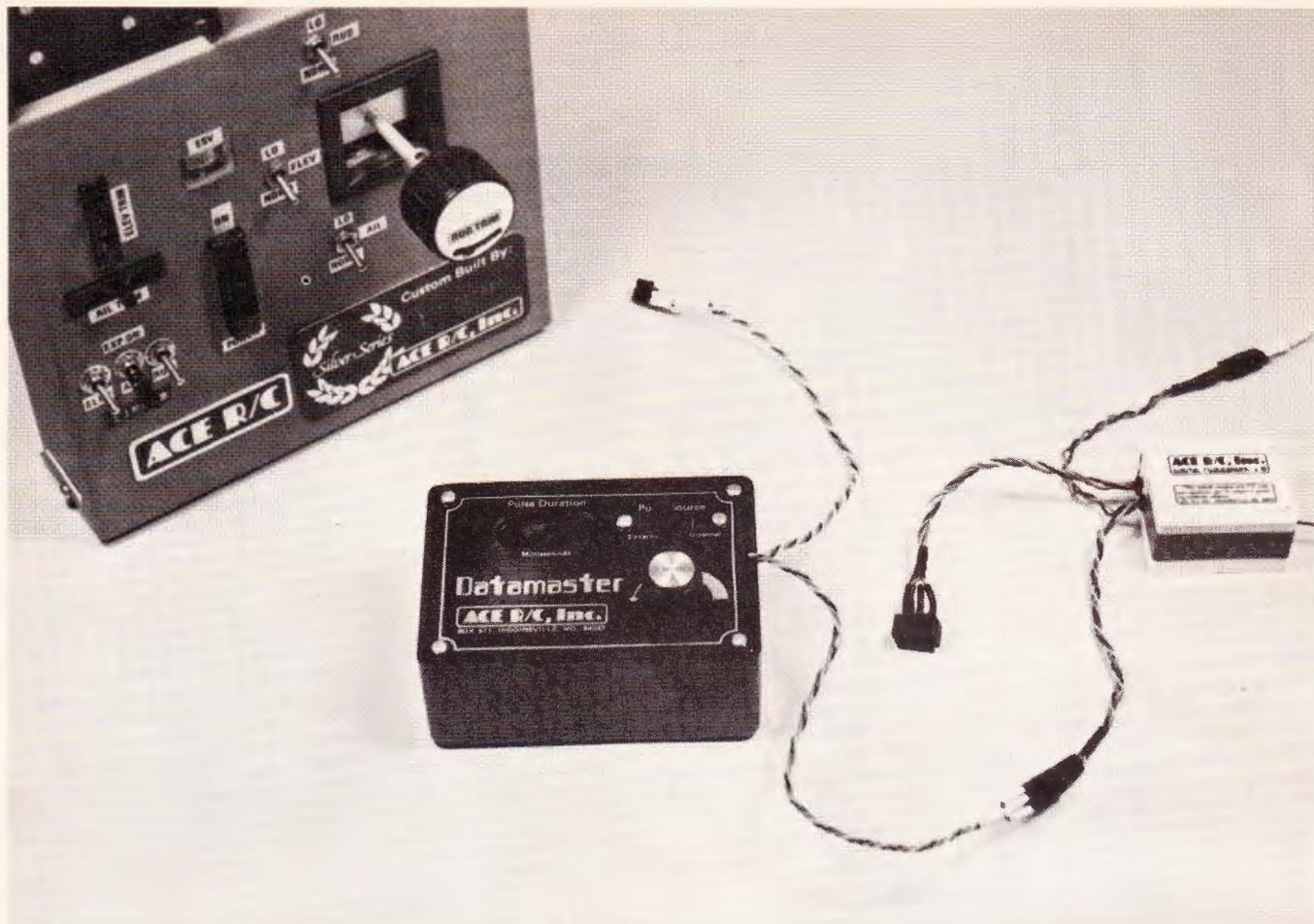
How do you use the Datamaster in normal practice? Lets start with the DPM being used to set up transmitter controls. First place the "Pulse Source" switch on the Datamaster in the "External" position. Plug the Datamaster (male plug) into the receiver channel you wish to check. In other words you actually plug the Datamaster into the receiver position normally occupied by a servo. Turn on the power to both your receiver and transmitter. In this mode of operation the Datamaster is powered by the receiver battery pack. When you move the appropriate transmitter control stick, the digital readout

on the Datamaster will vary or change (normally the servo in this same position would move to the same commands). What you may want to do at this point is record the neutral position and the control end point extreme positions. You may record, for example, 1.50 M.S. for the neutral position on your elevator channel (with the trim lever at zero). Then after flying the model lets say it required down elevator trim. Taking another DPM reading after the flying session you might obtain a DPM reading of 1.60 M.S. which now includes the added trim. If you recorded this reading you could easily verify the exact trim position before the next flying session. The basic suggestion, when using one transmitter with several airborne packs, is to take readings on each channel position, for each airplane. Keep a separate log sheet for each airplane system. When changing from one model to another, just re-establish all the controls to the DPM readings you previously recorded. The only real problem, or inconvenience, in using a meter of this type is that you must gain access to the receiver servo connectors (for each channel). This means in many cases "diving" into the fuselage and removing a lot of foam rubber padding to get at the connectors. This could be especially annoying if done on a routine basis.

Another use of the Datamaster is for servo test and alignment purposes. This can be a great help after performing maintenance

such as, pot wiper replacement or cleaning. In this test mode you won't need a receiver nor a transmitter, but you will require a four cell, receiver type, battery pack. First switch the "Pulse Source" switch to "Internal". The servo to be tested is plugged into the Datamaster female connector. A suitable battery pack is then plugged into the remaining male connector. At this point the displays will light up. The control knob on the front panel of the Datamaster is then rotated to command the servo, much as the control stick would do on the transmitter. If you had previously recorded the servo neutral position of 1.5 M.S. you could use the knob (pot control) to establish that same reading. Should the servo output arm appear to be off the neutral position, mechanical or electrical adjustments could be made to re-center the servo. By rotating the knob from one extreme position to the other you can "exercise" the servo. Unfortunately, the Datamaster's built-in servo driver does not have an "automatic" function, as does the popular ACE R/C "Servo Cycle" (catalog no. 14G-7). With the auto feature you can let the servo cycle back and forth by itself (unattended). This is helpful when checking out or "burning in" a new or rebuilt servo.

The ACE R/C instruction sheets (which are excellent) also provide a suggestion for hooking up an internal battery supply for the Datamaster. There is enough room inside the case to accommodate a four cell, nickel-



cadmium battery pack. In addition, you would need to install a small SPDT switch and a charging jack. The addition of this battery pack would make a totally self contained unit.

Let me give you a few more application suggestions for the Datamaster. It is most helpful when checking out the functions of a transmitter which has exponential rate control, to have access to a DPM. In fact, the use of a DPM, is almost essential to plotting the necessary curves to determine if the expo rate feature is working properly and at the proper degree of sensitivity. A procedure on this was covered in my article, "Exponential Explained," FLYING MODELS, June 1981, pages 33-37.

Another potential application is to construct your own direct servo controller. This is usually a feature found only in very expensive R/C transmitters. The idea is to be able to check your throttle channel, with the engine running, prior to a flight, without actually turning the transmitter on. This is especially helpful at R/C contests where the transmitters are usually retained in an impound area until just before an official flight. All you have to do is tap off your throttle servo cable (or use a "Y" connection harness which some manufacturers supply). Bring that tap out to a Deans type, bulkhead mount, charging connector (if you can make it a 3 pin variety). Once this is done it is a simple matter to plug in the Datamaster to this receptacle mounted on the side of the fuselage. Switch the Datamaster to the "Internal" position, turn on the receiver power and then rotate the knob to actually control the movement of the throttle servo. If you had



Datamaster being used to check a receiver channel being operated by Ace Silver Seven transmitter (top). Datamaster checking servo with its internal pulse source (above). Internal battery pack can be added to unit.

previously taken throttle channel DPM readings you could easily record them on a label and affix it to the Datamaster case for easy reference. With the aid of the Datamaster you could run up your engine and adjust both high and low throttle (idle) needle valve settings, without having the transmitter in your possession. This would be a real bonus application of the Datamaster worth considering. About the only drawback might be the

fact that the L.E.D. displays may be hard to read in direct sunlight. But this problem could be overcome with the use of a small hood or shield over the display.

There is a lot of potential for application with this neat little device. The price is right and the experience in kit building is certainly valuable. Unless you have so little confidence in yourself, buy the kit version. You can hardly go wrong!

Tool Chest

By Bob Hunt

The scenario goes something like this: You are out at the field enjoying a beautiful afternoon's flying when suddenly you utter those infamous words "I haven't got it." If you are having any luck at all that day you will arrive at the debris area and find that your pride and joy missed the rock pile to the left, the road to the right and has impaled itself up to the leading edge in nice soft dirt (some luck). Hopefully, aside from some minor repair work, the ship can be salvaged. But what about the motor? How many times have you seen a flyer brush the dirt from the outside of a just buried motor and proceed to squirt some fuel on it and turn it over? More than once I'll wager. There is a better way!

The folks at Soni-Clean, 642 E. 84th St., Brooklyn, NY 11236, have an answer in their newest cleaning unit. The Soni-Clean machine cleans not only burrowing motors but many other small bits and pieces peculiar to this hobby, as well as other household items. It's great for all of the Mrs. jewelry too!

The Soni-Clean unit is incased in an attractive, high impact plastic case which has a molded-in tub measuring 10³/₄" long, 3³/₄" wide and 1³/₄" deep. A blue tinted, transparent cover tops off a very professional looking device.

In use, the Soni-Clean utilizes sound waves to "Electrosonically" clean parts immersed in the tub. The manufacturer recommends that R&S Engine Cleaner be used, as this solution won't attack the plastic case. The cleaning solution can be filtered after use and reused many times.

We just happened to have a motor in the condition described at the outset and we carefully disassembled it completely. If this hadn't been done, critical tolerances might have been affected by the cleaning action. For the same reason we were careful to keep the parts separated during the cleaning process.



PHOTOGRAPHY BOB HUNT

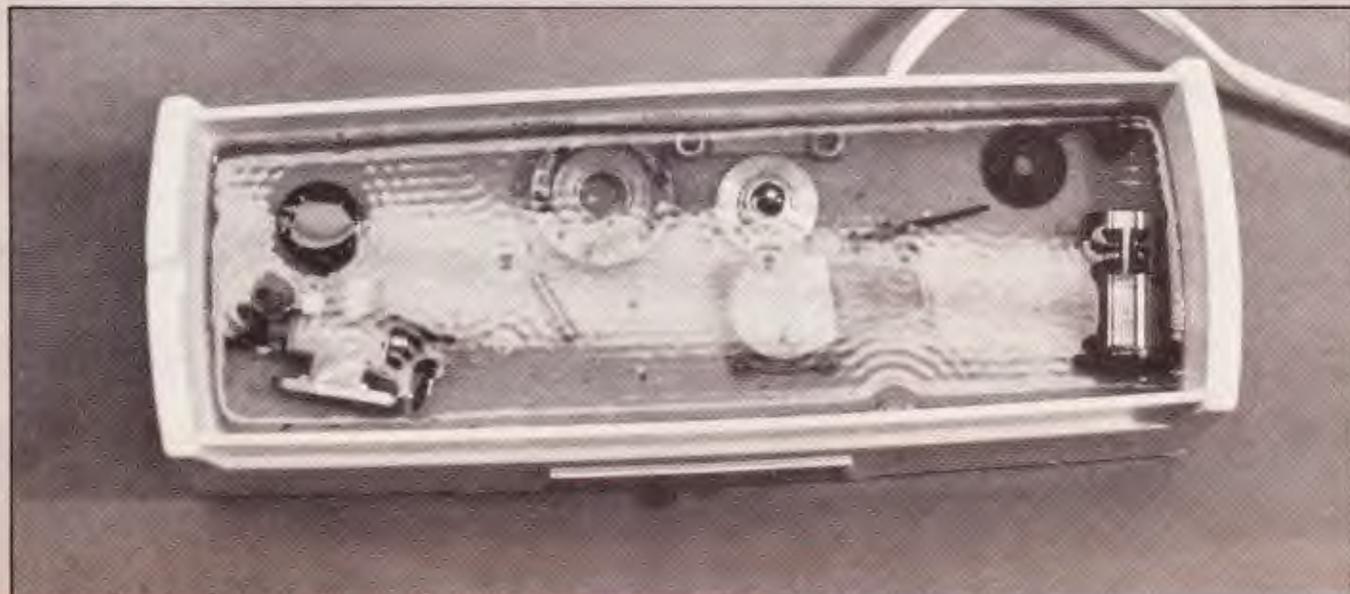
The Soni-Clean will do a fine job of "electrosonically" cleaning motors, hardware, and the like, as well as other household items (above). Soni-Clean in action (bottom). Normally cover is closed during cleaning.

We left the motor in the Soni-Clean for the recommended 30 minutes, during which time we occasionally rotated parts which were not completely immersed in the cleaning solution. The manufacturer indicates that an old toothbrush can be used to expedite the removal of especially baked on grime or stains. This brushing should be done several times during the cleaning process.

After only a few minutes in the Soni-Clean much dirt was seen at the bottom of the tub. Cleaning completed, we carefully removed the parts from the tub and dried them with a clean paper towel. After an oiling we reassembled the parts and once again had a "like new" motor.

The Soni-Clean is unconditionally guaranteed for one full year from date of purchase. If anything goes wrong during that time the unit will be replaced with a new one at no charge.

In summing up it is important to point out that sonic type cleaning is superior in every respect to the old method of simply brush cleaning with a solvent. Deep seated particles of dirt, and even microscopic metal particles which could wear out an engine before its time, are flushed out. The Soni-Clean is priced at \$39.95 and considering the above, it's a bargain indeed. For further information on the Soni-Clean, write to the address above.



TOP FLIGHT'S J-3 CUB

GOES MILITARY

By Rich Uravitch



PHOTOGRAPHY: RICH URAVITCH

Most Piper Cubs are yellow, but the subject of this review is a little different. This Piper Cub, modified from the Top Flite kit, is olive drab, and carries the military designation of L-4 Grasshopper (shades of Kung-Fu). The "L" stood for Liaison, but the machine was more frequently used for courier work or observation, with "just for fun" flying thrown in. The Top Flite kit duplicates all the fun! Little needs to be said about the full scale Cub, for many pilots cut their teeth on it, sprouted their wings. Starting out with an unpretentious beginning, it fulfilled its basic design requirement: it's an airplane! It was born to provide an inexpensive training plane and went on to become a classic. Even non-airplane people knew "Piper Cubs", nearly everything flying was one.

Its basic good design remains pretty much the same even with powerplant changes from a meager 40 horsepower to the snarling 150 h.p. in the recent PA-18 series aircraft.

Well folks, Top Flite has provided pretty much the same features in their Cub kit. The modifications performed don't alter the flying qualities a bit, and affect the building sequence only minimally, so what's presented here is essentially a stock, out of the box kit review.

I was joined early on in this project by Frank Klotz, a friend who has probably built and flown more Cub kits than anyone in the

world! The L-4 mod was his idea (spawned, I expect, by need of a diversion from all the standard Cubs he's had). He knew of a real L-4 based locally, is a friend of the guy who owns it and had, in fact, actually flown the airplane. That kind of enthusiasm should not be allowed to go unchanneled.

I haven't built a basic "stick" airframe in

quite a while, so I was rather enthusiastic when the kit arrived. The sheer weight of the box gives the impression that one of Mr. Piper's originals is stuffed inside; it's jam packed with material. The plans are super nice and the construction booklet clearly illustrates the building sequence. The kit is quite complete containing a sturdy injection molded cowl, a huge set of mylar markings, nylon-epoxy engine mount and a hardware package that saves some bucks (especially if you had to buy the parts separately).

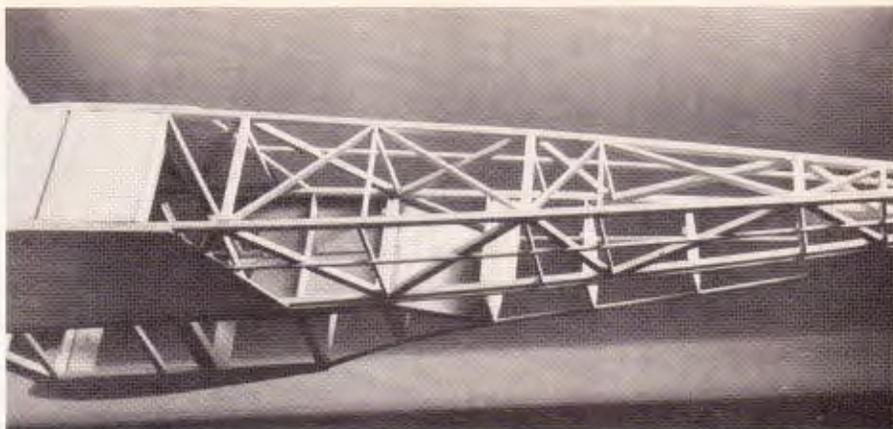
The Cub is a big airplane with a 77" span, putting it somewhere between 1/5th and quarter scale; 2.2" = 1 ft exactly. Now you know where all that lumber in the box will end up, speaking of which, the wood in my kit was generally of excellent quality and the die-cutting was good, not perfect, but good. The plywood parts took a little bit of coaxing, but I'll gladly trade a little extra work for overall high quality. There are a couple of real nice touches to the design: the wing attach bolts (1/4" x 20) are completely hidden in the upper cabin structure (no unsightly exposed bolt heads to mar an otherwise clean exterior) and the method of attaching the functional basswood wing struts enables "fine tuning" of the wing surfaces. I'm not telling you to build a warp into the panels, but minor twist differences can be easily removed by adjusting the clevised attach points. Building was done according to the construction booklet after spending an evening or so studying the plans to become familiar with the various wood sizes, materials, and parts locations. I would strongly suggest you do the same since the kit, while not complicated, contains a fair amount of parts. After working up the basic fuselage structure, the necessary and reasonably easy mods were performed to the cabin area which provided all that additional "greenhouse" area so characteristic of the L-4 variants. As I mentioned earlier, the new structure was patterned after the full scale airplane located a few miles away. Interestingly enough, that airplane also started life as a J-3. The owner used tube and weld, we used dowel and glue!



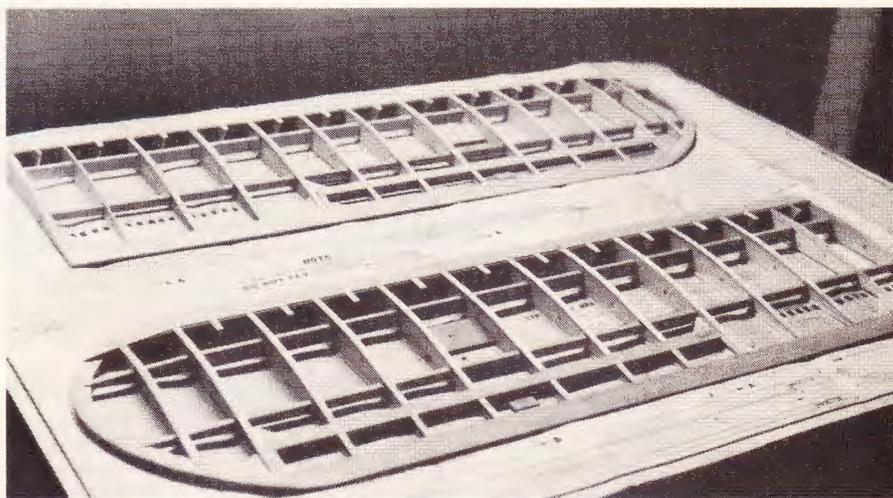
Is it real or is it a model? Full size prototype for Rich's "G.I. Cub" was found at a local airport (above). The model (right). Rich did such a fine job with the Top Flite Cub it's tough to tell which is which.

The wing construction is quite conventional, lots of parts but light and sturdy; no real problems here. The ailerons wore me a little thin . . . they're built like the real ones. Being accustomed to shaped, solid units, I cursed a bit, opened a fresh bottle of CA adhesive and pressed on. They really weren't that bad.

A little more gluing, more cutting, and a bunch of sanding and we had an airframe ready for preparation and covering. At this point you really appreciate how attractive structure can be . . . and how big things can weigh so little. Final sand and brush on a coat of Balsarite to really bond the covering. One last look before covering, fire up the Monokote iron, and do it. Since this is a Top Flite kit, the logical choice for covering is either Super Monokote or their new Fabrikote. Having a penchant for all things new, the latter got the nod. My mixed emotions began and my patience dwindled. The Fabrikote (I used white since I was going to paint anyway) went on beautifully using the same temperature setting as Super Monokote. Wing tips presented no problem, the stuff shrank without warping the structure (which is all you could want from any iron-on that really *does* look like honest-to-goodness fabric); that's the good part. Now let's talk drawbacks. I couldn't get it to bond securely to itself on seams with any amount of heat, cold, nails, tape, nothing. I've heard this from others who have had the same problem, so maybe it's not me. About the only way to guarantee it would stay stuck was to run a bead of CA adhesive over the seams. I don't know about you, but gluing the seam along a 77" span wing is about as much fun as entering (and winning) a Marty Feldman look-alike contest. I'm told that Top Flite did have a problem with the original batch of adhesive and I really haven't tried a new roll. (Top Flite has indeed corrected the adhesive problems encountered in early production runs of Fabrikote.—Ed.) I'd suggest you make a test sample before you use yours. It'll save a lot of frustration, not to mention CA. After the covering was done, I sprayed on a coat of



The Cub fuselage features a great deal of built-up construction using various size sticks (above). Wing panels sitting atop plans (below). The Cub requires a fair share of building, but the end result is great.



Coverite Primex which makes nearly any paint stick like fly paper, applied two coats of olive drab, masked and shot the national insignias. The unit insignia on the right side of the nose was hand painted after mixing paint to match a color photo.

The radio installation was a bit time consuming since it's all hidden under the seats. For sport scale work where the cockpit is not required, it would be a snap since there's more room than you'd ever need. The Cub

has a servo installed in each wing panel, one driving each aileron. In retrospect a healthy single servo would handle the job more than adequately. The engine is an Enya .40 TV mounted inverted with a Tatone EM-40 manifold which allows the exhaust to exit the lower cowl area. If you choose this method, make certain to use extension tubes on the manifold to insure the exhaust gets out into the airstream. If it's



J-3 CUB

trapped inside, it's overheat time. The 8 oz. tank will give you about 20 minutes of scale type flying. It weighs just shy of seven pounds after getting the CG as indicated on the plans. That puts the wing loading at 19.4 oz/ft² . . . just about where we want it!

Now that the building is behind us, let's head for the field. After a thorough rigging inspection and radio range check, I connected the ignition battery. The trusty Enya, swinging a 10 × 6 prop, fired up easily and responded well to throttle, settling back to a tick-over idle. A control check (remember the lift aileron goes up when you move the stick left) showed everything in order. Frank held onto the tail and I ran the engine up to full rpm, tweaked the needle and made one more control check to make sure vibration isn't bothering us. "L-4 ready to taxi".

The first take off occurred after about a twenty five foot run, twenty of which was tail high with lift off very clean and straight. No wobbling or bobbling. It took about three notches of down trim and flew hands off. Approaches and landings can be any way you choose, from straight-in to slipped . . . and it does slip! I almost forgot the fun of using rudder and aileron together. That wing is working all the time, and it's almost criminal to steer it around on ailerons only. Use that rudder, the Cub loves it.

We've since flown it in fierce winds (where enthusiasm or dumbness overshadowed common sense) and it handles fine. Sure it gets bounced around a bit, but you're not going 100 mph. You're making maybe 20 mph ground speed in a 20 mph headwind.

One recommendation, set your engine up with the lowest possible *reliable* idle you can get. The Cubs flies at minimum power set-



Top Flite Cub looks realistic on takeoff (**above**). It should be easy to find a prototype to model at a local airport. Realism carries through to actual flight (**bottom**). Everyone loves a Cub. They're neat.

tings and is reluctant to attach itself to the ground unless the prop is providing more drag than thrust.

This is really a fun airplane to both build and fly. I would stop just short of recommending it to a rank beginner because the building might be more than he's ready for but I'm sure, with a bit of initial help, he

could fly it. It is a perfect machine for the flyer who wants to try Sport Scale since it's easy to document, provides a good starting point for the detail work required to be competitive, and won't give him a case of white knuckles every time it's flown. Solid design, great kit, Classic airplane . . . what could be bad? C



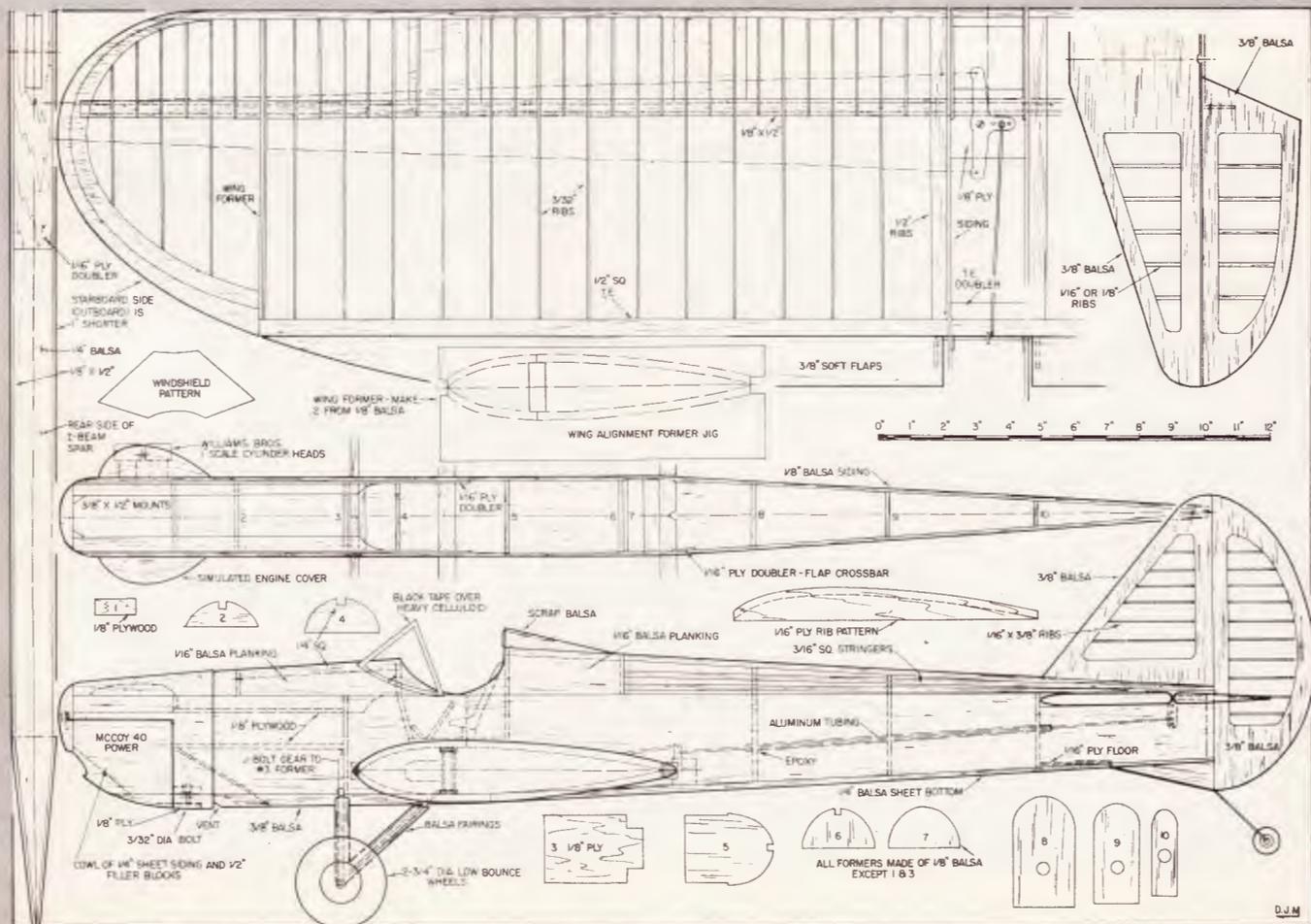
CF-277 Fly Baby

How does a semi-scale model of a full size plane which was designed by a modeler sound to you? That's right, Jack Sheeks' "Fly Baby" stunter is patterned after the full scale "Fly Baby" which was designed by modeler Pete Bowers!

Sheeks' Fly Baby first appeared in the October 1972 issue of FLYING MODELS. The 56" wing features sliced rib construction. Jack flew his model with a McCoy .40, but you can choose from any of today's .35-.46 size stunt engines and be assured of success. If you want, you can add the scale-like gear fairings, or just leave them off if you're going for the gold at your local stunt contest. The Fly Baby is not difficult to build and will provide you with a stunter that's just a little bit different.

Plans for Jack Sheeks' Fly Baby are available from Carstens Flying Plans service. Order plan CF-277.

A large selection of plans for R/C, free flight, control line, model boats and ships and accessories is available from Carstens Publications. A complete listing of the available plans was printed in the April 1982 issue of FLYING MODELS magazine. Selected back issues of FLYING MODELS, with construction articles, are also available. Available back issues may be ordered at FM's current cover price.



Fakeout

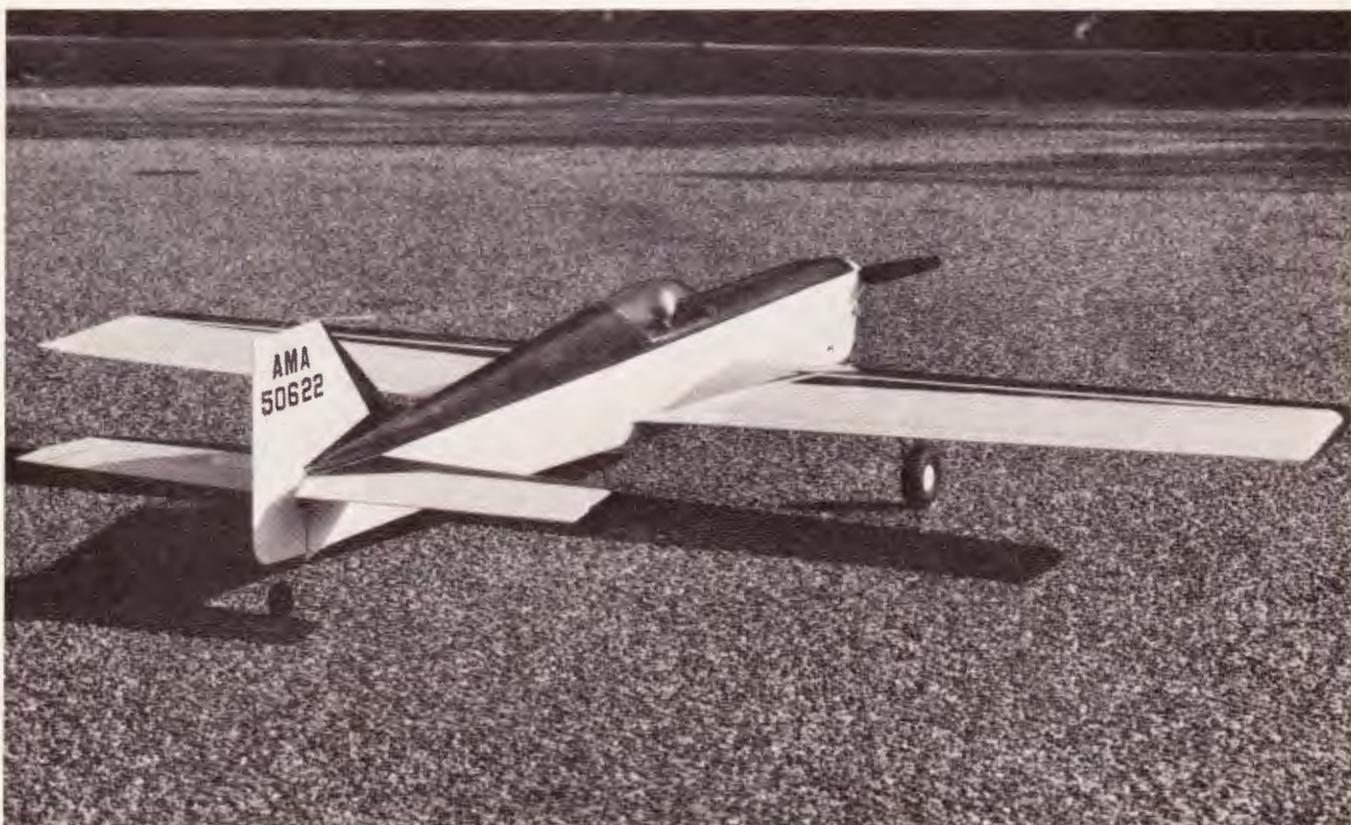
By Dom Palumbo

This 40 size sport pattern ship flew right off of the doodle pad. An agile design.

While talking to a friend on the phone one day, I (inevitably) began doodling on a scratch pad placed conveniently by the phone for important messages. My doodles usually wind up having wings, a tail, etc., and, depending upon the length of a given conversation, as many as three or four complete isometric views of airplanes can fill the page before I'm done. The general lines of the "Fakeout" were developed on (what I consider to be) one of my better doodling exercises. As a matter of fact, I was so pleased by the appearance of my impromptu creation that after hanging up I ran to the drawing board to further pursue things in the way of a model design. My thought process as the configuration began to quantify itself is de-

scribed in the following text.

Because my preference is for sport aerobatics' and pattern type flying, the airplane would have full aerobatic capability. I also prefer to fly airplanes in the .40-.45 glow engine size category for economical reasons. Hence, the airplane should weigh no more than about five pounds, and should have a wing loading in the 20-25 ounce per square foot range. A wing area of 550 square inches (minus tips) would, therefore, be suitable. A conservative taper ratio of .75 (tip/chord/root/chord) and an aspect ratio (span squared/average chord) of 5.5 were selected, leading to a root chord of 11.5 inches and a tip chord of 8.5 inches (rounded to the nearest half inch for simplicity). The wing planform would have a straight trailing edge so



PHOTOGRAPHY: DOM PALUMBO

Fakeout may have gotten its name on the spur of the moment, but some thought went into its design. This sport ship flies with the best of 'em. It's aerobatic.



as to maximize the dihedral effect of leading edge sweep and there by minimize the amount of "built-in" dihedral required. This consideration is important from the viewpoint of having good inverted flight characteristics. The old standby 64A01Z fully symmetrical airfoil was plotted up next, and a nose moment (distance from leading edge to spinner) of 9.5 inches and tail moment (distance from leading edge to rudder post) of 32.5 inches were selected based upon previous experience with this size airplane. A 20% horizontal stab having 40% span and 12% vertical stab completed the basic flying surface design. These would be solid 1/4 inch balsa sheet contoured to a general symmetrical airfoil shape for fabrication simplicity.

The basic fuselage lines were formed so as to completely enclose my Enya .45, while allowing for easy access and a nice streamlined appearance. The midwing, high stab configuration agreed with my isometric doodle as did the turtledeck/cockpit merging and high thrust line. Total fuselage side area and fore-to-aft area distribution were developed iteratively to achieve a design which would have good to excellent knife-edge flight characteristics. Conventional landing gear was chosen (over the more commonly used tricycle gear) so as to achieve minimum drag and weight of the gear components.

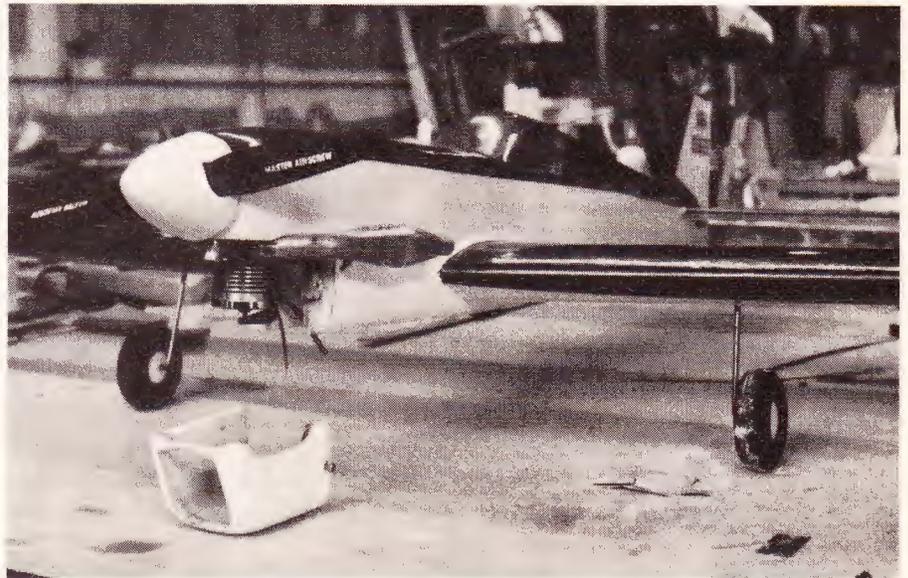
By the next day I was cutting wing ribs and in a couple of weeks the completed airframe sat fully assembled on my work bench. Time to decide on a color scheme. Painting is not only "not my bag", but is also more time consuming and a heavier approach than plas-

FLYING MODELS

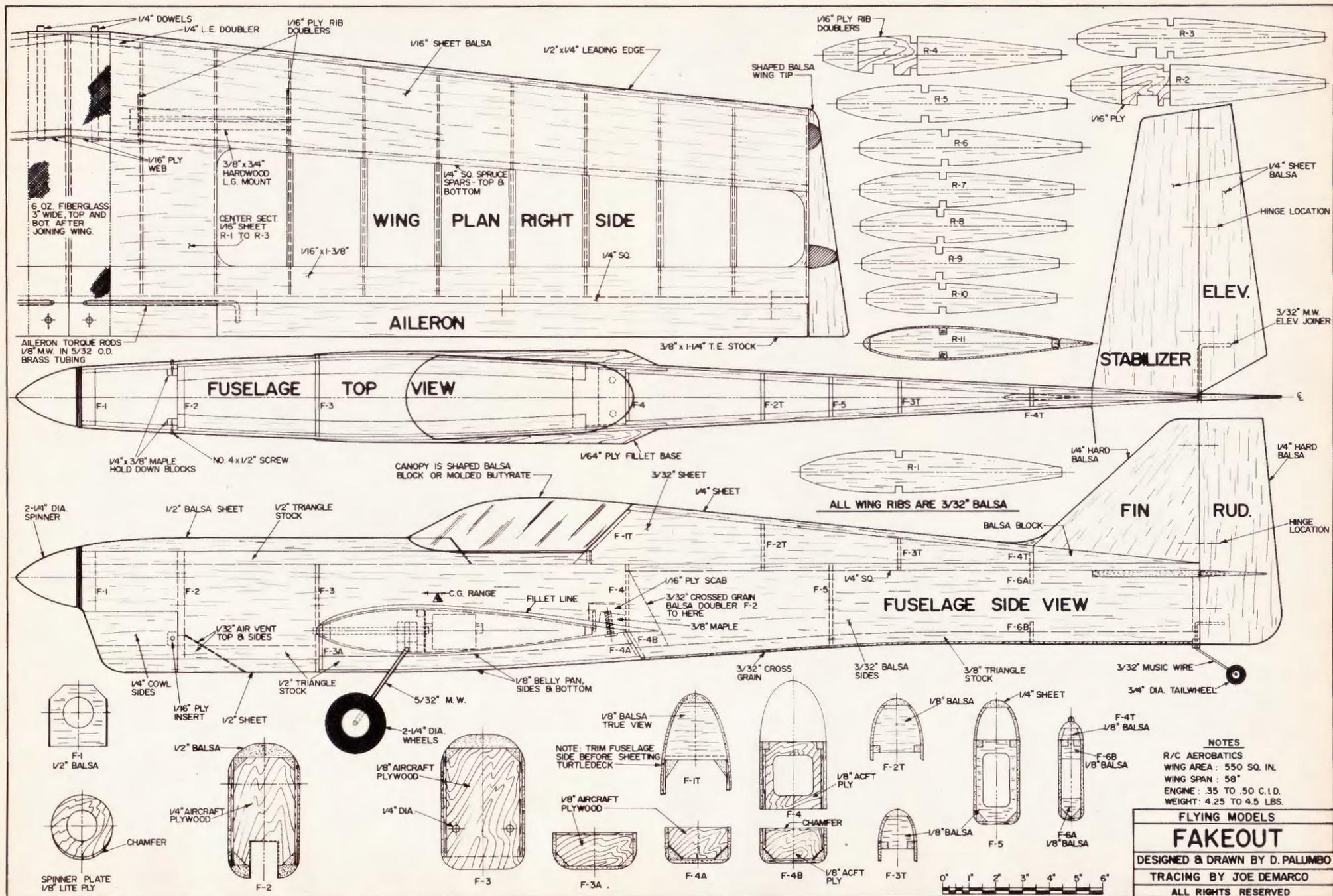
tic film finishes. I was anxious to get in the air and had some MonoKote™ and Solarfilm™ left over from a previous project, so white and metallic green in a simple but effective geometric design were used. Some black MonoKote trim was also used for highlight.

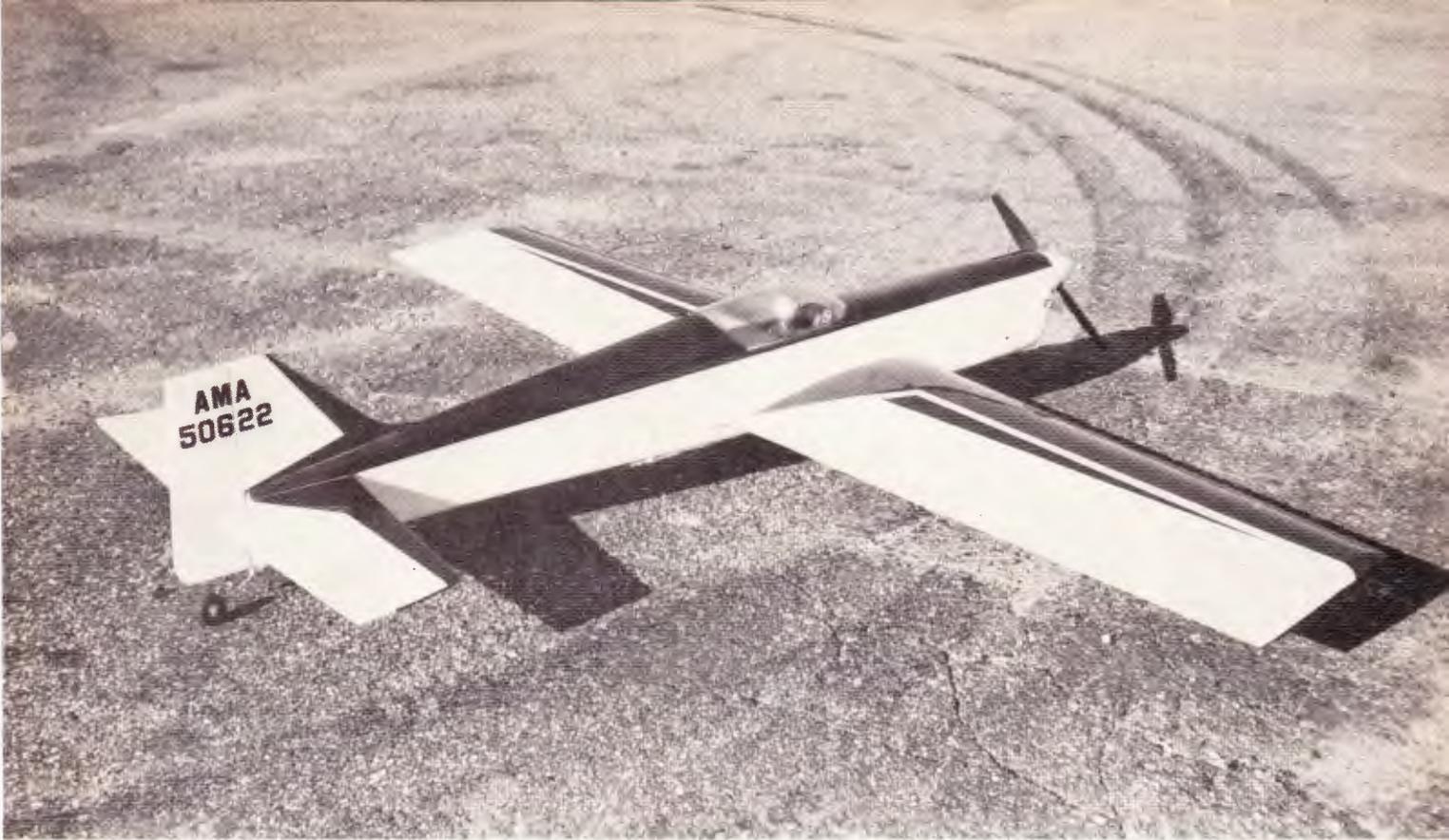
I arrived at the flying field with the usual maiden flight jitters and still had not come

up with a name for my creation. Inquiries from other fliers at the field forced me to come up with something on the spur of the moment and the name "Fakeout" was the only thought I could muster up. In that split second of reasoning I figured that the airplane looked real enough to actually be a model of a full size version and might indeed



Cowled-in engine is reminiscent of a C/L stunter (above). Careful work will allow a neat cowl with plenty of ventilation for the engine. Note wing mounted landing gear. Wide track for easy ground handling.





fake out some observers in this sense.

After the usual preflight I set the Enya .45 up slightly on the rich side and made my take-off run with every intention of taking it nice and easy on the first flight. All of that changed as I began to get more confidence in the flight capabilities of the "Fakeout" and after a few mock landing approaches to get a feel for the glide and sink rate I opened her up and bored proverbial holes in the sky in every imaginable attitude. A gallon of fuel later I knew I had a winner of an airplane, having executed every AMA pattern maneuver I could think of to the best of my ability as a pilot. The airplane simply flies very well and although it is not what I would call easy to fly (primarily because of its speed and sensitivity to control inputs), it is a suitable subject for those of you who have flown fully aerobatic airplanes before.

Construction

Construction is very straightforward so I will not bore you with lots of detail here. The conventional built-up wing structure can, of course, be substituted by a foam wing if you have the capability to cut cores. The wing will accommodate retracts if you so desire.

I used a clear canopy molded over a shaped block on my prototype, but a shaped balsa block is easier and just as effective from a distance if properly highlighted when painted. The all up weight of my prototype is 4 pounds 11 ounces with Enya .45 power and Aerosport radio.

Be sure to position the fuel tank as shown on the plan because inverted engines are very sensitive to fuel tank location, having a tendency to load up at low and intermediate speeds if the tank is too high relative to the carburetor. Also note that rear exhaust engines will require some modification to the firewall in order to pass the pipe through and down so the exhaust exits beneath the wing. Happy flying!

FLYING MODELS



Profile view shows that Fakeout has been influenced by a number of different planes (above). Looks a little like a C/L stunter. Clean lines and neat paint scheme give Fakeout a racy, lean look (below). A trim ship.



By Ron Farkas



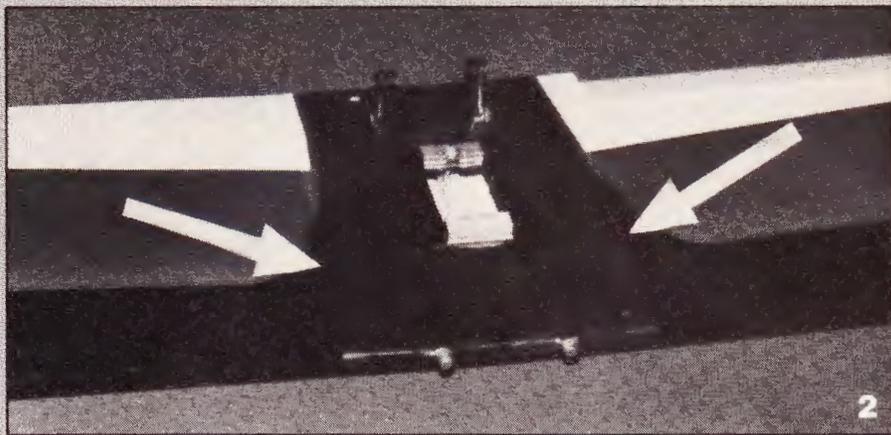
PHOTOGRAPHY: RON FARKAS

Silicone saddle seal

One of the biggest headaches in R/C flying is the oily residue from burned fuel. It gets into everything, hatches, seams, fuel line holes and wing saddle openings. Hatches and wing saddles are the most vulnerable since they require frequent access. You just can't seal them shut permanently.

A long time ago someone recognized that foam tape with adhesive on one side made a good seal. This is marketed in hobby shops as wing seating tape. In practice it works pretty well, but its main disadvantage is that it needs frequent replacement. I have found that household grade silicone sealer is the best thing to come along since seating tape and offers several advantages.

Let's list some requirements for a good wing saddle (or hatch) sealer: 1. must make a good seal (that's the obvious one), 2. must be fuel resistant, 3. should be able to fill irregular shaped gaps, 4. should not alter the wing fit or incidence, 5. should provide a cushion against vibration but not be too pliable, and 6. be inexpensive. Well, at about 3 to 4 bucks a shot, a tube of silicone sealer appears to be pretty expensive but actually it will do several airplanes. Silicone has all the other properties and with proper application will last as long as the airplane itself. For example, when I decided to repaint a six year old fuselage I



1) Ron uses GE Silicone Glue, many other brands are available and will work. 2) Cover wing center section with plastic wrap to prevent glue from sticking. Make plastic wrap as smooth as possible. 3) Apply generous bead of silicone sealant around entire wing saddle. Try not to smear glue. 4) When wing is tightly in position excess sealant will ooze out. Let it dry. 5) There will be beads of excess silicone around wing saddle when wing is removed. Contact area should be smooth. 6) Cut away excess silicone with sharp knife.

had to use an X-Acto knife to cut away the silicone seal along the wing saddle, and in several places I went down to the bare balsa.

Silicone sealer has great holding power. It will stick to bare wood, painted wood and plastic covering materials. Fortunately it won't stick to plastic food wrap, and that's the key to our application technique. Most paints won't adhere to silicone so use it after all your painting is done. If you work neatly, clear silicone sealer will be practically invisible. Several colors are available as bathtub caulk so you might be lucky enough to find a match. But then you will be stuck with the rest of the unused tube and the next thing you know you'll be caulking the bathtub (a distasteful chore).

Okay, if this stuff is so great where do you get it? Well, hobby shops are starting to carry it but it is most likely to be found in hardware and paint stores. Do not confuse silicone sealer with butyl rubber exterior caulking compound. The one we want is a general purpose household sealer. I think that several brands are available the one that I use is General Electric stock number 361.

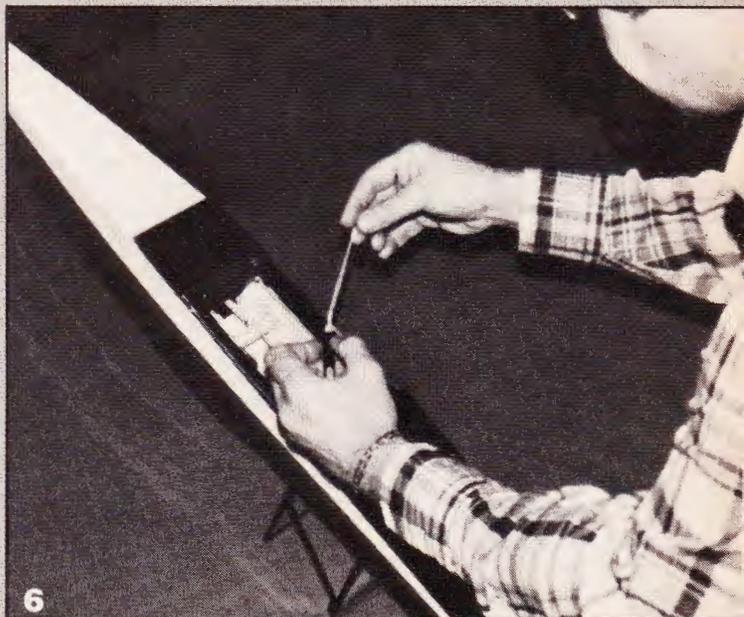
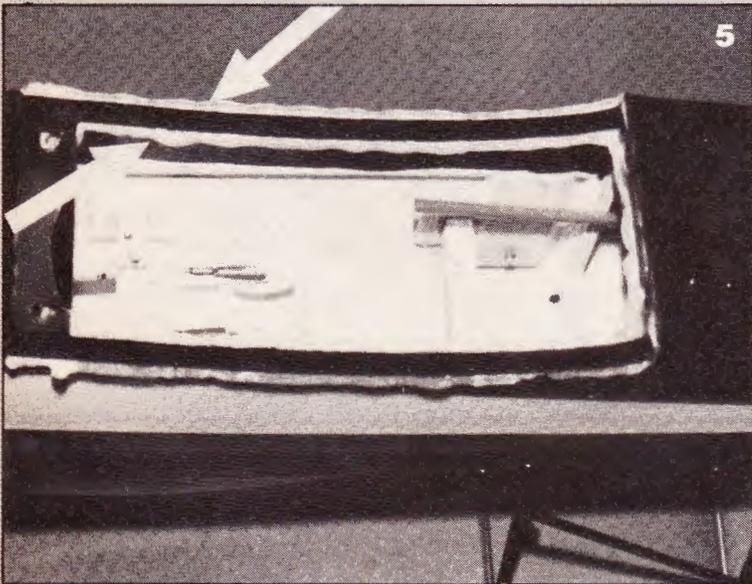
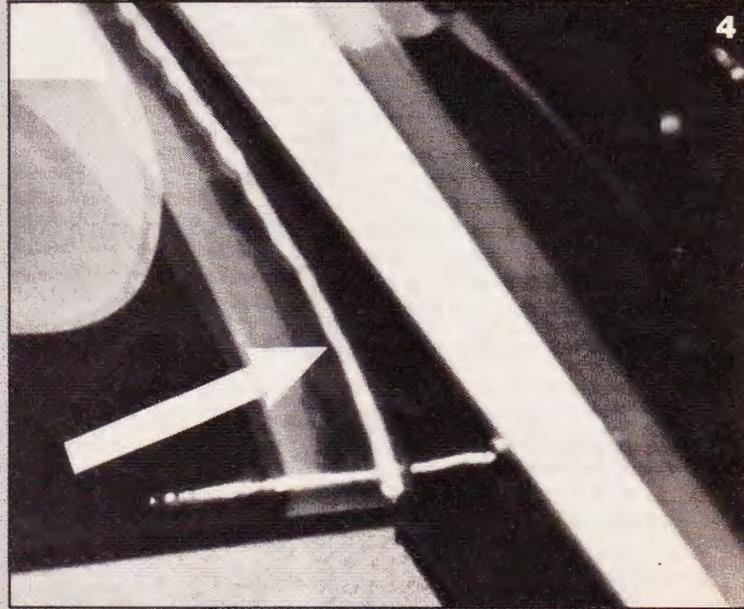
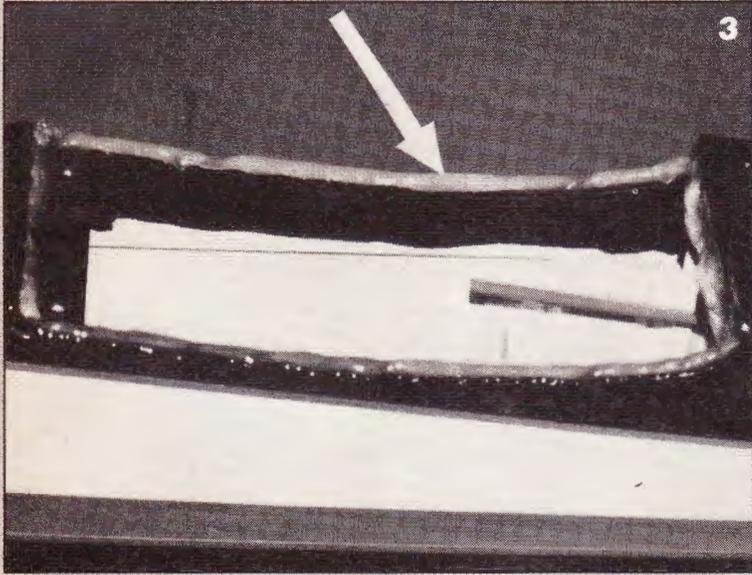
Here's how to make an effective wing saddle seal. First be sure that the fuselage is clean and dry. The best time to do this is before you have flown a new plane. If, however, there is already oil residue on the plane then clean it off with detergent, alcohol, or a quick wipe with something strong like acetone. The surface should be squeaky clean to the touch. Next, wrap the wing center section with plastic kitchen wrap. It must lay flat and be free of wrinkles. Of all the brands Saran Wrap seems to work best because it has some body. The cheapo brands crumple too easily. Frankly I use the plastic backing from Monokote™ covering material since it holds its

shape well. Wherever servo bearers or torque rods protrude from the wing center section I just neatly trim away the wrapping. A few pieces of masking tape will keep it from wrinkling or shifting as you handle it.

Next apply a hefty bead of silicone sealer all around the wing saddle. This application does not have to be smooth but should be rather uniform in thickness. The tube puts out about a 1/4 inch thick bead. In any area where you think there might be a depression put on some extra. Next, carefully place the wing in position and fasten it down tightly with its rubber bands or wing bolts, whichever you are using. During this step be careful not to slide the wing sideways in the saddle. At this point a large excess will have squeezed out all around the saddle. Don't touch it, we want it to cure that way. If you mess with it now the stuff will smear all over. If smears do occur then wipe them off with a dry paper towel now because tomorrow it will be there for good.

Now go work on another plane for a day. After a few hours the excess may have skinned over but the part not exposed to air will take at least overnight to cure, maybe let it go two days to be sure. When you do finally remove the wing try to leave the wrapping behind and then pull it gently away from the cured silicone seal. Guess what, there's a bead of excess on the inside too. These beads are easy to trim away by tugging on one end while slicing with an X-Acto knife along the edge of the saddle. Now you can see the benefit of having so much ooze out when we put on the wing.

There you have it, a seal that is custom fitted to your wing and fuselage shape. Two nights work and about a dollar per application.



Bostonian "T" Craft

A scale-like gumbander for the popular new freeflight event.



By Larry Kruse

PHOTOGRAPHY: LARRY KRUSE

The Bostonian Event, which originated on the east coast and then migrated to the west coast, has proven to be the most exciting concept to come along in freeflight since the advent of Peanut Scale. Reports from contests literally across the country speak of the popularity of the event. A Bostonian is simple, easy to build, and uses readily available materials. Typically, a Bostonian model can be built using $\frac{1}{16}$ " square balsa, a plastic propeller, and Japanese tissue covering - all usually needed to reach the 14 gram minimum weight of the Bostonian West rules.

One of the most attractive things about the Bostonian Event is that there is some small element of nostalgia built into it. Very few of us can look at a Bostonian model without thinking back to the 10¢ Comet kits or the Joe Ott scale job that introduced us to the wonders of flight years ago.

The Boston "Tea-Craft" presented here is the product of just such whimsical remembrances on my part. One of the first planes I ever caused to fly in any sort of respectable manner was a little Megow Taylorcraft that spanned about 15 or 16 inches and flew into the very top branches of a neighbor's apricot tree on its first voyage aloft. That flight couldn't have been over 10 seconds long, but at that moment I knew just how Orville and Wilbur felt. And, because I've never quite recovered from that experience, this little ship is offered in the hopes that some other young person may partake of that magic through the Bostonian Event.

While construction is quite typical of any stick and tissue plane and should pose no problems for anyone who has built such model types before, some time will be spent on each facet of building in the hopes of answering any questions a novice builder might have. For those of you who feel confident of

your building skills, skip the construction notes and go right to the building board. You can always come back if you get into trouble.

Fuselage

Pin the plans down to a flat building surface and cover them with Saran Wrap or waxed paper. Select (as nearly as possible) matching strips of $\frac{1}{16}$ " sq. balsa for the fuselage longerons, both top and bottom, and pin all of the pieces for one side down and glue them in place. Try to cut joints as squarely as possible using a sharp single edged razor blade. Do not stick pins through the $\frac{1}{16}$ " balsa; rather, hold the pieces in place with two pins at each hold-down location by making an X with the pins over the top of each piece of balsa. I recommend the use of Hot Stuff's new gap-filling formula of cyanoacrylate for quicker building time.

After one side is complete, remove the pins and cover that side with Saran wrap. Now build the second side directly over it. One useful tip in an effort to get identical sides is to place the hold-down pins for the new side in the same pin holes you made in building the first side. If you look carefully at your plans, you can find them quite easily.

Once the fuselage sides are dry, install the crosspieces in the cabin area and bring the fuselage to a box shape. Check to make sure everything is square and then draw the nose and tail sections together, cementing in place the remaining crosspieces. The nose sheeting and bottom cowl blocks can then be glued in place and finally the noseblock can be carved and sanded to shape. Try for a good friction fit of the noseblock into the basic fuselage framework.

The landing gear is bent from music wire and laminated between two pieces of $\frac{1}{16}$ " balsa before being installed. The wheels are simple laminations of cross-grained sheet

balsa with an aluminum tube bearing in the center. When the fuselage is complete, sand it carefully and dope it with at least three coats of thinned nitrate dope.

Flying surfaces

You have a choice of construction techniques in building the wing and the tail surfaces. I personally prefer the laminated method, but if you prefer, you may use the built-up method. Both are shown on the plan.

The built-up method is pretty much self-explanatory, but laminating requires some detailed instruction. Start by cutting templates for the wing tip rudder from $\frac{1}{8}$ " scrap balsa, and stabilizer and cover them with Saran Wrap or a similar kitchen plastic. Cut several $\frac{3}{32}$ " strips from a sheet of $\frac{1}{32}$ " "A" grain balsa. "A" grain is distinguished by its long grain marks and somewhat "stringy" texture. I cut the strips $\frac{3}{32}$ " rather than the finished size $\frac{1}{16}$ " to allow for some final sanding to size. Soak the strips in hot tap water laced with about $\frac{1}{2}$ cup ammonia per gallon until they are pliable. The ammonia will both make the strips less subject to breaking during the laminating process and will cause the cellulose fibers to firm up considerably when the lamination is dry. Now brush a thin coating of white glue or Sig-Bond between two of the strips and draw them around whichever form you are working with. Use pins at about $\frac{1}{4}$ " intervals to hold the strips in place until they are dry. Generally, I give balsa laminations at least 24 hours to dry before unpinning them.

The wing and tail assemblies themselves should be built flat on the building board in time honored and typical fashion, sanded smooth, and doped as the fuselage was. Construction begins with pinning the outline pieces in place for all three structures and then cementing in the crosspieces and ribs as

"T" Craft

required. The rudder and stabilizer are hinged for easy flight trimming, but inasmuch as the prototype needed only a small amount of left rudder and a small trim tab on the left wing, you could probably omit the extra center spars in both structures. The wing dihedral is installed via the center-section ribs. Small center-section gussets help strengthen the wing, since no wing struts were used.

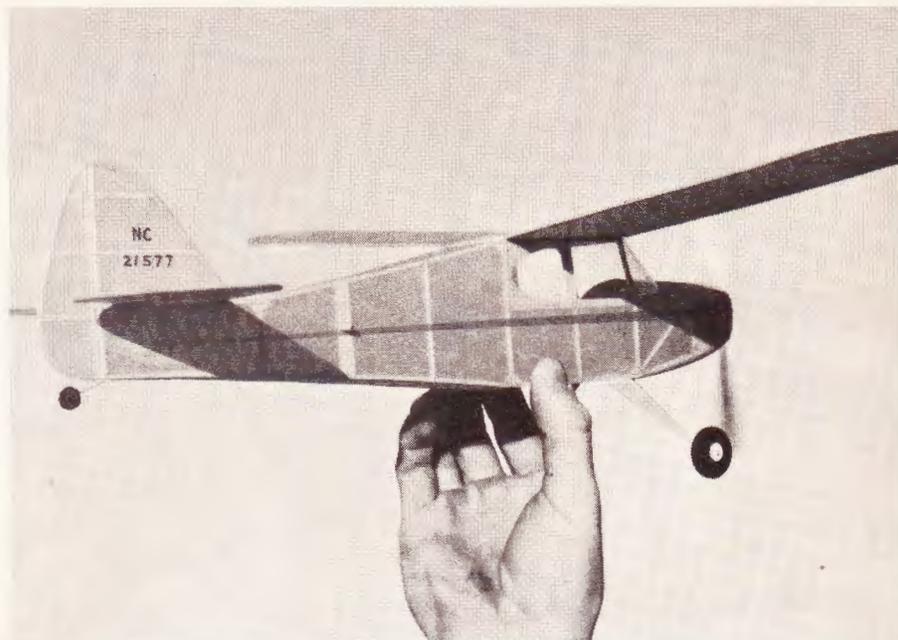
Covering

Cover the entire craft with light-weight tissue. Peck-Polymers has a very nice grade of tissue called "New Japanese Tissue" which weighs .032 oz. per 100 sq. inches. They also have an "Old Style Japanese Tissue" which weighs .030 oz. per 100 sq. inches. The newer style comes in several more colors and is somewhat less expensive, although its shrinking properties are a little bit difficult to control. Attach the tissue to the frame by using white glue (Elmer's is fine) thinned about 70% with water and brushed onto the framework. Shrink the tissue with rubbing alcohol applied with a cotton swab or cotton ball. Watch the shrinking process very carefully. In fact, it's probably useful to pin the flying surfaces down to the building board until they're dry in order to avoid warps.

When the tissue is dry, give the wing and tail surfaces two coats of nitrate dope, thinned about 60-40. The fuselage needs three or four coats.

Flying

The prototype balanced as shown with no additional weight added to the nose or tail. It weighed 15 grams, excluding the rubber motor, and flew in a left hand power pattern. I



Bostonians are supposed to resemble full-size aircraft and Larry decided to pattern his after a Taylor Craft. The prototype uses laminated rudder and stab construction. Larry tells how to do it in construction article.

used a 15" loop of $\frac{3}{32}$ " FAI rubber for initial flights. It was necessary to add about $\frac{1}{16}$ " left rudder deflection, and, in order to keep the left wing up, a small bond paper tab on the bottom surface of the left wing. If you need to add weight to the nose or tail in order to reach the indicated balance point, by all means do so. Begin powered flights with

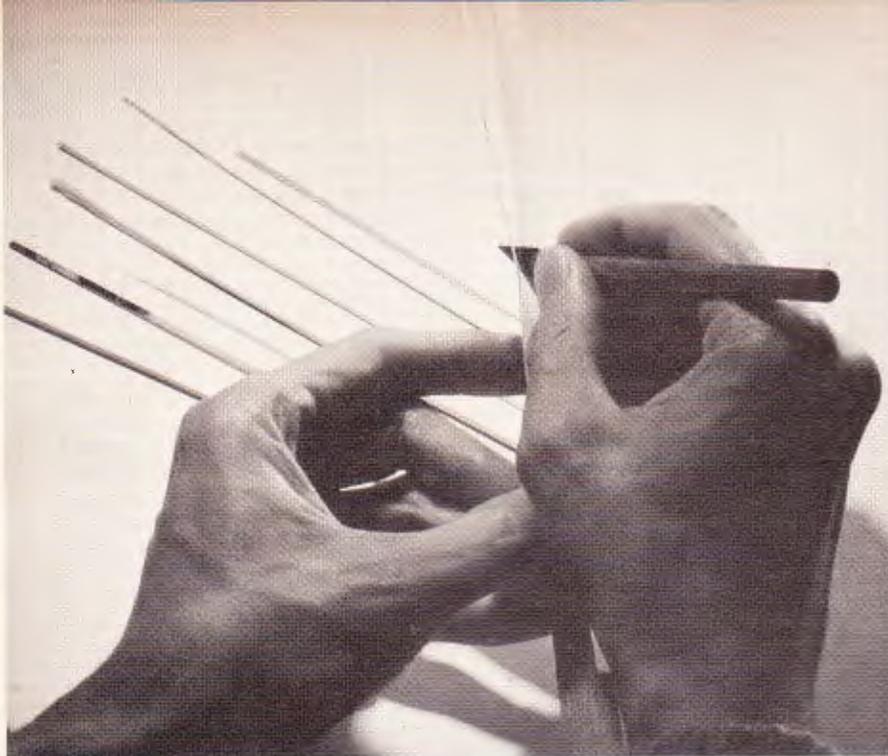
about 200 hand wound turns and work up from there. The "Tea-Craft" is capable of flights a bit over a minute on 1280 turns indoors. I'm not certain what its ultimate potential is due to the confines of the indoor site where I fly, nor has it been adequately tested outdoors. Build one and let me know how it does for you. ☐



Walt Mooney's Bostonian West rules

1. Wing span - maximum 16 inches.
2. Propeller - maximum 6 inches diameter.
3. Wing chord - maximum of 3 inches.
4. Fuselage length - maximum of 14 inches from the thrust bearing to the opposite extremity.
5. Windshield - minimum of one square inch of projected visibility.
6. Side visibility - minimum of one square inch visibility to each side.
7. Volume - the aircraft must be able to contain a theoretical box measuring $1\frac{1}{2}$ " by $2\frac{1}{2}$ " by 3" in any orientation.
8. Landing gear - a landing gear must be provided using at least two $\frac{3}{4}$ " diameter wheels.
9. Weight - minimum weight must be at least 14 grams excluding the rubber motor.
10. ROG - all flights must begin with an unassisted rise-off-ground (or floor) takeoff.

The "T"-Craft combines simple, scale-like appearance with good flight characteristics (left). Bostonian is another one of the "fun" F/F events. Rules are basic (above). The top priority is enjoyment.

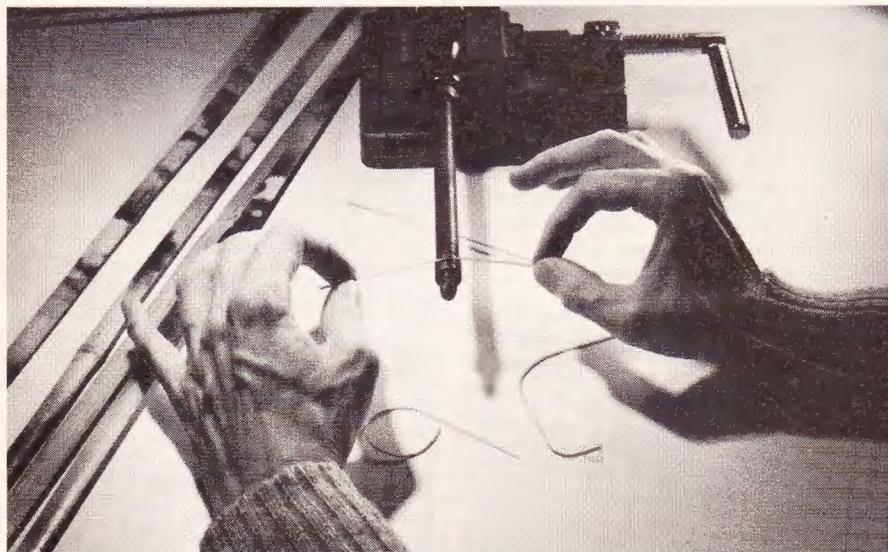


Hot wood starts with accurate slitting of bamboo porch screen. Slitting is best done free hand, with the knife blade following the natural direction of the grain. Pieces can be slit again and again for proper size.

HOT BENT WOOD

By Dave Rees

The prescription for curved structures on
freeflight scale models: apply heat!



PHOTOGRAPHY DAVE REES

A firmly mounted soldering iron is the heat source for bending bamboo. Make sure iron is securely fastened to work bench. Technique for bending is covered in text. You too can "slave over a hot iron" all day.

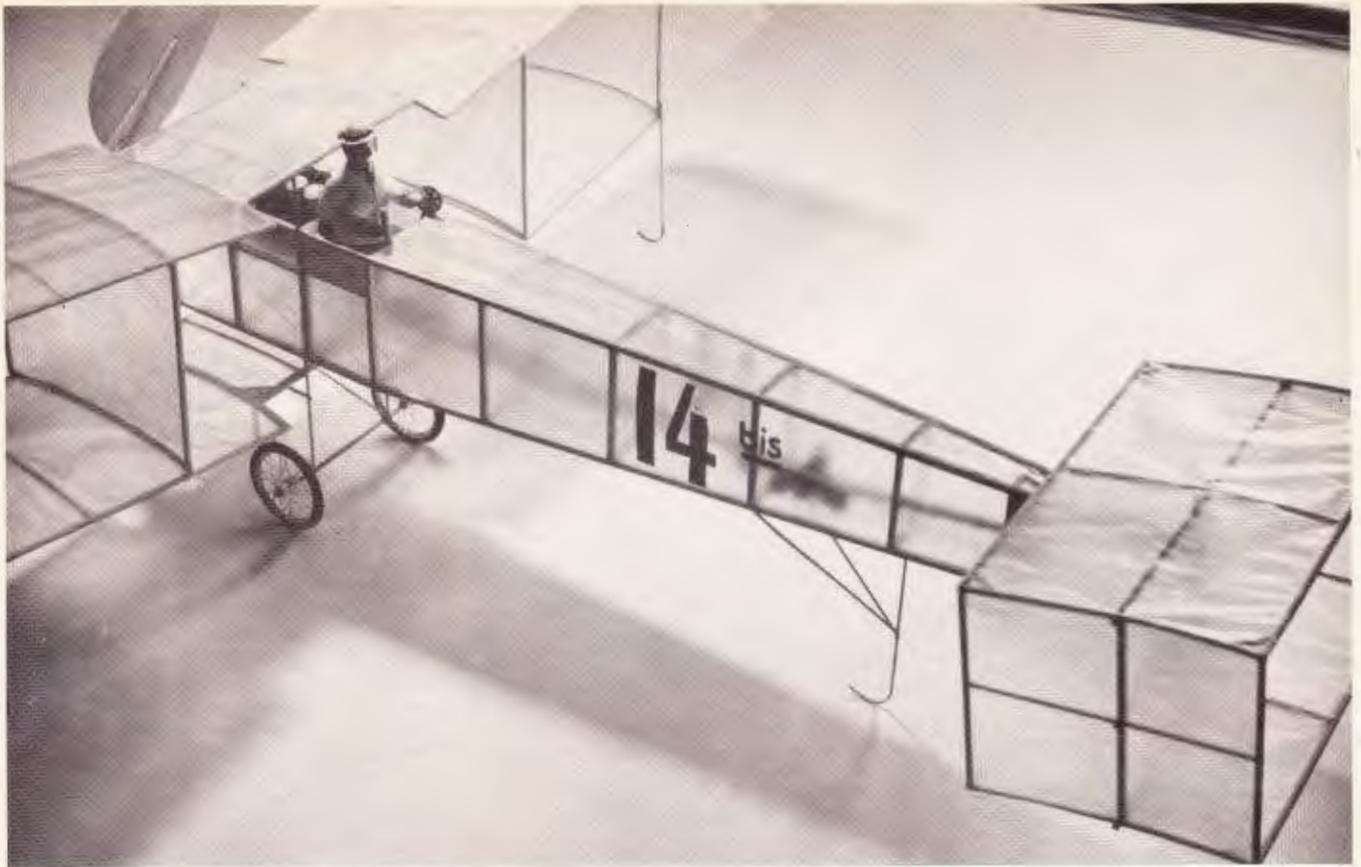
FLYING MODELS

Every now and then, I run across a technique for making rubber powered scale models that has almost vanished from our repertoire today and deserves to be put back into it. One of these goes back to my boyhood days in the banana oil era: hot bent wood. I can remember wingtips and even whole stabs and rudders made from bent bamboo, much like our indoor FAI ships use today, only on larger outdoor ships. So I had a talk with Walt Egger, current SOTS president, who was designing kits for Megow in the 30's and was very active in model aviation in those days. He showed me how it was done and I've been using it ever since.

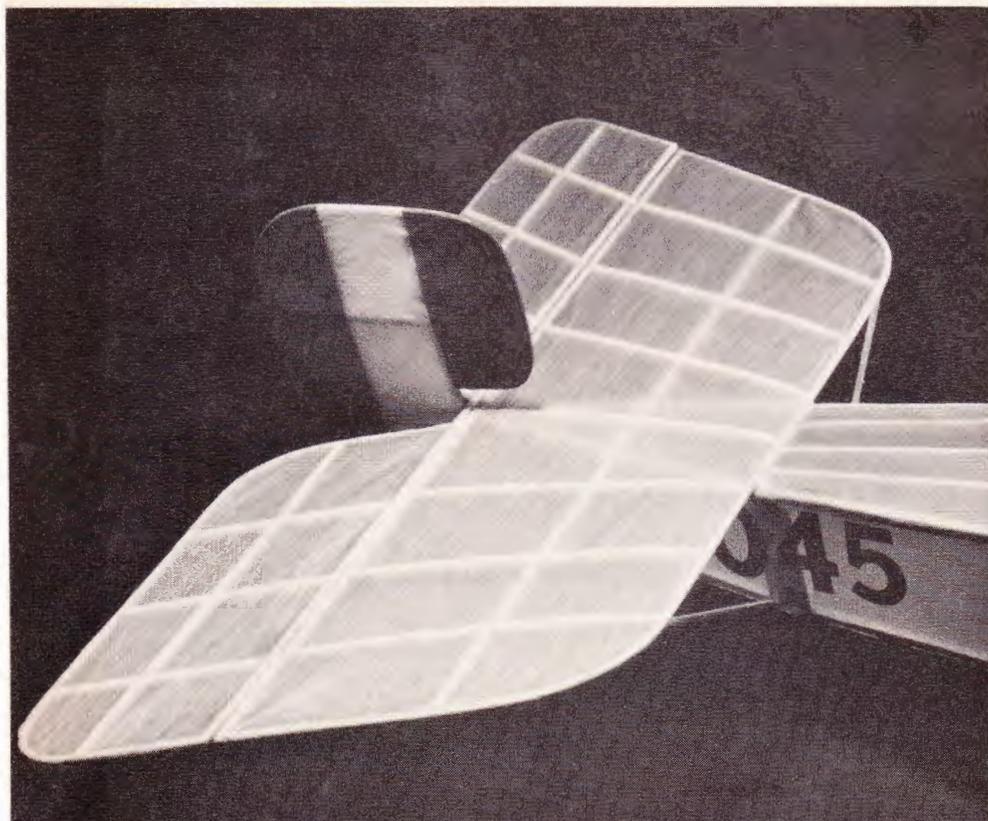
Hot bent wood, after you have mastered it, will become the best way to make certain structures without all the tedious laminating and making of templates. Wingtips, stabs and rudder outlines for World War I fighters, golden-agers, lightplanes and homebuilts are particularly well suited to this technique, as it best simulates fabric-covered tubing. One can expand on this even further. Bulkheads for round stringer-type fuselages can be made entirely from bent wood, resulting in a stronger, lighter framework with much more rubber room than in conventional bulkhead designs. A sheet can be bent to a rib contour and ribs sliced from it like pieces of salami, each one identical and stronger than conventional slit ribs made from sheet balsa. You may think of even more uses yourself. The method depends on one principle for its success, and that is simply that the grain of the wood is always parallel to the curvature, resulting in maximum strength for minimum cross section and weight.

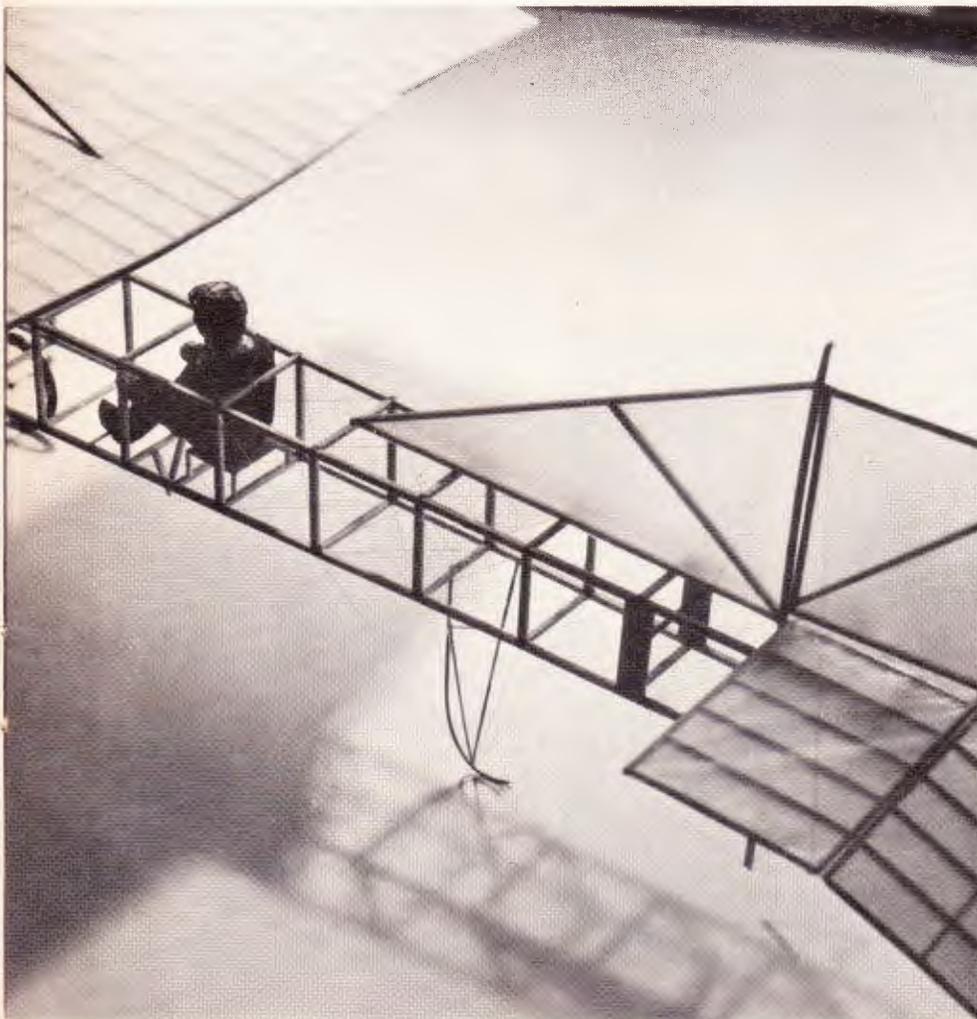
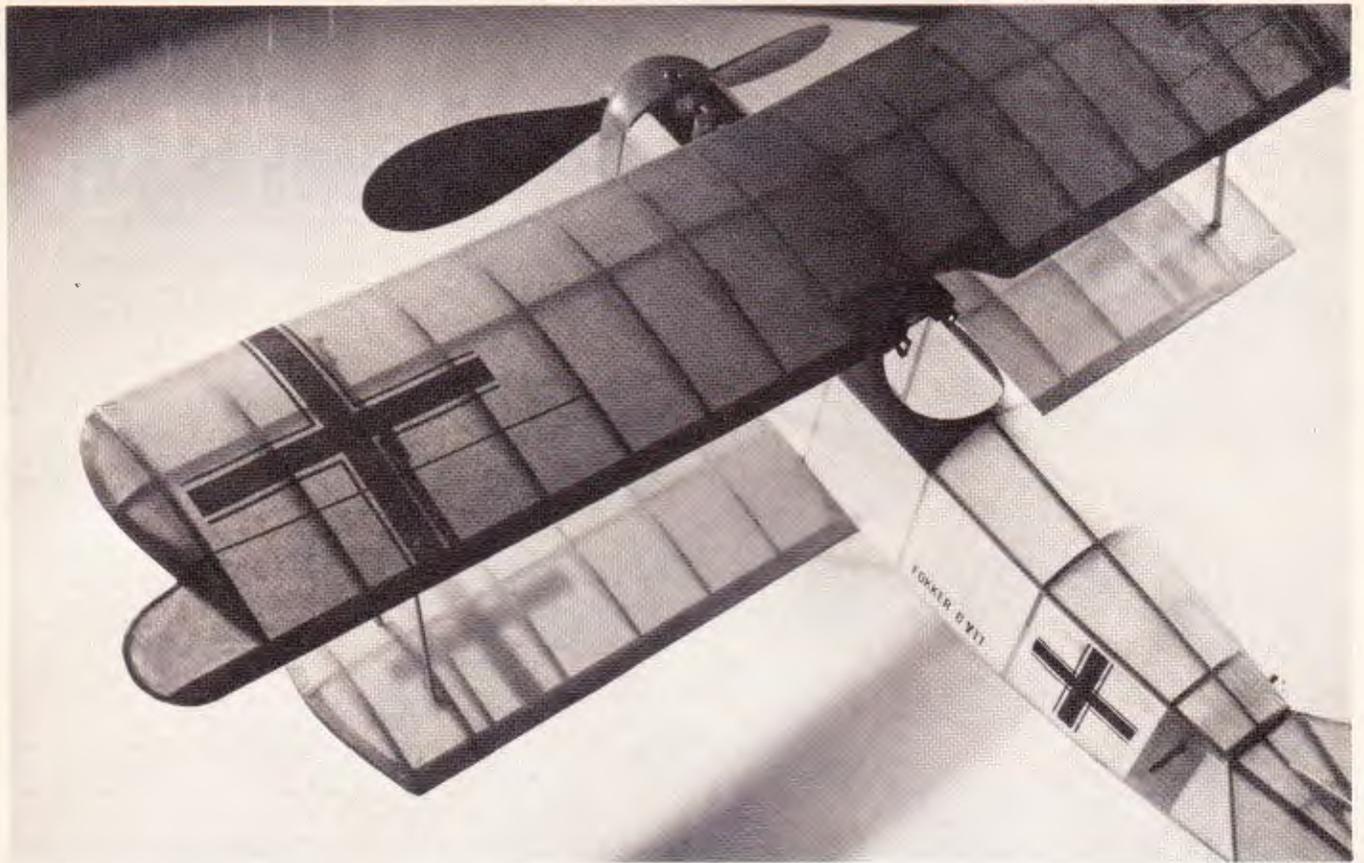
Not all woods can be bent with satisfactory results. By far the most easily bent with heat is bamboo. It's not truly a wood anyway, being classified botanically as a giant grass! Balsa is also a good bending wood, but is more easily snapped and therefore dependent on the type of balsa and grain structure. Some can, and some just can't be bent. Basswood and spruce are almost impossible to bend, but their strength to weight ratio is much less than bamboo anyway and their use in rubber scale models is limited. If you want to learn the age old skill of hot bending, begin with bamboo. Let's walk through it.

A porch screen is the best source of bamboo because it has already been sliced for you into segments approximately $\frac{1}{16}$ " \times $\frac{1}{2}$ " in cross section. Perhaps your club could buy one a yard or so wide, and give everyone some, thereby keeping the cost to a minimum. Take a single slat and firmly cut with an X-Acto knife starting at one end, trying to maintain an even square cross section for as long as you can on the piece you are paring off. Don't lay it on the bench; do it freehand in the air. You will notice the strong tendency for a knife blade to follow the grain until you come to a natural growth ring. Don't worry, pieces longer than 12 inches are seldom needed. Pare down a number of sticks just to get used to the feel of the medium. They can always be slit again or used for practice bending. The material is so much stronger than balsa that a smaller cross section than you would expect can be used. A $\frac{1}{32}$ " square of



Santos Dumont (above) has numerous bent bamboo parts. Tip and tail skids, as well as landing gear, is of $\frac{1}{64}$ " square bamboo. Plane weighs $5\frac{1}{2}$ grams, plans by Don Srull. Struts and wingtips of bamboo were used on this Fokker D7 from Golden Age kit (**above right**). Due to unique wingtip outline a balsa and bamboo composite construction was used. Bamboo is notched into trailing edge for strength. Vintage 1910 Farman, from Hannan plans, uses a great deal of Bamboo (**below right**). Struts, landing gear and tail skid all made from this useful wood. Hot bent balsa was made into the tail outline of Bristol Scout built from Hannan plans (**below**). Balsa was used to keep the tail light. Single stick was used for entire outline. Note tail struts.





bamboo may equal a piece of $\frac{3}{32}$ " square balsa in strength. I have a good friend who slits perfect .010" square bamboo sticks for spokes in vintage wheels that look gorgeous.

The sticks should be bent around a soldering iron of 75 watts or so, using water to prevent burning the surface of the wood black. Float the sticks in a pan of water for 10 minutes before bending them. The soldering iron should be held in place with a vise or C-clamp so it won't move while bending the wood over it. Now comes the technique part. Holding both ends of the stick, one in each hand, move it across the iron while applying pressure against the iron. Keep at it until a nice radius is formed, then remove from the heat and hold until cool and firm. Don't hold the stick still against the iron or a kink will be formed - keep it moving slightly at all times. Very small radii can be made for things like corners of W.W.I stabs. Long term spring-back is minimal, too. With a few sticks for practice, I'll bet you will be bending all sorts of shapes in very little time.

After you feel comfortable bending bamboo, try balsa next. Wood selection is important here. Medium weight straight grain cut seems to bend more easily. Keep the balsa moving faster on the soldering iron as there is a greater tendency to burn the wood black. If it dries off before forming is complete, re-dip in the water. Smaller radii are more difficult with balsa than with bamboo, too. This is a knack which you cannot learn by reading about it - you need hands-on experience.

For some reason, cyanoacrylates won't stick well to bamboo, so use either Ambroid or Tite-bond to glue the bent wood into the adjoining balsa parts of the airplane. It must be the natural oiliness and lack of porosity peculiar to bamboo. Have fun with this technique from the past.



Flyin' things for fledglings

More news from the gang. **By Earl VanGorder**

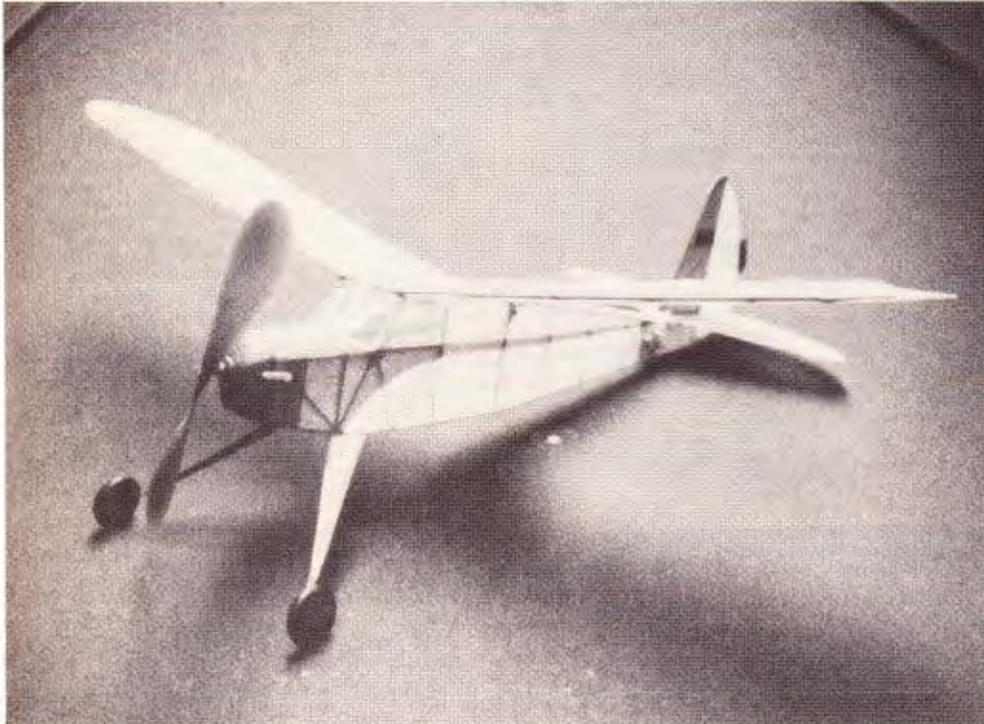


PHOTO: DON ROSS

Like oldtimer rubber models? Here's Don Ross' Pacific Ace (above). Don chose red and white tissue for this little gem. Another plane from the Ross hangar is this "Great Expectations" Bostonian (below).

PHOTO: DON ROSS



50

Hi, gang. Well, this is one of those months again - the kind when the old mailbag runs over! Yeah, I got so many things to tell you about this month that I don't even know where to start.

The best place to start is always to pass along what we hear from the school groups and those great teachers who help 'em along. I got a surprise phone call about a week ago, from one of our favorite teachers - Roger Wathen. I'm sure you remember some of the photos from Roger and his group who call themselves the Flying Raiders of Forest Manor School. Now, one of the reasons Rog called was to tell me that his school, in its library, maintains a large collection of model magazines which go back many years. He said that he would like to share this great reference source with other modelers, and here's how he'll do it. If you know of an article from an old magazine that you'd like to have, drop Rog a note and he'll send you a Xerox copy for the cost of the copy - probably somewhere around a half a buck. So, check with him and see if he has that old item you're looking for in his library.

You all know that Rog has one of the largest school groups in the country. They're really well organized, too. They have annual contests, prize award dinners, and the whole magilla. That brings me to Rog's next offer - which is especially for you teachers and other group leaders who'd like to get something going. Roger has put together a brochure of 111 pages for teachers and other group leaders with all the details on how to get an active group started. Not only that, but he'll even advise you of the pitfalls that you might encounter.

This is a terrific idea and could be of invaluable help to anyone who is considering a beginner's group and is not too sure of the procedures. Roger will send a copy of this material to any teacher or group leader for a five dollar bill. To take advantage of either of Roger's offers, just drop a line to: Roger Wathen, 3242 No. DeQuincy, Indianapolis, Indiana 46218. Don't forget to tell him how much we all appreciate the great job he's doing for newcomers to the hobby.

Now, I have to give you a slight correction on something I told you about last month. Remember the transfer film I told you about? . . . the stuff you can use to make your own printwood? Heck, I'll bet that some of you have already sent for some and are already using it. Well, I told you that after I ironed it on the wood, I peeled it off and had instant printwood. Fact is, that I did and it worked great. It seems that Bob Campbell, who sells the stuff, uses a different idea. He traces the parts onto the dull side, same as I told you. Then irons it on to the wood, dull

side down, also like I told you. But here, he differs from the way I used it. He leaves the film adhered to the wood while he cuts out the parts and peels it off after the part is all cut out and ready for assembly. I gotta admit that I can see one advantage to his method, over mine. Leaving the film in place while cutting out the part will tend to help in keeping the wood from splitting. Bob has a couple of other items which you might want to know about. If you send him three dimes and a 4" X 9" SASE, he'll send you a sheet of nice clear .008" windshield material the size of the envelope. He's got another "goodie", too. This is a booklet of helpful hints on materials, tools, methods, etc., which you can get by sending him one dollar and a 4" X 9" SASE. Here's the best part . . . if you send along an unusual and innovative idea of your own on anything pertaining to modeling, etc., he'll return your buck to you. What he's really looking for are innovative ideas on raw materials that are cheap, or free, and can be readily adapted to modeling. If you've got a good idea, here's a chance to swap it for a whole book of Bob Campbell's ideas. Send your buck and your idea to: R.A. Campbell, 1100 King, Grandview, Washington 98930. And, don't forget - if you haven't tried that neat transfer film for making your own printwood, send along three more dimes for a small supply.

I also heard from Bob Patterson at Foam Scale Models. Bob said that our gang really responded to my product review on his kits. Well, now he's added some new models to the line. There's a terrific Beechcraft Staggerwing that comes both in peanut scale and a large 21" span size, a whole batch of new peanuts including a D.H.-6, an Alexander Eaglerock Bullet, a Buecker Jungmeister, an M.E. 109, and a Bede BD-4. And, for those of you who like the old vintage types, there's a 1912 Avro G at 14 1/2 inch span. So, gang, if you haven't yet sent that SASE for a copy of Bob's catalog, better do it now. The address is Foam Scale Models, Box 43, St. Croix Falls, Wisconsin 54024. He'll even send you a one buck discount coupon that's good on any order of \$7.50, or more.

Dave Aronstein, who is a very successful indoor competitor in the northeast, has added to the line of plans that he sells. For those of you who like the "ultra lights", you should send a large SSAE to Dave for his latest list. I can tell you that one of his new ones, which he calls the "Goldwing", is just the thing for you canard lovers. It's a canard pusher that has done two minutes and 27 seconds! Send your SASE and ask Dave for his catalog. Write to: David Aronstein, 50 Pasture Lane, Poughkeepsie, NY 12603. You'll be glad you did.

While we're talking about plans, I've gotta tell you that I had another note from Rusty Toliver. You remember him . . . the guy that has the old time Flying Aces Plan Service?

FLYING MODELS



PHOTO: DON SANKEY

Don Sankey chose a Brown CO₂ Twin to power his Flyline Monocouple (above). Flies great. Don built his Flanders F-4 for Telco CO₂ power (below left). Warren Shipp's autogiro is a cabin job (below right).

PHOTO: DON SANKEY



PHOTO: WARREN SHIPP



Well, Rusty has more of the old Trailblazer series ready and, on top of that, a whole bunch of the great old profile type of flying scale models for those of you who haven't had that much building experience. So, while we're talking about sending out those self-addressed stamped envelopes, better send one to Rusty for the latest catalog of those great old plans. It's Rusty Toliver, RET Plan Service, P.O. Box 7893, Midfield, Alabama 35238.

I have some good photos for you this month, too. Bill Hannan and his buddy, Warren Shipp, out in California, have been doing a lot of experimenting with rubber powered Autogiros. They're having a good bit of success, too. Bill sent a photo of Warren's giro in flight. He tells me that they're getting great ROG flights and good stability. If we're really lucky, maybe we can get Bill to do one of those construction articles for us in a future issue of FM. I'm just guessing, but with all of you guys and gals who are so interested in canards, I'll bet you'd like to take a crack at one of these "windmill" types, too.

I also received some photos from Don Ross. You remember Don, the guy who dreamed up the "one-design" contest I told you about a few months back. Well, he decided on the old Pacific Ace for the "one-design" and he's now sent me a photo of his own model. He also sent me a shot of his latest Bostonian indoor type . . . fat little devil,

but kinda cute. He calls it "Great Expectations" and it weighs 9 grams and does a minute and a half consistently.

I also heard from Don Sankey again. He's a former World War II bomber pilot from England. Don just loves CO₂ power and he does all sorts of things with it. I'm sure you'll all remember the shot I showed you of his Short Sterling Bomber with R/C and four Telco CO₂ engines. Don also does more conventional things - like building standard kits, as well as some of his scratch-built rare birds.

Well, gang, it's like I said at the beginning of this session . . . loads of mail . . . and loads of things happening. I sure hope you get all those self-addressed stamped envelopes out to the people I've recommended. There seems to be so many little "goodies" out there just waiting to be discovered. I can't believe that you won't have a lot of fun checking into them and deciding for yourself what is your "cup of tea". Now, don't forget. Keep in touch with me and let me know what you're doing. Drop a note and give me the details and, what's always better, send along that good black and white photo of your latest project. Remember, the rest of the gang wants to know what you're doing. So, hang in there until next month when I'll have some more "hot scoops" for you. In the meantime, drop your old modeling buddy a note here at 10 Brothers Rd. in Wappingers Falls, N.Y. 12590. So long for now . . . be seein' ya. ☺

R/C sport scale

By Rich Uravitch

How many times have you thumbed through some airplane magazine and . . . *wham-o!* There it is, the most beautiful whatever you've ever seen. Most of the time it's the color scheme that gets you first, but frequently, it's the airplane itself. If you're anything like me, it's *that* picture that causes the instantaneous acceleration of the wheels upstairs and in micro seconds you're already pulling your replica out of the car, fighting your way through the admiring crowd to the pit, and then executing an absolutely perfect 100 flight score. Well friends, slipping back into reality for a moment, let's return to "the picture" that started this flight of fantasy. A lot of ground has to be covered in our trek from idea to actuality! Let's say the airplane in "the picture" was a P-51 Mustang (I don't know why I *always* choose a '51?). You now decide how big you want it to be, visit your local hobby emporium and select the one '51 kits (of the zillion available) that suits your particular needs, follow the kit plans and instructions, and build it. Apply all the detailing you want and finish it exactly like "the picture." Voila, another dream realized. Granted, I've understated the case a bit, mostly by shrinking the time frame, but the availability of the kit sure simplified things.

Let's get back to "the picture." It's not a '51, but it is a Norduyn Norseman. You've always wanted to build one because your great Uncle Zack shot down a FW-190 by choking its oil cooler after jettisoning the comic books he was ferrying to the troops in Europe. Now I'm not absolutely certain, but my guess is that documentation on the Norseman is about as abundant as fur coats in a nudist colony (and about as much in demand). Fear not, Smilin' Jack, all is not lost. There is salvation for all ye who seek.

Now that you have committed that Norseman to the "next on the list" status, protect "the picture," even if it means replacing the one of your wife, kids and dog on your desk. Now head down to your local hobby shop (if he handles scale plastic kits) and search for the Norseman. If he has it, or can get it, you're in business, if not, send \$1.00 to Squadron Mail Order, 1115 Crowley Drive, Carrollton, Texas 75006 and ask for their current catalog. In any event, when you find the kit, get two and I'll tell you why later.

You now have the two kits in hand. Put one aside with "the picture" and pull the contents from the other box.

We all know that the megabuck plastic kit manufacturers have access to tons of data from numerous sources and that they are pretty darned certain that what they are going to produce is going to be, in most cases, very accurate. Drawings are checked and rechecked prior to fabricating the steel tooling required for the molds. No reason we shouldn't take advantage of their work. The plastic kit will probably cost you less than

ten bucks and it will provide all the basic outlines, shapes and surface detail you're likely to need. Okay, let's get goin'.

Drawing Procedure

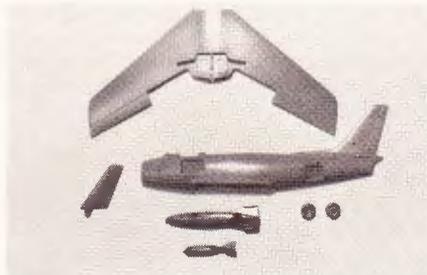
1. Take the left hand fuselage side and mark the position of bulkheads you intend to use on your model. I use $1/64$ " drafting tape of a contrasting color to the base plastic.
2. Arrange all the major kit parts (fuse side, wing, stabilizer, fin, rudder and wheels) on a large sheet of white paper and photograph them using a 35mm SLR camera with slide film. (Tungsten or daylight is acceptable. You can use filters to correct for light source if you are a stickler, but all you are really looking for is an image; color is unimportant). It is, however, very important that the camera lens be perpendicular to the plane of the white paper and centered on it. Take three shots at different exposures.
3. Get the camera equipment out of the way and, with a sharp, dark pencil, trace around all the parts. Make sure you mark the intended bulkhead locations (indicated by the tape in step #1) on the white paper.
4. Remove the parts from the white paper, which now has essentially all your required outlines on it.
5. Using a fine X-Acto razor saw, cut the fuselage half at the tape "bulkhead" locations on each tape mark. Line each

segment up at its appropriate location on the drawing and draw the outline of the bulkhead. This will give you the correct fuselage cross-section at the marked bulkhead location.

6. After all the bulkhead locations (cross-sections) are drawn on the paper, set up the camera again and re-shoot with three exposures.
7. Send the roll out for processing.
8. When the roll is returned, you should have at least one good slide of each grouping. Load this slide into your projector, aim it at the wall and move the projector toward or away from the wall until your drawing is the actual size of the Norseman you want to build.
9. Using a good grade of tracing vellum taped to the wall, trace off the projected image, producing your basic plans.
10. Add your construction lines, buy your building material and your Norseman is on its way to reality.

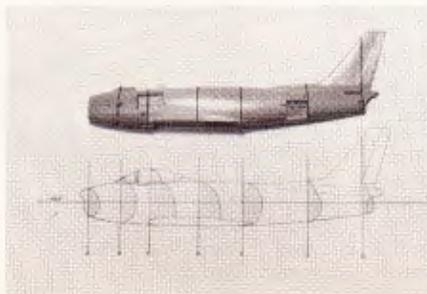
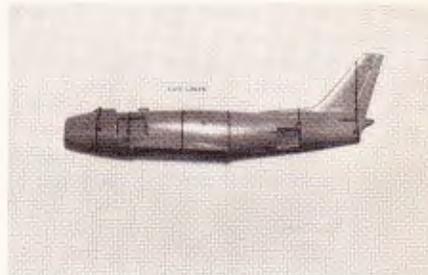
Oh yeah, remember that second plastic kit you bought, the one near "the picture"? Glue it all together (neatly) and don't bother to paint it. The new AMA rules allow the use of an assembled, unpainted plastic model as proof of outline accuracy in your documentation package. It replaces two $8\frac{1}{2} \times 11$ pages usually dedicated to your three views. Use the remaining four pages for your description, affidavit, and "the picture" for your finish, color and markings.

See you next month with some words on "S³" (Small Sport Scale). 



PHOTOGRAPHY: RICH URAVITCH

Primary parts from plastic kit which will be used for scale documentation (above left). Fuselage marked off for cutting cross section pieces (above right). Documentation drawing made from plastic fuselage shows outline and cross section (below left). House of Balsa F-86 Sabre (below right) designed via this method.



R/C Sport

By Ron Farkas

Wait, don't throw out your busted airplane! Instead, repair that wreck. Nine times out of ten the airplane can be made flyable again if you have the patience. You say that you didn't like it anyway, then some industrious club member will probably be glad to take it off your hands and fix it for himself. But don't make any hasty decisions at the field when you have just crashed. Chances are that you are not in the right frame of mind to objectively assess the damage or repairs needed. Take it home and have a tall cool drink (maybe two if it was a brand new airplane). And don't leave any small parts behind. With today's instant glue you'll be amazed at how you can reassemble a plane from jig saw puzzle sized parts.

Preparation for that eventual repair job starts when you open the kit box and unroll the plans. I suggest that you make templates of all the critical parts such as formers and wing ribs. This will ease the pain of making replacements parts later. And, for goodness sake, don't lose the plans when the plane is completed. Another precaution you can take while you are building your new model is to fuel proof all areas that could be exposed to fuel or oily residue. You won't have much luck getting glue to stick to oily wood. This treatment should include the tank compartment and radio area, too.

Let's face it, students are probably going to crash several times before they pick up all the fundamentals. The risk of crashing will temporarily increase when the novice tries his first advanced trainer or sport airplane. Learning aerobatics will probably cost a couple of ships too. If you want to grow in the hobby then you have to take some risks. I suggest that any airplane which may get bashed around be finished with iron-on covering material. It is so easy to remove for damage inspection and then to patch when repairs are complete.

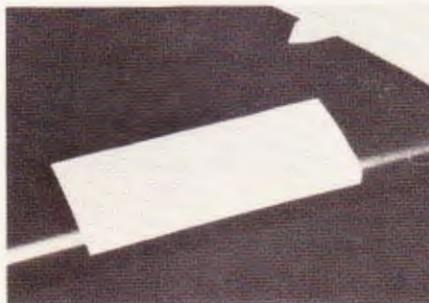
It would be difficult to cover all the possible repair jobs that you would encounter, but there are some general rules of thumb to go by. When you get home with a broken airplane and all of its loose parts, you must determine just how bad the damage is. It is necessary to clean the plane off thoroughly, and it is probably wise to remove the engine, tank and radio. Don't assume that the only damage is that which you see now. There may be structural damage beneath an apparently sound skin. However, begin the investigation at a point where there is obvious damage and keep removing the covering material until no further damage is found. If the plane has a painted finish then you will probably have to sand down to the bare wood in the area of the repair. Cracks that follow the grain tend to travel great distances while crushed wood stays pretty localized. Before proceeding with repairs you should shake, twist, flex or apply pressure on some adjacent areas to

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PHOTOGRAPHY: RON FARKAS

Repairing crash damage is not as tough as you may think. Damaged wing (above left) is not beyond repair. Remove damaged wood and prepare replacement parts from plans (above right). Careful cutting and gluing will result in strong structure. Mended wing awaiting covering (below left). Repaired, wing (below right).



check for hidden damage. If it exists then you must slice into the airplane's skin to gain access for internal repairs. It is a good idea to start the job on the inside and work toward the outside of the ship. Then you know that you haven't forgotten anything.

Any oil soaked wood should be treated with something like K2r Spot Remover. This is a spray which will dry to a powder as it draws oil to the surface. Just brush off the powder and repeat the treatment as necessary until the wood is free of oil.

Internal damage often requires replacement of those formers and ribs that you made the templates for when you first built the kit. Sometimes only a section of a part is damaged beyond repair. In that case carefully cut out the damaged area until only sound material is left. Try to make straight cuts so that it is easier to fit the new pieces in place. Don't pour a lot of glue all over a broken part in the hopes that it will hold together. This only adds a big weight penalty. Instant glue is great for repairs, especially if the wood is only split. With a long teflon tube applicator you can get into places that your fingers can't reach. Also instant glue can be applied to the surface of a cracked part and still penetrate into the wood, whereas you would have to pry the pieces apart in order to squeeze conventional glue into the crack.

As for broken or really pulverized sheet there are two approaches. I have seen modelers carefully press the pieces back in place and lock them together with instant glue. This is acceptable if the wood fibers can be

knitted together, which is often hard because of crushing. However it is a good way of reconstructing the external surface shape. If there are open spaces in this mosaic of pieces then you are not finished with the repair. What is needed is an internal lamination of thin plywood or balsa. I prefer the method of cutting away the affected area and splicing in a new piece. Then I only have to put a small doubler on the inside of the splice. Another advantage is that it makes finishing easier since only the spliced joint must be blended into the surrounding wood. I have used this method to repair gaping holes in wing sheeting or to splice entire new noses onto fuselages. (Don't ask me why it's always noses). Cracked spars should be doubled on both sides with thin plywood. If part of a spar has to be replaced then apply the doublers at each splice joint. I often build my wings on a jig with two 1/4 inch alignment rods. In one instance I had to replace about half of a wing panel. To keep everything lined up I just slipped the rods into the good portion of the wing and added four more rib bays. How about that?

The whole point of this month's column is that with patience and a good plan you can repair almost any damage, no matter how severe. Sometimes the size of the repair job will approach the amount of work to start all over with a new kit. Even in cases like that it may be more economical to fix the old airplane. Only you can decide, but at least make a fair assessment of the damage before you toss out the remains of your airplane.

☐

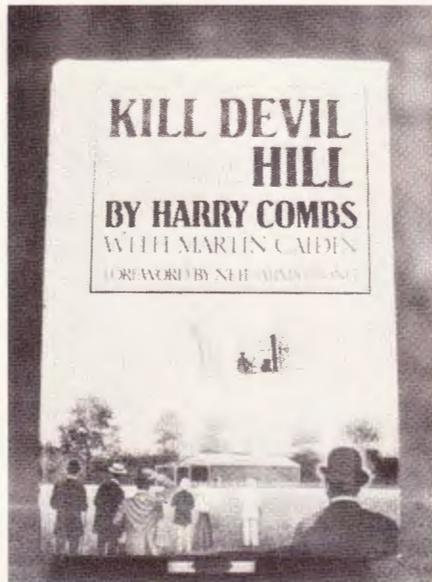
R/C Soaring

By Bob Crane



PHOTOGRAPHY BOB CRANE

Davey Systems, of Malvern, PA, produces this line retriever for winches (left). Operates off 12 volt battery. A soaring library is an added pleasure of the hobby. This is one of Bob's references (right).



This month I would like to comment on an important aspect of R/C soaring, and probably one of the most overlooked areas of our hobby. The soaring library offers to the experienced and the novice pilot a wealth of information. Some of the publications that I have deal with model aircraft and some with full size sailplanes. What I plan to do in this column is list the books and give a brief synopsis of each one.

Sailplane is the journal for R/C Soaring, published by the National Soaring Society. The journal covers the complete spectrum of R/C soaring including technical information and contest coverage. One must be a member of the NSS to receive the publication. Membership is \$10.00 per year, in care of Jim Barr, Box 1530, Denver, CO 80201.

"Model Glider Design", by Frank Zaic, copyright 1944, is a standard for anyone interested in how all the different parts of the sailplane function both separately and together. Although a lot of progress has been made in sailplane design and performance Model Glider Design is very interesting reading. There are many three views offered in the book which depict sailplanes of that time period. I believe this book is available through the AMA or contact Frank Zaic, Box 135, Northridge, CA 91328.

"Sailplane Aerodynamics", by Theodore J. Falk and Frederick H. Matteson, is an American Soaring Handbook, distributed by the Soaring Society of America. The paperback deals with full size sailplanes and covers a variety of topics including lift and drag; stability and control; lateral-directional stability

and the atmosphere. A very technical publication, it affords the reader a keener insight into sailplane aerodynamics. Available through the Soaring Society of America, P.O. Box 66071, Los Angeles, CA 90066.

"Meteorology", by Harner Selvidge, S.D., helps you make use of all the powers of nature to keep you aloft and that is what soaring is all about. Understanding meteorological conditions during the flight is just as important as the skill in flying your plane. The publication is especially good for the novice and intermediate pilot. A lot of what Mr. Selvidge discusses can be applied to R/C sailplanes. The paperback covers such topics as thermals (their characteristics and structure), clouds, fronts, winds, lee waves and the Weather Service. A very informative book. Just knowing where to look for that thermal at your next contest could put you in the winners circle. Available from the Soaring Society of America, P.O. Box 66071, Los Angeles, CA 90066.

The Art and Technique of Soaring, by Richard A. Wolters, in hardcover, is probably the simplest and most informative book for the beginning pilot. Mr. Wolters takes you right from the basics through the theory of flight. The book is divided into nine chapters. Everything you always wanted to know but were afraid to ask is answered in the first chapter. The other eight chapters concern themselves with a brief history of soaring flight, the controls of the sailplane, landing and every other aspect of soaring. I have gone through the book many times and have learned something new each time. One of my favorite sections of the book is the end of

each chapter which is entitled "It's going to be like this." Mr. Wolters has a particular talent for putting into words those emotions which are experienced during soaring flight. Check your local bookstore, but you will probably have to order it. Published by McGraw-Hill Book Co., New York, N.Y. Copyright 1971.

"Kill Devil Hill", is written by Harry Combs with Martin Caidin. "Kill Devil Hill" reveals for the first time just how two obscure brothers achieved in four years what the greatest minds in the world had failed to accomplish in all history. Wilbur and Orville Wright are often thought of as a pair of bicycle mechanics who were somehow, able to tumble into the air with a flying machine. But it was no accident that they were successful in four short years. They were hardly the bicycle tinkers of popular legend; however, their genius as scientists and engineers was overshadowed by the invention itself - the airplane the world saw." This book is fascinating reading to all pilots. It really opened my eyes to the problems that the Wright brothers had to overcome in order to fly. Once you have read this book you have a greater appreciation of flight. To quote from Neil Armstrong in the forward of the book, "Kill Devil Hill" is a story of synergism and serendipity, of sense and sensitivity. More important, it is an airman's careful analysis of one of the most dramatic achievements in the human experience." Copyright 1979, this book is published by Houghton Mifflin Co., Boston, MA.

"Superwings", a division of Hi Johnson Model Products, is a portfolio loaded with all types of soaring goodies and information. The late Hi Johnson really put together an informative portfolio. You can find anything from wing skins to fuselages and tow hooks. The portfolio is all about sailplane construction and design using foam and plastic. Available for \$2.50, post paid, from Hi Johnson Model Products, 11015 Glenoaks Blvd., Paicoima, CA 91331.

Your soaring library is an important asset to your involvement in the hobby. I'm sure there are more books available. If you drop me a line with other books I will include an updated list in a future column.

Soaring goodies

From Davey Systems Corp. in Malvern, Pennsylvania, comes their winch line retriever. The retriever will eliminate losing your turn or your frequency because of long turnaround times in retrieving lines. The unit features a drag free operation due to a fly-casting mode; 1000 feet of braided nylon line with a ball bearing swivel; a guide for line alignment in take up mode and a shroud to prevent line from tangling in the drive shaft. Cost is \$225.00, plus shipping, from DSC Corp., One Wood Lane, Malvern, PA 19355.

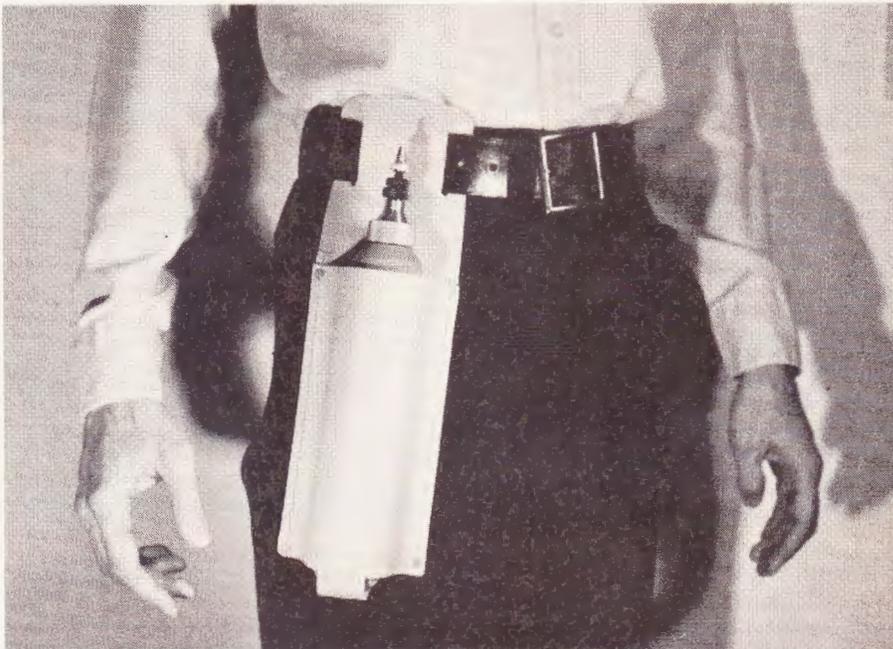
By Dave Rees

I just attended my first indoor CO₂ powered scale event, and am certainly impressed by the future potential it exhibits. Scheduled as part of a meet at the Sun Oil Company's activity center in Chester, PA, it was ably CD'd by Rowland Hoot of the SOTS (Scale Old Timers Society), assisted by members of the Civil Air Patrol who acted as timers. Outside, the weather was a car-stopping -8 degrees, but inside was a well lit 70 degrees, superb flying site. Approximately a dozen airplanes were entered in the CO₂ Scale event, with aircraft ranging from 1910 pioneers to a Spanish Fly Polikarpov "Mosca" fighter. The engines represented were mostly of the Brown, Shark and Telco class with a few of the new Brown A-23 peanut sized versions as well. Performance was truly amazing. If you have a meet coming up indoors, I strongly urge your club to include CO₂ indoor scale using FAC rules. Next, let's try some of the FAC mass-launch events for CO₂. Any takers?

Have you ever spent two hours combing through the grass of your favorite flying field looking for your Ansul charger after leaving it on the ground during an exciting launch? That matt brown color blends into the terrain just like camouflage, doesn't it? My son, Don, came up with a nifty idea that will help those of you using the Ansul 20 and 30 chargers. Simply explained, it is a "Charger Holster" which you can hang from your belt. The charger is therefore always with you and ready to use. The exact dimensions can easily be worked out to suit your size charger after looking at the pictures in this article. After first making two paper patterns to check the fit, head for your local shoemaker or leather goods supply house. You can probably locate scrap pieces of fairly stiff leather about 1/8 inch thick for under four dollars. Next draw the outlines on the smooth side with a soft pencil. Cutting is best done using a sharp razor blade against a metal straight edge, which seems to make a better looking edge than shears do. Mark off where you want the sewing to be done and descend on the closest shoe repair store. For about five dollars, the kindly old shoemaker will stitch and rivet things together as shown in the picture; or, if you are good at hand stitching, do it yourself and save the money. You had best hang it from a wide, sturdy belt, as the weight of the 30 charger shown is substantial

For those scale builders who like decals, some very nice ones were recently recommended to me by George Meyers, also of the SOTS. They are made for the model train folks by the Champion Decal Company in a nice range of sizes and matt-finish colors. Each sheet contains two full alphabets plus some extras of the high usage letters, as well as two 0 to 10 number sets, all for 60 cents. Letters must, of course, be cut out of the sheet, applied to a doped surface with water and nestled down tight with Solvaset or

FLYING MODELS



PHOTOGRAPHY: DAVE REES

Wow 'em at your next CO₂ contest with a charger holster (above). How about a quick draw contest? Like duration, only low time wins! Lubemir Koutney's twin Sikorsky S-38 flying boat (below).



equivalent. The following sizes are most useful to the free flight scale modeler: Block Gothic 1/4" high (white #A-10, black #A-11, red #A-13), Block Gothic 3/8" high (white #A-14, black #A-15, red #A-17), Block Gothic 1/2" high (white #A-18, black #A-19, red #A-21). All are carried by most hobby stores catering to model railroaders.

Also from the world of model railroading comes an idea by Alan Shanzle of the Wash-

ington DC MAXcutters. Alan showed me a bundle of basswood I beams ranging in cross-sectional height from 3/8" down to 3/32" which he had recently obtained at a hobby shop in Pennsylvania. The millwork is impeccable, resulting in a web thickness of about 1/64". The stiffness accompanied by light weight should prove very useful for wing spars, particularly where twin CO₂ motors must be supported by the wing structure. ☐

CA combat

By Phil Cartier

This month it's time for some *controversy!* Nothing like friendly disagreement to arouse people's interest. A couple of months ago my alter ego in this column, Rich Lopez, made some comments about the high cost of combat flying, FAI in particular. I say that is a lot of hogwash. Despite the large number of planes broken at the team trials last year, almost everyone spent more money getting there than they did on planes. A team trials is more like an Olympic event. It's not typical combat flying. The cost of combat is an overblown myth.

Forthwith, I present a discussion of what it *really* takes to get started in combat. Most of the following is by John Thompson and is taken from *Flying Lines* (published by John, subscriptions at \$13/yr, 1411 Bryant Ave., Cottage Grove, OR 97424) and the *MACA Newsletter* (\$9/yr. in care of Jordan Segal, 8314 W. Oak Ave. Niles, IL, 60648). John is fairly new at combat. He's been at it a couple of years.

"As an introduction, my own combat experience goes back to 1978, when Gene Pape, my mentor and coach talked me into trying slow combat. I accidentally flew fast combat once in 1979 and got hooked with the first boost of adrenalin that shoots into your veins in that sport. Later came 1/2A and even some very feeble beginnings in FAI (I picked the Nationals for a first try!). So, I'm not a rank beginner, but I'm still in the formative learning stages of the sport and not eligible for "expert" tanking, either. I hope this column will get some others interested in combat and help entry-level flyers avoid some of the mistakes I've made and am still making.

"Probably the biggest decision facing the beginning combat flier is what event to pick from the four classes. If you don't know the difference between the classes, check the rule book. Either slow combat or 1/2A can be a good starting point. Each has its advantages and disadvantages. If you have the time and money, you might want to try both. Generally, it's best to pick whatever is most popular locally. You'll find more help and more opponents.

"Slow combat's advantages are that it is the "slowest" of the events in terms of what is required of the pilot's reflexes. The planes can be built from several readily available kits with skills the beginning combat flyer already possesses. The disadvantages are that the planes do tend to come apart in crashes, they are bigger and thus more expensive. Most slow planes are sturdy enough that they can be repaired to fly another time. A fleet of four should last a season of four or five contests.

"HalfA combat planes are cheaper and much more resistant to crash damage. They are the kind of plane you go out and fly and crash every Sunday and still have them around. The disadvantages are that 1/2A



PHOTOGRAPHY: PHIL CARTIER

Phil Spillman gets a real kick out of his Flite Streak combat ship. The plane is five years old and has lost only one round of his club's Slow Combat contest. Not too shabby!

combat planes are just about the same as Fast combat in terms of reaction times and relative flight speeds.

"Before we talk more about how to get started in combat, there is one thing you must understand. You will not learn to fly combat at your first contest. You may, in fact, be convinced that you have absolutely no aptitude for it at all. Don't give up! Combat proficiency only comes with actual combat experience. No amount of solo flying will give it to you. The point is that you must pay your dues. Part of the reason that combat is so rewarding is that it is such a challenge to master. You must look to yourself to make yourself a winner. There is no rule book that has an event that you can go to your first day and win, not in combat anyway. The truth is that even if the Fox Stunt 35 was the only engine and Noblers the only planes, beginners would still crash and get beaten. It is the natural order of the universe. This is not bad. Beginning tennis players get beaten too! There is hope!

"Here is what I would consider minimum equipment. Two engines, four airplanes, and all the miscellaneous sundries to start the motor and make field repairs. Two engines are advised to that you will have a spare when needed. One motor can do, but there are enough times that it will get filled with dirt or broken that a spare can save the day. You'll also need to think in multiples of accessories, such as props, plugs, lines, and needle valve assemblies.

"In your early matches, concentrate on keeping your plane under control, not crashing. Just get the feel of flying a match. Be bold enough to do more than just fly level, be as unpredictable as possible, but don't let the plane get away from you. Keep it out of the ground and you just might win by surviving.

"The expense of combat is largely over-rated. True, if you want to jump in head first with the top in construction and powerplant technology, build dozens of airplanes and go first class all the way, you can pour a truckload of cash into combat flying. But you can also be competitive, have a lot of fun and even be a winner on a modest budget. Certain tricks can save a lot of money.

"The first year will be the most expensive because you will be getting your first engines and building up a fleet of planes. The second and third years will be much cheaper.

"The biggest single dollar outlay will be for engines. But before running down to the

hobby shop and plunking down cold cash for two brand new motors, think a minute. Are you planning on winning the Nats this year, or just learning to fly combat? What makes you think you need brand new Super Belch Specials just to learn?

"A few years ago, the top engine for both Fast and Slow combat was the Supertigre G.21-35. Then the Fox Mk III came along. All the experts immediately converted to Fox engines (except Howard Rush, who . . ., but that's another story). Yes there are many G21's lying around in the dusty drawers of many an expert's workshop. A sawbuck or two might get you one or two if you ask nicely. So you'll be a little slower. Don't worry about it. A slower plane is usually easier to keep track of, and it's not always a disadvantage. Some times it can be very difficult for the pilot of a faster plane to zero in on your streamer because of the speed difference.

"There's no escaping initial airplane costs, but there are ways to keep them down. The second batch should cost a whole lot less, too. Build simple planes and shop for the best kit prices. Building from plans will usually save a bundle, although there are some very reasonably priced kits available from the specialty manufacturers. Bear Model Products has a slow combat kit for about \$12, and it includes all the hardware. It's hard to build much cheaper than that.

"The key word to keeping subsequent airplane costs down is: *recycle*. Pick a design with simple components. Once the initial planes are built you should seldom ever have to build anything but wings. (The SC-2 in the May issue of *FLYING MODELS* is an excellent example of a recycleable plane). Motor mounts, tail booms, elevators, stabilizers, bellcranks, pushrods and horns can all be used again. I keep a big box under my workbench full of used parts. When I build a new plane, I just build the wing and fish around in the box for the rest of it.

"In addition, pick tried and true designs and stick with them. Don't try to be a designer right away. I've learned from my own failures that there are very few radical new ideas that weren't tried and discarded years ago."

Well, John tells it like it is. Combat is difficult, challenging, loads of fun, and not too expensive. A hundred dollars will easily buy enough equipment to get started in good shape. Double that will get you the top class stuff you need for several years of flying. ☞

CA stunt

By Bob Hunt

The maneuver up for discussion this month happens to be my personal favorite. The Triangular loop is one maneuver which will show off a good plane's performance and expose the bad characteristics of a poor flying ship. Basically the maneuver has three equal length legs which form a triangular path from level flight (shoulder height) to 45° elevation and back to level flight again. In competition, two consecutive maneuvers are performed with the paths being (hopefully) identical. Refer to your A.M.A. rulebook for a better look at this maneuver.

The reason this particular maneuver exposes the performance of the ship flying it so well is that it contains (along with the hourglass) the tightest corners to be found in the entire pattern. The first two 120° corners can be flown by just about any ship, while that last one is another "airplane eater". The difference between the first two corners and the last one being flown by an overweight ship are likely to be very pronounced and visible to the judges. A light ship in good trim should be able to fly all three corners equally well.

The Triangular loop is hard enough to fly correctly when executed as per the rulebook, but add to this the fact that most flyers tend to flatten the angles a bit and it becomes a nightmare. Like the four Leaf Clover, once the shape of the Triangle Loop is off line, there is no way to salvage the remainder of the maneuver. Flattening the angle of the maneuver (over cutting) means that the first and third corners will require an even tighter turn from your already struggling stunter, while the second corner (at 45°) will be far less pronounced. This seems to be the most common mistake. Few if any flyers undercut the first turn.

I feel that the Triangular looks best when it is flown as per the book or just slightly undercut (slightly less than 120° first and third turns). This gives the maneuver a much cleaner look as the plane has less tendency to slow up and "wallow". I think you will find that this type of Triangle scores better too!

Another common mistake is the tendency to "lean" the maneuver to one side or the other. Undercutting the first corner and overcutting the second one can display a rather odd shape. The same holds true of overcutting the first turn and undercutting the second. The only right way to fly this maneuver is as written in the rule book!

I prefer a dead downwind starting point for the Triangles to assure even speed throughout the maneuver. Starting to one side or the other of downwind can cause acceleration in one portion and deceleration in another. Timing is of the essence here, so try to keep a constant speed.

The fluid movement of the arm through the shape of the maneuver while inducing the rapid movement of the wrist at the proper

points, as discussed in our talk on the squares a couple of months back, applies here as well.

Against the grain

For some years now a few die hard stunt flyers (myself included) have been searching for the seemingly unobtainable grain free finish without the use of silkspan covering. The combinations of various materials used to try to achieve this goal would confuse a chemistry major.

The reason for such a quest was two fold. The biggest plus in finding such a finish would be its light weight. No matter how you slice it, silkspan adds an ounce to the finished airframe. A less important reason would be the reduction in building/finishing time.

The first try at this type of finish incorporated polyester resin as a grain "sealer". The resin was applied with a brush and allowed to soak into the wood grain for a few moments and then removed with a playing card. The card was actually used to scrape the majority of the resin from the surface. The resin was further removed by wiping the surface of the model with a paper towel. After the resin cured, the remainder of the finish would proceed as usual.

Many of the materials we used in finishing

didn't seem to stick too well to the resin and the grain began to surface after a while, so an alternate was sought.

The next sealer tried was Hobbypoxy Formula Two Glue. It was applied in the same manner as the resin and seemed to overcome many of the problems. The one problem it didn't solve was the emergence of wood grain after a few months. Another Hobbypoxy product was tried next and produced the best results of all. Hobbypoxy Clear Paint was applied with a brush and allowed to cure. A second coat of this material was applied and allowed to cure and was then very lightly sanded. This sanding only smoothed the surface of the material, it was not meant to remove a significant amount of the paint. This procedure was followed by the normal talc-dope filler type of finish. Even though the grain eventually reappeared, this was perhaps the closest we came, and it is still a good sport type finish.

The bottom line is that if you want a finish without grain, you will have to break down and cover it with silkspan or an equivalent material.

After eight years of constant use, Les McDonald's Stiletto 660 still retains its grain free appearance, and it is silkspan covered. I guess that about sums it up!



PHOTOGRAPHY: BOB HUNT

Glen Meador proudly displays his "Eagle" stunter (above left). The Eagle is powered by an O.S. 45 engine. Author's fuse jig (above right). Jig aligns the wing as well as being used for construction of the fuse itself. Unusual shot of Gary McClellan's "Allana" passing between Gary and photog during flight (below).



CF-76 SEA HORSE, RC seaplane, 67" span, twin float \$5.00.
 CF-77 4A, Don McGovern, FM 5-67. \$5.00.
 CF-88 MAKO MONSTER, RC seaplane, 45 ml. Don McGovern original. FM 7-67. \$6.00.
 CF-94 UNSINKABLES, 1/2A scale, convert big model to RC. Gene Rogers. FM 9-67. \$3.00.
 CF-123 KOOKABURA, 72" seaplane for 45 RC. Willem Arts. FM 6-68. \$6.00.
 CF-132 GRUMMAN WIGGON, RC scale flying boat for twin 45. Oscar Weinberg. FM 9-68. \$8.50.
 CF-150 MORAY MONSTER, 72" RC flying boat with retracting floats for 60 ml. Don McGovern. FM 1-69. \$6.50.
 CF-168 SCAMP, 63" span RC flying boat for 55 RC. Don Holland. Willem Arts. FM 7-70. \$6.00.
 CF-171 ENSIGN, 60" span RC flat plane uses Enya 45. Gene Rogers. FM 8-69. \$5.00.
 CF-199 SAVOIA-MARCHETTI, Twin Hull CL semi-scale of 1933 flight model. Make it RC. Sarpulus & Shubel. FM 9-70. \$5.00.
 CF-211 EDO FLOATS, Semi-scale floats for RCW craft. Convert your land plane. Willem Arts. FM 3-67. \$3.00.
 CF-247 LAKE BUCCANEER, Semi-scale RC flying boat, 15-19 pusher. Dave Ramsey. FM 12-71. \$6.00.
 CF-263 MADGE FLYING BOAT, 3 channel RC for 29. 45 ml with 57" span. Brent Reusch. FM 5-72. \$6.00.
 CF-290 FALCON TEAL, RC semi scale amphibian, 71" span, 45-60 eng. Don Prentice. FM 3-73. \$8.50.
 CF-361 SEAWEED, RC seaplane with 65" span, 60 engine. Bob Aberle. FM 3-70. \$6.00.
 CF-393 VIKING, Record setting RC seaplane for 35-60 engine, 77" span. Bryce Petersen. FM 1-76. \$5.00.
 CF-450 THE SEE BEE, 1/2A camera plane for RC with 42" wingspan. Dave Katagiri. FM 9-77. \$4.00.
 CF-539 ELECTRIC, 1/2A scale RC seaplane for 35-60 engine with Astro Flight 020 motor. Mitch Poling. FM 5-80. \$4.00.
 CF-592 ASTRO SPORT FLOATS, Easy to build pair of floats for use on electric powered or 1/2A models. Mitch Poling. FM 3-82. \$3.00.

CONTROL LINE SCALE

CF-10 FOKKER DVIII, 33" span WW1 fighter biplane, CL. 049. Paul Del Gatto. Two sheets. FM 6-64. \$8.00.
 CF-23 SPIRIT OF ST. LOUIS, 46" scale UC. Lindbergh's plane. Paul Palanek. FM 12-66. \$3.00.
 CF-33 SEA VIKON, Royal Navy jet fighter, 35 ml with prop, 56" span. CL scale. Jack Sheeks. FM 4-66. \$4.00.
 CF-40 EXTENDED QEE BEE, CL semi-scale lengthened for better flying. S. Miller. FM 6-66. \$3.00.
 CF-71 LOCKHEED HUDSON, 41" span twin 19 powered scale CL WW2 bomber. Paul Palanek. FM 3-70. \$3.00.
 CF-84 CURTIS WANK, 76, CL scale, 36" span, 35 ml, French radial engine. Paul Palanek. FM 4-62. \$5.00.
 CF-87 RYAN SC, Semi scale CL 51" wing, 35 ml. Jack Sheeks. FM 7-67. \$3.00.
 CF-106 FOCKE-WULF FW-190, 50" span. CL profile. 45 ml. fighter, 35-45 eng. Jack Sheeks. FM 1-68. \$3.00.
 CF-130 BELL P-39 AIRCOBRA, 56" CL stunt. W. Simmons, for 35 ml. FM 8-68. \$5.00.
 CF-167 MESSERSCHMIDT ME-109, Near scale 48" span combat CL design for 35 ml. Vince Mitchell. FM 6-69. \$5.00.
 CF-186 RYAN PT-20, CL stunt with 55" wing, 35 eng. Famed 2-place trainer. By A. DiMezza. FM 3-70. \$5.00.
 CF-195 MUSTANG P-51, Continental stunt for 35, semi scale. Joe Berry. FM 7-70. \$5.00.
 CF-197 F-86D, Sabre jet CL stunt 54" span with 35 ml. Bob Lamphere. FM 7-67. \$6.00.
 CF-210 MESSERSCHMIDT ME-262, Semi scale CL 56" span, Single engine & throttle. 35. Vornoh. FM 3-72. \$5.00.
 CF-212 STUKA, 47, F-40 FOKKER WW2 dive bomber. CL for 40 ml. Jack Sheeks. Semiscale. FM 7-70. \$6.00.
 CF-226 HAWKER TYPHOON, British WW2 fighter in neat CL version 1/12th size, 29-40 power. Paul Palanek. \$5.00.
 CF-228 CHANGE VOUGHT F4U Corsair, 62" CL scale, 59-80 eng, 1 1/2" scale. Ito. FM 7-70. \$8.50.
 CF-241 SKY FLY, 2" scale replica of Anton Cvetkovsk's popular homebuilt for CL. Takes 40. Robbins flight control system. Bob Adair. FM 10-71. \$6.00.
 CF-248 F-14 TOMCAT, CL stunt Navy fighter, 58" span, 35 ml. Vic Macauluso. FM 1-72. \$6.00.
 CF-297 F-105 THUNDERCHIEF, 57" span stunt CL semi scale for OS Max 40 engine. Bob Hunt. FM 5-73. \$6.00.
 CF-395 THUNDER, Semi scale CL stunt, 56" span, ST-46 engine. Steve Ashby. FM 1-76. \$6.00.
 CF-414 AT-9 JET, Semi profile CL for twin 30's 59 1/2" span. Jack Sheeks. FM 8-76. \$4.00.
 CF-426 GRUMMAN S-2G TRACKER, 63 1/2" span CL scale for twin 35's or 45's. Steven A. Hall. FM 1-77. \$6.00.
 CF-433 HANRIOT FICHEL H-10 PURSUIT, CL scale, 45" scale for 35 eng. 48" span. Dick Sarpulus. FM 3-77. \$8.00.
 CF-473 P-61 BLACK WIDOW, Twin CL stand off scale for .049, 34" span. Michael Beaulieu. FM 5-78. \$5.00.
 CF-489 F4U CORSAIR STUNTER, Stunt CL with 58" span, 35-46 engines. Jack Sheeks. FM 1-78. \$6.00.
 CF-518 CESSNA AGWAGON, Profile CL stunt with 50" span for 35 ml. Larry Kruse. FM 10-79. \$5.00.

CONTROL LINE

CF-24 SHIEK, Control line stunt, inverted glid wing, twin rudders, 35 ml, 53" span. Jack Sheeks. FM 6-65. \$3.00.
 CF-38 STRAFER, Midwing sport, twin rudder, 40" span CL, adds up to big competitive stunter. Windy Unruh. FM 6-81. \$12.00.
 CF-43 SUPERSONIC STUNTER, Very clean design, swept back 62" wing, 35-45. Bernard Ash. FM 7-66. \$6.00.
 CF-49 ENYA DEMON, 54" span CL stunt, flaps. Racy looking for full pattern on 35. Jack Sheeks. FM 8-66. \$3.00.
 CF-59 CHIZLER, F-4U stunt pattern flyer uses 35 ml engine with shaft extension, 50" span. Dick Mathis. FM 11-66. \$3.00.
 CF-62 TALON, CL stunt with inverted 35, 56" span. J. Kosztycki. FM 12-66. \$6.00.
 CF-67 SWINGER, Swept wing CL stunt, 51" span, 35 ml. Jack Sheeks. FM 1-67. \$3.00.
 CF-90 STARLIGHT, CL stunt, 56" wing for hot 35. Charles Mackey. FM 8-67. \$3.00.
 CF-111 NOWI III, 51" span stunt CL, 1st at 67 NATS. Dave Gierke. FM 2-68. \$5.00.
 CF-121 FREEDOM 45, CL stunt with 45" span, foam core wing, 45 ml sheet covered. Jack Sheeks. FM 5-68. \$4.00.
 CF-134 SPITFIRE STUNTER, Semi-scale CL 49 1/2" span, 35 engine. Jack Sheeks. FM 9-68. \$3.00.
 CF-141 FURY, Stunt CL trike gear, Fox 35 engine, full span flaps, 54" wing. Don Bambrick. FM 2-67. \$5.00.
 CF-144 WINDER, CL combat 42" span high speed 35. Terry Prather. FM 11-68. \$2.50.
 CF-147 FORMULA S, 55" stunt CL, 2nd at Olathe NATS. J. Kosztycki. FM 12-68. \$3.00.
 CF-149 TORINO S, 53" span CL stunt with 35 ml. Modern. Jack Sheeks. FM 1-69. \$4.00.
 CF-153 SCOTTSMAN, 53" span CL stunt swept wing design with full flaps. 35. Jack Sheeks. FM 2-69. \$3.00.
 CF-182 PEGASUS, CL stunt 630 sq. in., 57" span. McCoy 40 engine. Bob Howard. FM 11-69. \$5.00.
 CF-164 KNIGHT, T tailed CL stunt, 52" span, 35 ml. Jack Sheeks. FM 6-69. \$4.00.
 CF-172 H-L-O, CL stunt trainer, 51" span, uses 35 ml. Paul Palanek. FM 9-69. \$3.00.
 CF-181 TEAR-A-LOG, Combat CL, small and compact, for Cox. 15. Fast Richard. FM 12-69. \$2.00.
 CF-185 MESSERSCHMIDT ME-109, Semi scale CL 52" span for 35 engine. Jack Sheeks. FM 1-70. \$5.00.
 CF-192 NOWI IV, 55" span Control line stunt for 35 ml. FM 5-70. Dave Gierke. \$5.00.
 CF-203 OLD GLORY, Stunt control line, 53" span, 35-40. Jack Sheeks. FM 2-71. \$3.00.
 CF-213 MYSTERY, F-4U stunt with 55" span, 29-40 ml. Sensitive. Jim Van Loo. FM 10-70. \$6.00.

CF-225 VULCAN, CL stunt, Optional foam or bulk-up wing, 58" span, Fox 35, Bob Lamphere. FM 6-71. \$6.00.
 CF-246 STUNT MACHINE, 2nd place '71 NATS in sleek CL pattern. 35. Gene Schaefer. FM 12-71. \$6.00.
 CF-257 UNKINDLY, 54" span, 35 ml. Semi-scale CL. 35. Don Tyson. FM 3-72. \$6.00.
 CF-258 IRON BUTTERFLY, FAI combat CL with 33" span. Fast Richard. FM 3-72. \$3.00.
 CF-259 SWEETED, Stunt CL for 35, 53" span. Bob Lamphere. FM 4-72. \$6.00.
 CF-262 TIGER MIRAGE, FAI CL team racer for 15 diesel, 33" span. Dave Kelly. FM 5-72. \$5.00.
 CF-265 WARHAWK STUNT, CL stunt ship for 35-40 ml with 56" span. Jack Sheeks. FM 6-72. \$6.00.
 CF-287 BE WITCHED, Twin boom stunt CL, 51" span for McCoy 40. Jack Sheeks. FM 7-72. \$4.00.
 CF-277 FLY BABY, Semi-scale CL stunt ship, 57" span. McCoy. Jack Sheeks. FM 10-72. \$4.00.
 CF-283 PINTO, 1/2A stunt CL for Cox Tee Dee .049 with 45" span. Dick Mathis. FM 12-72. \$4.00.
 CF-302 VOLUNTEER, 53 1/2" stunt CL, McCoy 40. Jim Lynch. FM 7-73. \$6.00.
 CF-307 HURRICANE, Stunt control line with 49" wing and F4-48 engine. Jack Sheeks. FM 8-73. \$4.00.
 CF-312 U-2 STUNTER, CL U-2 spy plane stunt ship for OS. Max 35, 50" span. Joe Adamusko. FM 10-73. \$4.00.
 CF-316 MISS DARA, CL stunt with 49" span for Fox 36 engine. Dennis Duval. FM 12-73. \$4.00.
 CF-322 GENESIS, Stunt control line, winner with 92" span, 35 engines. Bob Hunt. FM 2-74. \$6.00.
 CF-327 P-26 STUNTER, Stunt control line, 61" span, 35 to 60. FM 3-74. \$4.00.
 CF-329 TALON STUNTER, CL stunt T-38 with 52" span with 51" span. Jack Sheeks. FM 4-74. \$5.00.
 CF-338 SUNSHINE, CL stunter for 35 engines. Andy Lee. FM 7-74. \$4.00.
 CF-342 CLIPPER, CL slow combat, 35 1/2" span for 35 engine. Wm. Wiley. FM 8-74. \$4.00.
 CF-344 BISHOP, Stunt CL for 35 to 46 engines, 56" span. Jack Sheeks. FM 9-74. \$4.00.
 CF-347 MACCHI 202, CL stunt, 54, 46, 58" span. Dennis Duval. FM 10-74. \$4.00.
 CF-358 P-51B STUNTER, CL "mustang" for stunt line with 60" span and 60 engine. Jim Vornoh. FM 2-75. \$6.00.
 CF-363 SCORPIO, CL stunter, 60", 48" ST engine. Bill Simmons. FM 3-75. \$6.00.
 CF-365 PANIC, Stunt CL for Super Tigre 46 ml engine with 51" span. Jack Sheeks. FM 5-75. \$4.00.
 CF-376 MATADOR, Fast combat CL for 35 and 36 engines, 42" span. Rich "von" Lopez. FM 7-75. \$4.00.
 CF-388 SUNDANCE, CL stunter with 55" span for 40 engines. Chris Lella. FM 11-75. \$6.00.
 CF-404 DUBREUIL, CL stunter, 53" span, 35-40. Jack Sheeks. FM 4-76. \$4.00.
 CF-421 THE TORCH, 54" span CL stunter for 35 engine. Dick Sarpulus. FM 10-76. \$6.00.
 CF-423 DAZZLER 40, CL stunter with 56" span for O. S. Max 40. Dan Clark. FM 1-76. \$4.00.
 CF-439 ME-109G, Stunt control line with a 54 1/2" span for 35 to 45 engines. Jack Sheeks. FM 5-77. \$3.00.
 CF-447 GENESIS 46 MK III, CL stunter. Winner of 76 NATS. Bob Hunt. FM 6-77. \$6.00.
 CF-469 GABRIEL, Stunt CL ship, 51" span, 35 engine. Jack Sheeks. FM 4-78. \$4.00.
 CF-482 AURA, Stunt CL ship with 56" span for 46 ml. Bill Bradford. FM 9-78. \$6.00.
 CF-492 STARDUSTER, Control line stunt with 58" span, 46 engine. 201 wingspan. CL. Richard Zschadra. FM 9-80. \$4.00.
 CF-503 SEAFANG, CL stunt ship, 58" span, 40-46 engines. Jack Sheeks. FM 4-79. \$5.00.
 CF-514 MIRAGE, CL stunt ship with 57" span for 46 engines. Lou Wolgast. FM 8-79. \$6.00.
 CF-543 MISS LAURA, 1/2A stunter for Tee Dee engines. Knock down construction. Don Winfree. FM 12-79. \$4.00.
 CF-528 JUNO, CL stunter featuring "I" beam construction, 56" span, 40-46 engines. Bill Verwage. FM 1-80. \$5.00.
 CF-541 MISS LAURA, Adjustable CL stunter for 46 engine, 60" span. Jim Adams. FM 3-80. \$4.00.
 CF-536 AQUILA, I-Beam construction stunter featuring adjustable control system, 56" span, 40 engines. Bob McDonald. FM 4-80. \$6.00.
 CF-544 MISS LAURA, Semi-scale stunter with Goodyear landing gear, removable landing gear, 58" span, 40-46 engines. Alan Seacat. FM 6-80. \$6.00.
 CF-542 SPECTRUM, CL stunter for 40-46 engines, 56" span. Adjustable features, competitive airframe. Jim Casale. FM 7-80. \$6.00.
 CF-545 1/2A MIRAGE, High performance CL stunter for .049, 32" span, tricycle landing gear. Lou Wolgast. FM 8-80. \$4.00.
 CF-548 F-15 EAGLE, Semi-scale Air Force fighter for .049 eng, 201 wingspan. CL. Richard Zschadra. FM 9-80. \$4.00.
 CF-549 MY BLUE, CL stunter features foam wing and tail, adjustable controls, unique design, 60" span for 40-46 engines. John Poynter. FM 10-80. \$6.00.
 CF-553 ORANGE CRATE, CL stunt ship, adjustable features, 61" span for 35. Alan Adamson. FM 1-80. \$6.00.
 CF-560 AVANTI, 60" wing span CL stunt ship for 40 engine. Many adjustable features. Bob Baron. FM 2-81. \$6.00.
 CF-566 FREEDOM FIGHTER, 1/2A semi-scale stunter for .049 engines with trike gear and 31 1/2" span. Dick Byron. FM 6-81. \$4.00.
 CF-570 GOTCHA, Winner of the 1980 Nats Open combat event. Features include 48" span foam construction. For 36 engines. Phil Carter. FM 5-81. \$6.00.
 CF-575 SWEEPER, 78" wingspan CL, powered with OS 60 engine. Add up to big competitive stunter. Windy Unruh. FM 6-81. \$12.00.
 CF-578 CERES, 58" CL stunt features I beam construction with sheeling, for 40-45 engines. Bob McDonald. FM 9-81. \$6.00.
 CF-582 ROGUE, Futuristic CL stunt design for 40-50 size engines. Foam wings and tail. 60" span. Bill Simmons. FM 10-81. \$6.00.
 CF-603 LUCKY 18, A control line stunt beauty by Poland's top CL flyer. Features include a 56" span, adjustable leadouts and 40-46 power. Piotr Zawada. FM 9-82. \$6.00.
 CF-606 ECLIPSE, Ultra high-aspect-ratio CL stunter for 35-40 power. Features a 63" span and adjustable controls. By Dennis Adamson. FM 8-82. \$6.00.

CONTROL LINE PROFILE

CF-284 SPIRIT OF SAGINAW III, Profile stunt CL 50" span for 35. FM 1-73. \$2.50.
 CF-291 MONGOOSE, Slow combat profile CL 40" span, 35. Fast Richard. FM 3-73. \$4.00.
 CF-295 CATIBRIA, Profile stunt for 29 to 40 ml. Dick Mathis. FM 4-73. \$4.00.
 CF-301 PLUM CRAZY CASSUTT, Goodyear profile team racer, 26" span, powered by K&B 15 or other. Matt Smith. FM 5-73. \$3.00.
 CF-EXCALIBUR II, CL profile with 48" span for 40 ml, 51 1/2" span. Dick Mathis. FM 9-73. \$6.00.
 CF-315 SPIDER, Slow combat profile CL 42" span uses Fox 36. Lou Wolgast and Mike Tallman. FM 11-73. \$4.00.
 CF-322 HEINKEI, 45-25, Profile for 35-40 engines, 38" span. Joe DeMarco. FM 5-74. \$4.00.
 CF-335 ERICOUPE, Profile CL for 19 to 40 engines, 53" span. Dick Mathis. FM 6-74. \$4.00.
 CF-342 CLIPPER, CL profile slow combat, 35 1/2" span for 35 engine. Wm. Wiley. FM 8-74. \$4.00.
 CF-354 BOING F4B-3 PROFILE, CL biplane with 34" span for 29-36 engines. Joe DeMarco. FM 12-74. \$4.00.
 CF-355 METAPHOR II, Stunt profile CL for 35 ml with 47" span. Bill Bradford. FM 1-75. \$4.00.
 CF-366 SKYFIRE, 1/2A CL stunt profile for Cox foam wing, 26" span. Larry Reger. FM 5-75. \$4.00.
 CF-392 MISS JILL, Profile CL stunter with 52" span, Fox 35 ml. Jack Sheeks. FM 12-75. \$4.00.
 CF-398 BEART & BOB, Two profile CL with 29" span, 09-15 power. Joe DeMarco. FM 3-78. \$4.00.

CF-409 METAPHOR II, CL profile stunter with 52" span and 58" span. Bill Bradford. FM 6-76. \$4.00.
 CF-411 TRAGER, CL Navy profile carrier, 32" span, 15 engine. Russ Brown. FM 7-76. \$4.00.
 CF-444 THE WILD GOOSE, Canard profile control line stunter with 48" span for 35 engines. Dick Sarpulus. FM 7-77. \$6.00.
 CF-480 DRUINE TURBULENT, CL profile stunt trainer, skinny cheap and easy, for 35 ml. Larry Kruse. FM 7-78. \$4.00.
 CF-507 THE PRETENDER, Profile CL stunt trainer for 49 engines, 45" span. Dick Sarpulus. FM 5-79. \$6.00.
 CF-516 F-84 THUNDERJET, Profile stunt CL with 49" wing for 29-35 engines. Joe DeMarco. FM 9-79. \$6.00.
 CF-555 FRUGAL PHANTOM, CL profile sport scale for air show demonstrations. Designed for 35-40 engine and throttle control. Hal Redner. FM 12-80. \$6.00.
 CF-563 1/2A SPITFIRE, Profile control line ship with 29" wing-span, for 1/2A engines. Dick Sarpulus. FM 3-81. \$3.00.
 CF-567 BEECHCRAFT STAGGERWING, Sport scale profile model of a biplane classic, 29 1/2". \$6.00.
 CF-572 WARBIRD, 36 1/2" span profile CL stunt trainer designed for the NCRA program. Mark Romanowitz. FM 6-81. \$4.00.
 CF-586 NORTHRUP GAMMA, Sport scale profile version of a racing classic, with wheel pants and 29 1/2" wingspan. Bob Musciano. FM 1-82. \$5.00.
 CF-598 SC-2, A top CL. Slow combat stunter with 36 size motors. Larry Kruse. FM 5-82. \$5.00.

FREE FLIGHT SAILPLANES

CF-207 GOB, A/1 Nordic with Jadesley type construction. Mel Allen. FM 4-71. \$3.00.
 CF-209 ATHENA, 80" span Nordic A/2 glass fuselage. Open class winner 56 NATS. Roger Simpson. FM 3-67. \$3.00.
 CF-233 LEAD ZEPPELIN, Sleaf A/2 Nordic free flight, 88" span. Tom Hutchinson. FM 8-71. \$3.00.
 CF-244 GAMBIT, A/2 Nordic Benedek 7457 airfoil, fibreglass rod fuselage. Kit Bays. FM 11-71. \$3.00.
 CF-250 POACHER, A/2 Nordic. FF 77" span. A beam and glider. Don Chancey. FM 1-72. \$3.00.
 CF-292 ANGLIT, Giant 50" span catapult glider by Mike Atwood. Free flight. FM 3-73. \$6.00.
 CF-306 UNDERDOG, Handlaunch glider design by Harry Kruse. 19" span. FM 8-73. \$2.50.
 CF-314 THERMUS, Catapult glider, 36" span. Bob Adair. FM 11-73. \$2.50.
 CF-343 FACE SAVER, Handlaunch glider for rough wind, 16" span. Larry Kruse. FM 9-74. \$3.00.
 CF-378 OCHROMA PYRAMALE, Nordic A/2 with 70" span. Dave Linstrom. FM 8-75. \$3.00.
 CF-401 BACKLASH, Catapult glider with 24 1/2" span. Larry Kruse. FM 3-76. \$3.00.
 CF-408 DESPERATION, A/1 Nordic glider, 48" span. Bruce and D. J. ... FM 7-76. \$4.00.
 CF-424 BOOM BUM, 78" span Nordic A/2 competition glider. Joe Slovacek. FM 12-76. \$4.00.
 CF-443 MOJAVE A/2 NORDIC, A/2 Nordic free flighter with 85" span. Dick Mathis. FM 6-77. \$6.00.

FREE FLIGHT GAS

CF-318 MAXIPEARL, FF power for classes BCD for 29 to 40 engines, 86" span. Bill Chenaault. FM 12-73. \$6.00.
 CF-325 STAR SEEKER, FF power for BCD classes, 29-40 engines. 86" span. Bill Chenaault. FM 12-73. \$6.00.
 CF-330 JUBILEE, Competition FF with old timer look, 74" span. Dick Mathis. FM 1-74. \$3.00.
 CF-346 STANDARD, Scale pipe for rubber, FF or 020 and lightweight RC, 36" span. Hurst Bowers. FM 10-74. \$3.00.
 CF-351 THROWBACK, FF sport 29" span. \$3.00.
 CF-416 1910 FABRE HYDRAVION, FF scale seaplane for Cox 020 engine. 35" span. W.R. Stromer. FM 9-76. \$3.00.
 CF-419 HELLAPENDO, 1/2A competition FF with 47" span for 049-051 engines. Joe Slovacek. FM 10-76. \$4.00.
 CF-449 VALKYRIE MODEL A NO. 1, Free flight electric scale for the Astrolite 02 motor, 37" span. W.R. Stromer. FM 9-77. \$2.00.
 CF-453 COUNTRY BOY CLEM, Competition FF for Class B-C. Engines from 20-41. Jim Giesm. FM 10-77. \$6.00.
 CF-465 CHICAGOGLANDER, Class A power FF for 15 ml, 52" span. Dave Linstrom. FM 3-78. \$5.00.
 CF-470 EVIL WAYS, Class A/B contest FF ship for 15-23 engines, 60" span. Mike Hallum, Gray Turner. \$6.00.
 CF-472 HOLY SMOKER, FAI 15 competition FF, 59" span. Joe Slovacek. FM 5-78. \$6.00.
 CF-499 THE SKY BIRD, WA competition FF for .049-.051 engines, 46" span. Larry Kruse. FM 3-79. \$5.00.

CF-504 RUMPLER 3F SEAPLANE, FF scale for 020 gas engines, 32" span. W.R. Stromer. FM 4-79. \$5.00.
 CF-513 SUDDEN SAM, Competition FF B-C for 29-35, 75" span. Jim O'Reilly. FM 7-79. \$6.00.
 CF-517 1912 ALBATROSS TAUBE, FF scale biplane for electric or diesel power, 33" span. W.R. Stromer. FM 9-79. \$6.00.
 CF-524 STARWORM, Contest FF design to use kit built wings. Dave Linstrom. FM 12-79. \$4.00.
 CF-547 EASTERN STATES CHAMPION, Replica of an old time favorite, 020 powered. Al Lidberg. FM 9-80. \$4.00.

RUBBER

CF-511 1919 BUTTERFLY, Scale free flight with 23" span. CO2. Larry Kruse. FM 4-80. \$4.00.
 CF-510 PORTERFIELD ZEPHYR, Rubber of CO2 scale with 28" span. Cox Maths. FM 10-79. \$4.00.
 CF-521 ROGER DODGER, P-30 rubber design with 30" span. Larry Kruse. FM 11-79. \$4.00.
 CF-535 CAVALIER, AMA scale rubber ship with 30" span. Larry Kruse. FM 4-80. \$4.00.
 CF-554 BIG X, Rubber scale version of Steve Wittman's homebuilt, 29" span. Cox Maths. FM 11-80. \$4.00.
 CF-561 MIG-3, Rubber scale low-wing ship has a 22 1/2" wingspan. Larry Kruse. FM 2-81. \$4.00.
 CF-564 CALIBRON, C525 SIMOUN, 1980 rubber champion in Rubber Scale. Dave Rees. FM 3-81. \$4.00.
 CF-577 SHINDEN, Rubber scale version of Japanese card fighter WW2, with 24" span. Don Sruhl. FM 9-81. \$4.00.
 CF-581 JUIBLEX, Easy to build class P-30. Mike Lidberg. FM 10-81. \$4.00.
 CF-584 BELLANCA SCOUT, Second place winner rubber scale 1980 NATS. Easy to build. FM 11-81. \$4.00.
 CF-590 EMBRY-OK, Designed by Fulton Hungerford, this rubber scale amphibian features exact scale construction and optional retractable landing gear. Can also be built as two channel RC. 34" span. Ed Toner. FM 3-82. \$6.00.
 CF-599 EMBRY-OK, Designed to compete in the F/F Rubber Embryo class, this design includes many scale-like features. Al Lidberg. FM 5-82. \$4.00.
 CF-601 B-25 MITCHELL, A 36" span, super-scale, rubber powered version of a famous WW2 bomber. Mike Kidkiff. FM 6-82. \$4.00.
 CF-607 McRAE SUPER DART, A 27 1/2" span rubber scale beauty. By Florent Baecke. FM 8-82. \$4.00.
 CF-610 BOSTONIAN "T" CRAFT, Designed for the popular rubber competition class, this scale-like ship features a 16" span. Larry Kruse. FM 9-82. \$4.00.

CO2 FF

CF-529 SUPER SKY-ROCKET, B, CO2 powered replica of a 1942 FF design, 19 1/2" span. Al Lidberg. FM 1-80. \$4.00.
 CF-551 GUPPY, Semi scale CO2 powered biplane. All sheet balsa construction. Al Lidberg. FM 10-80. \$3.00.
 CF-557 BOOM BOOM, Semi scale twin boom CO2 powered fun flyer for small fields. Al Lidberg. FM 12-80. \$4.00.
 CF-568 SCRAPPY CO2, replica of Ray Heil's 1939 Flying Aces design, 20 1/2" wingspan. Al Lidberg. FM 4-81. \$4.00.
 CF-588 FUBAR, A replica of the famous free flight design for CO2 engines. It spans 20". Al Lidberg. FM 1-82. \$4.00.
 CF-590 SPYBUTT SWALLOW, A CO2 powered free flight scale model of a little known WW1 fighter, 22" span. Walker. FM 2-82. \$4.00.
 CF-596 1910 BARNWELL MONOPLANE, A CO2 rendition of an early Scottish monoplane, featuring a 26" span. Larry Kruse. FM 4-82. \$4.00.

RADIO CONTROLLED BOATS

CB-1 GLEN-L SPORT FISHERMAN, 39" boat for electric power. Jerry Dunlap. FM 9-76. \$6.00.
 CB-2 DEE-VEE, 32" wood deep vee for 29-40 engines. Jerry Dunlap. FM 9-74. \$4.00.
 CB-3 FOAMY, Balsa and foam ski boat, 19 engine. William C. Young. FM 11-74. \$4.00.
 CB-4 POLY WOG, Extended hood 19 powered RC runabout. Jerry Dunlap. FM 2-75. \$3.00.
 CB-5 FM AIRBOAT, 26 1/2" long water-rudder RC airboat for 15 ml. Jerry Dunlap. FM 4-75. \$4.00.
 CB-6 QUARTER CRACKERBOX, 24" wood mono for 15 engines. Jerry Dunlap. FM 9-75. \$3.00.
 CB-7 DEEP VEE DAY CRUISER, 36" wood deep vee RC racer for OPS 40 engine. Jerry Dunlap. FM 2-76. \$3.00.
 CB-8 GREY GHOST, 45" long deep vee competition boat for 60 eng. Robert Slaus. FM 11-76. \$8.00.
 CB-9 GREY GHOST 40, 38" deep vee boat for 40 engines. Bob and Wally Staat. FM 2-77. \$4.00.
 CB-10 MISURI, 26" long electric scale German one-man tugboat. Gerald Julian. FM 3-77. \$6.00.
 CB-11 AQUADUCT 40, Experimental jet boat using Midwest Bk40 ducted fan for power and K&B 6.5 engine. Length 48" beam 24". Bob Aberle. FM 1-79. \$6.00.
 CB-12 E. PHYLIS, 43" long electric powered tug boat for RC. Art Bauer. FM 1-80. \$6.00.
 CB-13 PLATYPUS, Designed for 20 class engines, 31" length. Lew Pitzer. FM 4-80. \$6.00.
 CB-14 SCARAB S-TYPE, Complete superstructure details fit atop commercially available deep vee hull. Features include wet exhaust, railings, windshield, and interior details. Vic Macaluso. FM 3-82. \$6.00.

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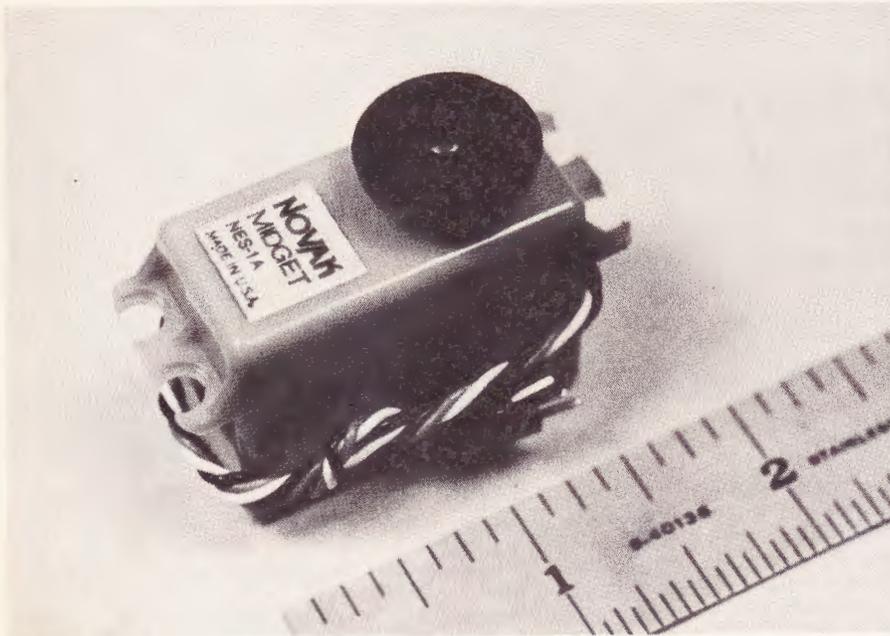
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PHOTOGRAPHY: BOB ABERLE

The Novak NES-1A is the new, improved replacement for the popular Novak Bantam Midget. The NES-1A will be popular with electric racers because of its good speed, even on a four cell battery pack, and ruggedness.

An FM Product Review:

Novak's NES-1A Midget Servo

By Bob Aberle

Speed and accuracy combine in an all new servo designed with the racer in mind.

Novak Electronics has introduced a new servo for the 1982 season. It is called their Novak Midget and replaces the existing Novak Bantam Midget servo which has been so popular over the past couple of years, especially with the R/C car enthusiasts. The reason for dropping the old and introducing a new servo is basically improvement. Bob Novak has designed this new NES-1A servo based on his experiences with the previous unit. The Novak Midget case is a completely new proprietary molding (it is not related to either D. & R. or Dunham).

Let me mention some of the features of this new servo. The gears are molded of type 66 nylon for strength and durability. As you can see in the photos, the case separates into two parts. Both case sections contain an interlocking tongue and groove to achieve a tight seal. Although not part of the basic NES-1A servo, you can obtain an optional

waterproof seal/ball bearing kit for \$6.95. The basic NES-1A servo lists for \$39.95. This price includes your choice of connectors for the following popular R/C systems: ACE (Deans), Airtronics, Futaba, Kraft (standard Multicon), Kraft imported (K-Line), Kraft Sport Series (1.9 M.S. neutral), MRC (Grand Prix) and RS Systems. There are still other connectors available on special order. The basic NES-1A servo comes with an assortment of output arms including: two types of adjustable arms, a wheel output, and a special Ackerman steering arm expressly intended for the R/C car operator. The NES-1A servo measures 1½ inches long × 1¾ inches high × ¾ inch thick (less output arm and flanges) and weighs slightly less than 1.0 ounce with cable and connector. Cable length is approximately 9 inches. As a matter of information, the mounting holes are exactly the same as those found on the Bantam Midget, although the new case is slightly larger in both length

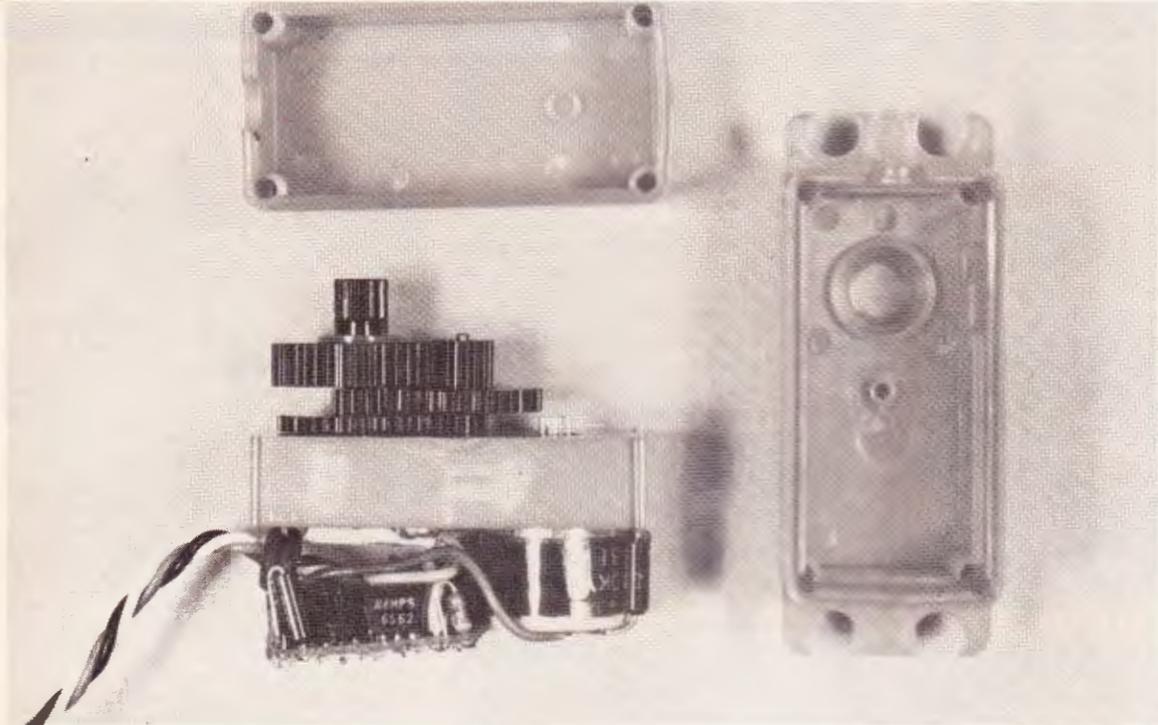
and width. The top of the output shaft has a spline gear which permits adjustment of the neutral position.

Inside the Novak Midget you will find a five pole motor with silver commutator and gold alloy brushes which is 14 MM in diameter, with a resistance of 6.5 ohms. The amplifier contains the popular Signetics NE-544 IC chip with external PNP driver transistors. The feedback pot is of the conductive plastic variety. I measured the idle current at 5 MA. Output torque is claimed to be 21 in.oz. Transit time specification is 0.27 seconds for full 90 degree rotation when operating off a four cell nickel-cadmium battery pack. With a six cell pack the transit time is further reduced to 0.20 seconds.

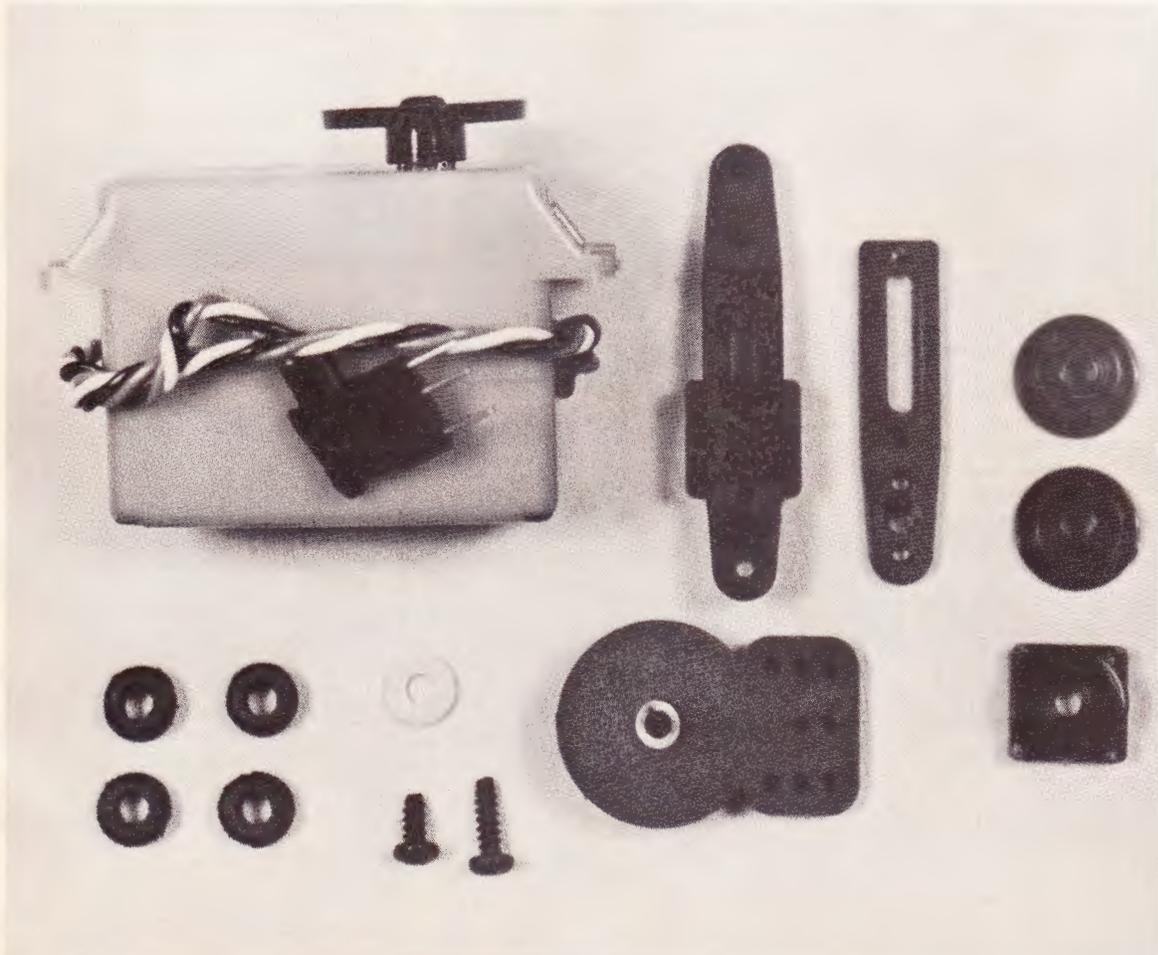
My particular review servo came equipped with a Futaba connector. To conduct an operational check I used a Futaba "G" series transmitter and receiver which was in my possession at the time. Typical servo rotation with this system was 80 degrees (+/- 40 degrees either side of neutral). Neutral return accuracy was something in the order of ¼ degree when returning from full travel. Under no load conditions the servo did tend to overshoot and then come back to the final neutral position (within ¼ degree or less). Under normal load conditions I suspect this would not be very noticeable. For sure this servo is *fast!* The mechanical stops in this servo limit total travel (rotation) to 115 degrees. Pulsing the servo in continuous motion, I measured the average servo current (no load) at 300 MA. This is moderate to high current drain and not surprising with such a low resistance motor.

On a comparison basis with the previous Novak Bantam Midget servo, this new servo has the same output; is slightly faster; draws the same current; is roughly the same size and weight; has an optional waterproof seal and ball bearing support of the output shaft (that was not previously available) and is considerably more rugged. For the extra ruggedness you will pay a little more (Novak Bantam Midget was \$34.95 vs. the new NES-1A price of \$39.95). R/C car racers will undoubtedly be thrilled with the performance of this Novak Midget servo. For additional information you may wish to contact Bob Novak. The address is Novak Electronics, 2709-C Orange Ave., Santa Ana, California 92707 (telephone A/C 714-549-3741).

I have one more additional piece of information regarding this particular new servo. The Novak NES-1A servo will also be offered by Kraft Systems Inc. It will be designated as their model KPS-33N servo. In addition, Kraft will also market the popular Novak two channel receiver (naturally in a gold colored case!). The combination of this two channel receiver, along with two KPS-33N servos and a power cord will be identified as the Kraft Carpak, Model KCP-2N, with a list price of \$169.95. Kraft will also offer their Carpak system along with their very popular, K-Line handgrip transmitter (Model KPT3KW) expressly for the R/C car (and boat) enthusiast. This extra marketing concept will obviously extend the popularity of these Novak Electronics components. Keep an eye out for them!



NES-1A Midget with case removed (**above**). Rugged gear train will take the abuse of flat track or off-road racing. New servo has same mounting hole alignment as older Bantam model. A number of output wheels and arms are supplied with the Novak Midget (**below**). Arms fit on a spline-type output shaft. Channel mount for adjustable arms is useful for throttle wiper arms. Excellent servo.



FLYING MODELS

R/C racing cars

R/C Auto clinic

By Jack Russell

Outriggers

Some of you may have noticed that the newer Lightning 2000s and the new Associated RC12i have a set of body posts mounted wide on the rear edge of the radio tray. Instead of using the wing tubes as the rear body mounts these cars use a second set of body posts to support the rear of the body. This makes very good sense. The wider the body posts can be set apart, the more stable the body mounting "platform". This is important because there are situations where even a perfectly mounted body will lean in high speed turns. This leaning can allow the body to rub on either the front or rear wheels, which in turn (no pun intended) adversely affects cornering and steering. The extra pair of body posts helps eliminate this unwanted leaning.

Even if you are not driving a Lightning 2000 or RC12i you can take advantage of this body mounting system. I mounted a second pair of body posts on my MRP GP-12 with a minimum of effort. A look at the photo of my car should give a good indication of how these mounts can be added to just about any car. The mounting ears are cut from sheet fiberglass and held to the rear blocks with self-tapping screws. The body posts mount to these ears.

After adding these posts to the GP-12 I have not had any problems with leaning bodies. It's a quick, easy and inexpensive way to build a little more "performance" into a car.

Painting goodies

I'm always on the lookout for items which can be used to do a better job of painting Lexan bodies. For the last year I have been painting my $1/12$ bodies with water base acrylic paints. So far I have used BoLink's "Mr. Concours" and Liquitex Artist's Acrylic paints with outstanding results. Grumbacher also makes acrylic art paints, but I have not had a chance to try them yet. The acrylic paints are a joy to use. Because they are water soluble they clean up easily and can be thinned, with water, to the proper consistency for airbrushing.

Recently I came across yet another water base paint for R/C car bodies. Concept Two, of Huntington Beach, California, has a line of paint on the market which includes a number of "pearl" colors! This is a water soluble paint which smells a lot like latex paint. That's right, latex paint like you probably have on the walls in your living room! I've contacted the folks at Concept Two and hopefully will have more information on their line of paints in a future issue of FM.

Masking bodies is always a difficult and time consuming chore. Masking tape is totally unsuitable because of the sloppy edges it leaves. Some people have used automotive pin striping tape and vinyl shelf paper with some success, but both materials are a little

too thick to adhere well in tightly curved areas.

Lately I've been using Flex Mask tape with outstanding results. Flex Mask is a product of Karoden Hobby Products, P.O. Box 434, Bergenfield, NJ 07621. This tape comes in $1/8$ and $3/4$ inch widths and is very pliable. It adheres well and will make a small radius curve with no wrinkles. Flex Mask was designed for use with model airplane paints including epoxy and enamels. I've only used it with the acrylic paints previously mentioned, but it is the best tape I've come across. Flex Mask is available from your local hobby shop. Just follow the directions, then stand back and admire some of the sharpest paint edges you've ever seen.

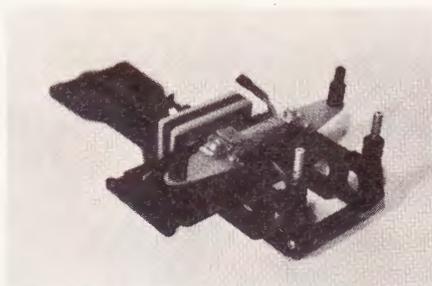
Sticky philosophy

To glue or not to glue, that is the question. Whether 'tis nobler to spin out and lose or glue and win is a perplexing decision which has faced us since the good old days of slot racing. Now, that same decision has to be made by $1/12$ electric racers.

Not only must the decision be made, but another question must be answered: what is glue? Is WD-40 or Teac glue? Not according to the current ROAR definition of tire additives. How about STP or slot car glues such as "Stick It"? If they leave a residue on the track they are technically illegal under ROAR rules. There is always the cotton ball test for treated tires. Jomac's Don McKay came up with this test. Just rub a cotton ball across the surface of a treated tire, if the cotton sticks to the tire the goop on the tire is illegal.

What if the stickum isn't on the tire? What if the traction juice is sprayed on the track? The ROAR rules don't cover that possibility, but it does exist. VHT is a traction compound used on the starting lines at drag strips around the country and it has been used on R/C tracks with the result being vastly improved traction.

In an upcoming issue former ROAR Nats Champ Chris Chan will take a personal look at the tire doping situation. I think you'll find his observations interesting.



PHOTOGRAPHY JACK RUSSELL



Rock and roll is here to stay, but not when it comes to car bodies. Calm your bod with outriggers (above left). All of these potions are ROAR legal tire preparations (above right), but some are reminiscent of slot car tire glues. How far should situation go? Water base paints suitable for airbrushing (below).



Practice, practice practice

I'm sure a great many of you tire of hearing about how the top drivers do this and that and how if you follow their lead you will improve, too. After a while all this reference to the top drivers must sound like a broken record, but it really isn't. Granted, many of the top drivers possess skill and dexterity many of us will never have, but there is one thing that they do which we can all do in order to improve . . . practice.

Although some of the youngsters who are among the best R/C drivers in the world have a great abundance of natural talent, they still put in a great deal of time practicing. Ralph Burch, Joel Johnson, Mike Lavacot and many other younger drivers spend lots of time practicing. Of course, teenagers have a lot more spare time to practice than does an older person who has to work for a living and has a family to support. Regardless, if you're serious about racing you should set aside some time each week to practice. Just like any other sport, R/C driving requires you to put some effort into it before you can expect to reap the rewards.

Personally, I do not drive well indoors. It takes me a number of races to get into the groove. Part of the reason for my poor performance indoors has to do with not having a place to practice. The lack of a track for practice keeps me from getting much needed time at the wheel. Outdoors, however, I seem to get into shape much faster because it is a simple matter to find a blacktop surface where I can practice.

The benefits of practice are numerous. Practice allows you to build a fund of first-hand personal experience at the wheel. The more time you spend on the track, the more relaxed you will be when it comes time to race. The practical experience gained during practice, like where and when to pass a car and just how far you can push your own car, is invaluable. In this way, practice is an educational tool for learning how to drive.

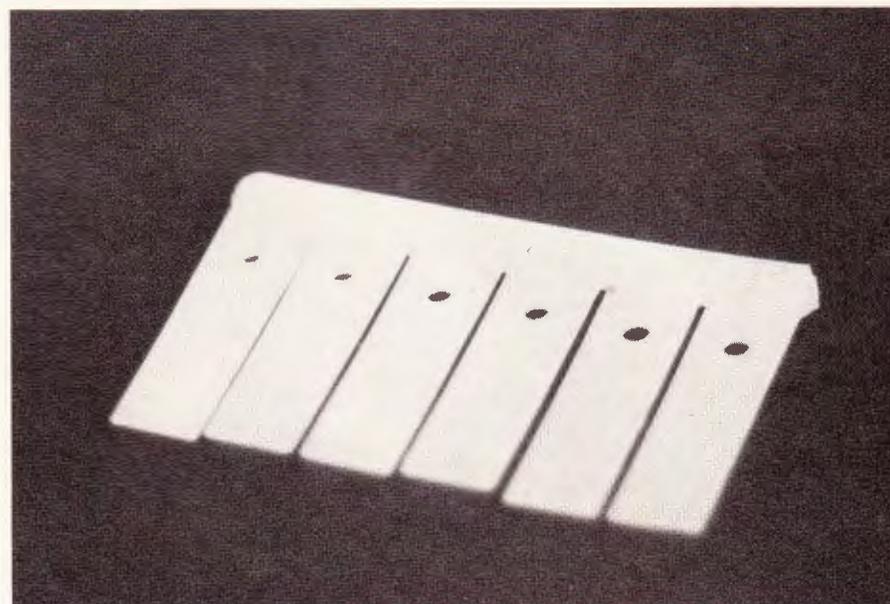
Practice also gives you the opportunity to try new things with your car. The ability to experiment with a car is what most of the experts use practice for. They are constantly trying out new ideas which they hope will give them a slight edge on race day. I personally feel that new ideas and experiments should be reserved for practice sessions, not race day. For most people race day is a harrowing enough experience without having to worry about new, untried changes to a car.

One of the best things about practice is that there is really no pressure during practice. You can go out and try experimenting with your car or learn the track without having race day pressure on you. It's amazing how many things you would never try during a race which can be done at practice without worry. After all, a mistake in practice is just another mistake. A mistake on race day can cost you a spot in the "A" main.

FLYING MODELS



Practicing pays dividends when the green flag drops (above). The more you practice, the better you should go. Sterling Thrust Wedges are perfect for making caster adjustments (below). They're airplane items.



Don't look at practice as drudgery. Learn to use the time to become a better driver who knows more about his car. Many of the qualifiers for August's World Championship in California have been out practicing since January.

A Sterling Idea

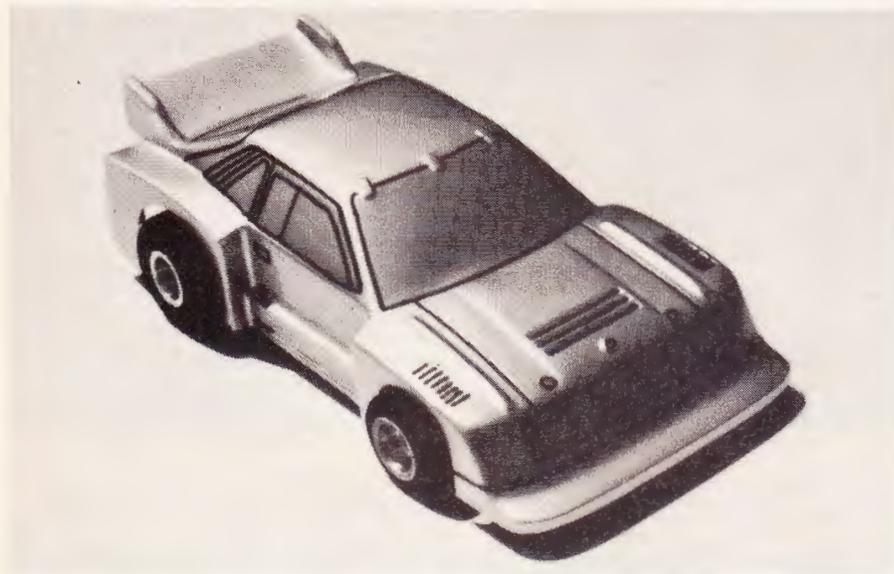
Except for Delta's Phaser, which has provisions for caster adjustment built right in, you don't see many other $1/12$ cars with the ability to make caster adjustments. There are times, however, when caster adjustments can make a difference. Caster angle will affect straight line stability, cornering and tire selection.

One of the easiest ways to make accurate caster adjustments to a car (other than the Phaser) is to use a readily available model airplane item. Sterling Models, Sterling Bldg., 3620 "G" St., Philadelphia, PA 19134, makes

"Thrust Wedges" for adjustment of the thrust line of model airplane engines. These thrust wedges are perfect for making caster adjustments to $1/12$ scale cars. The wedges are made of a nylon material and come in 1, 2 and 3 degree angles. The wedges have a hole in them as they come from the manufacturer, all you have to do is drill another hole to match the screws holding your front blocks to the chassis and you have a simple, accurate method of adjusting caster and keeping track of the results.

Depending in which direction you mount the wedges you can add or remove caster angle in relation to the way the car is set up by the factory. These wedges are a whole lot easier to use than a stack of washers and the best part is that they are available at many hobby shops. If your local shop doesn't handle them they should be easily available because they are a Sterling catalog item. ☐

Pit report



PARMA INTERNATIONAL, INC., 13927 Progress Parkway, North Royalton, OH 44133, introduces the Miller Mustang body in

both 1/24 and 1/32 scale. The 1/24 scale version of the race winning Mustang will fit the new Parma BobCat R/C car.

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Monza GT body. Share large car excitement at a small price!



parma 13927B Progress Parkway, North
International Inc. Royalton, Ohio 44133 (216) 237-8650

TWINN-K, INC., P.O. Box 31228, Indianapolis, IN 46321, has a complete line of fuel-proof decals for both 1/8 and 1/12 scale cars. The AJ's Viva Italia mylar sponsor sheets are available for such various cars as Mario Andretti's World Championship Lotus F1 machine, the Parmalat Brabham and the Greenwood Vette. Various sponsors such as Jagermeister and Fruit of the Loom are also available in this series. For more information write to the above address.

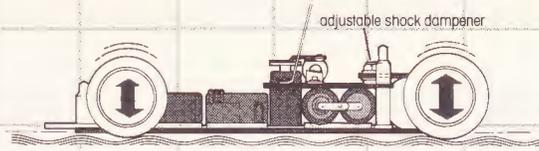
TWINN-K, INC., P.O. Box 31228, Indianapolis, IN 46321, manufacturers a complete line of AJ's White Dot tires for 1/8, 1/12 and 1/10 scale R/C cars. A wide selection of compounds is available for the 1/8 and 1/12 road racers. Both front and rear tires are available with compounds ranging from super soft to firm molded in each scale. AJ's also has a full line of replacement tires for Tamiya road racers and the Tamiya Off-Road cars. For more information write to the above address.

NOVAK ELECTRONICS, 2709-C Orange Avenue, Santa Ana, CA 92707, has a new catalog featuring the company's complete line of servos, receivers, battery packs and servo parts. Included in the new catalog is the popular Novak NES-1A servo which is a favorite of 1/12 electric racers. Included with the catalog is a price list. For more information write to the above address.

MODEL RECTIFIER CORPORATION, 2500 Woodbridge Avenue, Edison, NJ 08817, introduces the Tamiya Toyota 4X4 Pickup. This 1/10 scale, electric powered truck has four wheel drive and a servo controlled three speed transmission. Selection of two or four wheel drive and gear shifting is done from the transmitter while the truck is in motion. The three speed gear box comes factory assembled and utilizes a one-way clutch system. The Toyota 4X4 Pickup has a metal frame and comes with all metal parts. The truck is supplied with an RS-540S electric motor. For more information write to the above address.

TRINITY PRODUCTS, P.O. Box 86, Brooklyn, NY 11228, introduces the Trinity Body Clip. Most body clips last a few heats and then bend and loosen so they easily fall from the body post. The Trinity Body Clip is built to last. By using heavier gauge wire, which has been anodized, the Trinity clip is more rugged and stands up to greater abuse. The end of the Trinity clip is bent up to make it easier to insert the clip in the body post hole, while allowing the body to rock on the posts and avoid chassis tweak through a tightly mounted body. Trinity Products Body Clips are priced at 6/99¢. For more information write to the above address.

PARMA INTERNATIONAL, INC., 13927 Progress Parkway, North Royalton, OH 44133. Super Gripper hood pins, #8038A, are thicker, stronger and will stay in place. For more information write to above address. ☐



While the tires of the amazing RC12i follow the contours of the track, the central chassis, radio equipment and batteries remain stable for phenomenal cornering power.

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1981 ROAR Nationals! Boston — Mike Lavacot/Team Associated wins Indoor Modified.
Reedy motors win All modified classes for 4th year in a row.



PHOTOGRAPHY: VIC MACALUSO

An FM Product Review:
**Steve Muck's
Spartan Streaker**

By Vic Macaluso

Another hot hull in the winning tradition of Streaker Deep Vees moves out of the pack with K&B's new 7.5cc outboard.

R/C boaters who have been around awhile or are involved in Deep Vee racing, the Streaker name should be very familiar. Steve Muck's Streaker series of Deep Vees have been quite successful in several classes and have won national recognition. Using the very successful 39" (40-60 size) Streaker hull and incorporating several modifications in both deck and hull it looks like Steve has come up with another winner.

Before I get into the actual product review I'd like to point out some of the differences between the Streaker hull and the new Spartan-Streaker hull, the subject of this review. The most obvious difference on initial inspection is the completely new deck design

on the Spartan-Streaker. The old Streaker hull has a deck very reminiscent of the older off-shore racing Deep Vees. The new Spartan hull has a much sleeker deck with a downward sweep to the sheer line forward of the hatch opening. The new deck has a raised section approximately $\frac{3}{4}$ " high just forward of the hatch opening extending rearward to form a coaming all around the hatch, and extending forward to end just before the bow, forming a raised section that follows the curve of the gunwale approximately 2" inboard. Not only is this new deck very eye appealing (looks very much like some of the new full-sized outboard go-like-crazy-boats!) but has some very important aerodynamic properties to it. At the speeds this boat is de-

signed to travel, that downward sweep of the sheerline up forward helps keep the bow down, especially in rough conditions when the changing attitude of the boat could very easily cause it to blow off the water. By the way, the windshield I added strictly for looks seems to aid in keeping the boat on the water. I seem to be getting a spoiler affect at very high speeds. This new deck design seems to have hit the mark on two counts: both styling and performance.

While we are on the subjects of changes for performance, those of you who are familiar with the Streaker hull will notice the absence of the full length running strakes on the new Spartan-Streaker hull. The only strakes on the Spartan hull are two (one on each side)

approximately $\frac{1}{3}$ the length of the hull starting approximately $\frac{1}{3}$ the length of the hull forward of the transom. Having never run a Streaker hull I cannot give a direct comparison of the two hulls but I will say the new Spartan hull is certainly not lacking in performance. More about that later.

On receiving this hull from Steve Muck R/C Boat Products my first impression was the hull was very light for its size. Most 40-60 sized hulls I've compared it to are about 3 to 6 oz. heavier than this hull. After thoroughly inspecting the hull I'm thoroughly convinced that the lightness in no way affects the strength of the hull. The proper amount of glass cloth was used where needed and no dry spots were noticed anywhere on the hull. Instead of using extra cloth for strength, the deck moulding gets its strength from the design rather than extra material. This is a trend I would really like to see throughout the industry. I'm sure top speeds will eventually climb.

The Spartan-Streaker hull comes with the hull and deck already joined and the engine mounting rails and transom doublers tack glued in place. The engine rails are cut and drilled to accept a 5" engine mount which can be ordered from Steve Muck. A very interesting aspect of this hull is the $\frac{3}{8}$ " wide flange or rub rail around the entire hull at the hull/deck joint. This flange serves two purposes. First, in the joining process, it supplies more of a gluing surface, and even though the entire hull/deck joint is reinforced with glass cloth inside the hull, it still adds a measure of strength to the hull. If it looks really offends you, you can grind it off with a belt sander with no sacrifice in strength. I personally chose to leave it on to protect the paint job. (Just like the rubrails on real boats!) And secondly, as mentioned, it offers a measure of protection in minor collisions.

Although the Spartan/Streaker hull was designed as an inboard hull the purpose of this review was to test this design with a new K&B 7.5cc outboard. No modification to the basic hull was required other than drilling the necessary holes required for the outboard installation.

Before I progress any further I'd like to mention that although this particular hull will remain as an outboard, the radio and tank installation was done in a way that the boat could be very easily converted to inboard power if necessary. The radio box and tank were glued in place with silicone rubber sealant and can be easily removed if necessary.

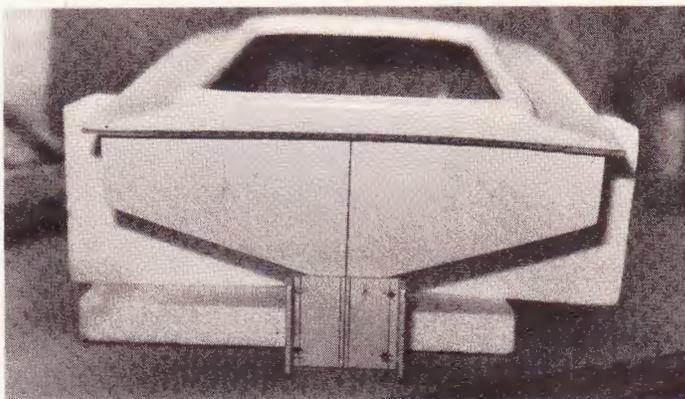
The basic hull is supplied from Steve Muck as shown in the pictures (one piece, ready for radio & engine installation) and if you're really in a hurry just add engine, radio and go! Because I have a little more class than that, I'll describe each step of the outboard installation.

As mentioned before, the engine rails come tack glued in place and must be securely bonded to the hull using polyester resin and cloth strips. Although in the outboard version they won't be bearing any of the engine loads, they do add strength and rigidity to the hull bottom and should be glassed in either case. Should you decide to convert to in-

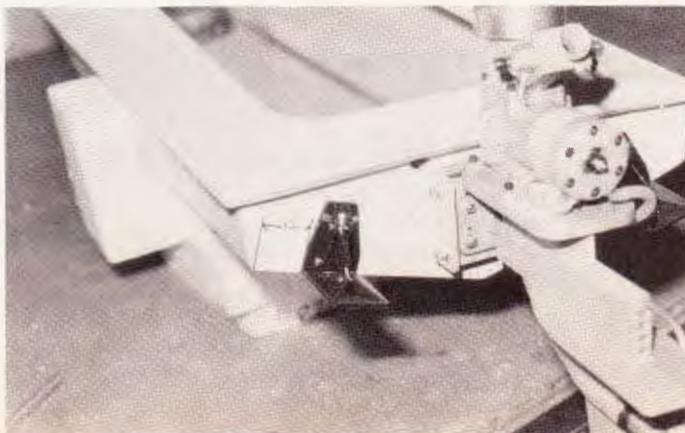
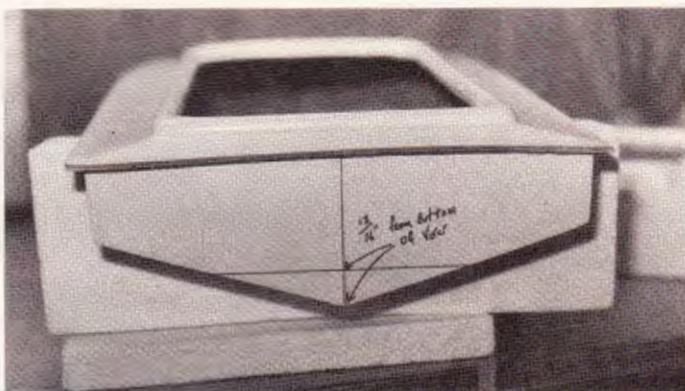
FLYING MODELS



Basic components used in this review include Steve Muck's Spartan/Streaker hull, K&B 7.5 outboard, adjustable engine mount, radio box and trim tabs.

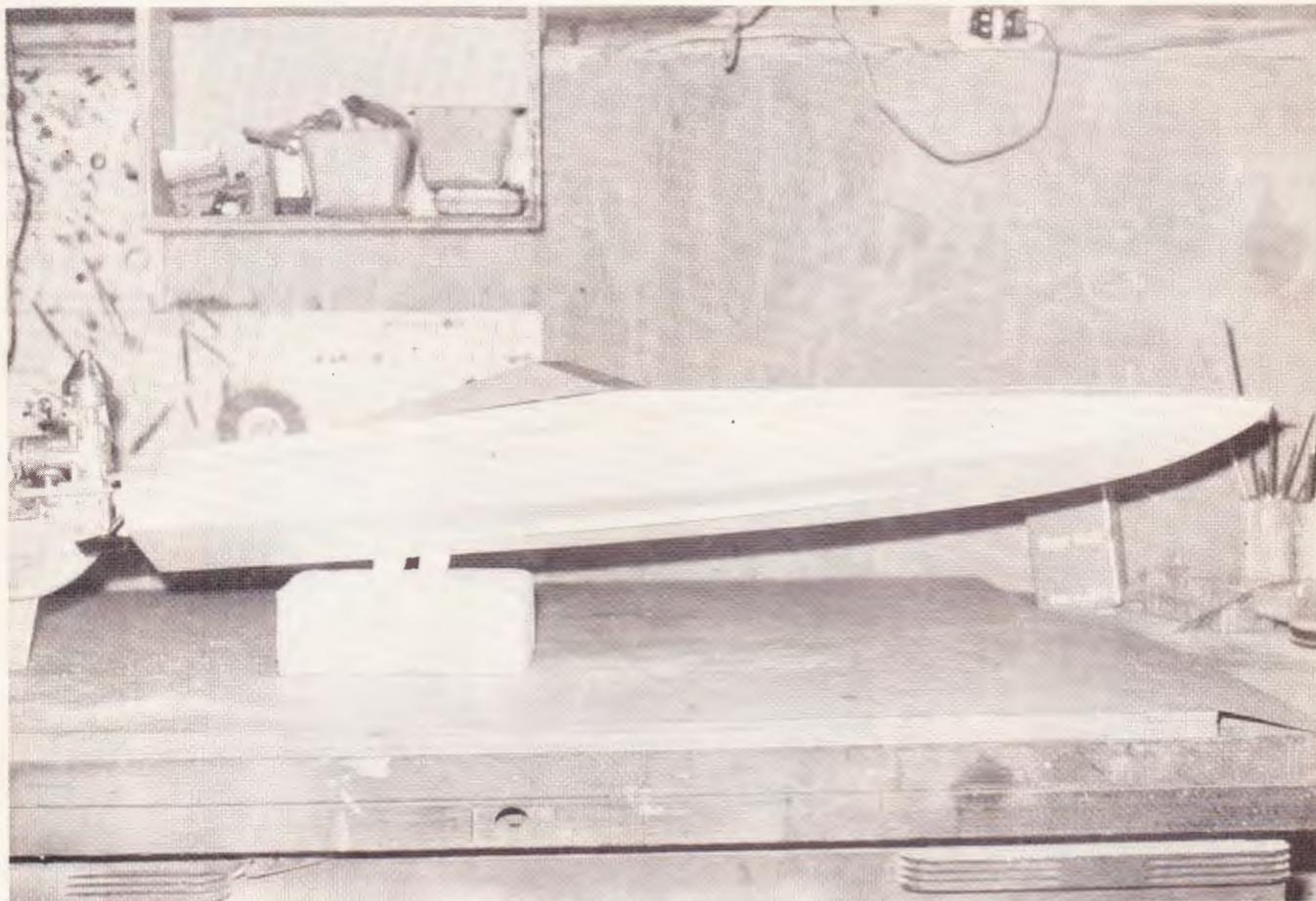


Center line was drawn on transom to accurately locate the engine mount (above). Accuracy will pay dividends. Horizontal line (below) indicates bottom of engine mount. Located here, Prather motor mount allows prop center line to be $\frac{9}{16}$ " below keel. Aeromarine Trim Tabs (bottom). Very scale.



R/C model boating

Spartan Streaker



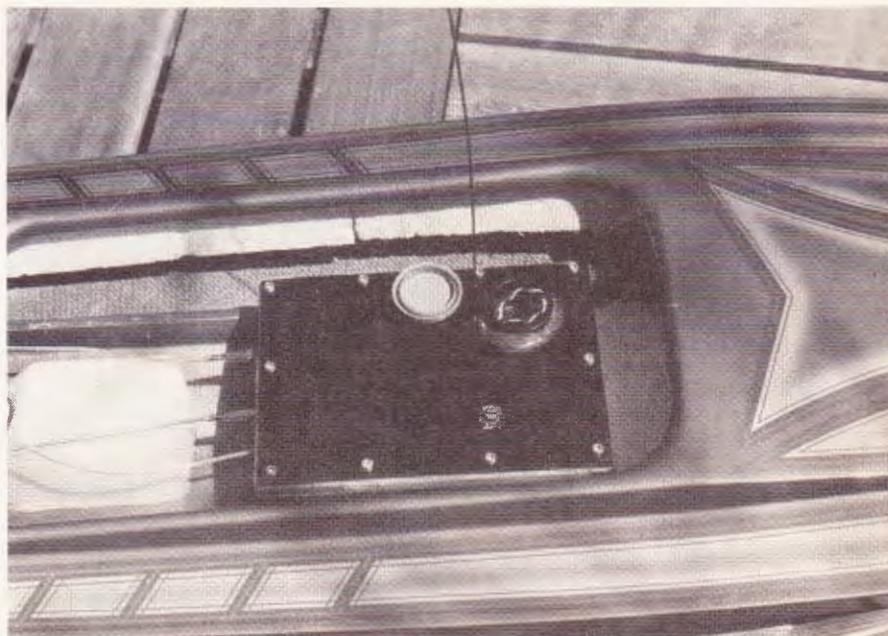
Boat rigged and ready for finishing. Note cardboard windshield. Final dimensions of this windshield are very close to those for Vic's Scarab S-Type featured

in March '82 FM. Do not install turn fins shown in photo! They are detrimental to performance and cause boat to flip over in the turns.

board power later on this *necessary* step will already be done.

With this done the next step is to locate and drill all necessary holes for mounting this motor and trim tabs. The dimensions shown in the photos were guessed at after several conversations with Steve. After much running and testing these dimensions proved to be a good starting point. No two hulls are alike but using these dimensions and the latitude provided by the adjustable engine mount and the slotted mounting holes on the engine you should have no trouble dialing in your particular hull. Speaking of engine mounts, I personally feel that an adjustable one is absolutely necessary for quick, easy, accurate adjustments of your boat's running attitude. For this particular review I used the Prather adjustable engine mount. Teagues' Model Marine Products, 8027 Genesta Ave., Van Nuys, CA 91406, also produces a very good engine mount with similar capabilities. The choice is yours.

When locating the radio equipment in this hull I took into consideration the aft C.G. created by the weight of the outboard. With this in mind I located the radio box as far forward as practical and this brought the finished C.G. (without gas) to $\frac{1}{3}$ the length of the boat, forward of the transom, which is right



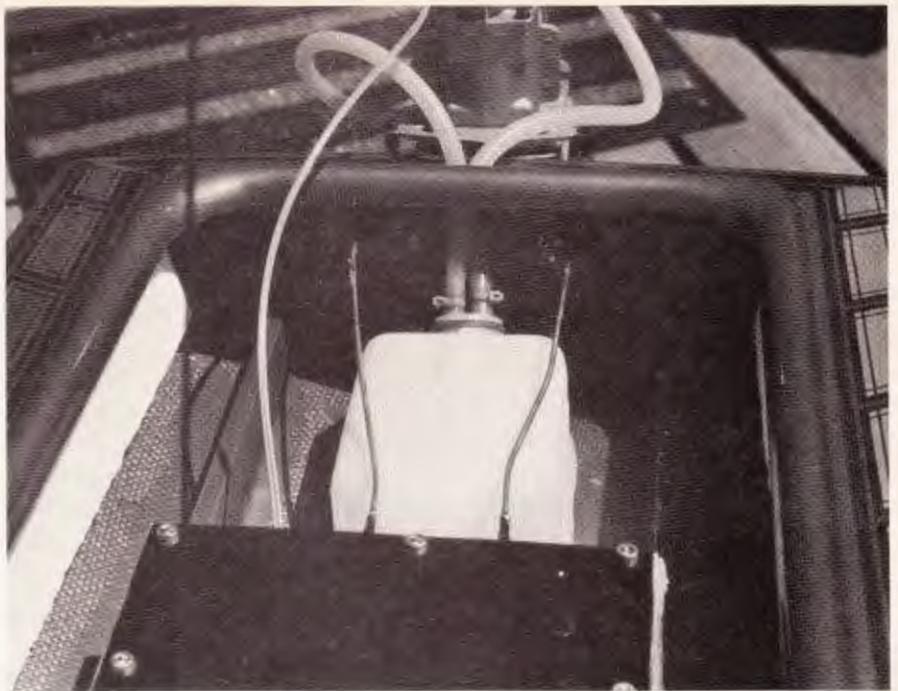
Radio box is placed as far forward as possible. If you decide to use windshield be sure to give yourself access to box. Note the 35mm film can and cover. This installation allows the batteries to be charged without removing waterproof lid and bearing seal. Streaker has another one of Vic's outstanding paint jobs.

where I like it for deep vee hulls. With the center of gravity at this point, deep vee type of hulls are very easy to trim and this Spartan/Streaker hull is no exception.

The quality of this hull is outstanding with no detectable ripples in the mold and no voids in the gelcote or glass cloth. Speaking of the gelcote finish on this hull, when I first received it I was concerned about the satin rather than glossy finish found on this hull. A quick call to Steve gave me my answer. Most if not all modelers paint their hulls and the satin finish gives a better foundation for this. After completing this model I found no difference in finish procedures. All fiberglass hulls should be well sanded prior to finishing anyway.

Now to the best part! Performance! Without going overboard (no pun intended) I'd like to say the performance can be described as explosive. With this outboard motor the acceleration is almost instantaneous with very little tendency to torque roll (once trimmed properly using trim tabs.) With the shaft centerline $\frac{1}{2}$ " below the keel line and set at about 2 degrees negative thrust (lower unit kicked in) the boat sets up in an excellent planing attitude with the entire boat out of the water except the last $\frac{1}{4}$ of the keel line. This planning attitude coupled with the downward sweep of the sheer line at the bow and the spoiler affect of the windshield keeps this boat really glued to the water, yet there is a minimum of wetted surface to create drag.

As far as speed is concerned, I have no sophisticated measuring devices available to me but the boat (with very little trim work so far) is at least as fast as any 40-60 sized deep



Just visible under deck lip at stern are the rubber bellows used on steering rods. Bellows prevent water from entering hull while boat is at rest. Note styrofoam floatation under gunwales.

vee in my area. My testing and trimming program came to an abrupt halt due to a blown engine (cause, yet to be determined) but this hull engine combination certainly has potential and is especially simple to rig.

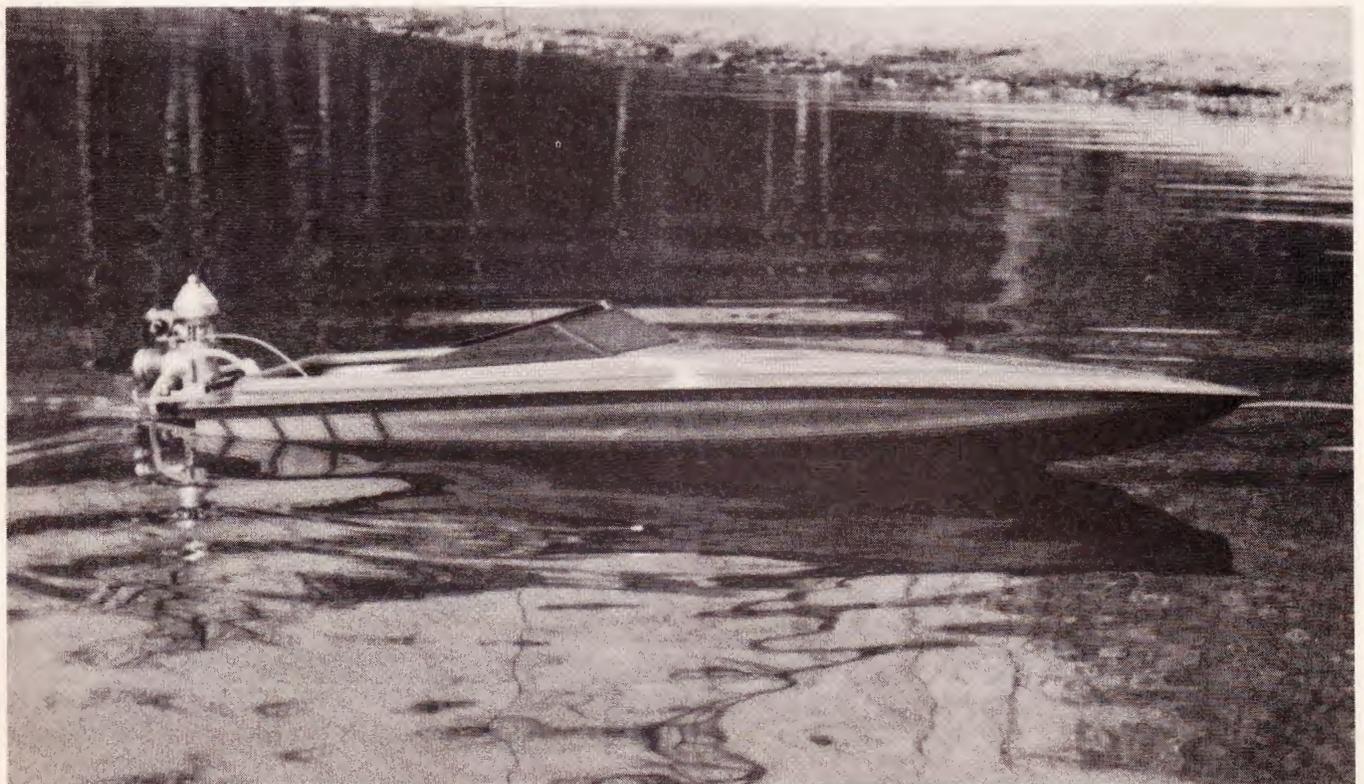
The boat was finished using all Hobby-poxy materials. Their new metalizer for creating metallic colors from their standard colors, is really something. The colors on this hull are 3 different shades of blue and two different shades of grey all made by mixing different amounts of metalizer with dark

blue and black then applying in the usual way. The introduction of this metalizer has given a much greater creative latitude to Hobby-poxy users.

In summing up this review I feel that this hull/engine combination is ideal for anyone wanting to try a 40-60 sized rig. It's much easier to set up than an equivalent inboard and the performance is easily just as good. In addition, you also have the option of converting back to inboard power at a later date.

This rig is a winner, try it!

CC



R/C Scale Boats

By Art Bauer



PHOTOGRAPHY: ART BAUER

How's this for realism? Take a look at the bow wave pattern and wake produced by this boat built by Ron O'Neill from a Dynamic Models "Sportfisherman" hull.

The tremendous increase in interest among modelers in R/C scale model boats has convinced the editors of this magazine (who are naturally aviation oriented, and for that we can forgive them) that it is time for the R/C scale model boaters to have a column of their own.

With that in mind, welcome to our first column on R/C scale model boating, in which we hope to be able to answer your questions on scale model boats, report on contests and their results, pass on to you new products news as it is received, to keep you informed of trends in the hobby, and above all, to give recognition to all scale model boaters who build a scale boat and get out and run it, which after all is the primary objective of our hobby.

I will be writing this column on a bi-monthly basis, with the alternating months being written by Eric W. Goldschrafe, who will provide you with the technical bits and how-to's of building your scale model boat, while I will concentrate on all the other news as outlined above.

R/C scale model boats have been around for as long as radios to control models have been around. Scale model boaters, however, seem to have been until recently very quiet in the pursuit of their hobby, being contented with running their models without any of the hassles associated with the other phases of

R/C modeling.

Because of the scale boat modeler's lack of organization and/or push for recognition, most stories and columns in the popular model magazines on R/C model boats have been slanted towards the power (speed) boat models.

As this column is being written, the 1982 WRAMS and Toledo shows have come and gone, and if nothing else is remembered about them, the turnout of R/C scale model boats that were on display at both of these shows will not be forgotten. At both shows, the number of scale boat entries far exceeded the power boat entries.

At the WRAMS show, scale model boats outnumbered the power boats by 6 to 1! At the Toledo show, scale model boaters had the pleasure of seeing one of their own, Loren Perry, take the top honors as he won the "Best in Show" prize.

Before we go further, and to ease some of the fury of the power boaters (as this column will from now on refer to the speed boaters) who are reading this column and will claim that they are also running scale boats, let us define what we mean by a scale model boat.

An R/C scale model boat is one that when it is running on the water looks like, and operates like a real full scale boat, whether modeled after an actual vessel, or just built to look like one of a type of actual boat.

While it is true that some power boaters are running craft that are designed after real boats, the majority of power boaters are running nothing more than something that resembles an actual boat in looks, and whose whole objective in life seems to be more speed and more speed. All you can observe as they run are the plumes of water thrown up by these missiles as they move out. They do not look nor do they operate like a scale boat.

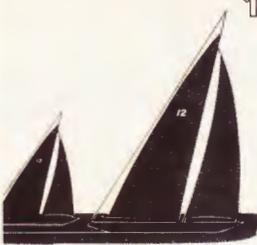
Let's be honest, scale model boats do not run at scale speeds either, as one of the sad facts of life for a modeler is that we can not scale water. (We will have more on this in a later column, and its effect on scale model boats).

In order to get our models to look like they are running at a scale speed, as determined by the bow water patterns and the wake of the hull, we do have to run over what would be the scale speed for that particular type of boat, but at least a scale model boat will look and operate like the real boat to any observer on the shore watching it.

My guess is that I will be hearing plenty from the power boaters on the above (Vic Macaluso will probably reply in his column on power boats), but one purpose of this column will be to tell it as it is for the scale model boater.

Now that we have defined the differences between scale model boats and power boats

Mini-America's Cup 1983



PHOTOGRAPHY: RICH PALMER

A man and his sailboat. John Cleave won the Mini America's Cup in 1980. Can he defend in 1983?

(I hope), lets go back to what this column will be about, those already in scale model boating, and those who would like to be.

Many new scale model boaters come from those who happen to see model boats running and become interested in them. Others come from the ranks of model airplane builders who have become tired of spending their time and efforts building a model only to see it rekkited (crash) before they have really had a chance to enjoy it, and some come into the hobby just from reading about it in columns like this.

One big advantage that scale model boaters have is that after spending their money, time and effort in building a model, it is always there ready to go after the batteries are recharged. It seems to always come back (99.9% of the time anyway, there is sometimes that unfortunate incident), and they can have the pleasure of enjoying their rewards for years.

I personally have models around that are over ten years old, and if I wanted to get them into the water, the only thing that would have to be done to them would be to put batteries and a radio in them. I am sure that there are many other scale boat modelers who can say the same thing.

Scale model boats can never go out of style; while the prototype may disappear, it was there originally.

Contests are usually judged not only on looks (like the WRAMS and Toledo shows) but also on the model's ability to perform by either running a prescribed course or completing a work task.

Many contests go unnoticed by scale model boaters due to their lack of knowledge that these contests are taking place. While many are listed in the "Timetable of Coming Events" in this magazine, most are not. It is not necessary for your contest to be NAMBA or IMPRA sanctioned to be listed, all it takes is a note from the sponsors of the contest to the editor, and you may be able to top the almost 100 entries that were turned out at the Huntington Nautical Festival last year.

If contest sponsors of scale model boat events would send us the results and some photos we will make every effort to use them in a future column. The same goes for any scale model boater who sends a picture and description of his favorite model.

Whether new to the hobby, or one of the oldtimers, I am also sure this will provide the basis for many questions for which you would like an answer. Hopefully, it has answered some initial questions.

I am also sure that this column will no doubt provoke many comments, both pro and con as to its contents. As I am a glutton for punishment, send them along to me, care of the magazine, and I will attempt to answer them all, either in the column or directly.

Until next time . . . Happy Boating! ☺

FLYING MODELS

By Richard Palmer

It may seem rather strange starting a column for 1983 in 1982. However, the fact is the next 12 months will disappear rapidly, as the year preceding the 1983 event has many details and preparation which have to be accomplished. First, we should explain that this column will be a monthly feature from now through September 1983. FLYING MODELS readers will have a first-hand look at what is in store for the 1983 running, and some of the details that will take place between now and then. Second, here's a brief history that leads us to the present time.

The "Mini-America's Cup" program was first initiated in 1974, as a publicity program for the Hobby Industry of America. At that time, the Hobby Industry was producing news films on timely hobby subjects which incorporated models. It was decided to duplicate "in miniature" the famous and historic races sponsored by the New York Yacht Club, known as the America's Cup. With but six weeks to work out the details, it was decided that the top model skipper from the West Coast and East Coast would be brought together for a match race, paralleling the procedures of the full-size 12 meter yachts. The American Model Yachting Association was contacted to recommend their two leading skippers and supervise the race. Ironically, two brothers wound up meeting at historic Fort Adams State Park in Newport, R.I. The event was held at the same time as the Newport International Sailboat Show, and the America's Cup races. James "Buddy" Black bested his brother Chuck Black in the best of seven series, and the "Mini-America's Cup" program was officially launched. The idea and concept immediately attracted attention, and a challenge was put forth to foreign countries to send a challenger. In addition, the Narragansett Model Yacht Club was organized from the interest seen at this event, and became a leading model boat club in the New England area.

1977 saw two challengers from Australia and one from England in attendance, with Bob Harris, a past president of the AMYA (now deceased), besting Neil Bennell of Australia to clearly establish U.S. title to the "cup", a truly international event.

Throughout the entire 125 year history of the New York Yacht Club's event, the U.S. has never lost a defense of the cup. John Cleave of England made it known in 1977 that he would be a serious contender for the next Mini-America's Cup series in 1980. He visited the U.S. entering various races, as well as winning the EC-12 international series in Canada (July of 1980).

For the 1980 series, the Mini-Cup triangular race course was moved from heavy seas

near the entrance to the bay, to a more sheltered spot at Fort Adams. This proved to be a vast improvement with superb facilities for spectators, participants, and committee members. There were five days of jammed-packed racing, which saw Carter Cain win the right to "defend" the cup for the U.S. John Cleave bested Max Lewis of Australia to be the official "challenger." The series went to seven races, and John Cleave of the United Kingdom became the first foreign winner of a "Mini-America's Cup" series. He will now be the "defender" for 1983.

Since that date, U.S. skippers have been quietly gathering their skills, practicing earnestly to hopefully retrieve the cup in 1983 for the U.S. The U.S. and other countries now become "challengers."

Part of the "Mini-America's Cup" program includes two EC-12 model yachting programs annually. One is the "U.S. Mini-Cup Trials" held at a different location each year. The other is in Newport, R.I., under the sponsorship of its mayor, Paul Gaines. He hosts a "Mini-America's Cup Mayor's Race" every September at the Fort Adams site. Through both of these efforts, U.S. skippers are constantly keeping in preparation for the future races. It must be mentioned at this point that the "Mini-America's Cup" is designed to coincide with the same procedures, race formats, etc. as the America's Cup series which is held on a minimum three year basis. Thus, since 1974, these races have been held every three years with a "Mini-Cup" series very closely tied in.

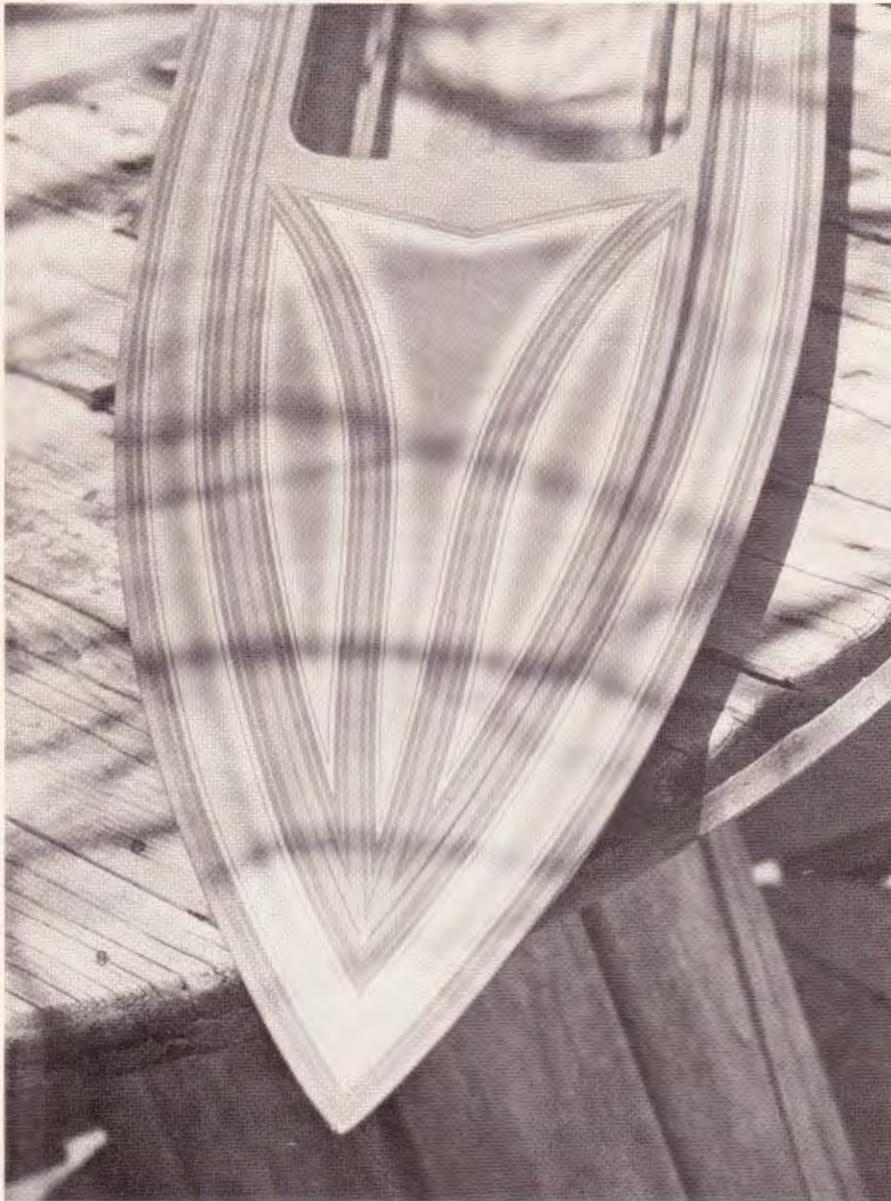
The official "U.S. Mini-Cup Trials" for 1982 will be held at Orlando's SEA WORLD, with many thousands of spectators having the opportunity to view three days of model sailboat racing. Co-hosting the event with SEA WORLD is the Orlando Radio Control Model Yacht Club, under the Direction of its president Bill Kline. Bill Crump is Race Director with John Reynolds acting as liaison between the "Mini-America's Cup" committee and that organization. More on those results next month.

Through this column in the next 12 months, we will give you up-to-date backgrounds on currently ranked U.S. skippers and the list of foreign and countries that will be participating.

The 1982 "Mayor's Race" is scheduled for the weekend of September 11th & 12th, at Fort Adams in Newport, R.I. Anyone interested in additional information can contact Richard H. Palmer, Mini-America's Cup Coordinator, 69 Route 46, Fairfield, N.J. 07006, (201) 575-7766. ☺

R/C Sport Boats

By Vic Macaluso



PHOTOGRAPHY: VIC MACALUSO

It took six different widths of tape to stripe this Streaker by Steve Muck. Vic used tapes from $\frac{1}{2}$ " to $\frac{1}{32}$ " to do all this work. Each panel is separated by 11 stripes (count 'em). Nothing like a nice paint job.

How many of you have looked at a model and wondered how the builder got all of those pinstripes so straight and evenly spaced? Unless you are an artist or a professional pinstripper chances are you haven't the slightest idea how it's done. What I'll try to do in the short space of this column is present a method by which any one with a fairly good eye for gauging spacing can turn out a truly professional looking pinstripping job.

I'm sure you are all familiar with the vari-

ous pinstripping tapes available in automotive stores and hobby shops. This tape is excellent for a good looking accent to any paint job and it's very easy to apply, but like anything else that's easy it's usually short lived. Once this tape is hit with glow fuel or just left in the sun too long it's all over and what once was a beautiful pinstripping job becomes a mess.

The method I'll present here uses tape of various widths (the width of your pinstripes). The tape does not become the stripe but is

only used to mask it and is then removed.

At this point you should have a collection of various width chart tapes available to you. This tape can be obtained at most art supply stores and is preferred because it is backed with a silkspan type material, does *not* stretch and paint will absolutely *not* leak under the edges. This last factor is very important because when you are working with lines as narrow as $\frac{1}{32}$ " paint leaking under the tape can completely wipe out a line. This tape comes in widths ranging from $\frac{1}{64}$ " to $\frac{1}{2}$ " in diameter in $\frac{1}{64}$ " increments. As you can imagine, and as can be seen in the photos a wide range of pinstripe widths can be had.

The most important part of any paint job is planning it to be not only eye appealing but not so overdone as to detract from the model. This is especially true of pinstripping. Too many stripes or stripes of wrong widths will do more to detract from a model than bad color combinations. The idea is to know exactly what you want before the first piece of tape is put on the model.

The model shown in the photos is my latest product review of Steve Muck's new Spartan/Streaker hull. The entire paint job was done using only 3 colors, dark metallic blue, metallic grey, and light metallic blue. All three colors were mixed from Hobbyoxo blue and black and various amounts of their new metalizer (more about that later.)

Before you start you must imagine the pinstripping job on a three color layout and that each subsequent series of pinstripes will be the color of the paint that the tape is going over. (ie. Dark blue base, tape stripe over this, light blue sprayed over tape, tape removed, light blue paint with dark blue pinstripe) Get the idea? Good! If you don't understand don't go any further until you do!

If you look at the photos you will see that there are 11 (count 'em) pinstripes when going from one area of light blue shading to the adjacent area of light blue. This may seem very intricate and tricky but it really isn't once you understand what the striping tape does.

Assuming you have your model sprayed all one color (this will be the color of your first set of stripes), mask off all major panels that will be part of your first trim color. In the example show this included the front and side decks and the sides of the boat. Within these masked off areas, (the rest of the boat is masked to prevent overspray, this is a must when spraying with epoxy enamels) using whatever width tape you desire for the affect you want lay down all of the stripes you want within the first trim color. Again in the example shown the base color of the boat is dark metallic blue and the second trim color is a medium metallic grey. (Very pleasing to the eye.) When you are satisfied how your tape "pinstripes" look, spray your trim color within the masked off area. If you are using Hobbyoxo or similar material, immediately

begin to pull all of the tape off the model. The sooner you do this the less of a paint edge you will get. If done while the paint is still wet there will be practically no paint edge. What you have at this point is a two color model with pinstripes, the base color of the boat within the second color. This process can be used on as many subsequent colors as you want. The only limitation is your imagination and the amount of time you wish to spend taping. The actual taping time to do the striping job shown was in excess of 3½ hours with an actual spraying time of less than two minutes! (How's that for dedication?—Ed.)

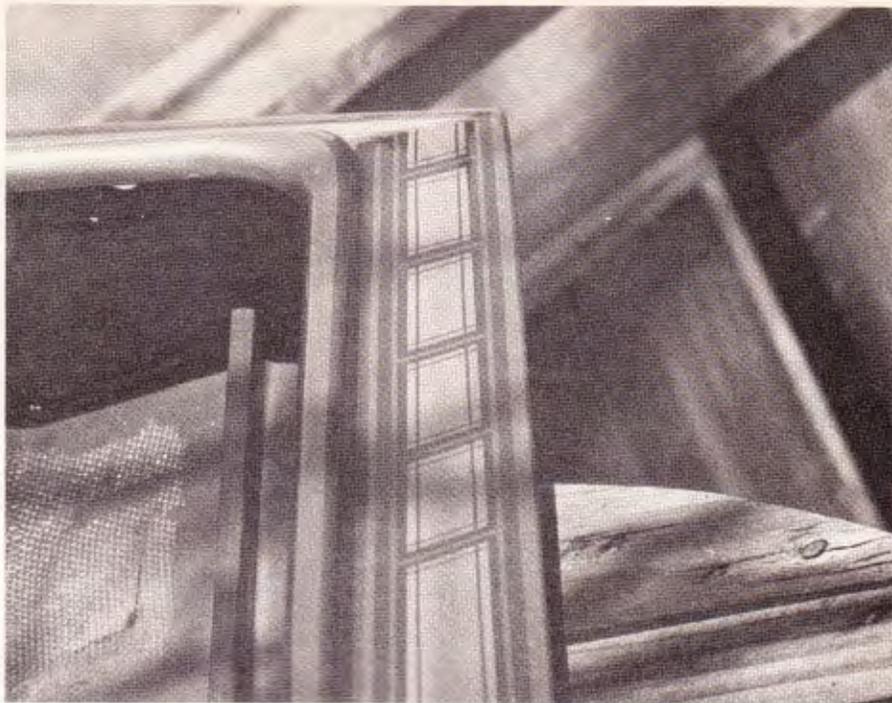
If you study the photos you will see that the striping job is really fairly basic. It just takes a lot of time and patience to cut and trim all of the stripes necessary for this kind of affect. The only tools needed in addition to the chart previously mentioned are a brand new #11 X-Acto blade in your knife handle and a free imagination. One final hint on creating an attractive, flowing paint job. Don't fight the lines of the model. Try to panel or stripe to accentuate the model's lines. Allow your trim scheme to flow parallel to the model's lines rather than cut across moulding lines and deck structures. Again don't over do it! Three colors will make any model stand out in a crowd if properly applied. The transition between the three colors on the model is fairly subtle with the light blue just light enough to contrast with the grey bordering it and not over power it. Using the method I've explained you should be able to come up with the wildest of pinstriping jobs limited only by your imagination. Good luck!! Send some pictures of your efforts.

Good news from Hobbyoxy

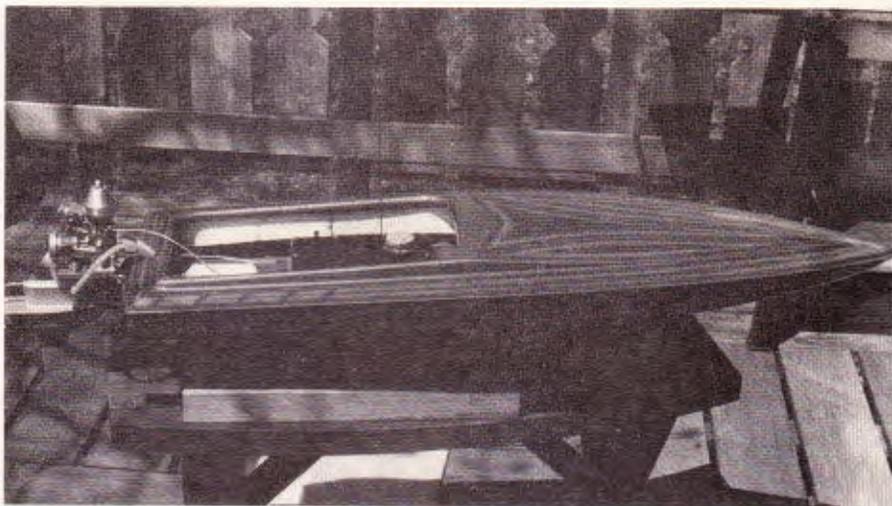
The Pettit Paint Co., Inc. (Hobbyoxy), 36 Pine Street, Rockaway, New Jersey 07866 has introduced what they call their paint metalizer. This is a part C (in addition to there parts A & B) which is mixed in varying amounts to their standard colors to produce metallic colors. The unique aspect of this additive is it not only metalizes the original color but by adding different amounts you can obtain an infinite number of shades of that color. The two blues mentioned in the previous portion of this column were obtained by mixing different amounts of metalizer into Hobbyoxy's basic dark blue. The more metalizer you add, the lighter the color will be. Another neat trick you might consider on your next paint job is to mix up a batch of metalized color (your favorite of course) and before adding the hardener add about 25% Hobbyoxy clear to the color then add your hardener in a 1 to 1 ratio and spray in your normal manner. The depth that clear adds to the color is incredible. The paint looks about ½" thick.

Safe boating, Vic Macaluso, 34 Campo Ave., Selden, N.Y. 11784. 

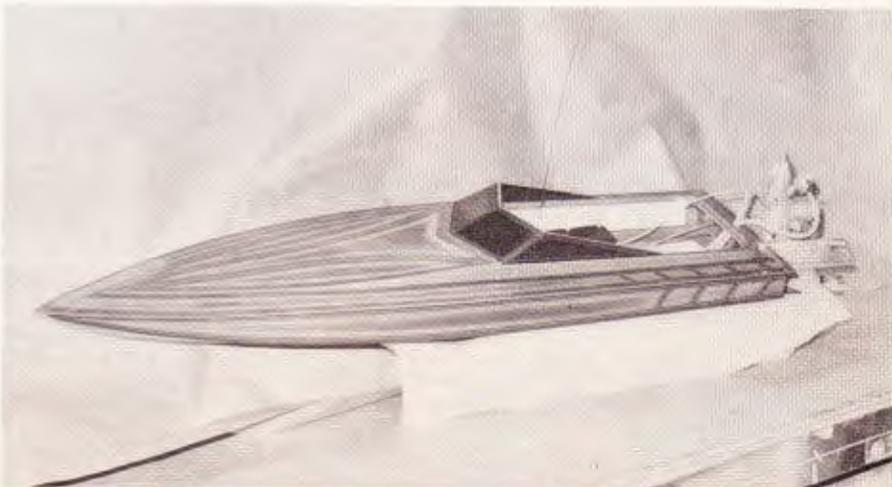
FLYING MODELS



Breaking up the trim design into panels adds interest and really makes a paint job ooze with class. Despite the complexity of the finished job, such a paint scheme is not as difficult as you might imagine. It is pretty.



The rearward sweep of the panels on this boat adds the illusion of speed, even when it's standing still (above). Subtle techniques such as this really add to a paint job. Paneling and striping should flow with the lines of the boat (below). Combinations and designs are limited only by your imagination. Get creative.



letter rip



PINCKERT CUSTOM BOATS, 9 North Grant Avenue, Masaryktown, FL 33512, introduces the "Coyote", an "idiot proof" boat designed for heat racing. A new construction technique allows only six construction steps until the hull is ready for painting. The front

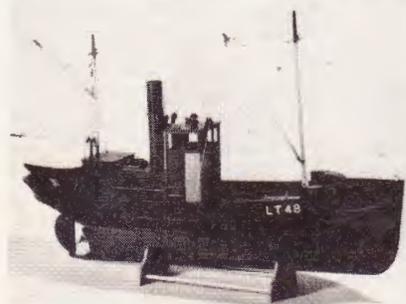
sponsons are built on a flat board and are self-aligning. The motor mounts are pre-drilled. The Coyote comes in single engine kit sizes for .21-.45-.65 and .90 size motors. Twin kits are designed for .45-.65 and .90 size engines.



PINCKERT CUSTOM BOATS, 9 North Grant Avenue, Masaryktown, FL 33512, introduces the Chaparral for .40-.46 inboards and 7.5 cc (.45) outboards. All wood parts are installed in the Chaparral hull and assembly time for the outboard is 2-3 hours, with the inboard requiring 4-5 hours of construction time. The Chaparral comes in Aztec Gold, Inca Yellow, Silver Cloud, Indian Sky, Mint Green and Snow White. For more information write to the above address.

DYNAMIC MODELS, Drawer "C", Port Jefferson Station, NY 11776, now has in stock a full range of brass propellers for the large scale R/C model boat builder. These

3 GREAT NEW R/C BOAT KITS!



These kits feature machine cut principle parts in basswood with planking balsa. R/C operation is anticipated in the design of each kit. Kits do not include cradle or running hardware except where stated.

The TUG (right). Working scale model of a small harbor tug. Length, 25" O.A. Kit, \$49.95.

Special Introductory Offer - The Tug Kit + running hardware + steam engine, all for only \$89.95.

The DRIFTER (top left). Working scale model of a small English steam drifter. Length, 26". O.A. Kit, \$59.95

Special Introductory Offer - The Drifter Kit & running hardware + steam engine, all for only \$99.95.

The TRAWLER (bottom left). Working scale model of a small eastern rigged trawler. Length, 26". Kit, \$69.95

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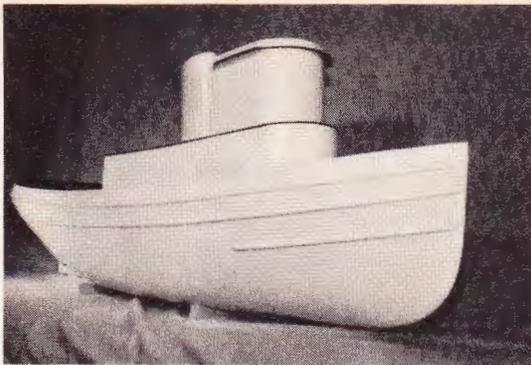
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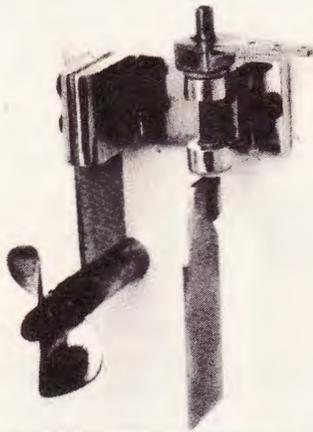
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ARTISTIC AIRBRUSH, P.O. Box 3318, 32 N.W. 11th Avenue, Portland, OR 97208, is offering its new 32 page airbrush catalog. This catalog is very comprehensive, with a wide range of single and double action airbrushes, sprayers, compressors, regulators, paints, inks, books and accessories. Artistic Airbrush also does repair work on airbrushes and the catalog has information on this service. In addition, the catalog lists replacement and spare parts for all airbrushes sold by Artistic Airbrush. For more information write to the above address.



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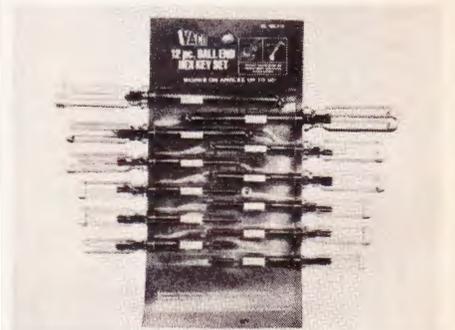
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VACO PRODUCTS COMPANY, 1510 Skokie Blvd., Northbrook, IL 60062, is adding two new Reversible Ratcheting Handles to its series of Vacombo interchangeable driver blades and handles. The new No. 90-1R Regular Ratcheting Handle and the No. 90-4R Ratcheting T-Handle accept over 70 different screwdriver, nut driver, hex key and bristol type Vacombo blades. An extra fine toothed ratchet mechanism in the handles speeds up the turning operation, providing maximum torque with minimum effort. For more information write to the above address.



VACO PRODUCTS COMPANY, 1510 Skokie Blvd., Northbrook, IL 60062, introduces its most complete line of Ball End Hex Tools. Not only is Vaco expanding its line of Ball End "L" style hex keys, they're also coming out with a brand new line of Ball End Hex Drivers. Vaco's Ball End Hex Tools allow easy access in restricted or hard-to-reach areas. Hex socket head screws can be set or removed at angles up to 30 degrees. The new line of Ball End Hex Drivers come in the

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IMPBA Roostertail

By now you have received your 2nd Quarterly Report, however, here is what your Board has been doing:

The Board met at Toledo during the R/C show. Ron Walker, Gus Johnson, Skip Horstman, Richard Jones, William Le Feber, Leonard Skwieria, and Fred McBroom were in attendance. Votes from George Harris, Gary Turner, Tom Von Mello, and Frank Blanchard were solicited by telephone.

The following were discussed on voted on:

1. The Last Boat Running Rule:

At the option of the host club, when two or more boats are entered in a heat and one boat remains in contention before a winner is declared, the remaining boat must cross the starting line and complete one more lap in a running attitude, and after clearing all penalties, shall then be declared the winner and awarded first place points, except at the Internats, all laps must be completed. All Directors were in favor.

2. All Directors were in favor of sending a ballot on rule changes to all members as well as to clubs.

3. The Out of the Stand Running Rule:

In the interest of safety, if a boat is started and removed from the stand before pit time has expired, it shall be allowed to be launched at the discretion of the Pit Manager. All Directors were in favor.

4. Requests to amend the Rule Book, under the heading "Procedure II - Annual International Regatta". Revised to read:

A. No IMPBA sanctions will be granted the weekend prior to the weekend of the International Regatta, within a 500 mile radius of the host site of the International Regatta. All were in favor except Gary Turner.

5. Proposed Constitutional change: Article V, Section I, Paragraph C; Appointment of Past Presidents to the Executive Board will be for life, with voting rights limited to four following terms of office. (8 years) Change to: Appointment of Past Presidents to the Executive Board will be for life, with voting rights limited to the two following terms of office. (4 years) All directors were opposed, as current Presidents need the help and experience of Past Presidents, and they should have a voice if expected to work for the President and Board.

6. Write in votes:

In the last Directors Election, there was a write in candidate who received a majority of the votes in his District. As your President, I canvassed all the current Directors by phone, and the majority voted to award the Directorship to the person who received the most votes. This of course caused some members to be quite

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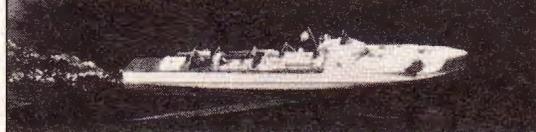


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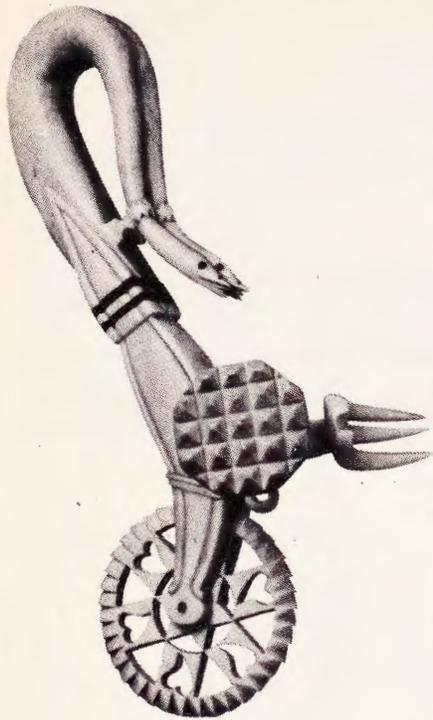
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upset. As a result, we are asking you to tell what the membership wishes to do relative to write in votes.

A ballot was enclosed with your 2nd Quarterly Report. Please mark your choices, sign the ballot, and list your IMPBA number and return to the IMPBA Office by July 6th, 1982.

This is my last year as your President, and it is necessary to have nominations in by July 31st. To qualify for the office of President, a member must have been an elected Director at some time or other. Check your rule book for information and get your nominations in by July 31, 1982.

If there are items you want changed, step up and submit your candidate or agree to run and serve to the best of your ability. There is no better way to have influence on the future course of IMPBA.

I am happy to report that our Canadian membership is increasing.

Our financial condition is sound in light of rising costs for postage, printing, rule books, etc.

Our rule book has some errors and omissions and I have appointed Bill Le Feber Chairman of a committee consisting of Len and myself to get it correct and complete in 1983. Should you have any questions, call one of us.

The Internats in Orlando are our next big event. At that time, your board will meet again. Should you like to propose a rule change at that time, contact your District Director.

I am looking forward to seeing many of you at Orlando.

FRED McBROOM
President

timetable

of coming events

Boat meets

LANSING, MICHIGAN - July 31-August 1. IMPBA Offshore Deep Vee racing, hosted by Lansing Model Boat Club at Crego Park. Contact: Bob Crumb, 2211 Ridge Line Dr., Lansing, MI 48912.

ENGLISHTOWN, NEW JERSEY - August 7. Central Jersey Model Boat Show for electric, sail and steam powered models. Competition in various classes, sponsored by Hobbymasters at Raceway Park. Contact: Skip Asay, Cincy Lane, Oakhurst, NJ 07755. 201/493-3933 (7am to 4pm).

HUNTINGTON, INDIANA - August 7-8. IMPBA Scale Internats (electric and steam only), hosted by the Huntington County Modelers at P.A.L. Pond. Contact: Bob Cline, 2009 Guilford Street, Huntington, IN 46750. 219/356-4773.

SOUTH EL MONTE, CALIFORNIA - August 7-8. NAMBA District 19 Points, Heat Racing, hosted by the Modelers, Inc., at Legg Lake. Contact: Leslie Smith, 15313 Gramercy Place, Gardena, CA 90249. 213/324-0128.

BRISTOL, PENNSYLVANIA - August 7-8. NAMBA District 1 Points, Heat Racing, hosted by the Del Val RC Boat Club at Magnolia Lake. Contact: Ruedy Oreskovich, 14 Florence Avenue, Collingdale, PA 19023. 215/586-8829.

FREMONT, CALIFORNIA - August 14-15. NAMBA District 9 Points, Heat Racing, hosted by the Model Mariners, Inc., at Kaiser Cove. Contact: Art Hammond, 6617 Spruce Lane, Dublin, CA 94566. 415/828-8523.

KANSAS CITY, MISSOURI - August 14-15. NAMBA District 7 Points, Heat Racing, OB, SC, Sport 40 D.V., hosted by the Kansas City RC Boat Club at H&S Sporting Lake. Contact: Tony Pearson, 4408 Terrace, Kansas City, MO 64111. 816/531-4102.

SUNNYVALE, CALIFORNIA - August 15. NAMBA District 9 Points, Electric Scale and Semi-scale, Tug Boats, hosted by Bay Area Miniature Maritime Association. Contact: Al Godding, 1805 Matzley Drive, San Jose, CA 95124.

KENT, WASHINGTON - August 15. NAMBA Heat Racing, hosted by the Seattle Model Yacht Club at Kent Lagoon. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98056. 206/226-7454.

SOUTH EL MONTE, CALIFORNIA - August 21-22. NAMBA District 19 Points, Outboard, hosted by ALII/TEAGUE at Legg Lake. Contact: Norman Teague, 8027 Genesta Ave., Van Nuys, CA 91406. 213/987-3239.

PORTLAND, OREGON - August 22. NAMBA Heat Racing, Sport 40, Unlimited Hydro, hosted by the Rose City Model Yacht Club at Force Lake. Contact: Larry Knudsen, 14739 S.E. Wanda Drive, Milwaukie, OR 98222. 503/654-1879.

KENOSHA, WISCONSIN - August 22. IMPBA Heat Racing, AB/CD/EF, Mono, Tunnel, Outboards (tunnel and Mono), hosted by the Badger Model Boaters, Inc., at Badger Lake. Contact: Gary Randall, 3209 Fenceline Road, Racine, WI 53406. 414/886-5295.

FLINT, MICHIGAN - August 28-29. IMPBA "Can-Am" Heat Racing, Hydro-Mono, AB/CD/E/F, scale (outboard tunnel hulls only), hosted by the Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ron Walker, 14869 Greenview, Detroit, MI 48223. 313/838-3589.

PALISADES PARK, NEW JERSEY - August 28-29. NAMBA District 1 Points, Deep Vee, hosted by the Racing Association of New Jersey at Overpeck Creek. Contact: Steve Luoni, 6 Ann Place, Pequannock, NJ 07440. 201/694-0216.

MIDLOTHIAN, ILLINOIS - August 29. IMPBA AB/CD/EF Mono and Hydro, hosted by the Illini Powerboaters Association at Midlothian Reservoir. Contact: Jim Prohaska, 14922 Hale Drive, Orland Park, IL 312/460-3886.

DAVENPORT, IOWA - September 5. IMPBA racing for B Mono and Hydro, D and E Mono and D and E Hydro, hosted by Quad Cities Roostertails R/C Boat Club at Credit Island Park. Contact: Phil Thomas, 239 30th Ave., East Moline, IL 61244. 309/755-8740.

BATAVIA, ILLINOIS - September 11-12. IMPBA Heat Racing for AB, CD, EF Mono and Hydro and Scale Unlimited, hosted by Midwest Council at Fox River on Logan St. off Rt. 25. Contact: Gary Randall, 3209 Fenceline Rd., Racine, WI 53406. 414/886-5295.

SAGINAW, MICHIGAN - September 12. IMPBA Multi-Racing for Hydros only, including 1/8th scale, hosted by Saginaw Bay R/C Boat Club at Lake Linton Reservoir. Contact: Terry Lindauer, 516 N. Grant, Bay City, MI 48706. 517/893-3105.

INDIANAPOLIS, INDIANA - September 17-18-19. IMPBA Indy Heat Racing for B, D, and E Hydro, hosted by Indy Model Boat Club. Contact: Martin Davis, 4120 Richelieu, Indianapolis, IN 46226. 317/898-8691.

ACTON, ONTARIO - September 18-19. IMPBA racing for AB, CD, EF, Mono and Hydro, 60 Scale, 20 Outboard open class and 30 Minute enduro open class, hosted by Toronto Model Power Boat Club. Contact: Peter Massey, 43 McNab Blvd., Scarborough, Ontario M1M 2W6. 416/267-7785.

FLINT, MICHIGAN - September 19. IMPBA Record Trails, hosted by Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ken Bergman, P.O. Box 102, South Lyon, MI 48178. 313/437-9452.

NAPERVILLE, ILLINOIS - September 19. IMPBA racing for 1/8 and 1/12 Scale, hosted by Minute Breakers Inc., at Tollway Lake. Contact: Bob Preusse, 21 W. 210 Ahlstrand, Lombard, IL 60148. 312/495-9184.

LANSING, MICHIGAN - September 26. IMPBA racing for AB, CD, and EF Hydro, 1/8 Scale Outboard, hosted by Lansing Model Boat Club at Crego Park. Contact: Gary Girvin, 1297 W. Dansville Rd., Mason, MI 48854. 517/676-3704.

ST. LOUIS, MISSOURI - September 25-26. IMPBA Class Heat Racing and Outboard Tunnel (two boat limit), hosted by St. Louis Thunderboaters. Contact: Rich Zimmerman, 2555 Greenbriar, Florissant, MO 63033. 1-314/921-3824.

CHESAPEAKE, VIRGINIA - October 2-3. IMPBA Record trials, 1/16 mile straightaway, 1/3 mi. oval, all classes, hosted by Old Dominion Model Boat Assoc. Contact: Bill York, 815 Pecan Point Rd. #82, Norfolk, VA 23502. 804/461-5774.

MARYSVILLE, WEST VIRGINIA - October 2-3. NAMBA Record trials, hosted by Seattle Model Yacht Club, at Twin Lakes. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98056. 206/226-7454.

SPOKANE, WASHINGTON - October 3. NAMBA Heat racing, offshore, outboard, hosted by Lilac City Model Boat Club, at Riverfront Park. Contact: Jimmie Wasts, S. 4315 Cheatham Rd., Spokane, WA 99204. 509/624-7109.

WHEELING, ILLINOIS - October 3. IMPBA Heat racing, hydro & mono, AB & CD (no EF), 1/4 mile oval, hosted by Racing Dolphins, at Polawatomi Lake. Contact: Mert Mischnick, 914 Robert Dr., Mt. Prospect, IL 60056. 312/437-2094.

INDIANAPOLIS, INDIANA - October 9-10. IMPBA Heat racing and governor's cup, AB, CD, E, F Hydro, Scale class, and outboard class, hosted by Indy Model Boat Club. Contact: Bernard Bathauer, 1042 S. Muessing, Indianapolis, IN 46239. 317/894-1892.

SAN ANTONIO, TEXAS - October 9-10. IMPBA Model power boat races (20-40-60 mono & enduro), offshore classic,

hosted by San Antonio Model Boaters, at Loop 410 Lake. Contact: Tom West, 8223 Sherri Oaks, San Antonio, TX 78250, 512/684-4920.

AMARILLO, TEXAS-October 9-10. NAMBA District 7 finals, championship points, enduro, D.V., OB, SC, SPT, 40, hosted by Muddy Rudders R/C Boat Club, at Thompson Park. Contact: Fred Wall, 3603 S. Van Buren, Amarillo, TX 79110, 803/373-3040.

KINGSBURG, CALIFORNIA-October 9-10. NAMBA District 9-19 challenge race, heat racing, hosted by Pipeline Racing Team, at Riverland Park. Contact: Bill Prigley, 39624 Lahana Way, Fremont, CA 95538, 415/656-7072.

EL CENTRO, CALIFORNIA-October 16-17. NAMBA District 19 points, enduro, hosted by Imperial Valley Radio Control Assoc., at Sunbeam Lake. Contact: Royce W. Hinson, Jr., 455 State St., El Centro, CA 92243, 714/353-4966.

HAMMONG, LOUISIANA-October 16-17. IMPBA Record trials-Oct. 16, heat racing-Oct. 17 (5 or more boats will make a class), hosted by Southern Gentlemen Racing Assoc., at Miller's Lake. Contact: Roger Moran, PO Box 262, Madisonville, LA 70447, 504/845-3547.

CUPERTINO, CALIFORNIA-October 17. NAMBA District 9 points, electric scale & semi scale, hosted by Bay Area Miniature Maritime Assoc. Contact: Al Godding, 1805 Matzley Dr., San Jose, CA 95124, 408/266-9144.

KENT, WEST VIRGINIA-October 17. NAMBA Heat racing, hosted by Seattle Model Yacht Club, at Kent Lagoon. Contact: Bill Hornell, 2533 N. E. 24, Renton, WA 98056, 206/226-4754.

PORTLAND, OREGON-October 17. NAMBA Heat racing, offshore, outboards, unlimited hydro, sport 40, hosted by Rose City Model Yacht Club, at Force Lake. Contact: Larry Knudsen, 14739 S. E. Wanda Dr., Milwaukie, OR 98222, 503/654-1879.

NEEDLES, CALIFORNIA-October 30-31. NAMBA District 19 points, outboard, hosted by Needles River Rats RC Club, at Park Moabi. Contact: Rich Hazelwood, 1807 Coronado, Needles, CA 92363, 714/326-4186.

INDIANAPOLIS, INDIANA-October 30-31. IMPBA Record trials, hosted by Indy Model Boat Club, at Lake #1. Contact: Bob Finley, 740 Mt. Rainer Dr., Indianapolis, IN 46217, 317/786-9048.

HAMMOND, LOUISIANA-November 6-7. IMPBA Hydro racing plus multi-engine class and big engine class, hosted by Southern Gentlemen Racing Assoc., at Miller's Lake. Contact: Art Matthew, 130 Carrollton Ave., Metairie, LA 70005, 504/834-7786.

KINGSBURG, CALIFORNIA-November 13-14. NAMBA District 19 points, outboard, hosted by K&B/Wavemakers, at Riverland Resort. Contact: Wallis Stewart, 347 Cypress St., Bakersfield, CA 93304, 805/322-6972.

NAPLES, FLORIDA-November 27-28. IMPBA Heat racing, all classes, hosted by Transon Twisters RC Model Boat Club, at Transon Twister Lake. Contact: Tony Irminger/Dick Jennings, 5500 Houchin St., Naples, FL 33942, 813/597-4337.

CONROE, TEXAS-December 4-5. IMPBA Oval and straight-away record trials, hosted by Lone Star Model Boat Club, at Lone Star Racing Lake. Contact: Gary McGee, 2307 Chantilly, Houston, TX 77018, 713/681-1907. 

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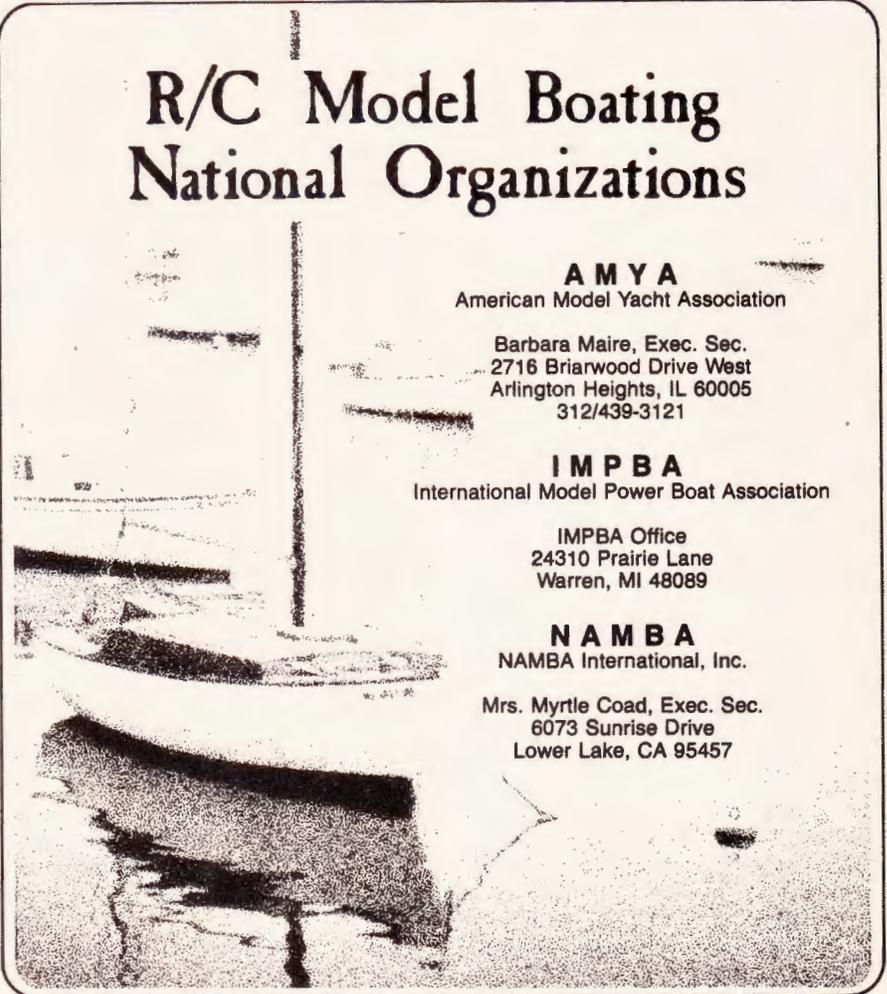
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advertising index for September 1982

Ace R/C Inc.....	15
America's Hobby Center.....	5-7
Associated Electrics.....	63
Bavarian Precision Products.....	4,76
Byron Originals.....	12
Carstens Book Hangar.....	18,19
Carstens Flying Plans.....	58,59
Charlie's R/C Goodies.....	20
DGM Industries.....	12
Gene Dubois.....	15
Dumas Boats.....	Cover II
Dynamic Model Products, Inc.....	75
Addis Eimore.....	15
Everybody's Bookshop.....	79
Flying Models Magazine.....	13,16,75
Fox Mfg. Co.....	20
Futaba.....	Cover IV
Hobby Barn.....	10,11
K&B Mfg.....	76
Laughing Whale, The.....	74
Mac's Products.....	14
Model Rectifier.....	Cover III
Norco Marinecraft.....	75
Octura Models.....	75
Parma International, Inc.....	64
Peck Polymers.....	9
Pipeline, The.....	77
Prather Products.....	76
RAM.....	76
Repla-Tech International, Inc.....	20
Rhom Products Manufacturing Corp.....	12
Richardson Precision Machine, Inc.....	14
Rolley Model Products.....	4
Saf-Flite Models.....	4
Satellite City.....	16
Sid Morgan Plans.....	9
Sterling Models.....	8
Steve Muck's R/C Model Boat Supplies.....	77
Taig Tools.....	4
Tarno Aero Engines.....	12
32nd Parallel.....	77
Tiny Tots.....	79
Tower Hobbies.....	17
Verdell Instrument Sales Co.....	14
VL Products.....	15
X-Acto.....	9
C.A. Zaic Co., Inc.....	12
Nick Ziroli.....	14



Rough Rider RA1015



Sand Scorcher RA1016



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