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AUGUST 1984

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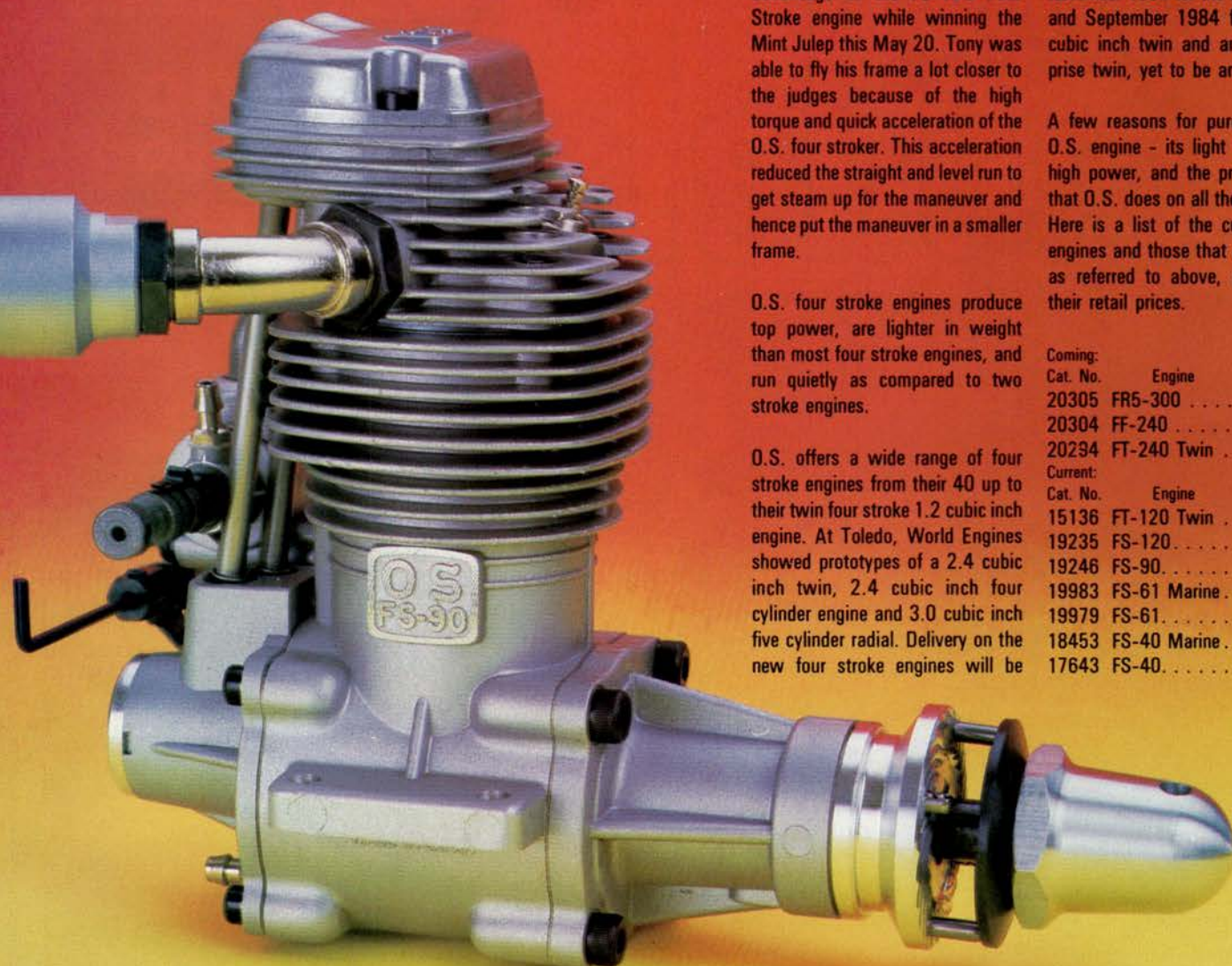
Toledo
Show Report

Golden Era **Air Racing**

Futaba's
PCM System
reviewed



1st MAJOR PATTERN WIN WITH 4 STROKE ENGINE - O.S. FS-120 MINT JULEP - 5/20/84 - TONY FRACKOWIAK



O.S. FS-90

Tony Frackowiak demonstrated the advantage of the FS-120 Four Stroke engine while winning the Mint Julep this May 20. Tony was able to fly his frame a lot closer to the judges because of the high torque and quick acceleration of the O.S. four stroker. This acceleration reduced the straight and level run to get steam up for the maneuver and hence put the maneuver in a smaller frame.

O.S. four stroke engines produce top power, are lighter in weight than most four stroke engines, and run quietly as compared to two stroke engines.

O.S. offers a wide range of four stroke engines from their 40 up to their twin four stroke 1.2 cubic inch engine. At Toledo, World Engines showed prototypes of a 2.4 cubic inch twin, 2.4 cubic inch four cylinder engine and 3.0 cubic inch five cylinder radial. Delivery on the new four stroke engines will be

early 1985 for the five cylinder, late November 1984 for the four cylinder and September 1984 for the 2.4 cubic inch twin and another surprise twin, yet to be announced.

A few reasons for purchasing an O.S. engine - its light weight, its high power, and the precision job that O.S. does on all their engines. Here is a list of the current O.S. engines and those that are coming as referred to above, along with their retail prices.

Coming:		
Cat. No.	Engine	Retail Price
20305	FR5-300	\$1500.00
20304	FF-240	1250.00
20294	FT-240 Twin	900.00
Current:		
Cat. No.	Engine	Retail Price
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19235	FS-120	299.95
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19983	FS-61 Marine	209.95
19979	FS-61	185.00
18453	FS-40 Marine	159.95
17643	FS-40	149.95

More world records have been set with O.S. four stroke engines than with any other kind.

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Other four stroke engines currently available in the O.S. line include those seen at right.

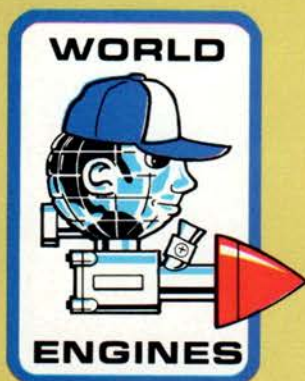
O.S. FS-40



O.S. FS-61



O.S. FS-120



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On the cover

Rich Theiss recaptures the thrills of 1930's Air Racing with CO₂ F/F miniatures, and outlines a competition program for them. Photo by: Brian Cormack.

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editorial

I've just finished moving into a house near the FM offices. This move comes after five years of apartment dwelling where I had use of the spare bedroom as a shop. Oh, if the landlord only knew the exotic substances that were kept on the premises there...

So here I am with this tremendous (by comparison anyway) area in the basement of my new abode to do with as I may. Here I have all the space even a super modeling nut could hope for, and I'm completely baffled! All the dreams of the perfect shop that I've had in the past now come flooding into my consciousness at once. I can remember being so sure of what I would do when at last I had some open space to work with, and now I am drawing blanks.

Lets face it, the shop is where the adult modeler will spend the majority of his spare time (probably the majority of time period!) and it has to fit perfectly in both size and arrangement for him to feel comfortable. This arrangement can be a frustrating experience. Everything has to be placed just so to allow quick access to each tool, or supply, thus allowing the "Ideal" building session. Now, I can hear the knowing laughs from the majority of you reading this. The above situation does only exist in dreams, and the reality of any new shop is destined to be a bit anticlimatic in comparison. Still, it is a challenge to see just how close one can come to the *nirvana* of the "perfect shop".

From experience, I've found that the main bench (centerpiece of the "Ideal Shop") should be placed like an island, out in the main building area. This allows easy access to any part of a model, especially large ones, during construction without the need of moving it around on the table. It's also a good idea to have at least this one area covered with a soft rug. The hard concrete floors of the average shop can take their toll on your feet and legs during those long sessions. My main bench is very sturdy, a four foot by eight foot table which has geodetic support ribs and a frame beneath it to insure it's true-ness. Without an absolutely flat building surface it is next to impossible to build straight

models. This is one area where perfection is a must!

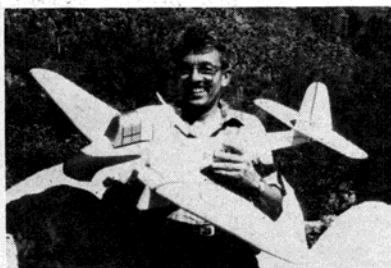
Installed against an adjacent wall perhaps a somewhat narrower "strip" bench where all modeling tools can be kept. It is a personal no-no to store tools on the main bench; invariably they find their way under a balsa wing and leave a "ginch" or two. On one end of this narrow bench could be an area reserved for all power tools. This would preclude the practice of getting a tool out of storage, setting it up, and using it for a brief operation and then putting it away again. The power bench could have all your electrical tools ready to go at all times. Behind this bench, on the wall, would be a large piece of 1/8 inch pegboard. A little creative arranging could have all of your handtools within grasp, without the need to move from your stool. Remember to keep a pair of safety goggles on the pegboard behind the power section along with a sign to remind you to use them! This area should be well lit, too.

Once the main building area is settled on, it's time to locate the storage bins for that precious balsa supply. Ideally this should be a dry area; balsa soaks up moisture readily and that means weight. If possible, the balsa supply should be stored flat. Short pieces could be stored in the drawers of an old chest (my favorite).

Consideration must also be given to completed models. They need an area that will keep them from being "dinged," and preferably one that is dust free. My good friend, Michael Leighton, has come up with a neat hanging loft in his shop for airplane storage. A few pieces of foam rubber for protection and a plastic drop cloth all around fit the above criteria while allowing use of the floor space under the loft. Perfect!

From this point on it's up to the individual and the needs of his particular type of modeling as to the arrangement of the remainder of the shop. One thing for certain, however, the contents will expand to fit the space allotted in every case. When this occurs, you can start dreaming of the perfect shop you'll have when you finally get enough room...

—BOB HUNT



Tribute to Don Martin

On March 29, 1984, R/C modelers lost another good friend in the name of Don Martin of Tucson, Arizona. Don was a contributing designer to FLYING MODELS for many years, having been responsible for the popular Fokker T-2 back in 1975 and, more recently, the very un-

usual Luton Buzzard.

As a 12 year old grade school student in 1950, I first met Don Martin while flying free-flight models at the old Curtis Airport in Valley Stream, New York. Although 11 years my senior, Don was kind enough to play the roll of the father I had just lost. We flew with the old Long Island Gas Monkeys F/F club and got into R/C in the mid 50's. In fact we even took our HAM license exams together back in 1957.

The years went along, the age gap, if there ever was one, narrowed, and the friendship continued. Even the move to Tucson in 1976 didn't prevent an almost constant dialogue and exchange of interests. Well those days are now past, not to be repeated but certainly never to be forgotten. We'll miss you Don!—BOB ABERLE

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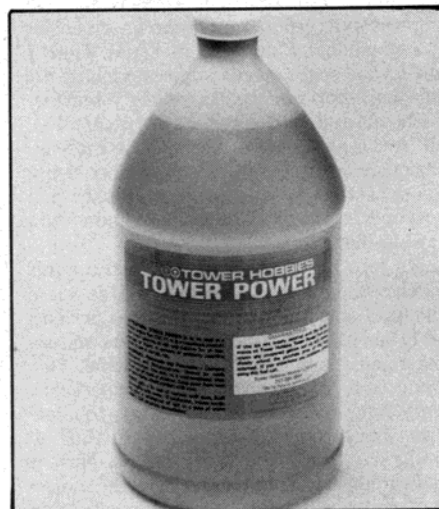
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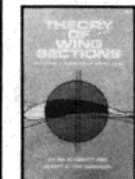
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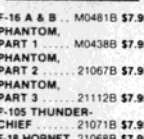
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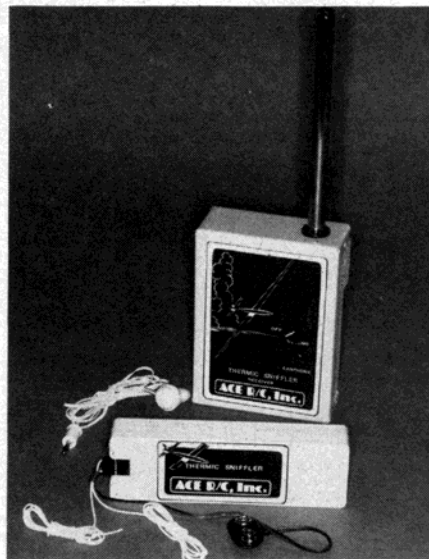
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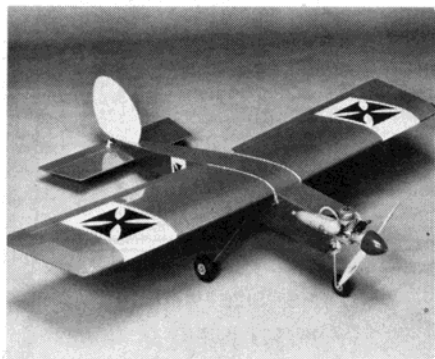
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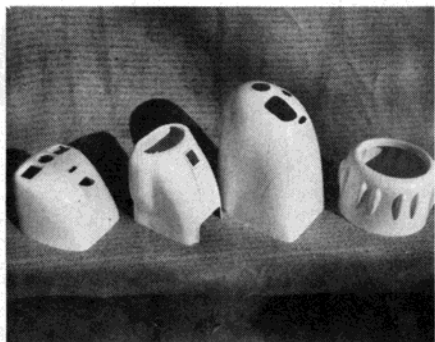
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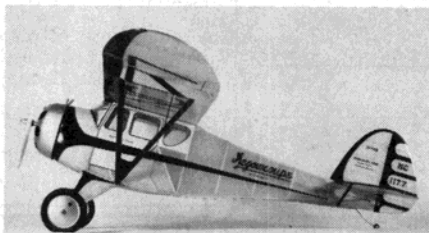
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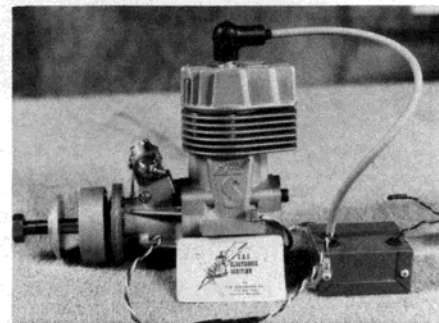
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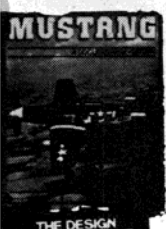
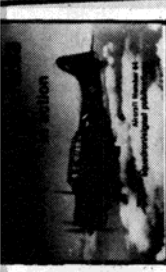




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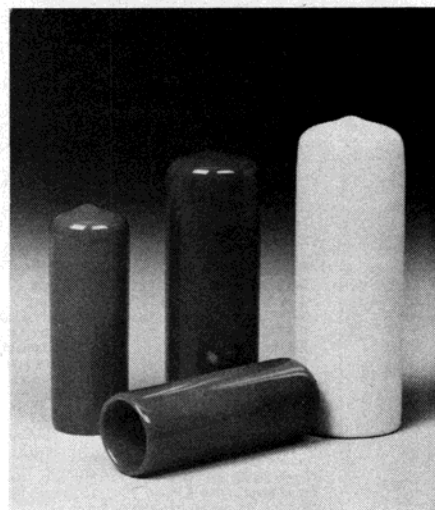
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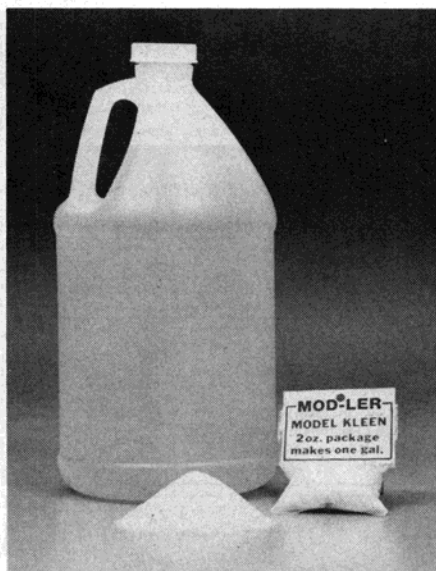
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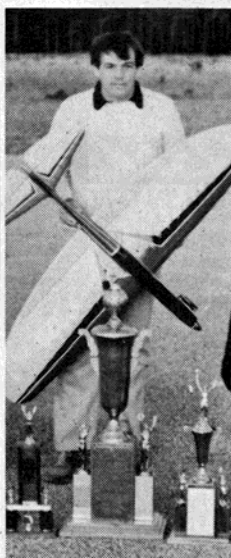


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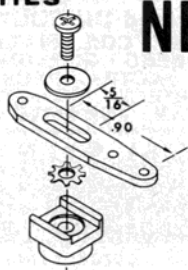
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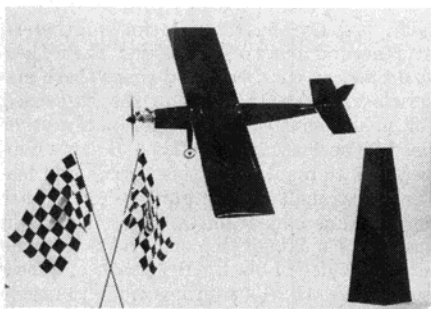
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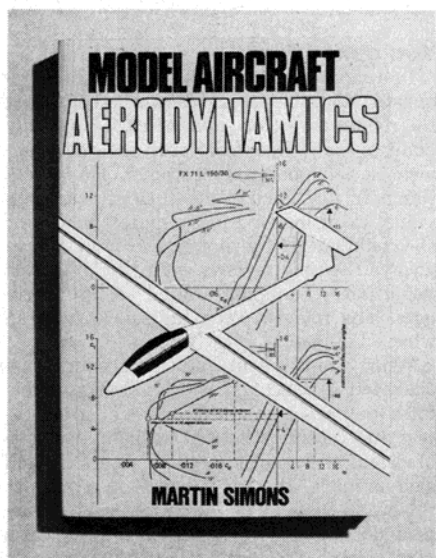
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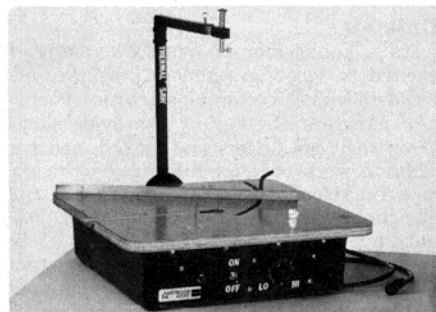
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ZENITH AVIATION BOOKS, PO Box 2, Osceola, WI 54020, is presently distributing Model Aircraft Aerodynamics by Martin Simons in a new paperback format. This book has been one of the more definitive works in this field and covers the theory of flight in modeling applications. Twelve chapters, three appendices, and numerous diagrams and tables explain airfoil sections, airflow characteristics, trim and stability, thrust, and model performance. It's in 6 × 8½ inch format with 260 pages for \$14.95.



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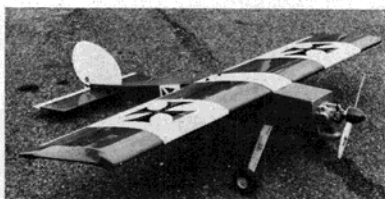


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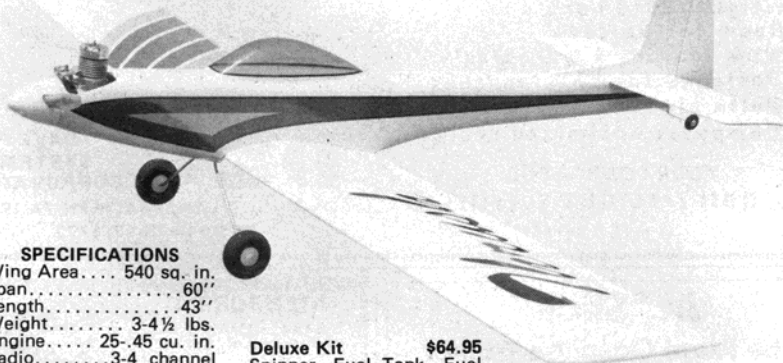
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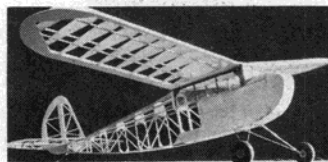
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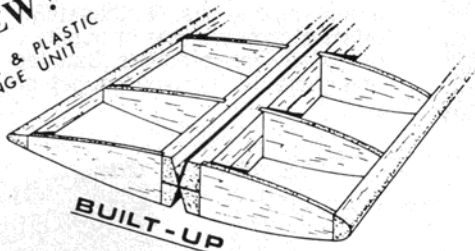
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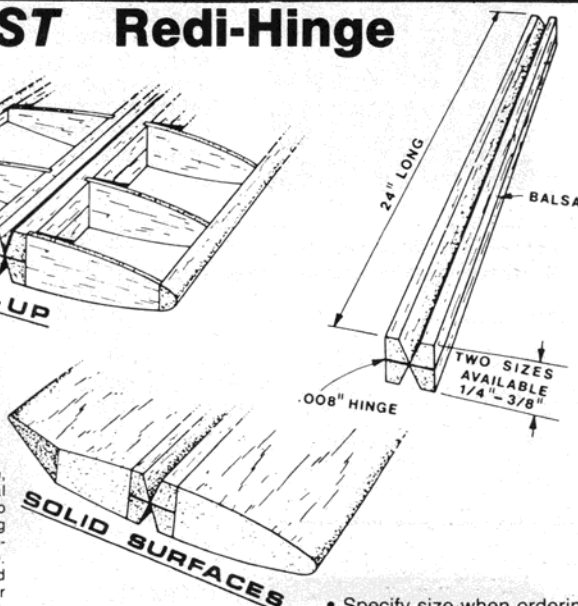
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air mail

You asked for it

In a recent product review, Bob Aberle requested reader feedback as to whether or not the reader cares for such articles. From my point of view, I consider such articles a service to the potential customer. He covers things in just enough detail to give an individual good information — more than he or she could gather by shopping around. I have always read his reviews even though I was not actively shopping around for R/C products. The reviews keep me up to date on what's happening in the hobby.

What would be of additional help, especially to the newcomer, is a summary, in table form (perhaps once a year or so), of transmitters and receivers listing pertinent features of each brand and list price. A notation could also be made whether it had been a product review in the past, and what issue it appeared in. In this way, a person could see at a glance the brands that might be of interest without having to dig up back issues from months or years gone by (magazines that a newcomer wouldn't even have). Such a table would obviously list the latest on the market and any noted product review could be sought after in one or so magazines. Of course, this could be done for chargers, batteries, or anything else.

That's about the extent of my input. Above all, please don't stop his product reviews. Unfortunately, such a loss is only realized when it's too late.

HERBERT KRANSTON
Orlando, FL

Deja vu

As a subscriber to your magazine, I wanted to voice an opinion. I believe you could do a much better job attracting young/new modelers. The key is to provide something they can understand, afford, and get right to work on after reading your magazine. I'm referring to full-size plans with construction articles for Bostonian types, Peanuts, etc.

If you don't want to spend the money for new articles, just republish some of your past efforts over the last 40 years and watch the comments that you'll get.

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31	Bayless Gee-Bee	11 1/2	6	17 1/2	8	35 1/2	16
13	Supermarine S.6B	15 1/2	6	22 1/2	8	44 1/2	16
33	Curt Hawk P-6E	15 1/2	11	23 1/2	14	47 1/2	28
31	Curt Sprhwk F9C-2	12 1/2	10	19 1/2	14	38 1/2	28
32	Doolittles G-Bill	12 1/2	8	18 1/2	12	37 1/2	24
31	Boe F4B-36A P12B	15 1/2	12	22 1/2	16	45 1/2	26
32	Spfld Bull Dog	13 1/2	7	20 1/2	10	40 1/2	20
18	Fokker DVIII WWI	13 1/2	6	20 1/2	8	41 1/2	16
32	Howard Ike & Mike	10 1/2	6	15 1/2	8	31 1/2	16
34	Turners Wed- Wms	13 1/2	6	19 1/2	8	39 1/2	16
35	How Mr. Mulligan	16 1/2	7	23 1/2	10	47 1/2	20
33	Boe P26A Low Wng	14 1/2	9	21 1/2	12	42 1/2	24
35	Stinson T-W SR-7	20 1/2	6	30 1/2	8	62 1/2	16
35	Lock Electra #11	12 1/2	15	41 1/2	20	82 1/2	40
39	Mesramt BF109E	16 1/2	9	24 1/2	12	48 1/2	24
41	Focke-Wulf Fw190	28 1/2	8	28 1/2	8	28 1/2	8
39	Lock Lighting P38	27 1/2	12	39 1/2	16	78 1/2	38
40	Mitsubishi Zero	30 1/2	8	30 1/2	8	30 1/2	8
43	Grum Avenger TBF	30 1/2	12	40 1/2	16	80 1/2	32
42	Boe B17G Fl Fort	51 1/2	22	77 1/2	35	154 1/2	77
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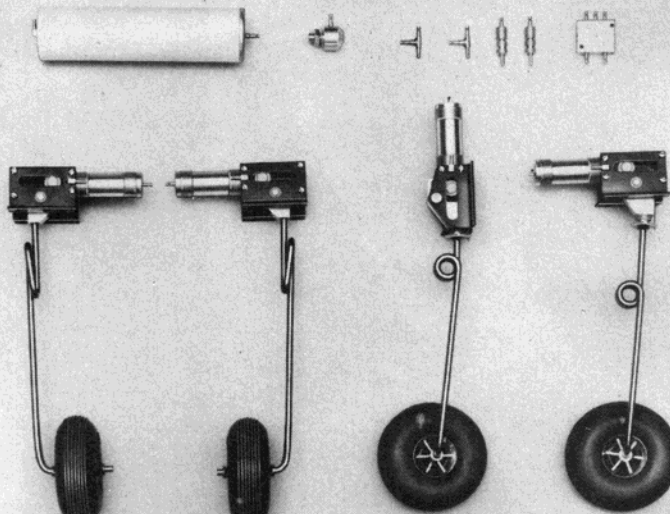
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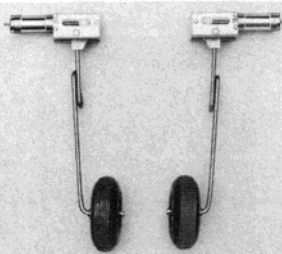
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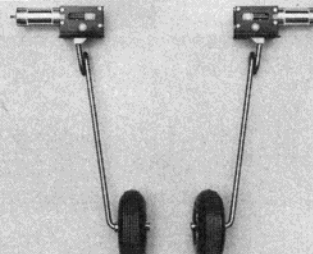
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PHOTOGRAPHY: DICK SARPOLUS

The canard concept intrigues more and more modelers. Dick's *Firestar* is his experiment with a canard design aimed at pattern competition.

FIRESTAR

Canard pattern ships aren't showing up at the contests yet, but they might be in the future. Canards can fly well, and they're certainly being seen more often in full scale aviation. I can't say the canard layout offers any real benefits for R/C pattern flying, but pattern designers and competitors haven't been working on tail first aircraft to evaluate and develop that arrangement. The Wright brothers started with a canard, and the aeronautical world quickly moved the horizontal stabilizer to the rear, where it's been ever since on most aircraft. We may now be seeing a re-evaluation and a move back to the canard configuration, sparked by a brilliant engineer named Burt Rutan.

Rutan's *VariEze*, *LongEze*, *Solitare*, *Quickie*, and other designs, including his work on Beech's new *Starship*, have made people realize that good aircraft don't necessarily have to have the wing in front of the tail surfaces. R/C modelers are recognizing the same thing, as can be seen by the variety of canard designs appearing in the model press the past few years. I've been interested in them for years, starting with a C/L canard in the 50's. I made a large R/C canard sailplane with good results and recently did an R/C sport canard aircraft with a forward

swept wing. The success of that model spurred me to try another canard, this time one aimed at pattern competition.

Design considerations

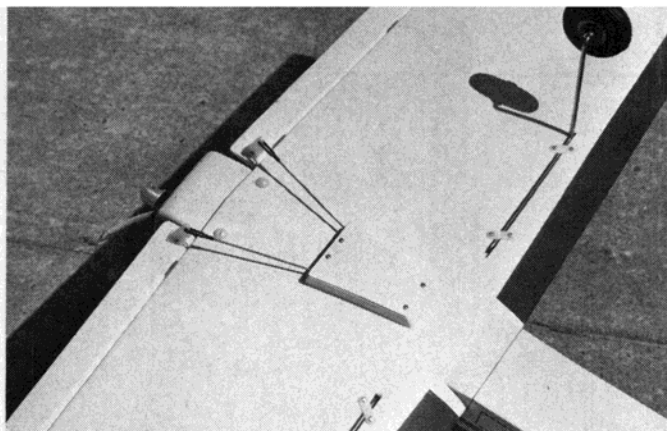
The toughest part of R/C canard design, to me, has been the mechanical considerations - primarily, how to get the aircraft to balance without requiring an inordinate amount of lead in the nose.

Other things, such as landing gear placement, adequate fuselage strength, fin and rudder placement, fuel tank, etc., are handled fairly easily. With a conventional aircraft layout, the R/C gear in the fuselage above the wing-engine and fuel tank in the nose, and an average tail moment length - the correct balance point can usually be achieved simply by moving the battery pack or adding a small amount of weight to the tail or nose. With a canard, it doesn't conveniently work out that way.

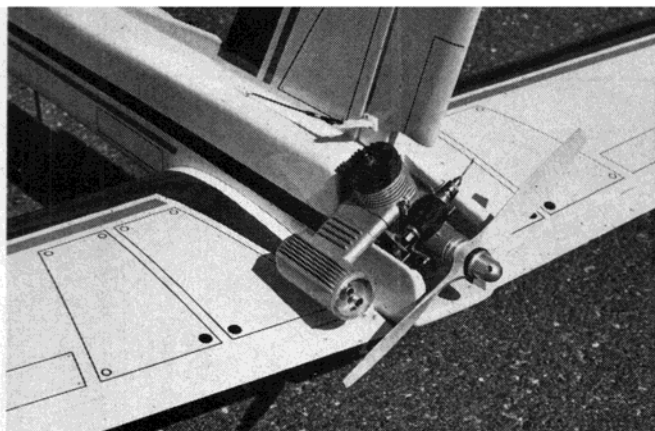
A rough rule for the balance point location on a conventional model is to put it at the 25% to 30% point of the wing's mean aerodynamic chord on a design with the "usual" proportions. Most average models are similar enough so that this 25 to 30% figure is quite safe, although wing sweepback does affect it. For a canard, the balance point is located be-

tween the aerodynamic center of the wing and the aerodynamic center of the forward located horizontal stabilizer. I don't have a rough percentage location as there haven't been a lot of canard designs around to get "usual" proportions. After working with a few canard designs, a ballpark location might be 20 to 25% of the distance between the stab's aerodynamic center and the wing's aerodynamic chord, ahead of the wing a.c. There is a safer way to do things, though.

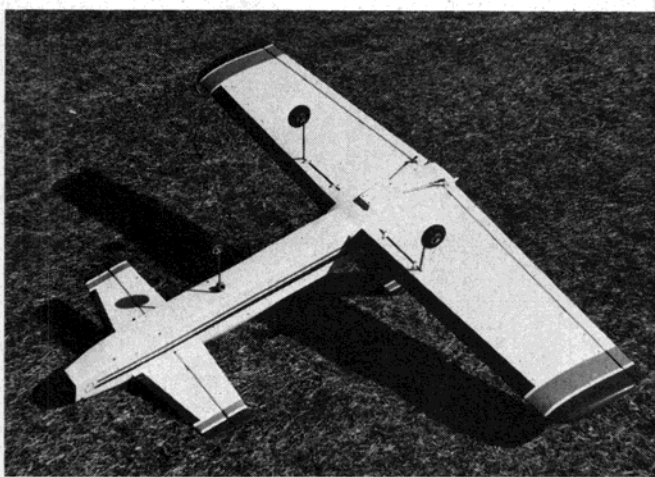
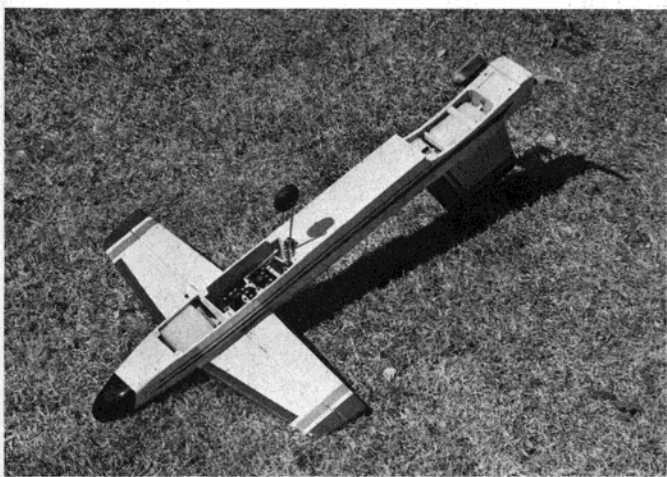
There are published formulas available to locate the balance point on a canard design, taking into account the design variables. I used such formulas during the design of the *Firestar*, attempting to get a layout that would balance without the need for extra weight in the nose. I selected a distance between the wing and stab, an area for the stab, and an equal taper wing planform that resulted in a calculated balance point location I thought would be achievable. The engine was positioned above the wing to get its weight forward, the battery pack was to go into the nose block, and the radio gear would be installed as far forward as possible. I almost made it; about four ounces of lead were needed in the nose of the prototype for correct balance. A lighter built-up wing or plastic film covering instead of a paint job might



The aileron servo has been switched to the bottom of the wing (above) with access provided by a small hatch. With wing and hatches off (below), you can see placement of radio gear and fuel tank.



Pusher configurations, such as the *Firestar* (above), require pusher props or reverse rotation crankshafts. That's an HB .40 PDP Blitz with special short muffler. Hatches and wing on (below). Finish-dope and Coverite.



Plunge "tail first" into R/C aerobatics. The product of the author's wealth of canard experience. For 40's.

By Dick Sarpolus

have resulted in no extra weight being required.

As with a conventional model, the balance point location should be varied to give the response you want in an aircraft. A more forward location and less elevator travel will reduce the model's sensitivity, but for aerobatic performance more sensitivity is desired than for a sport type model. Start with a forward balance point for safety, then try more sensitivity if you wish.

Flight characteristics

Two prototype *Firestars* were built; my friend Nick Nicholson made one in Alabama while I was constructing mine in New Jersey. Nick's was ready to fly first and I learned via a phone call that a crash was the first flight result - due to a too sensitive pitch response. Nick moved the balance point forward, reduced the elevator throw, and his model was flying well on the next day. I should have learned, but my first flight almost ended in disaster for the same reason. I added a few ounces of lead to the nose, cut down the elevator travel, and the subsequent flights were successful.

A characteristic noted on my previous canard repeated itself here; when power was cut, the nose went up, and down trim was

needed for the landings. This time, the action was stopped by shimming the engine mount to tilt the thrust line up several degrees. When trimmed for level flight under full power, there was now no trim change when the power was cut.

Some full scale canards are said to be stall proof. I'm sure this would also be true of the *Firestar*, if the elevator control available was limited. When stalled with limited up elevator, engine at idle, the nose will drop straight ahead with no tendency to fall off, and this action will be repeated as the up elevator is held. However, with more elevator control and rudder movement, the plane will definitely snap. I have been reluctant to spin my canards after reading about the difficulty of recovering from a spin - but Nick reports that his aircraft has been spun a number of times and with application of full opposite control and down elevator, the plane comes out of the spin. Here's where more elevator control is necessary. Honestly, at this time I still haven't tried it with mine.

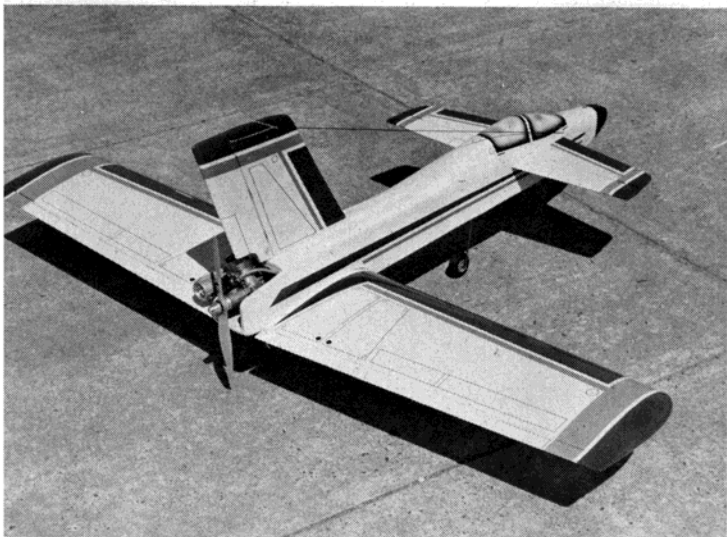
An important thing to keep in mind when flying a pusher canard is that there is no prop blast across the control surfaces to provide control force at low speeds. Until the aircraft is up to some speed, there will be no control response - so, don't yank the plane off the

ground; let it accelerate to a good flying speed, then take off. And when the aircraft is stalled in the air, remember that there will be no control until airspeed again builds up, from a dive. This is similar to ducted fan model flying, the same situation.

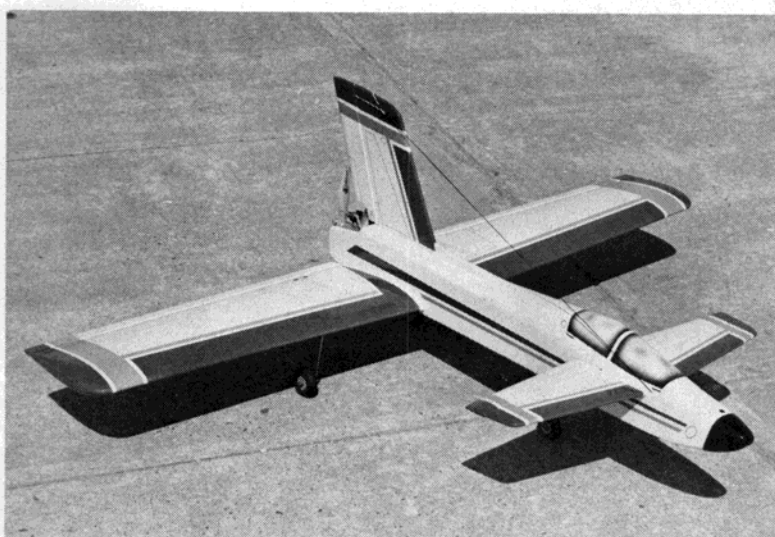
The *Firestar* knife edges well, probably due to the fuselage side area up front, making four point and slow rolls easier. For wingovers, obviously the kick over should be started before all airspeed is lost - again, there's no air blast over the rudder. The plane tracks well, and if control sensitivity seems too great, reduce the surface throws and/or shift the balance point forward.

Another canard design characteristic is the necessity for a large fin/rudder area. Double fins could be used on the fuselage, or dual fins could be installed part way out on the wing panels. I wanted to do this but didn't want the added complexity of installing rudder linkage out through the wing panels. The fin area could be cut down if another fin was added below the wing. If you modify this design I suggest you maintain ample fin area in one way or another. With the fin and rudder necessarily located so close to the engine, vibration is a factor to guard against. The fin must be well anchored to the fuselage and sufficient rudder hinges used to resist the





Canards seem to require much larger vertical stabs (above). Note how the bottom of the rudder is notched for engine clearance. Dick Robbins holds as author/pilot Dick Sarpolus pre-flights for maiden flight (below).



The fuselage of the plane is a basic box construction with some balsa blocks in the nose and canopy to allow for shaping (above). Paula Nicholson (below) holds her dad's, Nick, *Firestar*. His was the first to fly.



FIRESTAR

structure vibration.

Regarding the engine installation, there is no prop blast to assist engine cooling on the ground so watch for overheating. A pusher prop is necessary (I use the Zinger 10-6 pusher on a .40) or a reverse, right hand crankshaft is available for some engines which would permit use of a standard propeller. I install the fuel tank as usual, clunk toward the rear, and run the vent and fuel lines back over the top of the tank to the engine. Despite the long fuel lines, using muffler pressure, I have had no engine operating problems. A fuel pump would insure a steady running engine.

The design specifications are as follows: the wingspan is 57 inches, an equal taper planform from 11½ inch root chord to a 9 inch tip chord, for 580 square inches. The usual full symmetrical airfoil is used. The horizontal stab area is 125 square inches, 21% of the wing area. The vertical fin and rudder area is 90 square inches, 15% of the wing area, and I would go no smaller than

this size. The overall fuselage length is 41½ inches. The weight of my *Firestar* with a good painted finish and some lead weight is exactly six pounds - it could certainly be built lighter, but flies well at this weight. The wing loading calculates to 24 ounces/square foot but since, for a canard, the stab area is included when calculating the loading, it works out to 20 ounces/square foot.

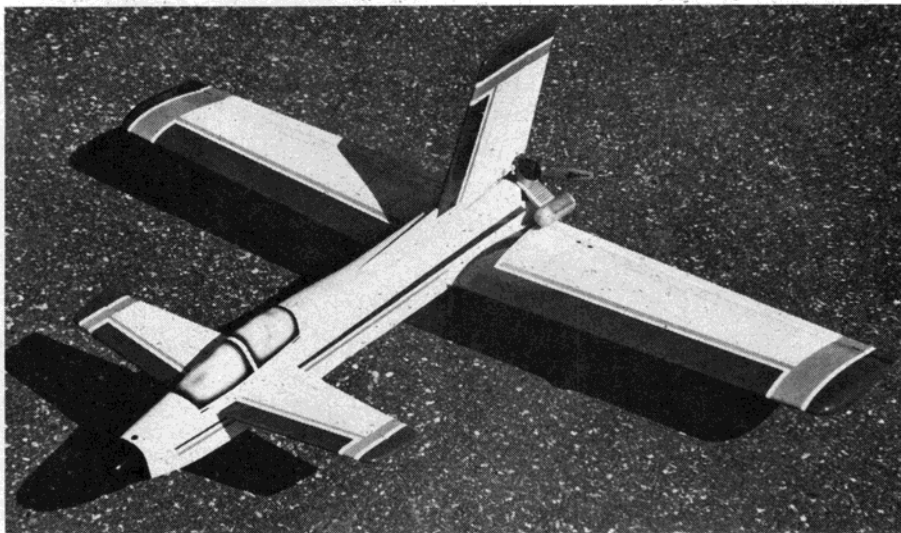
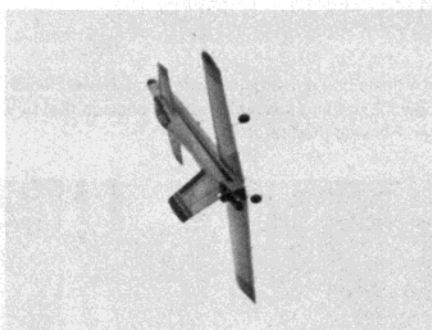
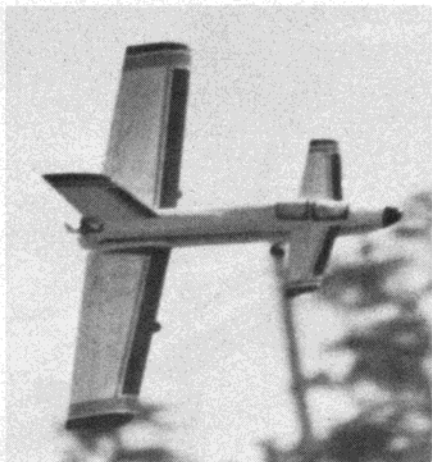
Construction of the model is, as usual, as straightforward as I could make it. The wing is foam cored, but could be built-up if you believe that would be lighter. The tail surfaces are sheet balsa and the fuselage is a basic box construction, with some angled pieces and blocks up forward to allow shaping of a streamlined canopy area.

Starting with the wing, if you don't have a local source for foam cores, I suggest Ken Marcheselli, Ryerson Ave., Newton, NJ 07860. The core is skinned with 1/16 inch balsa, and although I used a modeling contact cement, I agree with FM's Editor, Bob Hunt, that use of epoxy glue to attach the

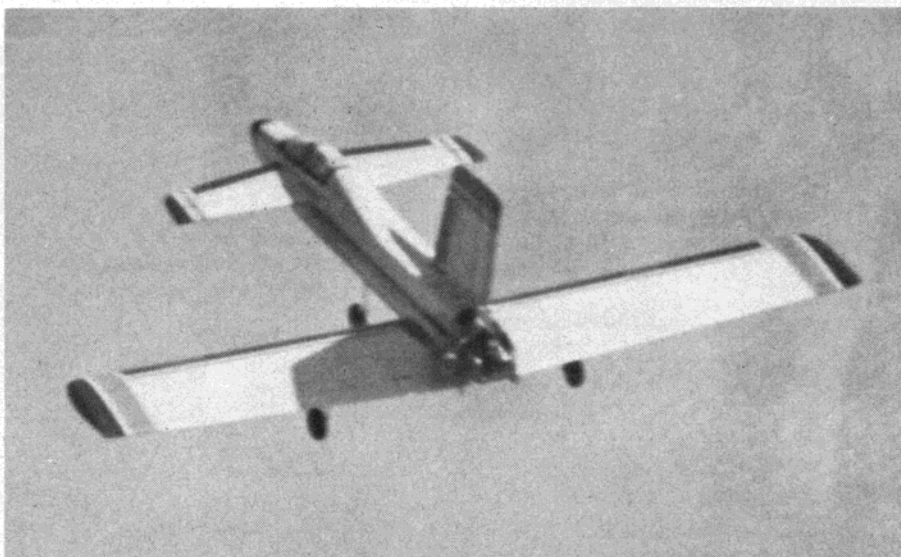
skin would result in a lighter wing. Bob applies the epoxy only to the prepared balsa skin, using a minimum of glue to do the job. The skins are held in place on the core with the foam blocks the cores were cut from, and weighted overnight to allow the epoxy to cure.

The grooved hardwood landing gear blocks must be installed in the foam core before it is sheeted. I use two sections of 3/4 inch dowel epoxied to the gear block extending up through the foam core for reinforcement, or install partial ribs of 1/16 inch plywood into the foam, cut to retain the gear blocks. Leading and trailing edges and tip blocks are added after the skinning, and sanded to shape. I use heavy fiberglass cloth and epoxy around the center joint for reinforcement.

There is no room inside the fuselage to permit a standard aileron servo linkage arrangement, so I install the servo into the bottom of the wing with a small access hatch. The linkage can then be run directly to the ailerons - it's easily accessible for adjustment and



The biggest problem is orientation as you may guess from these flight shots (at left). Reflecting his control-line interest, Dick used a #3 Leroy drafting pen to ink on the panel lines (above). The absence of air blast over the control surfaces reduces their effectiveness so obtain some speed before lift-off (below).



FIRESTAR

doesn't look bad.

Construction

First step for fuselage construction is to epoxy the $\frac{1}{32}$ inch plywood doublers to the $\frac{1}{8}$ inch balsa sides. On my models I extended the plywood doublers all the way to the nose block for extra strength, figuring that the slight amount of added weight would be needed in the nose anyway. The sides are joined by the fuselage bulkheads, followed by the top planking. The canopy area side pieces must be trimmed to fit with the correct angles block sanded on the edges. The forward block and top pieces are added and then should be well sanded to a rounded contour on top. The nose block should be hollowed out to accept the battery pack before it is permanently glued in place.

Before closing in the fuselage bottom, install the throttle cable and rudder pushrod. The fin should be notched and fitted into the top block for maximum strength. Provide holes in the fuselage bulkheads so the aileron

extension cable can be fed through later. Since several degrees of engine upthrust are needed, you may want to tilt the top of the firewall forward $\frac{3}{32}$ inch when installing it so you won't have to shim the engine mount. Hardwood blocks are installed and later drilled and tapped for the nylon wing retaining bolts.


The horizontal stab surfaces are cut out and shaped out of $\frac{3}{8}$ inch balsa. A $\frac{1}{8}$ inch wire control horn must be made to tie the two elevator halves together for control; be sure the horn assembly is brazed for strength, not soft soldered. A commercial horn may be found for use. The radio gear access hatch, $\frac{1}{8}$ inch plywood, can be held in place with small screws into hardwood blocks.

I finished the project with my usual materials - silkspun Coverite over the balsa followed by acrylic lacquer automotive primer and then Sig butyrate dope, sprayed on. The canopy area was airbrushed with white, blue and black dope. After the color trim areas were painted, panel lines and details were

added with a number three Leroy drafting pen. Four or five coats of clear were sprayed on top for gloss and protection.

There are a number of short mufflers on the market which will clear the propeller and allow the exhaust to go out toward the rear of the aircraft. One benefit of a pusher canard engine installation is the lack of exhaust oil on the airplane to be wiped off. Very neat. I used an HB .40 PDP Blitz engine, with the HB short muffler and a muffler extension piece.

Test fly with some caution; you must remember that the little end flies in front and it takes a while to get comfortable and oriented to the canard's appearance. Keep the balance point forward and restrict the elevator travel to about $\frac{1}{4}$ inch each way at first; later you can adjust things to get the response you are comfortable with.

Try the *Firestar* in your club pattern competition; I think we'll be seeing more canards in the future. Be the first in your area with a tail first pattern model, and enjoy it! 

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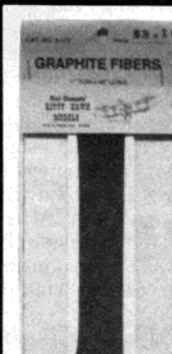


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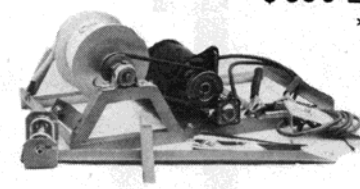
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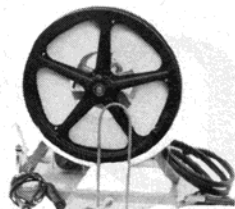
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1984 TOLEDO Show

By FM Staff

The Weak Signals
host yet another
strong show!



PHOTOGRAPHY: FM STAFF

Bob Campbell's mammoth C-130 Hercules was back to greet modelers at the 30th Toledo Exposition, this time in its finished form. Suspended from the ceiling, its 20 foot wing span created quite a "shadow".

The Thirtieth Annual Radio Control Exposition, sponsored by the Weak Signals R/C Club of Toledo, Ohio, proved another great success. For any of us in the hobby, success at this show means two things, large crowds and lots of new items to look at. Both were true, as we have seen year after year.

From those of us who travel from all over the country (and the world) to Toledo each year, it was most encouraging to see all the changes in progress in the overall downtown area. There are many new high rise office buildings and hotels. A new waterfront area, to be opened this coming summer, includes many restaurants and shopping facilities. And the best word of all, is the possibility of a new modern convention center, which might be ready for occupancy in several years time. The slogan this year (and seen all over Toledo) was "Toledo Alive". We agree and it is definitely a good sign of things to come.

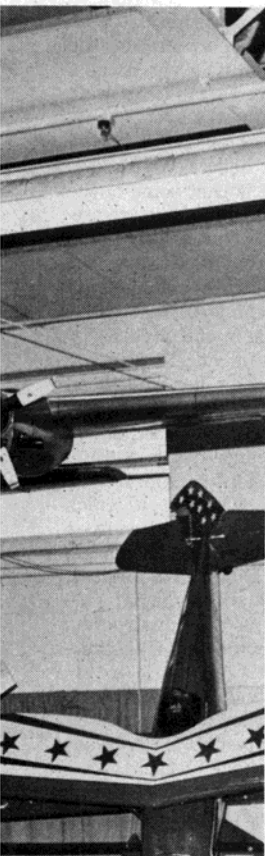
FM staffers in the name of Editor, Bob Hunt, Advertising Director, Bob Cosgrove, Associate Editor, Frank Fanelli, Technical Editor, Bob Aberle and Contributing Editor, Ron Farkas were all present this year at "Toledo 84". Their detailed reports now follow.

R/C equipment and electronic items

Early Friday morning (the first day of the show) Kraft Systems held a press conference concerning their new synthesized transmitter module and receiver. This system was first announced at the IMS Show in California during early January, 1984. Synthesized means that electronic circuits take the place

of individual crystals. The end result is that the operating frequency can simply be dialed to any desired R/C channel on both the transmitter and receiver. The purpose of this press conference was to dispel some of the concerns people had for the safe use of this new system. As supplied, you can "dial up" any one of the 49 new R/C aircraft channels, right now, even though we should only be using 11 of these channels up until January 1987. In fact we shouldn't be using the full 50 aircraft channels until January 1991. The concern is that modelers may "jump the gun" and start operating on non "AMA approved" channels. From a safety standpoint that could prove disastrous. Kraft first of all explained that it was not economically feasible to program the synthesizer chip for limited channel capability. So they had to resort to an "all channel" unit right from the start. They have a very clear warning placard displayed on the rear of the transmitter module indicating the 11 approved channels for now. This will be stressed in all future advertising. You won't be able to enter an AMA sanctioned contest using anything but the approved channels in accordance with the official AMA Phase-In Plan. The only problem, therefore, will be at the local flying fields. With common sense and care it is hoped that responsible people will put this new technology equipment to best use rather than mis-use. I'm already flying one of these systems and will be reporting on it next month. Look for the review. At any rate Kraft Systems was the first in this regard and they should be congratulated for technical achievement.

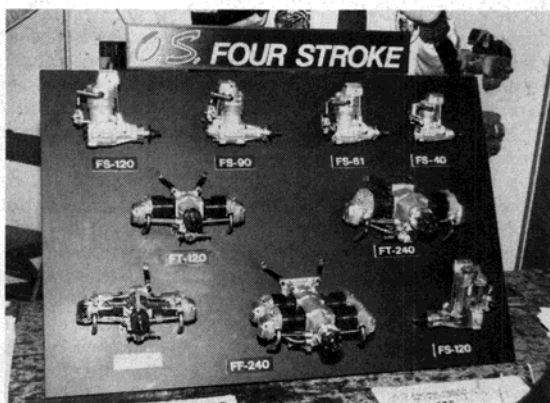
Futaba actively displayed their new, highly sophisticated PCM system for both aircraft and helicopter applications. Else-



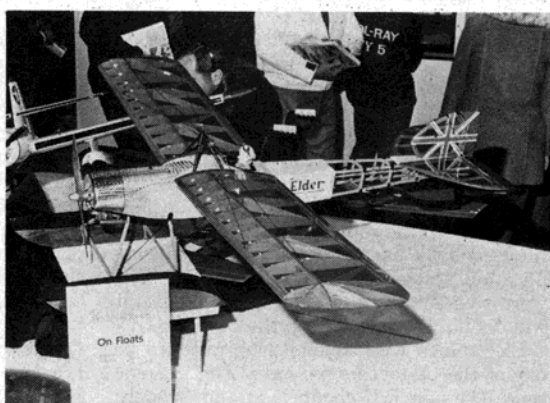
DAVE BROWN PRODUCTS, 4560 Layhigh, Hamilton, OH 45013. One of the biggest hits of the show was the Radio Controlled Flight Simulator for Apple Computers. Very realistic.



ACE R/C INC., 11 West 19th St., Higginsville, MO 64037. Tom Runge, at left, and Paul Holsten holding their new economy priced and fully assembled system based on Silver Seven design.



WORLD ENGINES, 8960 Rossash Ave., Cincinnati, OH 45236. The display board had some real dream engines for four stroke lovers. Large twin and four cylinder engines coming later.



TOP FLITE MODELS INC., 2635 S. Wabash Ave., Chicago, IL 60616. Scott Christensen of Top Flite entered his personal Elder, a new kit for .20 four stroke engines.

where in this same issue is my review of the aircraft version. The PCM coding, in this instance, appears to offer a high degree of interference rejection. That, in combination with a very narrow-band receiver, makes this fully "1991" qualified. For those interested, Futaba gave us an advance look at a new single stick version of their PCM system which should be available by the end of the year. Hopefully, the PCM concept will be offered in less complex versions later on so that "Sunday flyers" can also benefit from the new technology as well.

Bob Novak again showed his new AM dual conversion receiver, which was introduced at the WRAM Show last month. This receiver can work off any existing AM R/C transmitter and give "1991" qualified performance. A good way to upgrade your present system and still keep your existing transmitter and servos. Bob's promise of a matching FM dual conversion receiver didn't come to pass. He simply got short of time. But look for it by mid year. This way you have a choice, AM or FM.

Altech Marketing (the Enya engine people) announced that they will distribute the Simprop brand PCM-20 R/C system in the U.S. Hanno Prettnner, representing the Simprop Company, was present at their booth explaining this new radio throughout the show. One of the interesting features is that the transmitter encoder board is actually a plug-in module or assembly. As such you can buy the system with either a basic encoder for all around flying or specific modules for helicopter, F3A aerobatic, or F2B glider competition flying. Fail safe features will be included along with a 1200 mAh battery pack in the transmitter. Should prove quite an innova-

tive system. List price will be in the order of \$900.00 which is definitely up there. Remember, this is the system that Hanno flies in international competition.

Circus Hobbies also showed a new PCM system which they call their PCM9. It will be available in both an aircraft and a helicopter version and in single stick as well. No prices were stated and I couldn't receive many details because it apparently had just arrived and was quite new to everyone, including the Circus folks. One thing I spotted in the literature was the fact that the pre-set fail safe servo positions could be activated by pressing only one button. On some new systems this must be done individually for each channel function and prior to each flight. I hope to learn more about this system as time goes along.

ACE R/C introduced their new version of the Thermic Sniffer thermal sensing device which is intended for use with R/C gliders. ACE actually picked up the rights on this unit from Soaring Products. It includes an updated sensor unit which mounts in the glider and a new, specially designed 49 MHz receiver to be used as the telemetry signal monitor. Of special interest to all modelers is a new "Data Sheet" prepared by ACE concerning nickel cadmium batteries (charging, cycling, and care). This three page handout is must reading and I highly recommend it. Write to ACE R/C Inc. at 16 W. 19th Street, Higginsville, MO 64037, include a S.A.S.E., and Tom Runge will gladly send you a copy. Ask him also for a set of ACE Digipace instructions at the same time. The combination of both write-ups will cover all your R/C battery questions and concerns.

Mark Schwing of EMS showed us a new

extra heavy duty servo which is a derivative of the World Engines S-16 configuration. A new case top and gear train has been added. Known as the EMS Eagle II S.P., this servo has a rated output of 315 ounce-inches. Transit time is 1.1 seconds for 100 degree rotation. Should prove great for 1/4 scale flap operation, mechanical retracts, or even as a sail control for the R/C yachtsman. We also noted another new EMS accessory item which Mark identified as the "Signal Sentry". Place it in series with any servo in your system. Loss of signal or low battery voltage will drive that servo to any pre-set position that you select in advance. I hope to test one of these devices later in the year and report on it.

Jim Lanterman indicated that World Engines is now actively pursuing a highly sophisticated new R/C system design. It will operate on AM, not PCM, but will include full synthesizing in both the transmitter and receiver. Jim plans on microprocessor control for various pre-programmed functions and, if I understood him properly, Dave Brown will be flying a prototype of this system during the coming year. Don't expect to see a production version until next Toledo.

Every once in a while I mess up a photograph. I must apologize that my photos of the new Hobby Shack 900 XLC R/C system did not turn out and as a result won't appear in our show photo section. But please do take note of this new system. It provides such things as servo reversing, dual rates, two built-in mixing circuits, full nickel-cadmium battery packs and four servos for just \$169.95. Quite a deal! Their address is: 18480 Bandilier Circle, Fountain Valley, CA 92708.

I also wish to acknowledge some very

pleasant conversations with Jim Oddino of *Radio Control Modeler* and my old friend and AMA R/C Frequency Committee member, Bill Hershberger, both of whom made the Toledo scene. Jim appeared quite enthused about the new Futaba PCM system which he has also been flying. We talked, in addition, about the possibilities of 926 MHz R/C for the future. Hopefully, Jim will get a chance this coming year to actually fly the AMA experimental 926 MHz R/C system to gather some additional data. He has some good suggestions for future R/C claims to that spectrum which should definitely be explored further.

Bill Hershberger critiqued my test procedure for "1991" receiver qualification. Some of his suggestions were already included in my review of the Futaba PCM system. I certainly thank him for that. Bill also mentioned some new receiver circuit possibilities which could achieve "1991" type performance without the need for dual conversion. This would involve the alternative of selecting an "odd" i.f. (intermediate frequency), something other than the standard 455 kHz. Apparently, the rapid expansion of the remote telephone market has produced some interesting new I.C.'s, filters and the like which may have some application to the R/C industry. We look forward to seeing progress in this area since it will definitely tend to keep the costs down.

Electronics wise Toledo 84 proved to be one of the best years we have seen in some time. The new R/C channels are now widely accepted. As a result a lot of new technology is surfacing. That's good for the hobby and the industry—BOB ABERLE.

Kits, engines and accessories

While roaming around Toledo this year it was apparent that the city is undergoing a major modernization effort. The theme of this effort is "Toledo Alive" and the multi-color signs to that effect adorn posters all around the city. Well, I can tell you that the Weak Signals R/C Exposition was alive too, with displays and activity. The Toledo show, as it has come to be called, is also a great affair for some of us who only see each other once a year.

Most of the major manufacturers had something new to show. Many of the smaller companies had only their usual products but the indications were that they were doing well with the existing lines.

Great Planes Model Mfg., one of the biggies, had three new airplanes on display. One sure winner was the CAP-21 for .40 size engines. This all wood kit looks easy to build and is in a very popular size. The wing span is 60 inches and area is 550 square inches. With its simple but pleasing lines and great aerobatic flight performance, the CAP-21 has become one of the modeler's favorite designs. The other two new designs from Great Planes are a .40 size built-up Piper *Cherokee* with optional operating flaps, and a glass & foam kit of Dave Brown's *Illusion* pattern ship for .60 engines of course. The *Cherokee* is just for fun flying while the *Illusion* is for serious competition.

A while ago Joe Bridi sold his company to Great Planes and they now market his old product line. Since then Joe has been popping out new designs regularly and has a new kit company called Bridi Aircraft Designs, Inc. As of last year he had a few trainers and a sailplane for two. This year he has added the *Warlord 40*, a low wing trainer and all-around sport model. Its span is 51 inches and

the kit features all balsa built-up construction. These are all nice sport models for beginner to intermediate flyers.

Moving over to Sig Mfg. Co. there was a prototype of a new giant scale kit, the *Morrissey Bravo*. This is an attractive low wing two place monoplane modeled after a relatively new EAA homebuilt. Its proportions are just right for a model airplane. The construction method will be all built-up wood with molded canopy, cowl, and wheel pants. The span is 84 inches and recommended engine in the 2 to 4 cubic inch range. Other Sig kits were on display including their recent, classic *Astro Hog* fitted with a four stroke engine. That's a nice combo.

Another company that has concentrated on giant models is R/C Kits Mfg. Their designs generally feature sheeted foam wings and built-up fuselages. New this year is a 1/5 scale *Hawker Sea Fury*, for medium displacement gasoline engines. As far as I'm concerned the *Sea Fury* is one of the most beautiful of all the WW II fighters, and I hear that it makes a fine flying model.

The folks over at Ohio Superstar Products also produce foam & wood giant scale kits. They do primarily aerobatic civilian light-planes for gas engines. For example, one of their new kits will be the Henry Haigh *Super Star*, which I believe is a variation of the Stevens *Acro* design. The *Super Star* is for Quadra or similar engines. Also new this year are the *Monocoupe D-145* and the Piper PA-17 *Vagabond*. The *Monocoupe* has a 94 inch span and takes glow engines of .90 to 1.2 cubic inch, while the *Vagabond* has an 84 inch span and is best suited to engines of .60 to .90 displacement. Both build fast because of their sheeted foam wings. They are not necessarily for the contest scale buff but more for the average Sunday flyer.

Getting back to more conventional size models for a moment, Carl Goldberg Models, Inc. has reduced last year's *Sky Tiger* design down to a 50 inch wing span and calls the result the *Jr. Tiger*. Like its predecessor, the *Jr. Tiger* has a built-up wing and stab and the unique die-cut light plywood fuselage parts that go together so fast. This *Tiger* is happiest with engines of .25 to .30 displacement since it is a pretty lightly loaded model when completed.

Also for sport flyers, Balsa USA has just introduced an updated version of their popular *Phaeton* biplane. The *Phaeton II* has an all new wing mounting system with wire cabanes, "N" struts, and bolt-on wings. A molded ABS cowl with cheeks is now included which really changes the appearance. Balsa USA has added a sport scale *Tipsy Nipper* to the line. The *Nipper* is a full quarter scale but is so compact that its wing span is only 59 inches. Both new airplanes take .40 to .60 engines and you can choose a four stroke for some realistic flying. Because of their simple construction and no-frills packaging, Balsa USA kits are very economically priced.

For the pattern minded modeler who is cost conscious the new .40 size *Firebird* from Craft Air is just the ticket. This easy to build wood kit provides the aspiring pattern flyer with a competitive airplane without the investment of a full blown .60 size fuel guzzler. The *Firebird* is very sleek looking and is capable of doing the whole AMA pattern. Craft Air kits are first rate values.

Using similar reasoning, the Champion Model Aeroplane Co. has stretched the .20 *Hammer* design to a .40 version. The *Ham-*

mer 40 has the same appearance but has been tailored to the correct proportions for the larger engine displacement. This should be a hot performer and easy to build as well. Champion has also introduced a kit of the famous Sal Taibi *Powerhouse* old timer. It consists of all built up stick balsa construction. A nice feature of this kit is that some of the full length curved fuselage longerons are pre-assembled out of sections that are jig-glued together. This should greatly minimize the bending loads on these members and ensure a warp free fuselage. Neat idea. A .60 four stroke would be a natural in this model.

After a couple of years of concentrating on sailplane designs, Airtronics has developed two new power planes for this year. One is the *Jetfire 40* which is a streamlined shoulder wing design for advanced aileron training. It has a distinctive jet-like appearance. The other airplane is the *New Era 40* which is a low wing sport pattern model based upon the older *New Era III* design. Both models have 52 inch wing span and use .40 engines. Additionally each model will come in a .20 size version too. Balsa is the construction material and Airtronics is known for their superb kit quality.

I couldn't miss the grand Byron Originals display, especially since they were right next to our FM booth. Their latest kit is a 1/6 scale P-47 *Thunderbolt* razorback version. Like most of their recent scale models, the flying surfaces are of molded high density foam and the fuselage is an epoxy glass shell with internal bulkheads. All sorts of custom made Byron accessories are available for flaps, retracts, and even a geared Quadra prop drive with a 24 inch four bladed propeller. This is the ultimate in state of the art construction technology and the prices reflect the development and materials cost. Time has proven that the Byron Originals approach works very well at the field, where it counts.

One of the smaller specialty manufacturers is Dave Platt Models. Each year he develops one new super detailed stand-off scale model, wins a bunch of contests with it, and then goes into kit production. Actually the contest circuit is the proving grounds before he will bring a design to market. This year his latest project is a Japanese A6M5c *Zero*. Dave designs his models to 1/5 scale but by using all built-up balsa construction he keeps the weight under twenty pounds. Therefore the recommended engine size is .90 to 1.2 glow instead of a much larger gas burner. The Platt *Zero* has a wing span of 79 inches for a total area of 1100 squares and is said to fly very well. The prototype at the show was just gorgeous.

Another specialty kit company is St. Croix Models, Inc., who have just come out with a scale model of the Bert Rutan *Long-EZ* pusher canard. Construction is balsa for the fuselage and canard and sheeted foam for the wings. In fact due to the angles in the leading edge the cores are sheeted in sections and then all joined together to make a completed wing. The big bubble canopy is molded as is the ABS cowl which neatly fits into the wing root. At 62.6 inches span it is 1/5 full size but only needs a .40 engine. Like its full scale counterpart, the *Long-EZ* model is claimed to be extremely stable and theoretically spin-proof so it is a good choice for intermediate level pilots. St. Croix makes it possible for any sport modeler to fly this exciting and unique scale model.

While on the subject of "EZ" airplanes I have to mention the Hobby Shack "EZ-



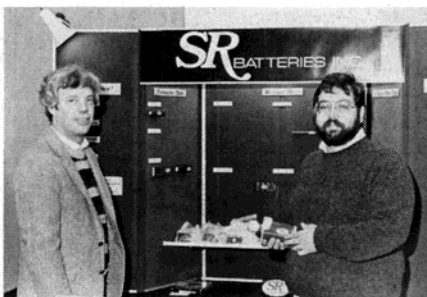
GREAT PLANES, PO Box 721, Urbana, IL 61801. This is the latest CAP-21 for .40 engines. Construction is all balsa with both machined and die-cut parts. Span is 60 inches for a total of 550 square inches of area.



CIRCUS HOBBIES, 3132 S. Highland Dr., Las Vegas, NV 89109. New single stick PCM 9 channel system unveiled at show. No details or pricing information were available. System will also be offered in dual stick and helicopter versions.



SIG MANUFACTURING CO., Montezuma, IA 50171. This Morrisey Bravo is a quarter scale kit of a popular new EAA homebuilt. It is very simple to build. Has 84 inch span. Takes gas engines of 2 cubic inches or bigger. Pretty too.



SR BATTERIES INC., P.O. Box 287, Bellport, NY 11713. Bob Giani, at left, and Larry Sribnick displayed their complete line of special purpose, high quality battery packs. Larry is holding a Sullivan starter with integral pack.



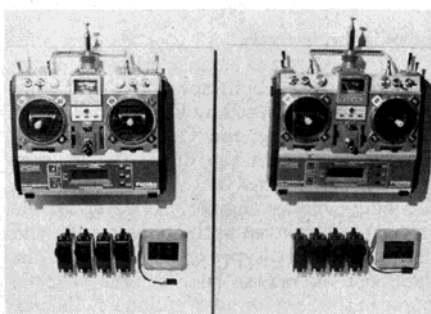
CHAMPION MODEL AEROPLANE CO., INC., PO Box 891, Woodbridge, NJ 07095. The popular Hammer design has been stretched to a .40 size airplane this year. Same easy balsa construction with many pre-shaped parts. Hot performance.



TOWER HOBBIES INC., P.O. Box 778, Champaign, IL 61820. Tower's into it's second year with their popular System 500 R/C units. Systems were reviewed in the May 1983 FLYING MODELS. Check what you get for \$149.98 price tag.



HOBBY SHACK, 18480 Bandilier Circle, Fountain Valley, CA 92708. Latest in the pre-built EZ-Series is this Art Scholl Super Chipmunk. Retracts optional. Comes finished as you see it. Only minor assembly required.



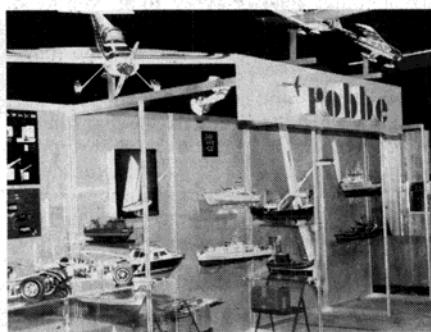
FUTABA CORP. OF AMERICA, 555 West Victoria St., Compton, CA 90220. Top of the line PCM R/C units on display. Helicopter version at left and F3A (aircraft) aerobatic system at right. Look for product review in this issue.



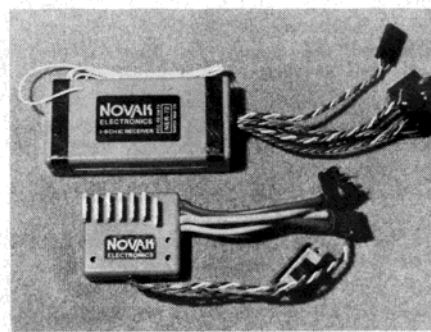
ST. CROIX MODELS, INC., PO Box 279, Park Falls, WI 54552. This scale model of the Rutan Long-EZ duplicates the stable flight characteristics of the full size homebuilt. Wood fuselage, sheeted foam wing, and formed cowl.



MODEL PRODUCTS CORP., PO Box 314, Pompton Plains, NJ 07444. Dick Remington, who came out with the original Head Lock glow plug connector, now has several remote and twin cylinder versions. 1/4 turn twist on & off.



ROBBE MODEL SPORT, Princeton Meadows, The Office Suite 2D, Plainsboro, NJ 08536. They import high quality planes, boats and cars. Most are almost ready to use, except for final finishing. Very large selection.



NOVAK ELECTRONICS, 2709-C Orange Ave., Santa Ana, CA 92070. Bob Novak showed new dual conversion, narrow-band, AM receiver which is fully 1991 qualified. FM version will follow soon. Other item is new electronic speed control.



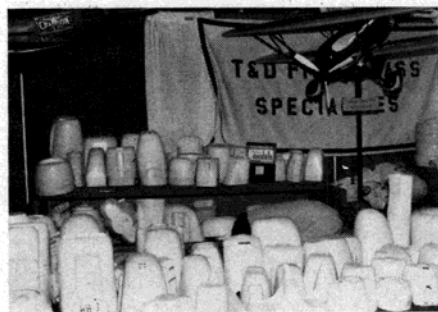
ALTECH MARKETING INC., P.O. Box 286, Fords, NJ 08863. Hanno Prettner introduced the new Simprop PCM R/C system at Toledo which will be marketed by Altech in the U.S. This is the same system that Hanno flies in competition.



BOB VIOLETT MODELS, 1372 Citrus Rd., Winter Springs, FL 32708. Space age carbon filament material is the basis for Magnalite building products. Comes in sheets, strips, and balsa laminations. Low weight & super strength.



KRAFT SYSTEMS INC., 450 W. California Ave., Vista, CA 92083. Display board demonstrated new Kraft synthesized Tx module and matching receiver. It is now possible and legal to dial your own channel much as you would a CB set.



T&D FIBERGLASS SPECIALTIES, 30925 Block, Garden City, MI 48135. Company produces epoxy glass cowls and wheel pants for kit replacements and for an enormous variety of giant scale plans. Extra sturdy glass work.



BYRON ORIGINALS, P.O. Box 279, Ida Grove, IA 51445. Display board clearly shows the components of the new P-47 Thunderbolt. Excellent engineering and materials. Bruce Godberson explains all of the options.



AMERICAN R/C HELICOPTERS, INC., 635-11 N. Twin Oaks Valley Rd., San Marcos, CA 92069. This is the exciting new American Eagle helicopter. All new mechanics. Fully aerobatic. Unusual winglets have operating ailerons.

Series" of pre-built, almost ready to fly models. This novel construction technique involves a high density foam skin formed over a light weight plywood sub-structure. A brightly colored, highly durable plastic coating is applied to the foam at the factory and makes these airplanes appear to be professionally finished. The only assembly required is to glue the wing halves together, mount the tail, install the engine and hook up the radio. The EZ-Series is so popular that there are now about a dozen different ones to choose from, including trainers, aerobatic stand-off scale monoplanes, and some gliders. Two of the newest are the Bellanca Decathlon and Art Scholl's *Super Chipmunk* which can even be ordered with retracts. Both take a .40 to .60 engines or larger four stroke. If you don't have enough time to build, then you can't go wrong with one of the EZ-Series models from Hobby Shack.

Before totally running out of space I want to tell you of some other things that left an impression on me. For example, at least six displays featured helicopters. Three specific models were of great interest to me. One is the *Cobra* from Gorham Model Products because it is economical to purchase, is based on proven Hirobo mechanics, and is suitable for both beginners and experts. Another is the *Eagle* from American R/C Helicopters because it is full of state of the art tricks like winglets with ailerons and all new mechanics. The last is the Kobe Kiko, Robinson *R22HP* from California Model Imports, because it is an almost exact rendition of a captivating little two place private helicopter. The last year or so has seen a real upswing in model helicopter activity since the mechanics are fully reliable and gyros have taken a lot of the pain

out of learning to fly.

Four stroke model engines are really growing in popularity. Right now the marketplace seems to be dominated by Enya imported by Altech Marketing and O.S. imported by World Engines. In the displacement race right now, Enya and O.S. are tied at 1.2 cu. in. single cylinder engines. However, at the show, O.S. displayed both opposed twin and four cylinder prototypes of 2.4 cubic inch displacement for release later on this year. Of course in the race for most cylinders, Techno-power II wins with radial engines from three through nine (count 'em) cylinders.

One of the highlights of the show for me was flying the computerized R/C model simulator at Dave Brown's booth. This runs on an Apple II (+ or e) computer. The CRT screen has an animated graphic image of a model airplane that follows every pilot command just as if you were flying a real model. Dave has developed a game controller in the shape of a two stick R/C transmitter so that your control inputs are as natural as if you were down at the field standing on the flight line. I also got some stick time on the prototype of a helicopter version that will become available later on. These simulations are not games but honest to goodness training aids that can help beginners and experts sharpen their skills. Watch for a review of one or both of these products in a future issue of FM (when I'm through writing this article on my Apple II e).

So, that about closes the books on the 1984 Toledo Weak Signals show. We'll see you there next year folks.—RON FARKAS

Giant Scale

From my vantage point as an interested

though not participating observer, it has seemed that the growth of Giant Scale has been meteoric in some areas and sluggish or non-existent in others leaving vacuums in some places and gluts in others. The impression left by Toledo is that many of those "vacuum" areas have been filled and that growth has occurred across the board not only in kit offerings and powerplants but also in accessories dedicated to this arena of modeling. There are some new companies, and also some old, making major efforts to serve the needs of Giant Scale buffs.

Dick Bennett of B&B Specialties is probably no stranger to those who have seen his ads in *High Flight*, the publication of the IMAA. Dick is now going "public" with his diversified product line dedicated to Giant Scale. Besides his customized engine service, mufflers, and smoke system, Dick has added some new hardware accessories. He has standoffs designed to allow you to reinforce sheet metal landing gear with 1/4 inch music wire. Saves a lot of bending and re-bending. Also in the landing gear department, he's got a set of wheel axle and collar pants mounts for positive attachment of your wheel pants. There's also a new servo doubler in the works so you can use some of those lower torque ones you have hanging around in some of the more demanding applications.

Nick Zirola Models has two new Giant Scale plan sets. One is the "perfect partner" for their *Corsair* or P-40. It's their A6M5 Zero for 2.4 to 3.2 cubic inch engines. Wing span is 91 inches. Along with that is Tom Polapink's Sopwith *Tabloid* which won Sr. Scale at the 1983 Nats. The quarter scale version will go with a wing span of 77 inches. By the way, for those of you with Zirola *Corsairs* or



AIRTRONICS, INC., 16191 Construction Circle W., Irvine, CA 92714. New *Jetfire 40* is a sharp looking advanced trainer, capable of aerobatics when pilot is ready. Has 52 inch wing span. High quality all wood kit.



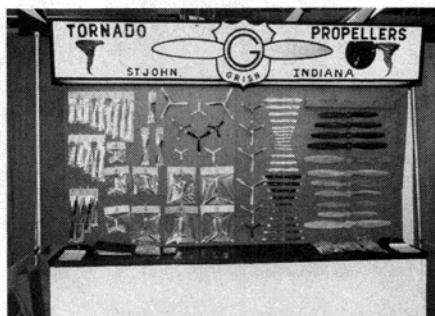
NICK ZIROLI MODELS, 29 Edgar Dr., Smithtown, NY 11787. One fifth scale *Corsair* always draws a lot of attention. Fiberglass and wood kit available some time in the future. RCM's Dick Phillips stopped by to say hello.



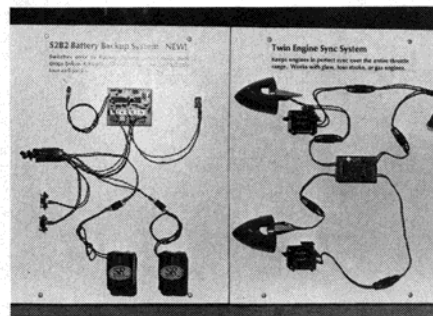
ALTECH MARKETING INC., P.O. Box 286, Fords, NJ 08863. Enya Model Products has an engine for just about every modeling need. Four strokes are very popular now, and sizes range from .40 up through 1.2 cu. in displ.



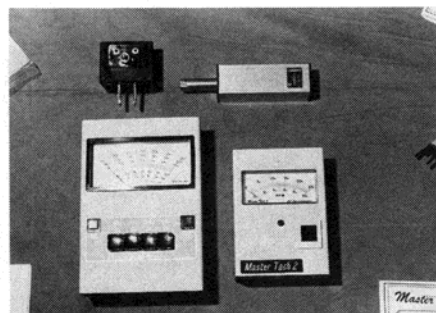
TATONE PRODUCTS CORP., 1209 Geneva Ave., San Francisco, CA 94112. These great new motor mounts have built-in nosegear struts with coil spring shock absorbers. Heavy duty tailwheel assembly and engine mount are also new.



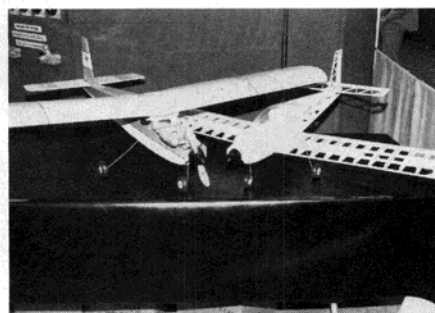
GRISH BROS., INC., PO Box 248, St. John, IN 46473. Tornado propellers are now available in molded glass reinforced polyester material. No more nylon. Selection includes both two and three bladed tractor or pusher.



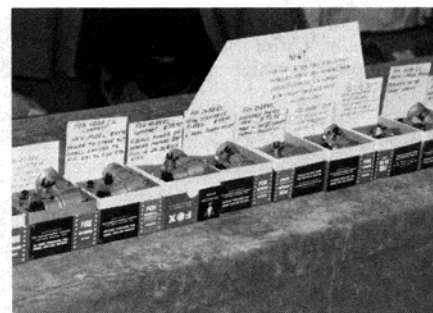
JOMAR PRODUCTS, 2028 Knightsbridge Dr., Cincinnati, OH 45244. Excellent new battery backup system (Model S2B2) shown at left. Requires two 4 cell packs and is fully solid state. Also shown is twin engine sync system.



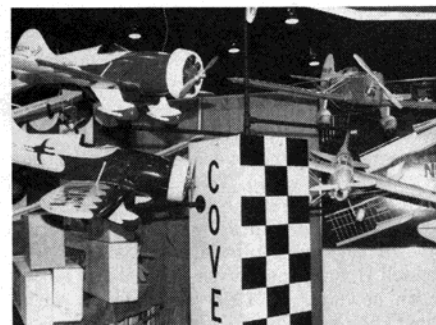
R/C DEVELOPMENT, 1836 Alabama Ave., Fort Wayne, IN 46805. At left is new Master-Tach. Five ranges up to 25,000 RPM, \$119.95. At right is an economy version with two scales for \$43.95. Master Glo-2 and charger (top) will go for \$25.95.



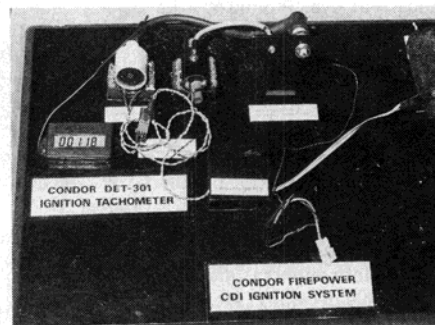
CARL GOLDBERG MODELS, INC., 4734 W. Chicago Ave., Chicago, IL 60651. On display next to the *Eagle 63* is an uncovered *Jr. Tiger*. This latest Goldberg kit has a 50 inch span, for .25 to .30 size engines.



FOX MFG. CO., 5035 Towson Ave., Fort Smith, AR 72901. One of the few American engine manufacturers, Fox is making a new compact schneurle .40 R/C based on the combat special crankcase. Fits common motor mounts.



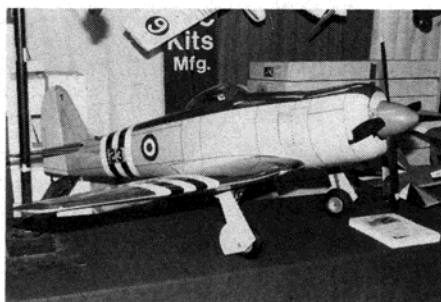
COVERITE, 420 Babylon Rd., Horsham, PA 19044. Gee Bee designs in abundance here. In the background is the new Art Chester's *Jeep*, another famous pylon racer. New pre-primed Micafilm covering is now available.



CONDOR HOBBIES, 17971 Sky Park Circle, Suite D, Irvine, CA 92714. Condor DET-301 can be attached permanently to model ignition engines to provide tach readouts and elapsed engine running time after shut down. \$69.96



CALIFORNIA MODEL IMPORTS, PO Box 1695, Garden Grove, CA 92642. Helicopters by Kobe Kiko are featured here. Both the *Hughes 300* and *Robinson R22hp* come in .60 size glow versions or with furnished gas engine.



R/C KITS MFG., 706 Easton N.E., North Canton, OH 44721. This beautifully finished Hawker Sea Fury is 1/5 scale. Built-up fuselage and sheeted foam wing. Seven foot, two inch span, for 2 cubic inch engines or larger.



US QUADRA, 1032 E. Manitowoc, Oak Creek, WI 53154. Long time Quadra specialist, Dario Brighella, runs the USA factory authorized sales and service center. Also sells accessories and does engine customizing.



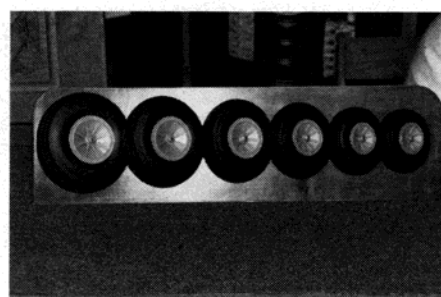
TECHNOPOWER II, INC., 610 North St., Chagrin Falls, OH 44022. Here are the radial model engines that are practical for everyday flying. Three through nine cylinders are available. All are four stroke operation.



DAVE PLATT MODELS, 6940 N.W. 15th St., Plantation, FL 33313. P-51 Mustang (l) is joined this year by the A6M5c Zero (r). Both are 1/5 scale and feature built-up balsa construction. Sport scale excellence.



BRIDI AIRCRAFT DESIGNS, INC., 23625 S. Pineforest La., Harbor City, CA 90710. The Warlord 40 is a low wing trainer and sport airplane. Its nice proportions lend themselves to many trim schemes. Balsa construction.



DU-BRO PRODUCTS, INC., 480 Bonner Rd., Wauconda, IL 60084. These are new large scale inflatable treaded wheels. Hub is molded out of nylon. Tires have positive seal air valve. Pump is available separately.

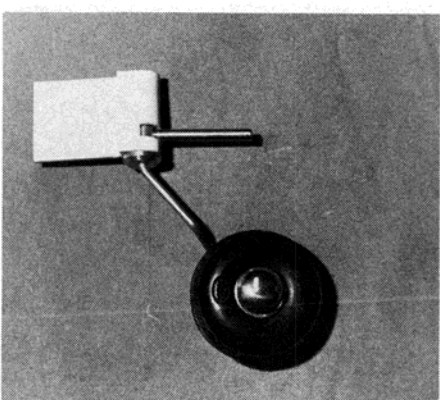
AT-6s, he has a 21 inch diameter, dummy nine cylinder radial engine made of white plastic styrene which should dress those planes up nicely.

If you're looking for a realistic, very light pilot figure for your cockpit, a new company, William M. Hawke, AIA has four sizes (1/3, 1/4, 1/5, and 1/12) of civilian pilot figures made of a special vinyl. When painted with Poly-S paints, they look amazingly life-like with very realistic facial features. In the works are more figures of US Army Air Force and Navy pilots in different scales.

JCM Specialties has been supplying modelers with a variety of accessories and hardware. They're working on an upcoming kit, the *Doodler*, a low wing design for giant scale fun flying. It will use .90 to 1.20 four cycle engines.

More engines are appearing that are dedicated to Giant Scale. Horner Sales has undertaken an ambitious effort with their twin cylinder Phase II Custom 3.7 CID engine and its "all-out" companion, the T.O.C. Special. Both use the well proven Kawasaki cylinders. Look for an expanding product line from this company, especially a CDI ignition system that uses a "Y" connector and microprocessor to provide a "fail-safe". This system can be retro-fitted to any Horner engine. Randy Villines has also said to expect a new line of performance, Giant Scale kits.

One in-grained expectation about two cycle engine advancements has always been more and more RPM. Not so with the OPS 30 Maxi now available from Shamrock Competition. This 30cc engine has been designed to swing a 22 x 8 prop at 5500 RPM on a fuel mixture of 8% castor and 92% methanol. It has a Dell-Orto FTRC diaphragm pump and regu-



ROBINAIRE, P.O. Box 8770, Coral Springs, FL 33075-8770. This new type tail wheel bracket caught our eye. Protruding wire enters rudder. Other end is inserted into a slot at the tail cone of the fuselage. Simple and effective!

lator and a specially coated aluminum cylinder that is harder than chrome.

Some gorgeous kits premiered at Toledo. One very impressive plane was Mallory Models' Lockheed P-38 *Lightning*. Bill Hinnant has given modelers a super deluxe fiberglass kit with lots of extras and the potential for a lot of scale detailing. He said the new Super Tigre S2500s would be a great pairing for this plane.

For you Stearman fans, Bob Dively Models expects to introduce a PT-17, 1/4 scale kit in the fall. It will be actual scale and feature keel construction. Estimated weight will be in the 25 pound range and a 2.4 to 4.4 cubic



BOB MARTIN RC MODELS, INC., 11178 Penrose St., Unit 4, Sun Valley, CA 91352. The fabulous *Hobbie Hawk* (center) is back in full production, this time from Bob Martin. Exact reproduction of Hobbie Alter's original design.

inch engine ought to pull it.

It seems that whenever a new Giant Scale kit or plan shows up, T&D Fiberglass Specialties is right on its heels with an appropriate cowl, wheel pants, or canopy. Among some of their new offerings are a cowl for Wendell Hostetler's Turner Special and a full length cowl for Orline's Fairchild 22 with scale type openings already molded in.

Believe me, there was lots more than I've already told you about so keep your eyes open for many new and versatile Giant Scale products which will be appearing in ads or articles this coming season.—FRANK FANELLI

August 19, 1984



flying models

4th Old Timer Contest

To Be Held At: _____

Carsten's Publications
Fredon, New Jersey Office Site

No Entry Fee!

Sponsored by FLYING MODELS Magazine
& Hosted by the Old Time Eagles MAC
Contest Director: Joe Beshar
AMA Sanctioned - 10:00 AM to 4:00 PM

Events (per S.A.M. rules):

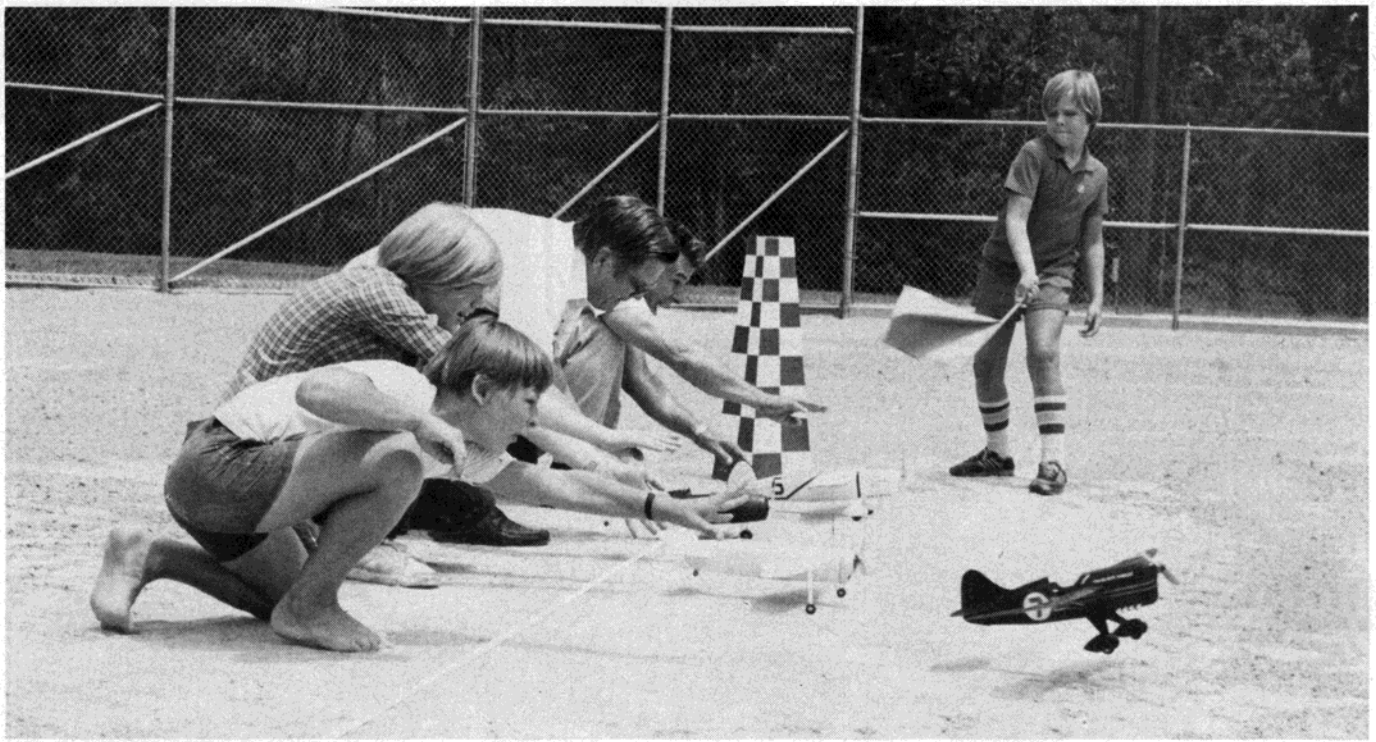
R/C Assist
Class A-B Glo (7 min. max)
Class C Glo (7 min. max)
Class C Ignition (7 min. max)
Antique Ignition or Glo (10 min. max)
1/2A Texaco (15 min. max)

Engine run
20 seconds
20 seconds
30 seconds, converted; 40 seconds antique
10 sec./lb., ignition; 7 sec./lb., glo
two flight total

Directions from major arteries: _____

From Int. Rt. 80 West: Take exit #25 to Rt. 206 North. In center of Newton, make a left turn at Shelby's Department Store and a left turn again onto Rt. 94 south. Travel approximately four miles to blinker light and make a left turn. Entrance is second driveway on the left.

From Int. Rt. 80 East (Pennsylvania): Take exit for Rt. 94 North (approximately three miles east of Delaware Water Gap). Travel approximately 18 miles to the Fredon School. At the blinker, make a right turn. Entrance is second driveway on the left.



PHOTOGRAPHY: BRIAN CORMACK

Golden Era Air Racing (G.E.A.R.) is off and running. Utilizing CO₂ powered models of the famous racing planes of the 1930's the group above launches

another heat in this unique new free flight event spawned from the imaginations of the author and his colleagues at Walt Disney Productions.

Golden Era Air Racing

By Richard Theiss

The glamorous heyday of air racing returns again in CO₂ F/F form. A novel event.

As a scale modeler, I have always desired to build and fly craft that not only looked realistic, but would also perform with the same realism.

Having been a model builder for the past 44 years, I've been involved in and with just about every kind of model activity devised, and yet, only recently have I come to know true scale model flying in every phase, from construction to flight.

Interestingly, the answer to my quest for a true scale (i.e., one that would make a convincing ground roll, lift its tail, and climb gradually at a truly scale speed, and then actually make a reduced power approach to a wheel landing) was at my finger tip back in 1946.

It was at Christmas of that year when my father gave me my first CO₂ motor. I didn't realize at the time, but my new power plant had the ability to provide every one of the

demands for scale flight. Of course, there were refinements to be made over the years. In '46, my pylon wing mounted contest free flight, carried the heavy CO₂ tank aloft along with a bleed-off device. Today, a very light tank carries the compressed fuel and provides for a much more efficient power/weight factor. In addition, CO₂'s of the present are much smaller than their predecessors although they can still swing surprisingly large propellers. In fact, I have found that the stock plastic props provided by the two major producers of these motors are, at best, very disappointing. All in all, the changes made over the years have been for the good, and I now have tons of flying fun from a mere ounce of motor.

In March of 1981, I was transferred from my normal theme design responsibilities to the W.E.D. model shop at Walt Disney World where I would be working on the EPCOT scale model until its completion on June first

of that year.

Having been a modeler at heart most of my life, I naturally looked forward to my new assignment. Most people would think that professional scale modelers would use their breaks and lunch hours for rest, relaxation, and the pursuit of physical replenishment...but...not so. At least such was not the case for the small group I found myself working with.

These periods found the WED pros hard at their individual projects, and so I too pursued my interest in model planes. Before long, the others were asking about my two 3/4 inch scale Golden Thirties biplanes and about the CO₂ motors that were to power them. I remember being surprised that no one in the shop had known of the development of compressed air for piston-powered craft.

Having sensed the sincerity of their interest, I further baited them with a stack of magazines I had borrowed from the Wings and Wheels Museum. The *Popular Aviation* publications were dated from 1929 thru 1939.

That did it!

The articles of most interest to the group centered around the pilots and planes involved in the National Air Races. Along with the stories presented were pictures and drawings of the winning craft. The drawings, as prepared by Carl Goldberg, were for rubber power and could easily be modified to take the CO₂.

Model Shop Supervisor, Paul Dennis, was the first of the model plane converts to swing into action with the building of a 16 inch span, P-6E kit. About a week later, he bought the first Telco any of us had ever seen. I would have given just about anything to have recorded the expressions on the faces of the group when with one flip, the little jewel did its stuff. Expecting the loud, high-shrilled scream of the normal model gas engine, we all were surprised and delighted with the realistic, throaty roar that seemed

to go on for minutes. And then, as the RPM started to drop off slowly, there was a final short blast of power. We since have found that the realistic sounding shut down is the standard cap-off for a normal Telco CO₂ run.

That little demonstration was responsible for the acquisition of eight more motors of the same type.

Even after changing the power setting of the motor, Paul's test flights were most disappointing. At best, the tiny bi-plane flew in a slow sink to the ground even though the CO₂ was running wide open. This bothered me, as I remembered the tremendous power of my compressed air engine so many years ago.

A serious look at the stock plastic prop provided soon established it as little more than a novelty. Further testing with wood props showed the small power plant capable of swinging up to an eight inch diameter with a #6 pitch at a loss of only a few RPM. I used a Dremel to sand the heavy hub and blade root areas of the wood propellers in order to cut down on weight. In addition, I plugged the shaft hole with a hard wood dowel and re-drilled for the much smaller CO₂ shaft.

Eventually it was decided that we would stage our own miniature national air races and build only Golden Era craft. It was further decided that a scale of 1" = 1'0" would be the best match for our motors.

Although we had the plans in the older magazines to build from, drawings for other racers were next to impossible to find.

I, myself, desired Art Chester's fast and famous *Goon* while my 8-year old son fell in love with a picture of the *Jeep*. Try as I may, I could find only pictures of both planes and so started construction on what might be described as modified Chester racers.

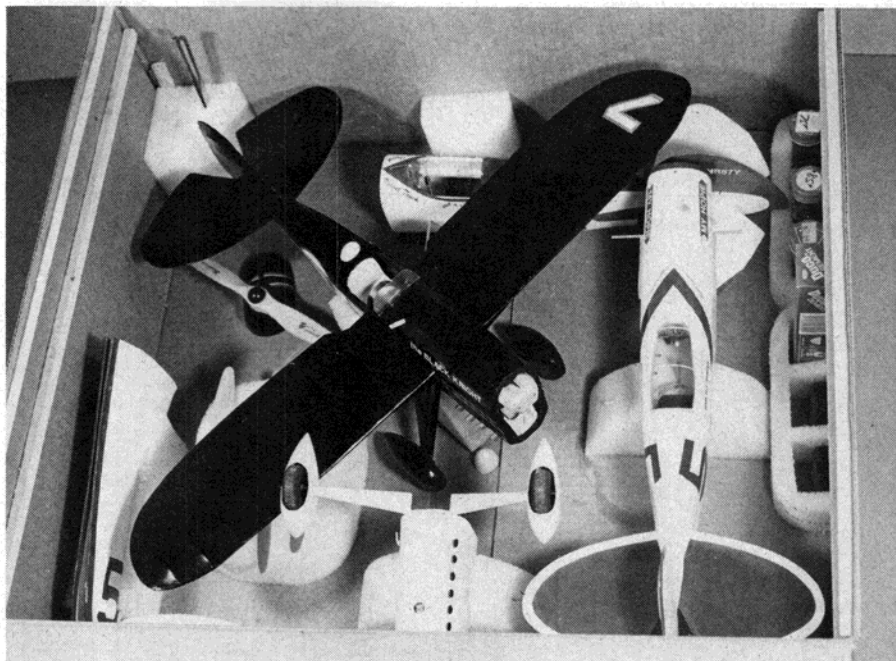
Our big break came when one of our group introduced me to a Martin Marietta engineer by the name of Art Hall. As it turned out, Hall is an aircraft historian specializing in Golden 30's racing. The real icing on the cake came with the discovery of a fantastic set of 3/4 inch and 1 inch to the foot scale drawings of Golden 30's racers drawn by Art. These drawings too were set up for rubber power and could easily take a CO₂.

Soon we were all building race planes during our break periods, and I was day-dreaming about race horse starts and how my number five would be showing the other racers the short cut thru the pylons. The latter part of my fantasies were shared by the rest of the gang and the humorous threats of what each racer would do to the others created the kind of atmosphere not often found in offices and shops today. Actually, our new-found pastime was having its effect on our homes also. Those of us with sons who were old enough were building teams of racers, and the wives seemed to join in with our efforts. Because of the CO₂ being gasless and greaseless along with almost noiseless, it was possible to test run in areas other than the confines of the garage or basement.

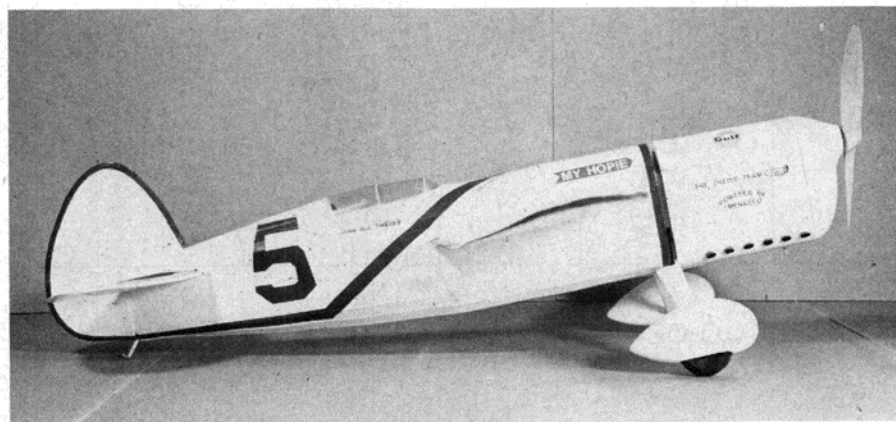
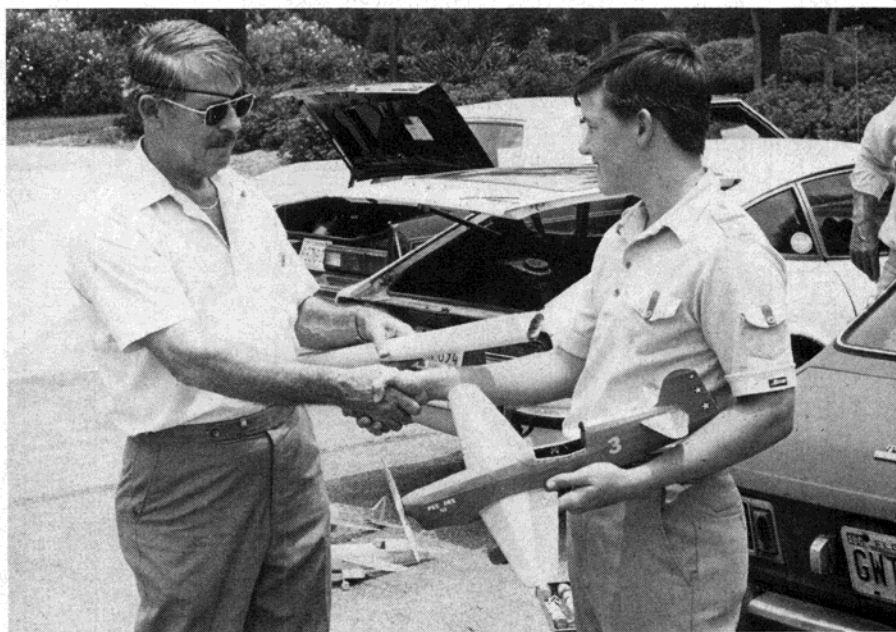
Interest was spreading to other departments and reports of construction were starting to roll in.

Among the first batch of planes under way were: two British *Mew Gulls*, two *Gee Bee Model D Sports*, a *Hughes-H1*, a Turner Laird *Meteor*, a Chester *Goon*, a modified *Gee Bee Sportster*, a French *Caudron*, a modified Chester *Jeep*, a modified Chester *Goon*, a *Gee Bee R2*, and an *Unknown Craft* being built by Sr. Artist, Jack Hood, the latter adding an air of mystery to the activities.

FLYING MODELS



The Theiss Air Racing Team packed and ready to go (above) for another day's activities. The "plug-in" construction concept facilitates transportation as well as maintenance. Wes Dennis accepts the victor's award from Art Hall for winning the Shell Speed Dash with *Pee Dee III*, a British *Mew Gull*.



My Hopie, an Art Chester *Goon*, was the author's choice for Golden Era racing. The scale employed, one inch equals one foot, seems to be the best match for the motor/propeller combination used in these planes.

OFFICIAL G.E.A.R. RACE COURSE LAYOUT

NOTE: LINES NOT MARKED ON COURSE BOUNDARIES

FINISH JUDGE

72'-0"

HARD, SMOOTH SURFACE

WHITE TAPE FINISH LINE

FINISH FLAG MAN

(NOTE: LONG COURSE - 176'-0")

88'-0"

THOMPSON TROPHY RACE SITE
(NOT TO SCALE)

60"-HIGH PYLON

FINISH

STOP WATCH TIMED

88'-0"

SHELL SPEED DASH

STARTER WITH FLAG

FIVE STRIPS OF WHITE TAPE - 36" LONG - NUMBER AS SHOWN - 8'-0" O.C.

WHITE TAPE STARTING LINE

FOUL, OBSERVER

ONE PLANE-FLIGHT PATH

START

I found great delight in watching the progress and skill of those who had not built model planes before. They were not only learning, but totally enjoying themselves.

It was decided that we would test all of our planes at the same time, in as much as most of the fellows had little experience with flying model planes. I reasoned that we could pre-set our craft for the realistic race horse starts with as many as five contestants on the line at the same time. The planes, I was sure, should raise their tails and move out in a low, straight flight. They should, I further reasoned, fly a distance of about one hundred feet before making a reduced power landing.

This was my thinking, although I had not completely tested my theories. So as to get an indication of things to come, and have a chance to leave the company, county, and state if all did not work out; I packed up my son and his modified *Jeep* and braved a cool Saturday morn for some secret testing. I had pre-selected a parking lot that I felt would be of an adequate size to accommodate the needed tests. The planes were perfectly balanced, and I could see by a few running glides, during which I never let the racer fly completely free, that it would take a pretty fast glide to accomplish a good landing; but, would it really be necessary for it to ever land power off? After all, the real *Chester Jeep* needed some 90 MPH to touch down and if our little *Jeep* could be held to about 24 inches altitude, the gradual reduction of the CO₂'s power would surely let it down at a decent angle of approach. I forgot about trying any hand launched glides. Testing these scale racers would probably have to follow the same procedures used by the builder pilots of the originals. So . . . to start off, I had my son hold his plane until most of the power had bled off so that the taxi run was short and slow. Each run had a slight increase of power, but on the fourth run of the CO₂ cartridge, Shawn misunderstood my signal and released his model at full power. It was fortu-

nate that on that fourth run full power was somewhat less than the first run full power. As it turned out, the premature release of the *Jeep* proved to be most encouraging. After making a very fast start, the little racer lifted its tail and tried to fly. Its left gear raised for a distance of about three feet and then settled again for a run of another fifteen feet. Next time the air speed was sufficient for flight and fly she did. I don't believe the model gained more than 24 inches altitude while traveling a distance of at least 200 feet. It made a slight arc to the left while at full power and then turned only slightly to the right while settling in for a landing. A smooth wheel landing would, I'm sure, have been made had the plane not run out of hard surface and flipped in the grass.

I was delighted with the tests and so happy, too, to have the racer still in one piece, that I decided to conduct any further flights with the rest of the gang, en masse, on the test day.

Now armed with renewed confidence, I scheduled the next two weekends for fun flight days. I tried to indicate and stress the enjoyment of flying models together rather than success and joy based on perfect flying results only. You see, I was still trying to protect myself from what might turn out to be a day of flying disaster.

I managed to find a much larger parking lot for the testing of seven racers, and the two weekends provided us with much needed information in addition to a whole lot of fun.

By meeting early in the morning, it was possible to test in wind conditions that ranged from zero to about 12 MPH. We found that as the wind picked up, our craft had the tendency to fly directly into it. In fact, the wind seemed to enhance a straight flight path and to our further surprise, the planes ran out of hard top even with the head wind conditions. Much of the time we found ourselves having to stop or catch our racers in mid-flight before they crashed into the sur-

rounding parking lot curbing. Happily, we recognized the need for an even larger race site, and the search for the very badly needed area led to my making a phone call to the management of the Wings and Wheels complex here in Orlando. Manager, Robert Hagood granted the use of the air museum's parking lot on Saturday mornings between the hours of 8:00 a.m. and 12:00 noon.

The time seemed right for us to hold our first meeting so that we might establish a basis for our future contests.

Rather than call our newly formed group a club, we chose to refer to ourselves as members of a Board. Being that the model sport we were establishing was a new form of free flight racing, it was further decided that we would be of more use to ourselves and expanded interest by serving as a Board of Directors, establishing and maintaining the rules and regulations needed.

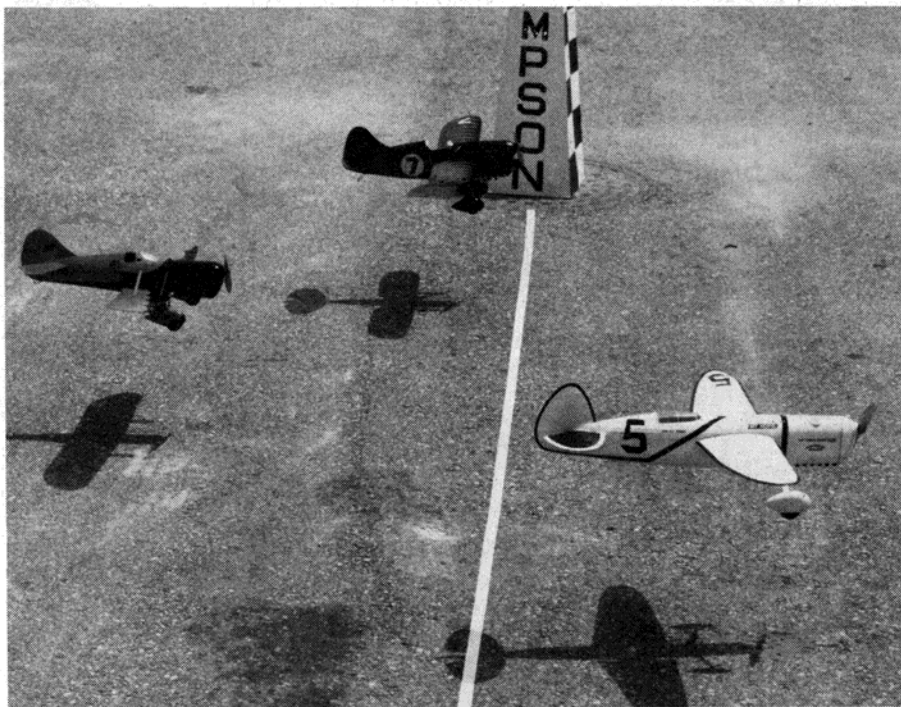
It was evident early in the formulating of the contest guidelines that two basic classes of racers would be needed. Some of our members had built very scale craft while others felt the need to modify their planes, if only slightly. Then too, our younger members who were for the most part, sons of our co-workers, thru lack of experience, had not produced their racers to the point of being truly scale, so the scale and modified classes were established. In keeping with the pure intent of the sport, we felt the need to stress realism in the craft of the modified division. The design of these craft would be based on proven designs of the period and use cowling of a size and shape required to house engines used for Golden Age racing. In addition, cockpit areas must be large enough to accommodate the builder-pilot at 1 inch to the foot scale. Younger modelers must estimate their size at maturity in order to comply with this ruling.

All rules and regulations are based on the three different kinds of races run during the Golden 30's. The Shell Speed Dash was a single plane event racing over a measured mile. A distance of 88 feet between pylons is used for the computing of 1 inch scale speeds. Currently our racers are turning in speeds from 150 to 250 scale MPH, just about on the button when compared to the official records of the early 1930's.

Again, the Bendix was a single plane, stagger start, cross country race against time and was most often flown from Los Angeles, CA to Cleveland, OH. For this event, we give each contestant three flights starting from a single pylon. The total distance of the three flights, flown in any desired direction, constitute an effort of that entry.

The Thompson Trophy Race was the most thrilling event for both the pilot and spectator of the 30's . . . and . . . so it is for us today. We, of course, do not have the ability to race our free flights around the pylons as the real craft did during this closed course race. However, the race horse start with five planes on the line . . . all with the intent of being the first to cross the finish line between two pylons . . . provides just about as much hot action as the human heart can take. It is amazing to hear all of the threats, cheers, and post race yacking that a few moments down the course can generate.

Our first racing season had its official start on Saturday, Sept. 12, 1981. Disney's Master Model Builder, Art Millican, agreed to serve as chief judge for the day. He arrived with bucket in hand containing two large sledge hammers and a coil of barbed wire for the fin-



Three racers cross the finish line during Thompson Trophy activity. The nice feature of Golden Era racing is that it allows you the double thrill of being both "racer" and spectator.

ish line. Although the comic gesture relieved some of the first event jitters, it also created a reverse effect on the already jangled nerves of some of the younger racers.

The majority of the events were held on the concrete parking ramp next to the Wings and Wheels complex at Orlando International Airport. The thrills, chills, and lessons learned from the many flights of the maiden sport year are another complete story.

In short, our flight activities very closely paralleled those of Whittman, Turner, Chester, and the lesser greats of the Golden Thirties. We've had everything from craft that just couldn't be made to lift off to those whose flights ended up in the side of a hanger because of not being able to lessen the distance flown after crossing the finish line. We have even had a mid-air crash with one racer spinning into the deck, the other going on to make a safe landing.

The success of the effort, I believe, is the single fact that even though the race planes operated off of and back on to concrete, not a single wood prop was split or broken.

Our first season's grand champion was a British *Mew Gull*, *Pee Dee III*, flown by Wes Dennis of the Dennis racing team.

The craft won the first Shell Speed Dash with the scale speed of 218.16 MPH. It nosed out a modified *Chester Goon*, *My Hopie*, whose time was one-tenth of a second slower resulting in the scale speed of 214.93 MPH.

The Dennis ship took top honors in the Thompson events and copped a third in the Bendix Cross Country.

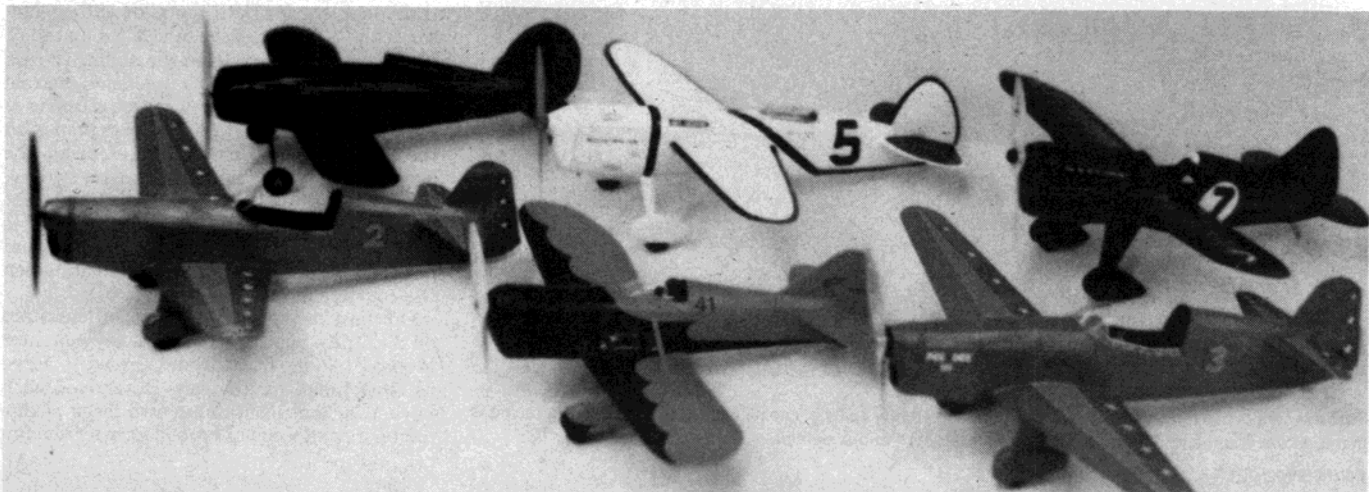
After Wings and Wheels closed, we transferred our Saturday morning activities to the Disney property and raced off of a clay surface. It was in this new setting that the No. 5, *My Hopie*, showed her stuff by turning in a long distance flight of 300 feet, one inch, good enough to claim the Bendix trophy and break the winning streak of the Dennis team. Now, with much learned from past racing seasons, pilots are busy at designing, building, and tuning new and existing craft. In retrospect, I've come to realize that model building has been a contributing factor in the consolidation of a goodly number of the homes of our nation for many years, and if we can bring even a few more moms, dads, and families to the level of joy and learning we are experiencing, then it will surely all be worth the effort.

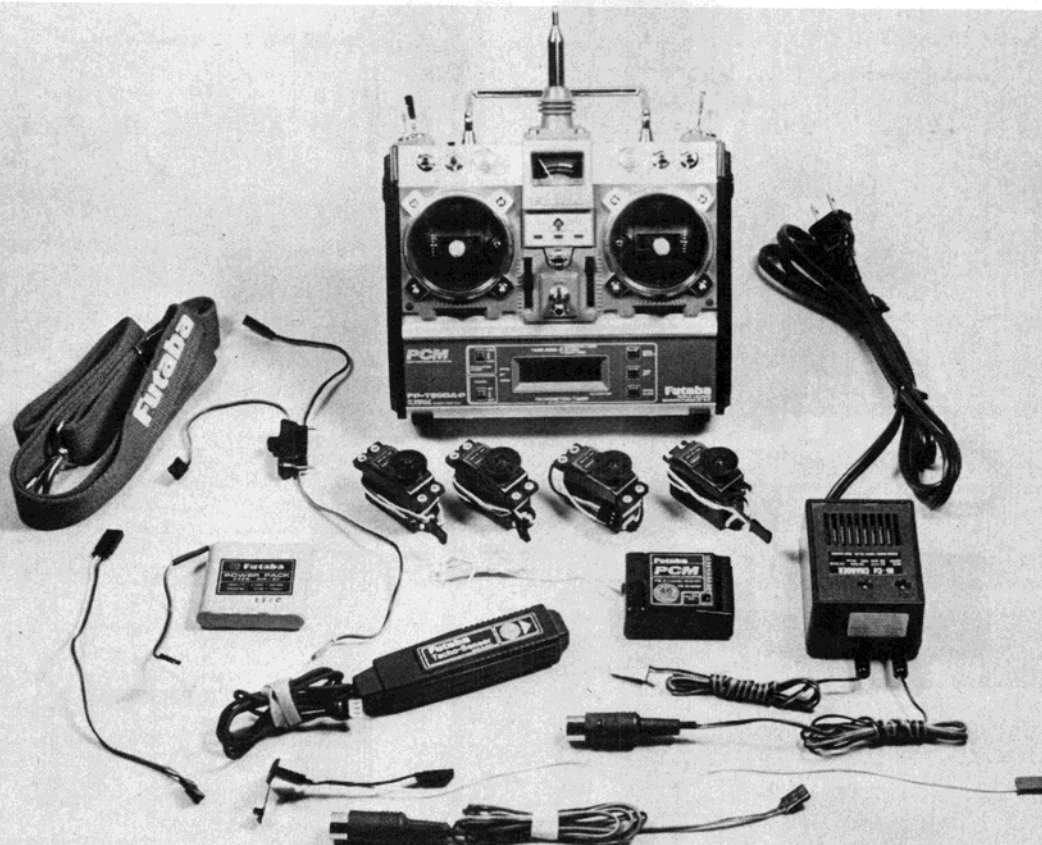
Anyone wanna race?

I'm sure they do, Rich, and to start them off right, we're going to present your My Hopie design in the next issue of FLYING MODELS.—Ed.



That's Brian Cormack, official G.E.A.R. photographer (above left) getting ready to launch his *Velvet Touch*. Shawn Theiss (above right) cheers his dad's *Chester Goon* on during a practice heat. Art Hall (below) shows off his almost complete *Laird-Turner Special*. His wealth of scale drawings really helped realize this event.





PHOTOGRAPHY: BOB ABERLE

The complete Futaba Model FP-8SGAP PCM R/C system. This new "1991 capable" system was designed primarily for aircraft operating under the FAI

F3A aerobatic rules and will list, with four servos, for \$799.95. In the foreground is a Direct Servo Controller (DSC) for ground operation of system.

An FM Product Review:

Futaba's PCM System

By Bob Aberle

One of the most sophisticated radio systems to appear to date. Read this one carefully.

As a point of information, R/C modelers were only permitted to use an "AM type" signal transmission prior to the major FCC rule change that went into effect in December, 1982. Other forms of R/C emissions, such as FM, SSM, and even PCM, have been used in other parts of the world for many years. The new FCC rules now make it possible for FM and PCM/FM systems to be sold and operated in the United States, provided that the equipment passes the necessary type certification. In the past year and a half we have seen many new FM R/C systems introduced into the U.S. market. The subject of this product review is the new Futaba PCM or pulse code modulation system. Unlike the more usual AM or FM analog systems,

which employ a variation in pulse width to effect servo position changes, the PCM concept actually transmits a digital code to the receiver. Exactly how it does this is difficult to explain in understandable terms. Jim Oddino gave a good, although quite technical description of PCM in his March 1984 RCM column (page 94). One of the primary problems noted with other attempts at PCM R/C in the past has been the somewhat poor servo resolution that resulted. That was certainly not the case with this particular new Futaba PCM system, so they have apparently "broken the code".

Not only does this Futaba system employ a new form of coded emission, but it also contains possibly the largest array of special control features (aided by a microprocessor)

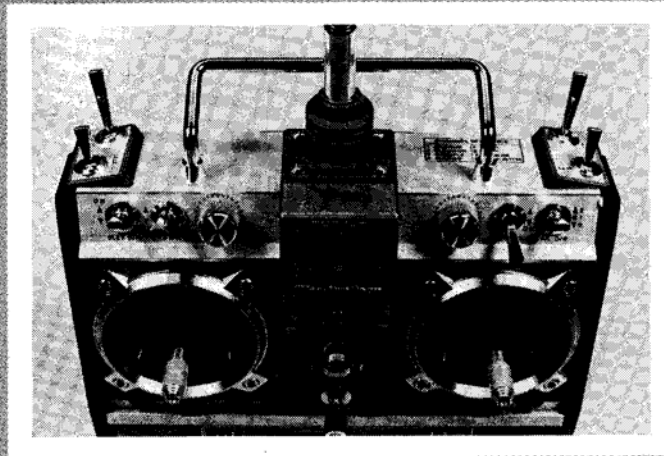
ever to be placed into a commercially available R/C unit. To reduce some of the complication that may result, let me try to review this system in the following order: (1) a brief discussion on PCM and what it can possibly do for you; (2) describe the basic Futaba PCM system; (3) cover the more "conventional" special control features; and, finally, (4) try to outline some of the brand new "goodies" available on this radio. Admittedly this review couldn't possibly cover every single aspect of this system because of space limitation. After reading this article, if you have any specific additional questions, please write to us at the magazine and we will try to help answer them (and learn at the same time ourselves).

PCM — what will it do for you?

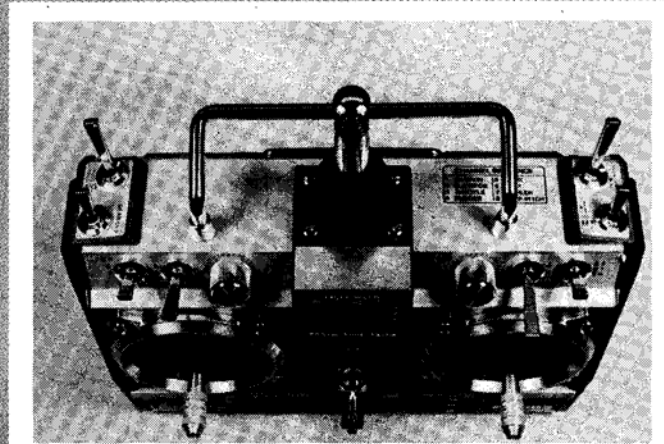
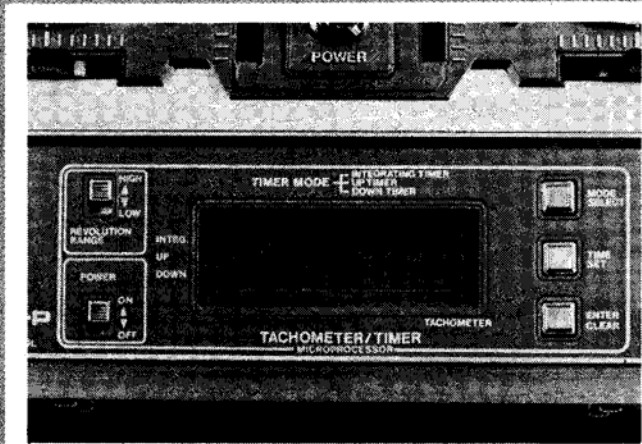
Because of the detailed nature of the digital coded signal, only the mating receiver on the same frequency is likely to respond to the proper transmitted commands. As such, interfering signals from other R/C systems or outside commercial radio sources will have difficulty "getting to" this PCM receiver. Up until now I have made it clear that a "1991" R/C receiver, one that will operate in the full 50 channel (20 kHz spacing) environment beyond January 1991, must be of dual conversion circuit design. Or, if not dual conversion, at least the receiver should have an "odd" intermediate frequency (i.f.) other than the usual 455 kHz. This new Futaba PCM receiver is definitely narrow-band from a selectivity standpoint, but it is also very definitely a single conversion set employing a 455 kHz i.f. However, I must point out that my flight testing to date has indicated that



The front view of the transmitter (above) can't show the "hidden" features such as control stick assemblies which can be slanted (with respect to the neutral position) or adjustable control stick tension. Incorporation of a tachometer/timer (below) on the front panel not only handy but good for battery management with the higher current drains exhibited.



View of the top of the transmitter front panel (above) shows the elevator dual rate switch at extreme left and aileron dual rate at extreme right. The two rotary knobs are two proportional channels (6 and 7). In this top view, the retract switch (below) and the rudder dual rate are at the left while the snap roll switch and a mixing function switch is at the right.



the PCM coding technique makes it essentially immune to all outside interference. This Futaba receiver passed the same tests as were noted with the Kraft KPR-8FD dual conversion receiver (see *FLYING MODELS* September 1983, pages 23-31). A test transmitter signal operating just 10 kHz away from the PCM signal (which was on Channel 46) resulted in perfect, uninterrupted flying. This was true, even when the model was flown within 20 to 30 feet of both transmitters. On a variation of this same test, the 10 kHz away "interfering" transmitter's antenna remained in the fully extended position, while a helper continued to collapse the antenna on the Futaba PCM transmitter. I was able to fly the model out several hundred feet from me with the PCM transmitter antenna collapsed down to just one section in length and still was able to maintain perfect control. Again, the interfering source was operating at the full 750 MW output level, just 10 kHz off my flying frequency. Even in 1991, the closest another modeler could operate to your channel would still be 20 kHz away. Get the picture?

Another test was run to determine if third order intermodulation products might "hit" our operating frequency of Channel 46 (72.710 MHz). We set up two other R/C transmitters on Channel 48 (72.750) and Channel 50 (72.790). All three transmitters were located directly next to one another. By doing this, the second harmonic of 72.750 (2 ×

72.750) or 145.500 beats against 72.790 (145.500 less 72.790) which exactly equals 72.710 or our flying frequency of Channel 46. Again the model flew flawlessly, even as it approached within 20 feet of all three transmitters. By the way you wouldn't normally be doing a stunt such as this, especially with ordinary R/C equipment. Always separate your flight line transmitters by at least 30 feet for maximum safe flying.

As a final test we went one better and flew the PCM system while two other transmitters, both on Channel 46 (the same channel) were also in operation. All three transmitters were located directly next to one another. Even at that, only one of the two interfering transmitters got through to the PCM receiver and even then the interference was short lived with the help of the fail safe feature that got it through the rough spots. So the conclusion I draw from this is that the Futaba PCM receiver can qualify at this time as a full "1991" capability unit, much the same as the Kraft KPR-8FD and the new Novak NER '91 AM or FM receivers.

Basic Futaba PCM system details

The specific system reviewed here is the Futaba Model FP-88GAP which is an eight channel PCM unit designed primarily for the FAI R/C aerobatic (F3A) competition flyer. Details of the F3A maneuvers, or what has become known as "turnaround pattern" can be found in the March 1984 issue of *Model*

Aviation (page 114). List price of this very sophisticated and complex system is \$799.95, although the actual selling price has been noted to be much lower than that. Still it is possibly one of the most expensive R/C systems presently offered on the market. A typical system consists of an eight channel transmitter and receiver, full nickel-cadmium battery packs, four servos, a switch harness with bulkhead mounted charging jack, dual output battery charger and cables, tachometer sensor and cable, new style frequency flags, servo trays, a heavy duty neck strap, assorted servo mounting hardware and extra output arms, and finally, a 37 page complete instruction manual which is literally jammed with information. The new Futaba PCM systems are available in both Mode II and Mode I stick configurations. We also saw a single stick prototype demonstrated at Toledo and were told that it would be available by the end of this year (I can't wait!). A special helicopter version of this system is also offered. You have a choice of any of the 11 new R/C aircraft channels or six meter frequencies. Warranty period is a full 180 days.

Starting with the transmitter, the case is typically 7 1/2 inches wide × 7 1/2 inches tall × approximately 2 1/2 inches thick (less the control stick projections). Weight is 2 3/4 pounds, which makes that heavy duty neck strap all the more important. Control stick assemblies have several adjustment possibilities. The neutral position of the stick can be slanted

slightly to either the left or right (either stick assembly). Stick length can be adjusted and, finally, from the inside of the case you can alter the spring tension with a simple screwdriver adjustment. Basically these open gimbal sticks, with dust covers, were very precise.

There is a top carrying handle and a rear mounted fold out stand for use at the flying field. The antenna is a ten section whip which extends to 42 inches and collapses almost completely into the case. Power output was measured at close to the 750 milliwatt legal limit. Futaba claims a total transmitter power drain of 250 mA from the internal, eight cell, 500 mAh battery pack. As such, their recommendation is to fly approximately ten, ten minute flights, after which recharging would be necessary. If you use up to the full complement of eight servos, be especially careful of the current demands. Battery voltage is available at the side mounted transmitter jack for test purposes. However, you will need a special connection to plug into that jack. Hopefully, Futaba will offer it separately for those interested.

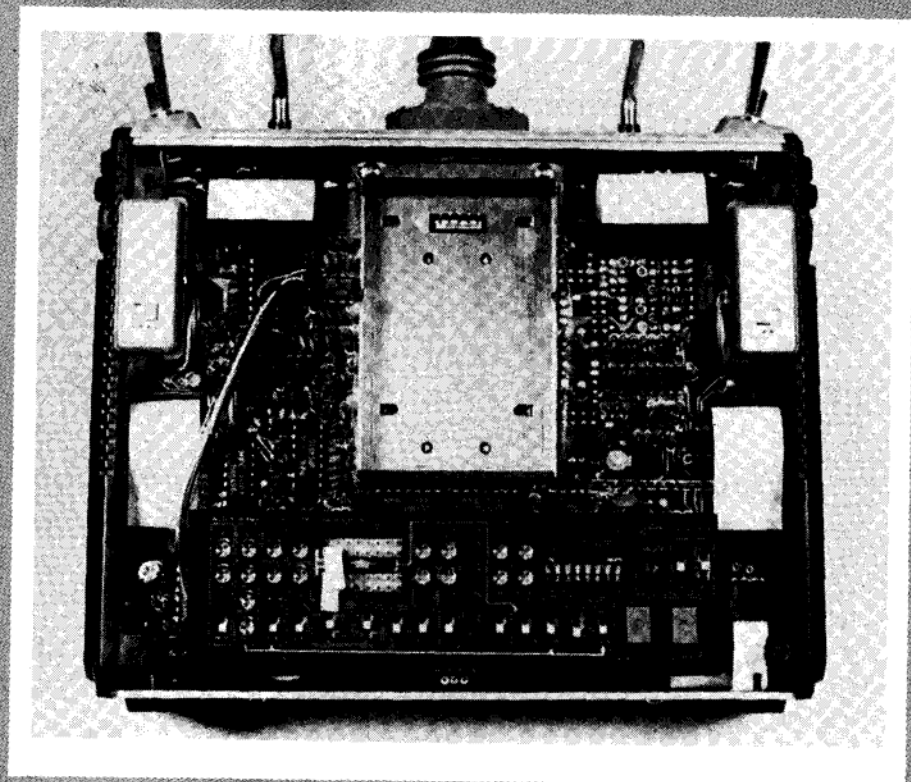
All channel trims are electrical and have ratchet devices to prevent unwanted movement. Typical trim travel is ± 12 degrees or 24 degrees total. Be careful to note that the typical elevator and throttle trim locations have been reversed (what we call cross trim). Elevator trim is at the left side, while the throttle trim lever is located next to the right side control stick assembly. Channel 5 is a switch operated function for retracts. Channels 6 and 7 are operated from two rotary action knobs located on the top front panel of the transmitter. One of these functions is intended for flaps and the other for spoilers. And finally we have Channel 8 which is a proportional lever operated function, located on the side of the case, and intended for propeller pitch control.

In addition to an output meter, Futaba has a main power "On" LED indicator light (near the switch) that flashes when the transmitter voltage drops below some unspecified minimum level. Only problem with this is the fact that the LED is almost impossible to see in direct sunlight. At the bottom of the transmitter front panel is a built-in timer and tachometer with an LCD read-out. More on that later!

Futaba's new Model FP-R118GP PCM receiver measures $2\frac{1}{4}$ inches long \times $1\frac{1}{2}$ inches wide \times $1\frac{1}{16}$ inch thick and weighs only 1.9 ounces. All eight channels, the battery, and the special DSC cable plug into a single block type connector located on one end of the case. The crystal is removable and is accessible from the outside of the case. Antenna length is 42 inches. The connectors employed throughout the system appear to be the Futaba "J" series variety, not the standard type as seen on the popular "G" series equipment. There are two other items on this receiver worth mentioning, namely the "Hold/Fail Safe" switch and an LED indicator, which will be described later. As explained earlier, this is a single conversion receiver with a 455 kHz i.f., but my testing has indicated that it will qualify as a full "1991" capability receiver thanks to the PCM coding. Selectivity was proven to be as good as 10 kHz which is excellent.

The servos supplied with this PCM system are designated as the Futaba Model FP-S130. They measure $1\frac{1}{2}$ inches long \times $1\frac{1}{2}$ inches high (plus the output arm) \times $\frac{1}{4}$ inch thick and weigh about 1.5 ounce each.

FLYING MODELS



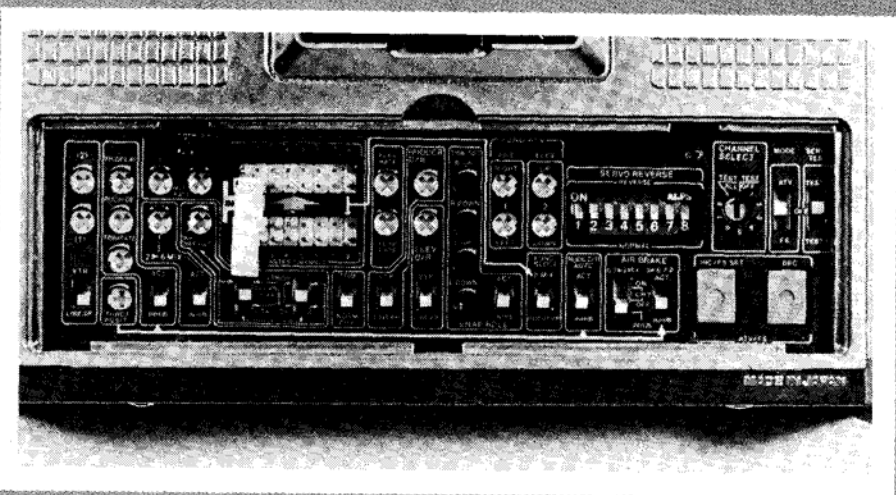
A college degree would help! The inside of the transmitter is extremely complex and houses the program board for all the functions. The RF frequency module goes in the silver box at the center.

Output torque is claimed to be 55 ounce-inches. Transit time is 0.24 seconds for 60 degree rotation and 0.36 seconds for full 90 degree rotation (which is very fast!). These servos have a double ball bearing output shaft, a water and dust tight seal, and a spline gear on the output hub permitting easy control linkage adjustments. In my testing I found these servos, fast, quiet and very precise. On return from a full control excursion (from either direction) the servo would center to within $1/4$ degree or less every time. Operation was always very smooth, and no "step effect" or buzzing was ever noted.

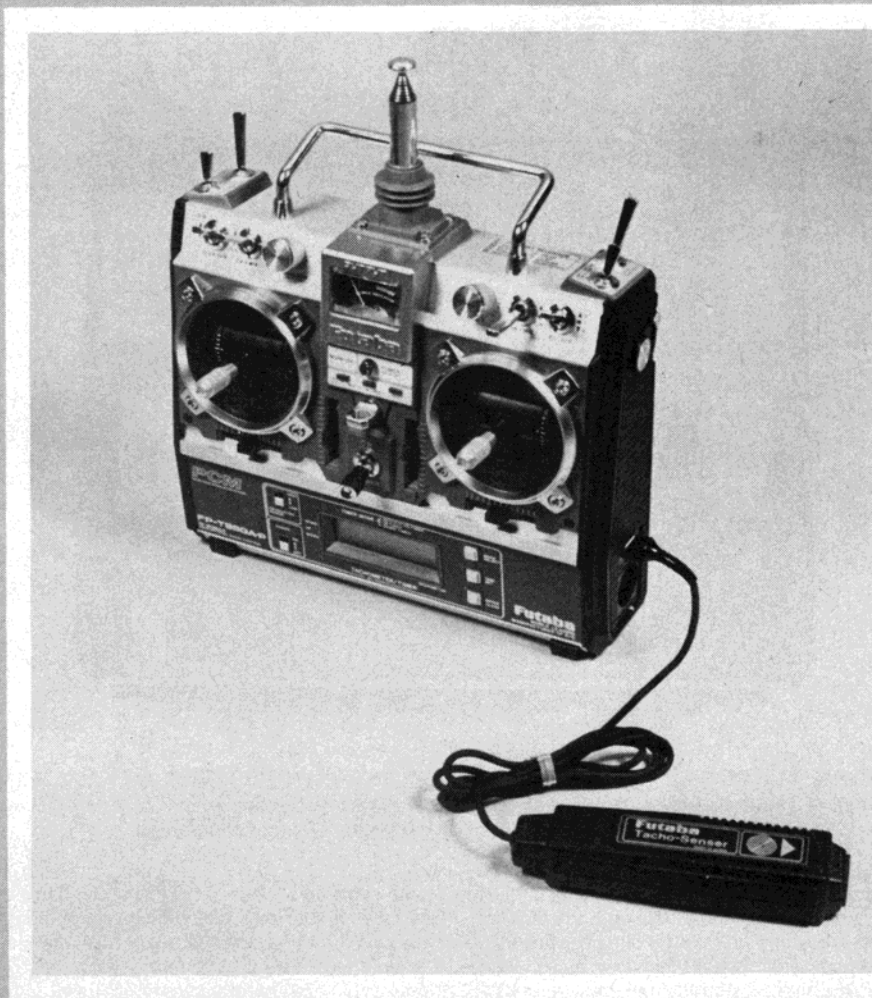
The airborne battery pack is a standard Futaba Model NR-4J style consisting of four AA size, 500 mAh cells covered with heat shrink tubing. This pack weighs 3.5 ounces

with cable and connector. The switch harness includes a charging jack which, via an adaptor cable, can be attached to a fuselage side or bulkhead. It's a little extra work, but by doing this Futaba apparently achieved a degree of commonality with some of their other systems.

Total airborne weight is around 12 ounces with four servos. Add 1.5 ounces for each additional servo. Receiver current drain was a rather high 44 mA (with the transmitter signal on). Each servo idles at approximately 10 mA (although it stated 5 mA in the specifications). So a total of four servos plus the receiver will idle at around 85 mA. Add four additional servos for extra control functions and the idle current (without any servos moving) would be 125 mA. While operating a single servo in continuous motion, the current



Careful examination of the rear program board of the transmitter reveals the extraordinarily varied capabilities of this system. Careful reading of the system manual required to fully utilize its potential.



Part of the system is an optical sensing device which plugs into the side of the transmitter and is used for the tachometer function. Point the device at the prop and the LCD display on the front panel reads out RPM.

drain was noted at 325 mA. With two servos in continuous motion, the drain totaled in the order of 650 mA. So the message is quite clear; both the transmitter (as noted earlier) and the receiver system have higher than usual current drain. Battery management will definitely be an important aspect of using this system properly. As you will see later, there is a battery fail safe feature built into the system.

Special transmitter controls

The special controls are operated by a combination of externally mounted switches and levers located on the top, front, sides and rear of the transmitter case. In addition, a removable rear panel cover will give you access to a total of 47 individual pots, switches, and "patch panel" plugs. Futaba supplies a small screwdriver which is helpful when operating some of these tiny controls.

To start with the more familiar controls, all eight channel functions have servo reverse switching. The aileron channel has dual rate control with two separate cut-back positions. Elevator and rudder have standard dual rate control. The rudder dual rate can be set in an "auto" mode which is tied into throttle commands. Adjustable throttle limit (ATL) provides throttle trim only when the main throttle stick is in the low position. Throttle trim has no affect at the high (full) throttle.

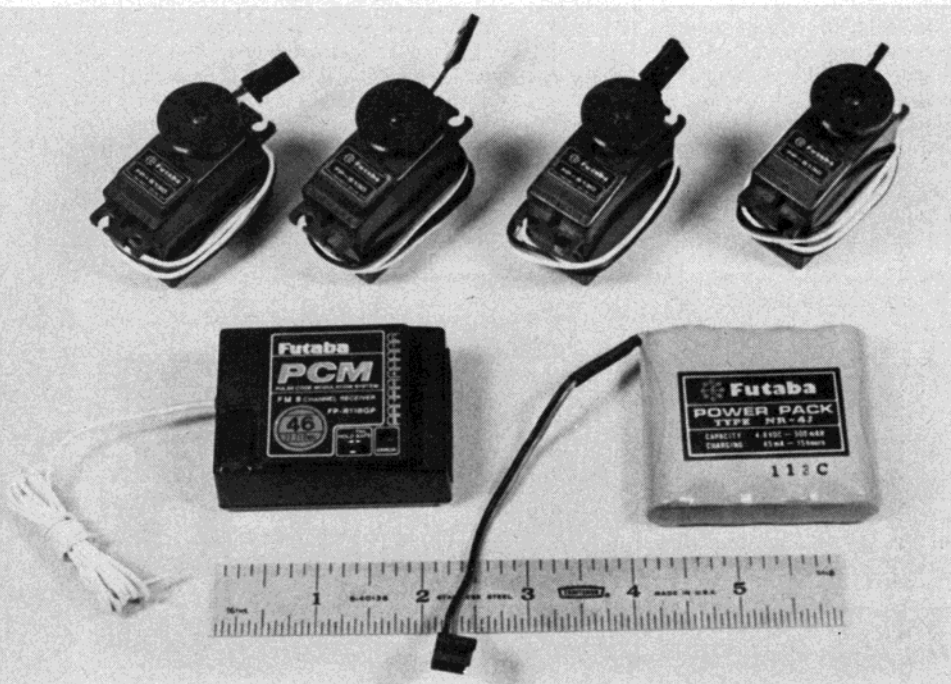
Adjustable travel volume (ATV) or better known as individual end point adjustment, is available on the aileron and elevator channel functions. Later I will mention a second and special form of ATV which applies to all eight channels.

In addition to dual rates, Futaba supplies a choice between linear control and, what they call, variable trace ratio (VTR). This VTR/linear choice can be set on the aileron, elevator and rudder channels. VTR is something like exponential rate control, but instead of producing a gradual curve or plot, it actually has a step or break point. You can adjust this break point and still achieve some of the advantages of expo rate control. I'm not particularly thrilled with this concept, but several top competitive flyers are now finding it quite helpful. It is strictly your choice!

A snap roll operate switch is located at the top right side of the transmitter case. At the rear of the case are two snap roll direction reversing switches. All snap roll input functions (aileron, elevator, and rudder) can be pre-set to your exact requirements. There is also the possibility of including a time delay in the initiation of any or all three pre-set controls. This delay can be varied from 0.2 to 2.0 seconds. Now that's a different twist!

New special control features

In the lower front panel of the transmitter is a built-in, LCD readout, combinatin digital timer, and tachometer. This item is essentially the popular Futaba Tachotimer (sold as a separate unit) which I reviewed in depth in the September 1983 FLYING MODELS (page 34). For the tachometer function you receive an optical sensing device attached to a 36 inch length cable. Point the sensor at the propeller and read the engine RPM in two ranges (up to 60,000 RPM) on the LCD display. On the timer side you have the ability to up count or down count and sound an alarm at the end of any pre-set period. With this you can keep track of flying time, which is especially helpful in competitions. Also included is an integrating timer mode which counts only when the transmitter power switch is



With the exception of the switch harness, this is the basic PCM airborne flight pack. Total weight for what you see is 12 ounces. Each servo is only 1.5 ounces and quite compact for its performance.

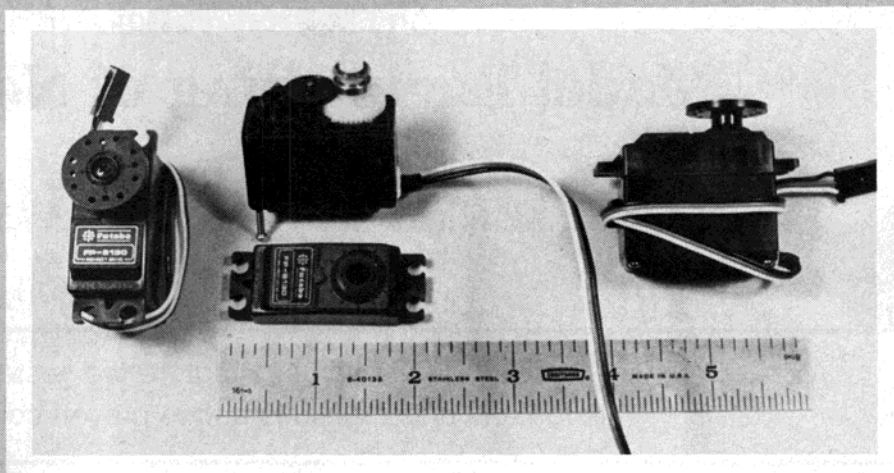
on. This mode can continue to function even when you are using other timer functions or the tachometer. What's nice about this feature is that you can get an exact handle on transmitter battery operating time. Remember what I said before about the higher than normal battery drain of this system. When you hit approximately 1½ hours of operating time you better recharge. Of course, that's based on the premise that the battery pack is of good average capacity, but it still beats guessing. This feature was certainly well thought out!

One of the new items is a propeller pitch control which operates on the Channel 8 function. This control can be mixed with throttle commands. There are even adjustable delay circuits available for initiation of either of the two mixed functions.

Programmed ATV (adjustable travel volume) is a new feature available on all eight channels. This is separate from the elevator and aileron ATV or end point adjustment feature that was described earlier (which is not a programmed function). With this new control adjustment circuit you can pre-set servo rotation on either side of the neutral position, individually, and for each separate servo (channel). All you do is set the main select switch on ATV, dial the channel number (function) that you want to program, hold the control stick or lever for that function hard over, and then push or pulse a button switch to obtain the exact position you want. Then dial the next channel and so on. When finished programming, turn the ATV switch off. As long as the transmitter power LED indicator doesn't flash (low voltage warning) you will save your pre-set controls.

This system has a rather elaborate fail safe scheme built into the transmitter and receiver circuits. First let's describe the "Hold/Fail Safe" switch located on the receiver case. In the "Hold" position should you lose transmitter signal (loss of contact, interference, etc.) for more than one second, all servos will remain at their last position until the coded signal is re-established. In the "Fail Safe" position a loss of signal or general interference for more than one second will cause the servos to all drive to the neutral positions. That means your throttle servo will go to mid range. If you like you can also program in pre-set positions for each servo which the system would only react to in the event of a loss of signal (of more than one second duration). The only problem with this pre-programmed fail safe feature is that once the receiver power is turned off, the positions are lost. That means that you would have to re-program for each new flight which could be a considerable nuisance. I personally like the simple fail safe, with each servo simply driving to its neutral position. I might add that there is also a battery fail safe (BFS) feature which moves the throttle servo to the low position when the airborne battery pack voltage drops below an unspecified minimum point. When that first happens, you can cycle the throttle stick once to dead low (idle position) and the fail safe will disengage for an additional 36 seconds, giving you time to land the model safely. Also included in this receiver is a small LED indicator. It is intended as an "error" light. Should it remain lit, you may have a problem somewhere in the system. Being able to see this LED, especially when the receiver is deep inside a fuselage, is a real problem. During my bench testing, the LED functioned as specified under many different simulated fault situations.

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The Model FP-S130 servo is the one expressly intended for the PCM system. The servo has a double ball bearing supported, sealed output shaft and an output of 55 ounce-inches. Retract version also available.

Because of all the pre-set and programmed control features Futaba was thoughtful enough to provide a servo test mode. In this mode you have a choice of separately cycling each servo to its maximum rotation or you can operate all the servos simultaneously in the short "spurts" to check on their movement. This cycling is all done automatically at the transmitter.

Finally we get to the various mixing circuits. Time won't permit much detail but here goes. You will be able to obtain mixing of flaps/spoilers with elevators; elevators and flaps; mutual mixing of ailerons and elevators (elevons); ailerons and flaps (flaperons); elevator and rudder (V-tail); ailerons and rudder and aileron differential action. On the programming side you can mix any master channel to a slave channel using a small patch board located on the special control panel. Understanding all the details of the mixing options will obviously take considerable effort. Space limitations prevent me from going any further into it at this time.

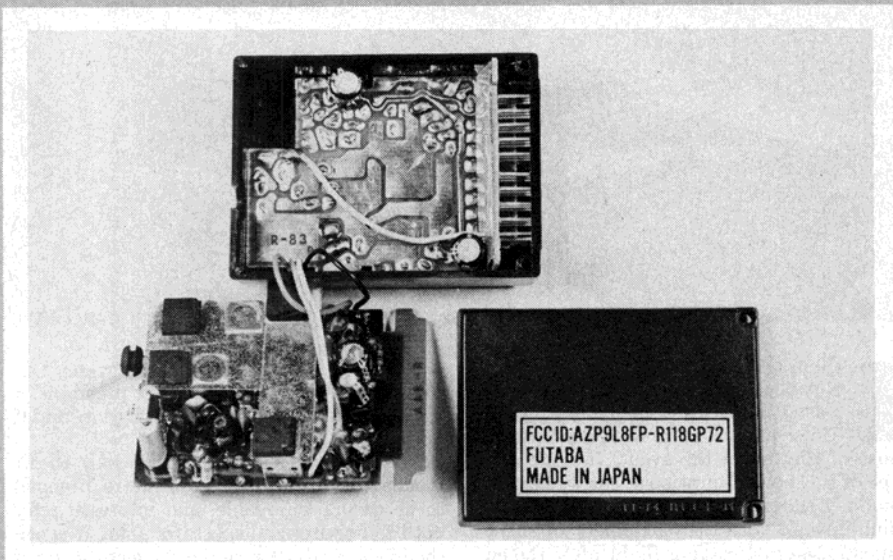
Summary

From my brief month or so of bench and field testing, it would seem that this particu-

lar new Futaba PCM system offers some great new potentials for interference free R/C operations. If not totally interference free, at least better than most. The new receiver passed our "1991" test procedure and will operate in the full 50 channel environment, with 20 kHz spacing, after January 1991. It passed this test, even though the receiver is of single conversion design with a 455 kHz i.f. The reason it passed was the combination of excellent selectivity and the digital coded PCM signal.

Admittedly this is a very complicated radio system geared primarily for an accomplished competition R/C flyer. I can only hope that by next year Futaba will offer a PCM system more in line with the features and price tag of their popular "G" series. For now that is strictly speculation on my part.

I can't honestly tell you what servicing a radio such as this will be like. Futaba did indicate that they will be able to handle any necessary repairs at their California facility. From what I can tell to date, none of these first few radios to hit the market have had any problems. Time will tell of course! Again, the new Futaba PCM system is most interesting. Keep a watch on it!



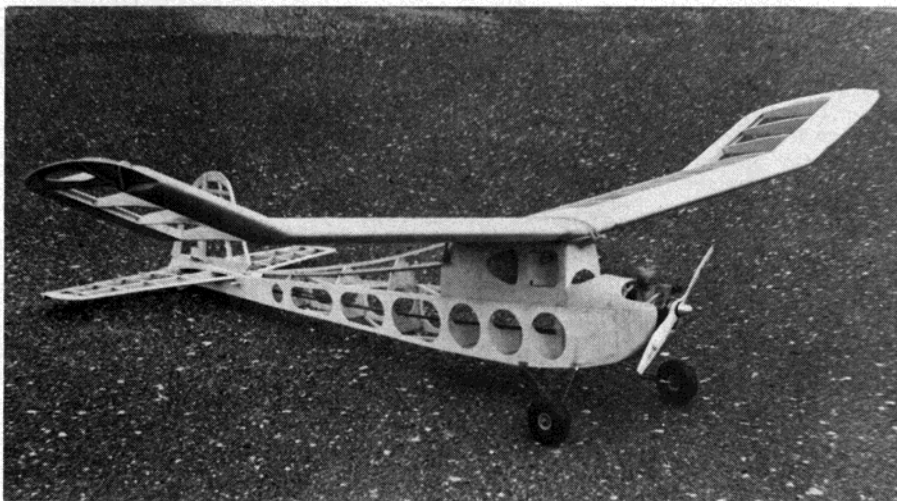
The PCM receiver employs double deck construction and a single conversion design with a 455 kHz i.f. However, it is still qualified as a "1991" receiver thanks to the PCM coding techniques.

An FM Product Review:

Model Engineering of Norwalk's Buzzard Bombshell

By Dick Sarpolus

R/C assisted Old Timer events recapture the yesteryear of modeling.
This remake of a classic is a time proven contest winner.



PHOTOGRAPHY: DICK SARPOLUS

A faithful reproduction of the original, MEN's *Buzzard Bombshell* offers the Old Timer fan a competition proven design (above). When completed (below), Dick's model used a Fox .36 Combat Special to pull its 4 1/4 pounds around. With a little less power it could also serve as a relaxing sport or trainer model.



I think Old Timer R/C flying is great! Not because of nostalgia, as I really wasn't born when many of the Old Timer aircraft were designed, but because of the fun of the event. It's the only type of R/C power duration event we have; it combines the thrill of an engine powered fast climb upward with the excitement of silent, majestic thermal soaring flight after the engine cuts off. I enjoy both parts of each flight.

SAM, the Society of Antique Modelers, re-

fers to the event as Radio Control Assist Old Timer and Antique Models. The preamble of the SAM rules explains their intent, and I quote:

"The competition flying of free flight model aircraft of vintage design is intended to be casual, enjoyable, and interesting for both competitor and spectator alike. It is neither desired to advance the state-of-the-art of aeromodeling, per se, other than to increase participation in the sport generally, nor to reprove again that which is already recorded in

aeromodeling history books. The intent of these rules is to categorize the basic types of vintage models and establish an equitable and simple framework of regulations for competition purposes."

SAM stresses having fun as the main part of flying Old Timers, but there is enough pressure at the contests for the die-hard competition fan, if that's what you're looking for. I like the competition, the relaxed atmosphere, the camaraderie, the bean feeds, and the modeling history that is apparent in the varied aircraft designs.

One Old Timer meet in particular inspired me to build the *Buzzard Bombshell* to be discussed in this article. A local Old Timer club, the Over-the-Hill Gang, has been holding the Jack Florenzie Memorial Meet for the past several years. The Contest Director is Joe Corneille, and this genial gentleman hosts such a relaxed, fun meet, usually including a lunch break and an after-the-meet party, that I just had to have an Old Timer so I could enter this contest.

Old Timer kits are available in a limited selection, many made by "small business" enterprises. We're fortunate that some modelers have put in the necessary effort to make these kits available. Most of the aircraft seen at meets are scratch built, from plans that have been reprinted in various model magazines or are available from such sources as John Pond's vast collection of antique model plans. Remember, the planes to be used must have been designed prior to December 31, 1942, or December 31, 1938 for the Antique class.

The MEN Kit

An Old Timer I'm fond of is the *Buzzard Bombshell*, designed by Joe Konefes. The original *Bombshell* won its free flight class in the 1940 Nationals, and it had one flight of 49 minutes! It's a cabin design, which I prefer over the pylon types. My main reason for building one was that MEN, Model Engineering of Norwalk, produces a prefabricated kit and I wanted an Old Timer as quickly as possible.

The *Bombshell* has 850 square inches of wing area, and under SAM rules the maximum glow engine which can be used is a .36. I naturally wanted a powerful engine for competition use, and since an R/C throttled engine is not needed, I planned to use a control line combat engine. The rules permit an engine run of twenty seconds, with the maximum flight time being seven minutes. I figured a *Bombshell* with a good .36 engine would be a competitive class C Old Timer.

The MEN kit is a faithful reproduction of the original design, with provisions for the R/C rudder and elevator controls, and some strengthening of the structure for the rigors of today's R/C flying. This model is suited not only for Old Timer competition, but also for sport flying and as an easy-to-fly R/C trainer, with less than .36 power. For training and sport flying a .19 or .25 will provide plenty of power for good flying.

I built the wing first, and found it unusual in that the first step is to glue the spruce spars to the leading edge planking. The trailing edge sheeting also receives an attached spruce spar. These spar/sheet parts are placed over the wing plan, followed by the wing ribs. Vertical grain spar webs are placed between the ribs and the top spar/sheeting pieces are added. The result is a fully webbed spruce/balsa I-beam spar configuration and a very rigid wing. Most Old Timers must be beefed up for use with today's better engines; I'm sure that with the MEN *Bombshell* we do not have to worry about breaking a wing in flight.

The tail surfaces are extremely light weight. It's good that they are, because the tail section of the fuselage is very long and with the short nose, excess weight in the tail would be tough to balance out. Made up of strip balsa stock, with the use of an instant cyanoacrylate glue, the tail surfaces are quickly built.

The fuselage construction is again surprising, with the main fuselage side pieces being made of plywood. It's light poplar plywood, with plenty of die cut holes to save weight. This light plywood tends to warp before assembly, and care must be taken to build a straight fuselage. This was the toughest part of building the model for me. I finally resorted to adding $\frac{3}{16}$ inch square balsa strips diagonally between the fuselage bulkheads, trimming them to force the sides into alignment, and gluing the bulkheads and diagonals in place one section at a time toward the tail. The final result was a straight, rigid, light fuselage.

Transparent MonoKote™ was used for a quick, light finish and nylon tube controls for the rudder and elevator. A slight modification I made was to install grooved hardwood bottom landing gear blocks across the fuselage bottom with the landing gear permanently installed and plywood equipment access hatches held in place with small screws.

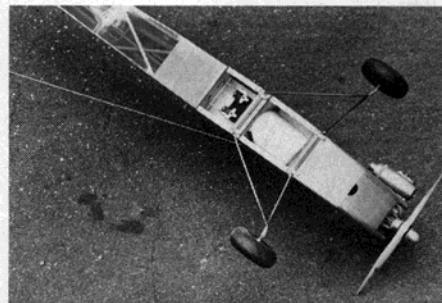
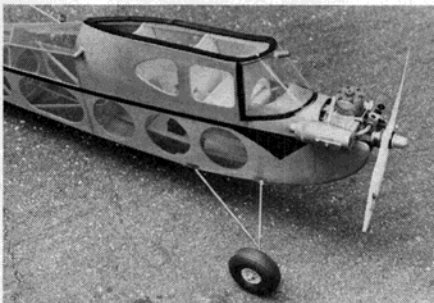
I obtained a Fox .36 Combat Special for power. In my area use of a muffler is mandatory, but it's not easy to add a muffler to this Fox. Expert machinist and long time modeler Charlie Williams machined some adapter pieces for a muffler retention scheme which has worked out well.

Fuel cut-off for the twenty second engine run is simply a piece of $\frac{1}{16}$ inch wire, bent to squeeze the fuel line when pulled by the servo; works fine. A two ounce fuel tank was installed; it's far more than necessary. My completed *Bombshell*, ready to fly, weighs $4\frac{1}{4}$ pounds for an 11.5 ounce per square foot wing loading. I had added fiberglass and epoxy around the wing center section, and used more epoxy than necessary in the fuselage construction; the plane can be built even lighter. It balanced perfectly with no weight required for trimming.

I first ran the Fox with its intake restrictor, but quickly removed it for maximum power. Muffler pressure was used for steady fuel feed and a 9-6 prop seemed to work best. With only several test flights on the new FLYING MODELS



Transparent MonoKote was used to finish the *Bombshell* (above). Kept the weight down. The Fox .36 is a "screaming" schnuerle engine (below left). The necessary muffler required an adapter for this engine. A minor modification (below right) was the addition of grooved hardwood landing gear blocks.



engine and plane, it was ready for the FLYING MODELS June 1983 Old Timer Contest.

This affair has been reported on in FM, and I will only add that Joe Beshar did his usual fine job as the Contest Director while FLYING MODELS hosted a great contest. The *Bombshell* and I were fortunate enough to find some thermals and go home with a nice Second Place trophy.

As further testimonial to the competition potential of M.E.N.'s *Buzzard*, we entered

the SAM R/C Old Timer meet in Lincroft, N.J., held in October 1983. Thermals were around and we placed First in the C Glow class. With only several dozen flights to its credit, the *Buzzard* has flown in two contests and collected a First and a Second. Not bad.

The *Bombshell* now hangs in my workshop, ready to go for contest use or some lazy summer day flying.

Get into Old Timer activity and have fun!



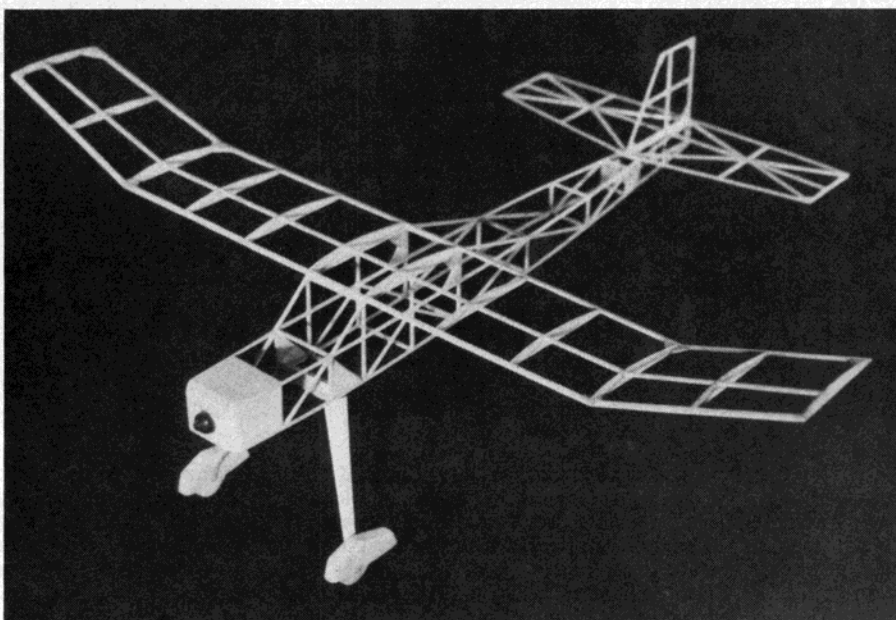
The emphasis in Old Timer events is on fun. Looks like Dick (left) and Harry Lawrence (right) appear to be getting a lot of it. To date, Dick's model has won its share of glory in Old Timer contests.

Back to . . . Square One

Tissuing

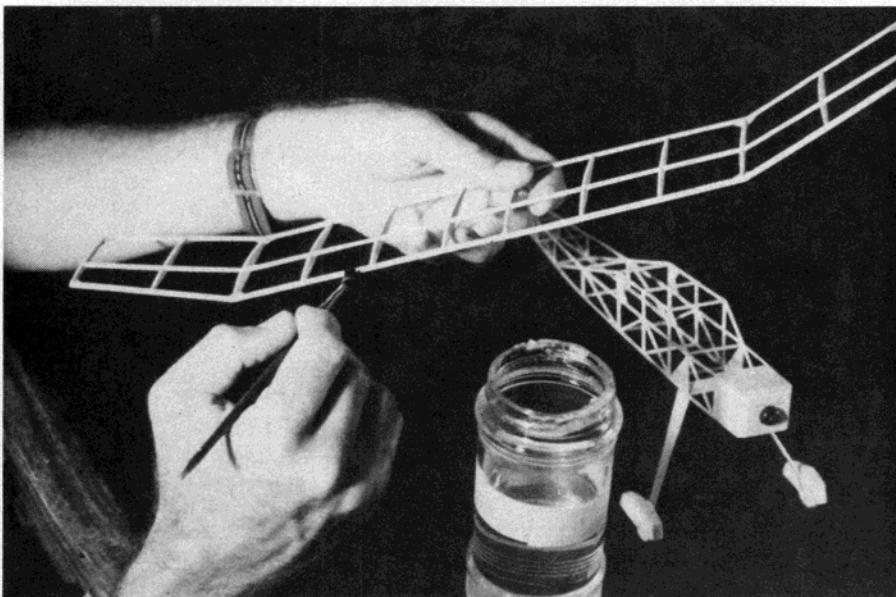
By Tom Sandor

Bare bones ready to cover? Follow this step-by-step procedure for great results.



PHOTOGRAPHY: TOM SANDOR

Used as the example of tissue application techniques, the Micro-X Hornet (above) is typical of small, rubber free flight models that rely on this method of covering. Once the framework has been sanded completely smooth, a 50-50 mixture of dope and thinner is applied over the entire model to serve as a sealer and base.



The neatly constructed subject of our lesson in tissue covering shown in the "bare-bones" photo is Micro-X's Hornet. In all fairness, I must give credit where it is due. The model was built right from the kit by our editor, Bob Hunt. Because of a very busy schedule, Bob asked me if I would do the job of writing this article. Many thanks also to friend, Art Colard, for his help in photographing the model.

Before you hurry off to cover that new little gem of a model, be certain to do the following: check over all the balsa joints to make certain everything is secure. Next, using a nail file, emery board, or light grain sand paper, carefully sand all "fuzzy" wood away from the framework. Finally, make certain to use a good quality, light Japanese tissue for the covering job. Many companies now supply a fairly good tissue with their model kits. If not, it would pay you to check with suppliers like Oldtimer Models or Micro-X Co. who offer some excellent grades of tissue.

We're almost ready to put the tissue on but, before we do, keep these tools handy: white glue or dope, scissors, sharp razor, small flat brush, and spray bottle. O.K. now let's get going!

Step 1. Coat the entire model with one application of thinned down dope. (50-50)

Step 2. Find an old picture frame approximately the size of the tissue to be used. Coat the back side of the frame with a thin bead of white glue all around the edge. Next, very carefully lay the tissue onto the frame, pulling evenly all around as you go. When you have completed this stage, let it dry. Now the tissue is ready for the pre-shrinking spray with water. By holding the spray bottle as shown in the photograph, let the spray fall lightly from the air. Wait until the tissue is dry and taut. This is all necessary so as not to warp the framework of the model later when it's covered, especially the wings. Even so, you will find that there is still enough shrink material left after pre-shrinking for the finished model.

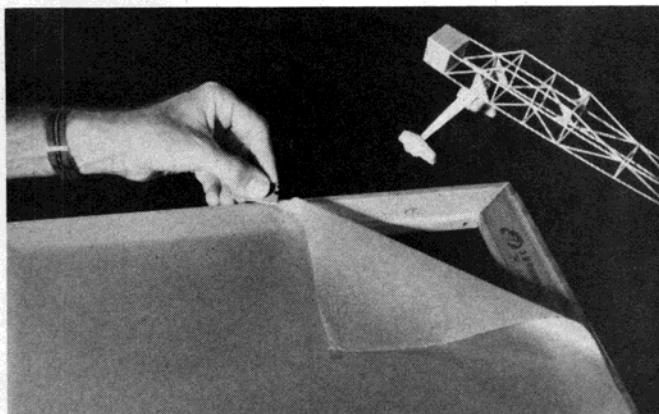
Step 3. Trim off the tissue from the frame and lay it aside in a safe place. Take one sheet and examine it closely. You will notice that it has a grain running through it. A fine grade of tissue should have it. A cheaper grade may not. To find out for certain, do the following: take the sheet of tissue by the corner and tear a little apart. If it won't tear fairly straight, then you are tearing against the grain. Try tearing a little again at a right angle to the first tear. It should rip evenly. Now you know where the grain is running, and are ready for the model's covering.

Step 4. Place a sheet of tissue on the plan. Trace the outline of the part to be covered on the tissue. The tissue grain should follow the length of the part, in this case the fuselage; leave about a 1/4 inch border around the fuselage outline. Now double over the tissue and cut out the two sides together. Follow the same method for covering the wing and tail surfaces. Be certain to have the grain in the paper running with the span of main wing, or across the ribs.

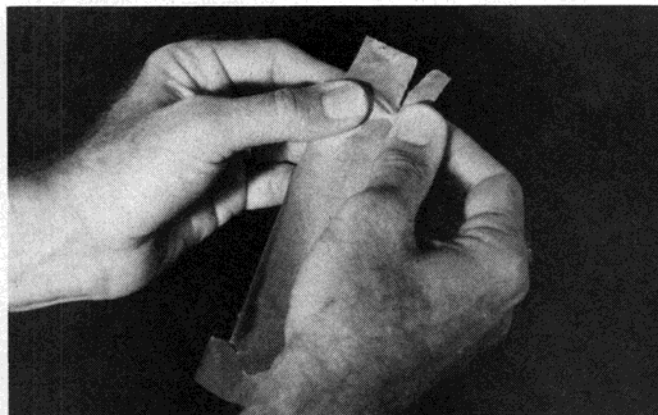
Step 5. Begin with the fuselage top and bottom using thinned-down white glue or clear dope. Apply the thinned down glue with a small brush along the frame edges only. Apply tissue carefully about three inches at a time, carefully nudging it along with your finger tips as you go, until the whole surface is completed. When dry, trim off the excess



Pre-shrinking the tissue is a necessity or it will warp the airframe as it shrinks. A picture frame (**above**) serves as a fixture to accomplish this. To achieve a fine, overall mist, spray water *up* in the air (**below**).



The **pre-shrunk tissue**, now dry, (**above**) is carefully cut from the glue joint which adhered it to the picture frame. Before application, it is necessary to determine the grain (**below**) of the tissue by tearing it.



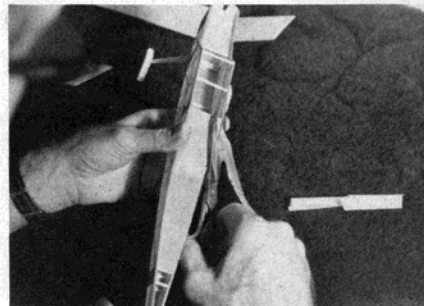
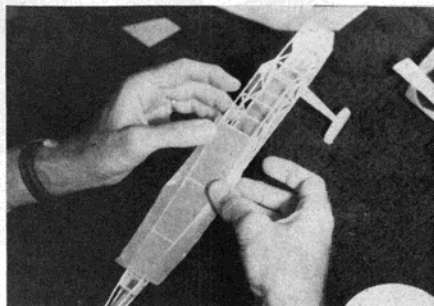
tissue with a sharp razor or scissors. Now apply tissue to the fuselage sides using the foregoing procedure when completed and dry. Once again, trim off excess tissue carefully to complete the fuselage.

Step 6. Now on to covering the wing. Remember to apply the white glue or clear dope only to leading and trailing edges, and not to the ribs, with one exception. Apply glue only to rib tops and bottoms where there is a break or angle change in the wing. The other ribs should be clean or dry of any glue.

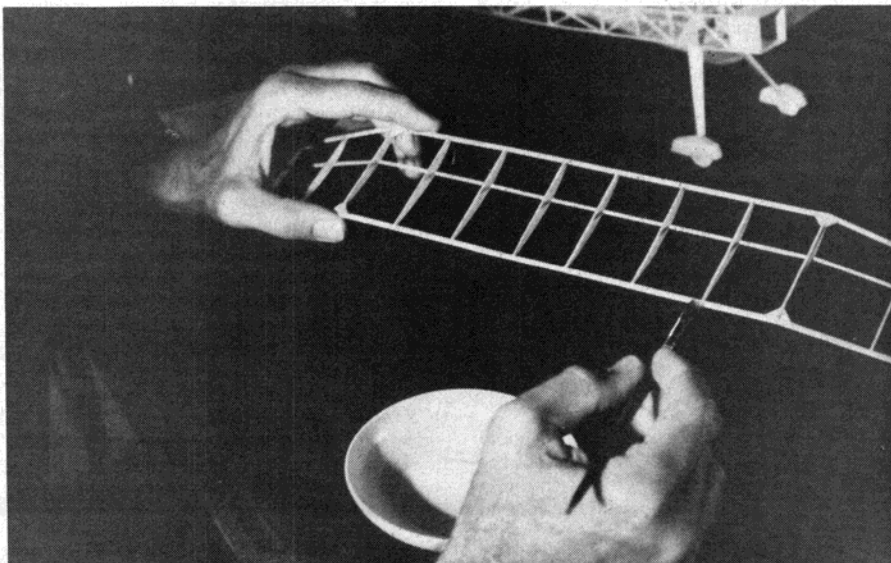
Step 7. Start with the trailing edge bottom. Apply white glue to this whole length. Lay the tissue on, leaving some excess, and remember to have the grain running across the ribs, or with the wing length. This helps to strengthen the wing through its span length.

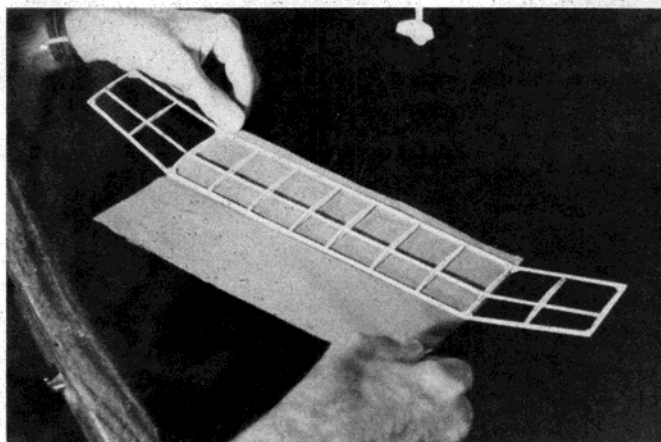
At this point I should comment that if you are using the white glue, (which I prefer) you will find that the tissue will soften quickly to ripples. Just gently pat these down evenly and it will all pull tightly later on. The good thing about using water glue is that when dry, if the tissue needs to be further tightened, it is easy to just moisten with water, and it can be nudged along to the correct position. It is not as simple when using clear dope to do this.

Step 8. With the tissue secure at the lower trailing edge, apply some glue to the two center ribs which will make contact with the fuselage cabin top, and two other ribs where the break will be. Even out the tissue neatly to these areas and next apply a very thin line of glue to the lower area of the leading edge. Pat carefully with your finger to even out the tissue. When completely dry, trim off the ex-

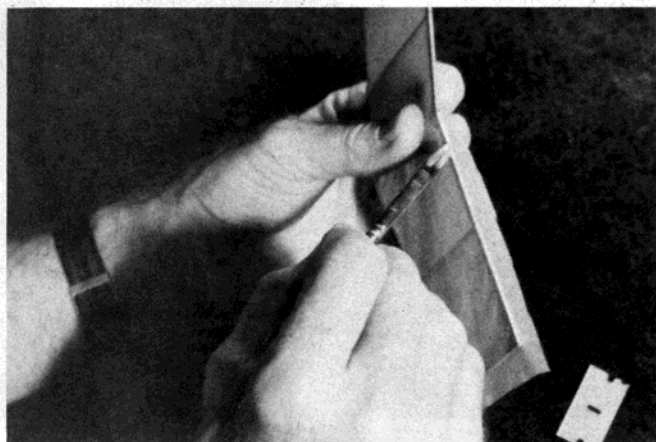


When covering the fuselage (**above left**) begin with the top or bottom. When glue has dried, carefully cut away the excess (**above right**). Whatever you use, scissors or knife, make sure it is razor sharp at all times. The glue for covering the wing (**below**) is "painted" on over the outside framework only.

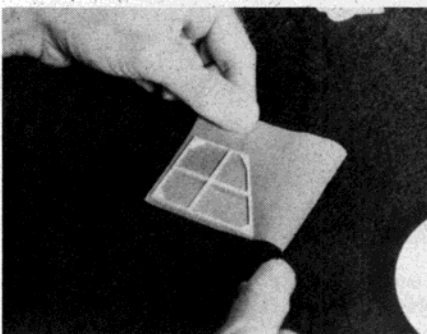
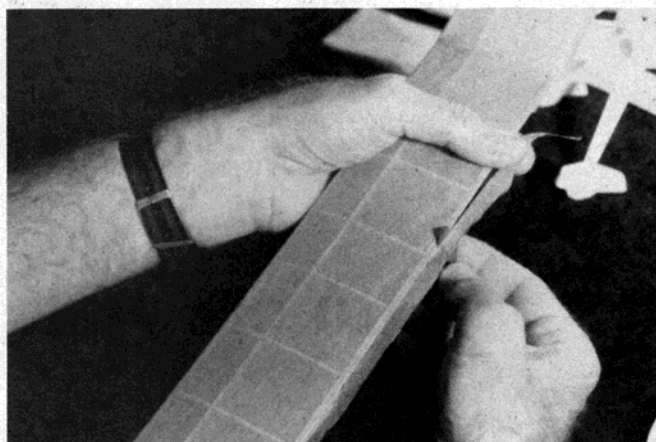
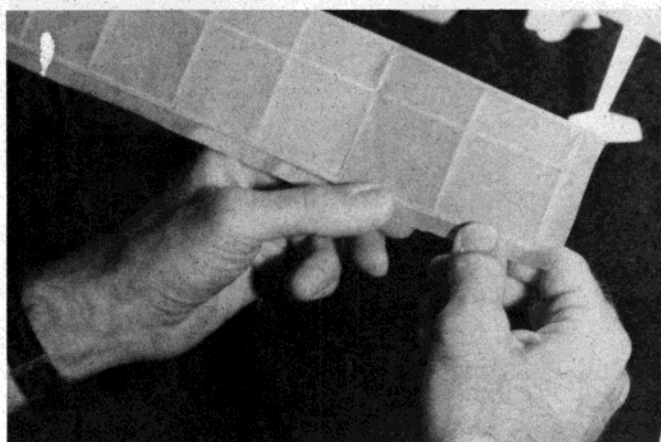




A good rule of thumb when covering any wing is to start with the bottom (above). It helps hide seams. When the glue on the trailing edge is dry, the remaining tissue is carefully brought up and over (below) and glued.



To hide the seam, glue is brushed on the back edge of the trailing edge (above) and the tissue patted on. Once the glue has dried, carefully cut the excess tissue (below) to almost eliminate a visible seam.

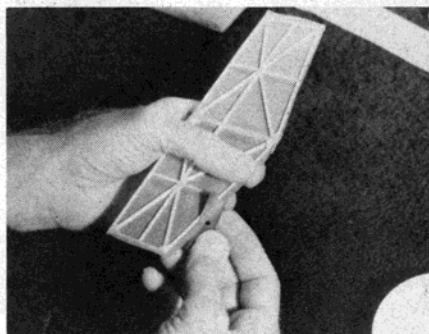


Covering the tail surfaces, such as the vertical stab above, is a duplication of the techniques already illustrated. Just be sure to always apply glue to the outside of the framework.

cess tissue from the trailing edge evenly. Now, to complete this stage, apply white glue to the trailing edge top and the outer ribs. Spread evenly with a brush.

Now, carefully pull the tissue over the whole wing section, patting it along the ribs with the glue applied to them. At this point, you must sort of "play" with the tissue, laying and pulling it here and there so as to get it all on evenly. Finally, if there are no "tell-tale" ripples in the tissue, and it all looks fairly even, pull down the remaining tissue onto the trailing edge. Smooth it out over entire area and let dry.

Step 9. The left-over excess tissue should now be glued back over the small area of the trailing edge of the wing before trimming. This is very important, especially if colored

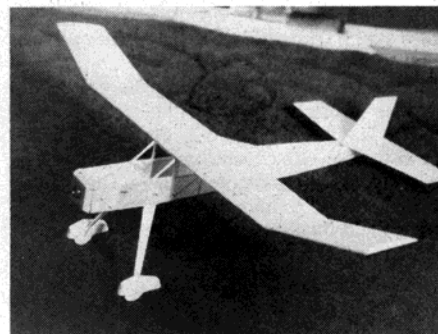


It has been mentioned once, but it bears repeating: make sure your tissue cutting blade is razor sharp at all times. At the first sign of dullness - pulling or tearing - discard it.

tissue is used on the model. When thoroughly dry, trim off the excess tissue. Follow the same procedure for the outer sections of the wings. The tail surfaces are the easiest to cover. Just be certain to apply glue to the outer edges only.

I like to cover one side at a time. Let it dry, then trim all around before covering the other side. The reason is this. When the final side is completed, this is then trimmed with scissors all around leaving about a $\frac{1}{16}$ inch tissue border. This is then "painted" with glue and molded all around the tail surfaces to give a nice finished look.

Step 10. Now comes the fun part. Using a fine spray atomizer nozzle, spray water up in the air and hold the covered parts so that the fine spray covers everything. Let this air dry



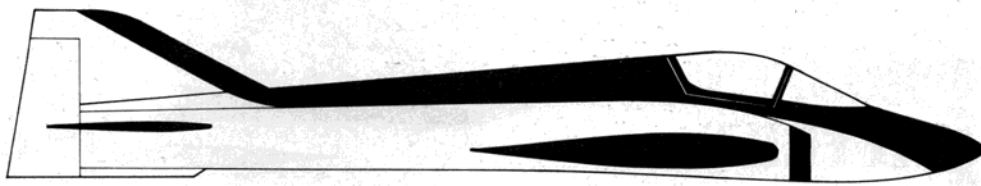
You've completed all the covering. To finally achieve the finished product above, the tissue must be finally shrunk and then, when dry, the classic coat of thinned down dope.

naturally to an attractive tight skin look. If there are some slightly loose areas, just lightly dampen the glued tissue area with water, wait, and then gently push with finger tips to tighten the same. Apply thin cellophane to cabin window area.

Step 11. The final stage, of course, needs the classical coat of clear dope. Make certain to use the thinned down dope, for two reasons: first, to keep the structure from warping, especially the wing areas, and, secondly, to keep it light for flying purposes.

That is it, for this stage anyway. Next comes adding the prop using a special "S" hook wire shaft, along with preparing the right rubber motor. Then, trimming and flying the model. But that's a story for another article of *Back to Square One*.

PROJECT PATTERN



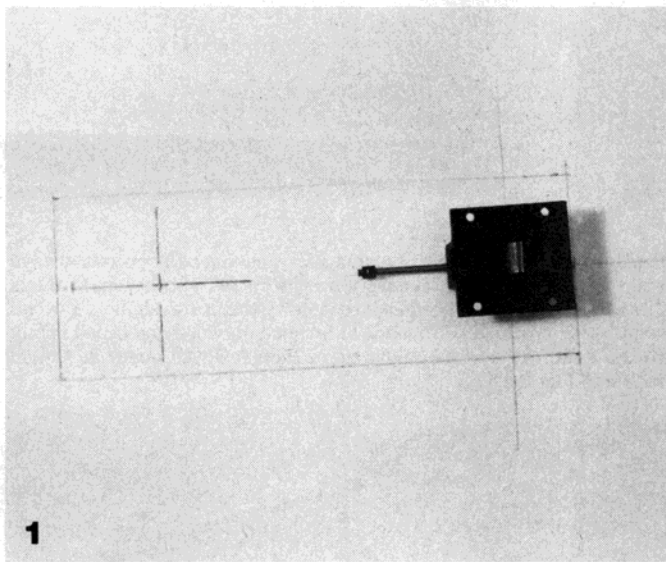
By Dean Pappas and Bob Hunt

This month, as promised, we'll cover the installation of retract mounts and wheel wells in the EU-1A. Needless to say, the EU-1A is typical of the foam winged pattern plane in this respect.

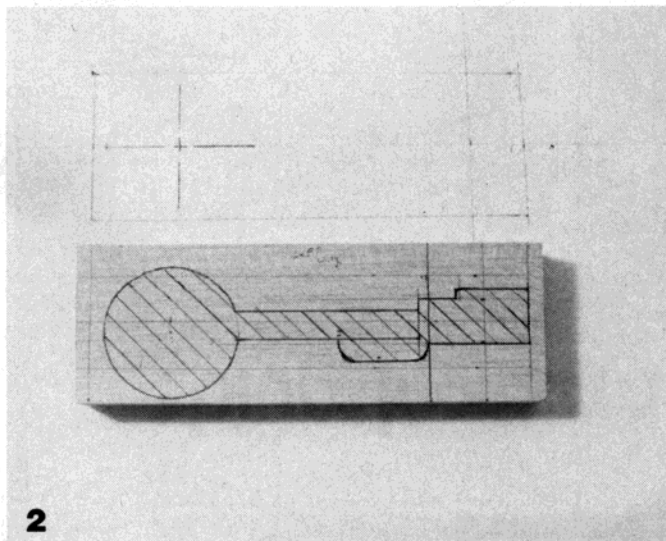
A few words about the life of a pattern plane are in order, as pattern planes are among those things which improve with age. Retractable installations should be both light (always important) and strong. This does not only mean that the gear should not pull out of the airplane, but that the wheel wells should not unduly compromise the strength of the wing. I once lost a *good* airplane because a fluttering aileron was able to break the wing through its weakest point, the wheel well! Standard procedure is to line the entire well with wood, as this tends to re-inforce the unsupported edges of the sheeting. It also keeps the foam from weakening where it is exposed.

Instead, Bob has come up with a novel method that promises to be light, easy to do, and allows you to come up with an easy to maintain installation; very important.

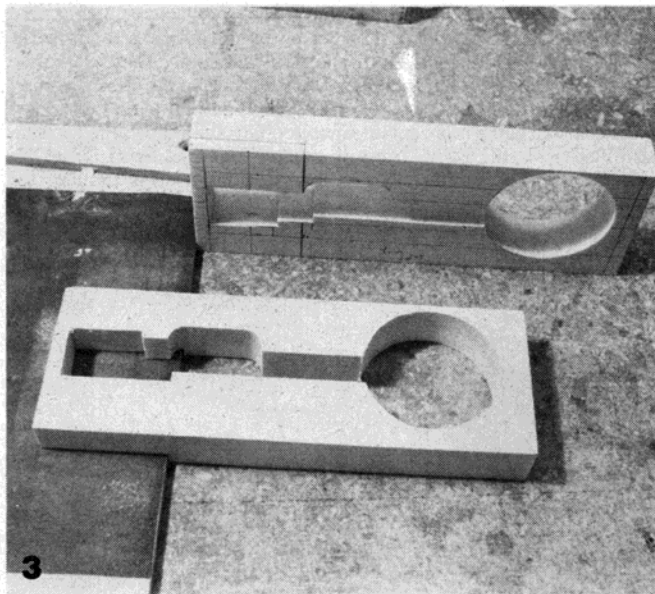
Start by marking out the landing gear location: measurements and drawings describing this are already in the complete instructions that come with the kit. **Picture 1** shows the pivot point and wheel



1
PHOTOGRAPHY: BOB HUNT



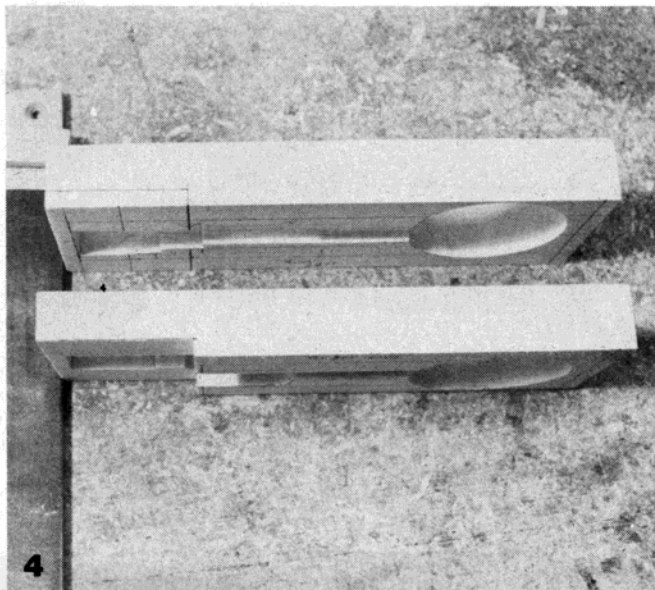
2
FLYING MODELS



centers laid out in felt tip pen on the foam. Check to make sure that you are marking the bottom of the wing. Pattern planes look very silly with the wheels sticking up from the top of the wing. Also marked out is the outline of the soft 1 x 3 x 9 inch balsa block that will serve as retract mount and wheel well lining in one. **Picture 2** shows the block appropriately marked out.

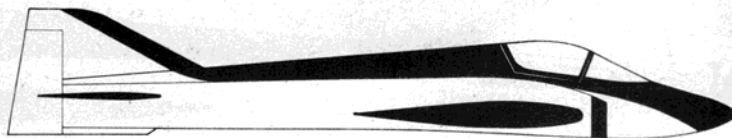
When marking out the wheel well shape on the block, remember to make the hole for the wheel about $\frac{3}{8}$ inch larger in diameter than the wheel to be used, and to offset it to the rear so that the front edge of the tire and the front edge of the well meet with the wire strut unstressed. A few landings will bring the wheel into the center of the well. If you fly from grass, a half an inch larger might be a good figure.

Picture 3 shows the blocks cut out, and marked for the $\frac{1}{4}$ inch deep recess that will receive the plywood plate to which the retracts are bolted. Using a piece of $\frac{1}{4}$ inch plywood and sandpaper as shown, your work up to this point should look like **Picture 4**.

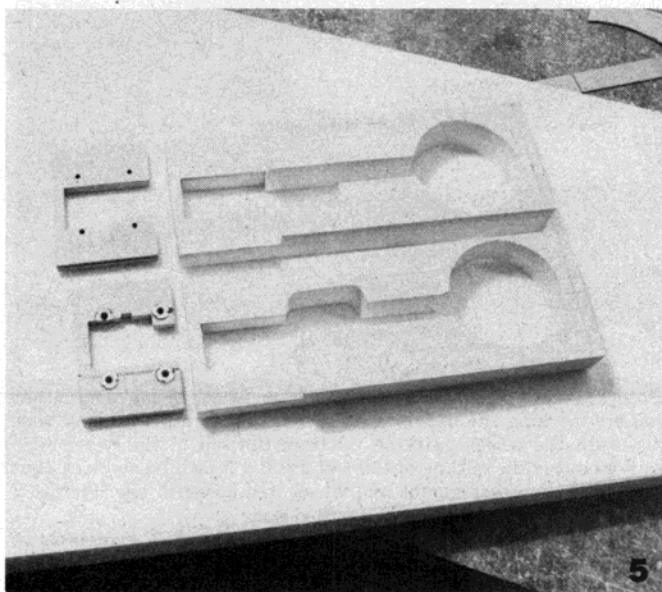


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53

PROJECT PATTERN

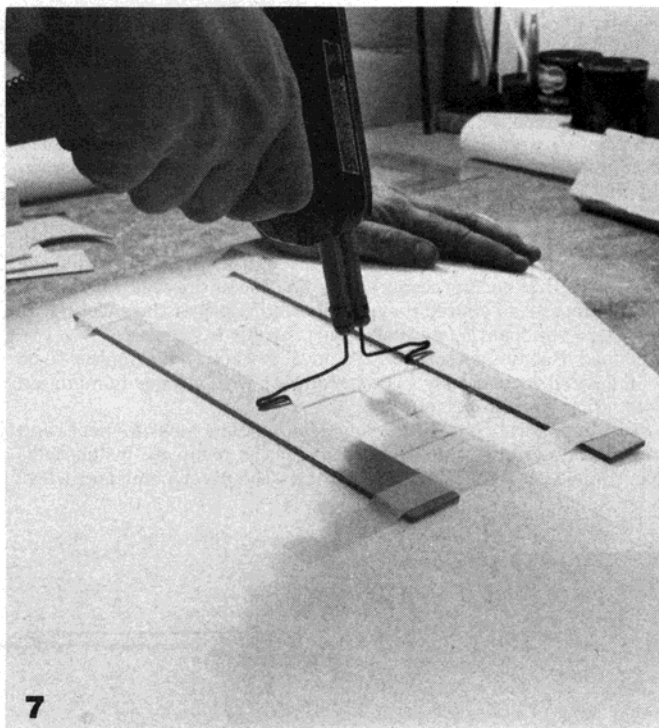
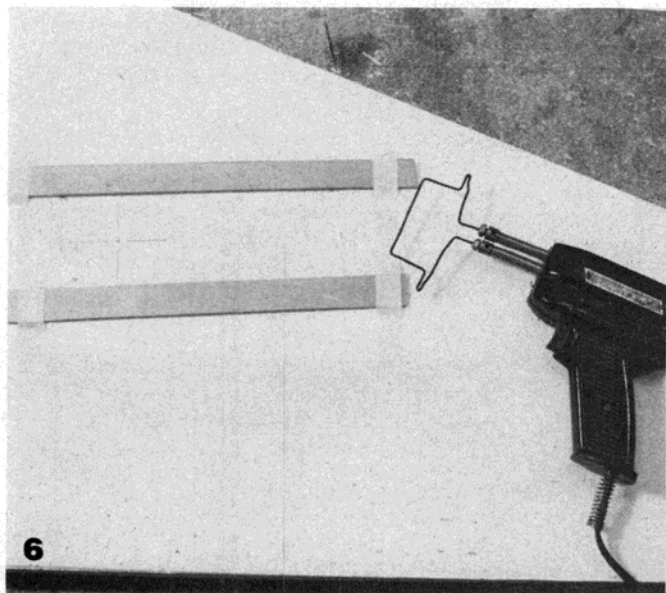


Plywood plates are now cut from $\frac{1}{4}$ inch 5-ply stock using the template that retract manufacturers always seem to provide with their wares. We used the B.D. mechanical units since they are light, and quite compact. Some people simply use wood screws to screw the retracts in, but I prefer to use 4-40 screws and blind nuts in order to make the airplane more maintainable. They should be glued to the balsa blocks at this point. I see no reason that Hot Stuff SuperT™ could not be used rather than epoxy. Besides, this is moving so quickly that the time savings will be appreciated. Picture 5 shows

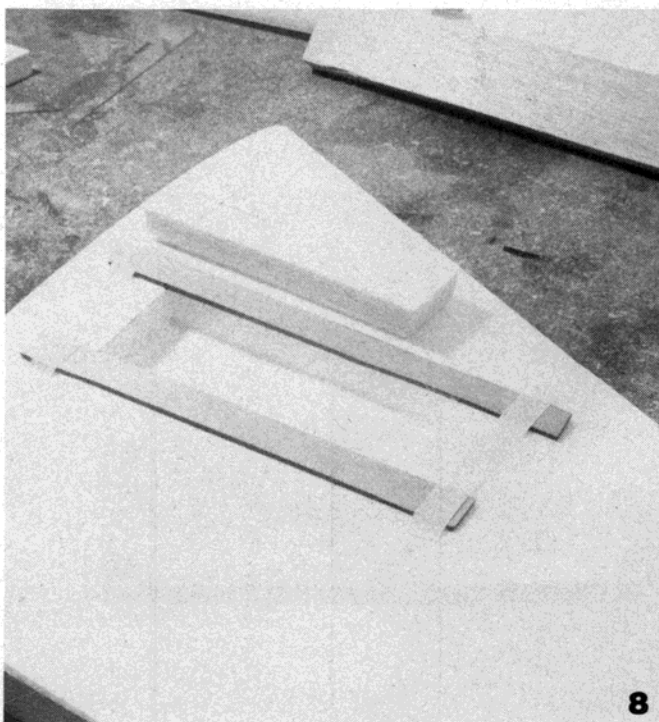


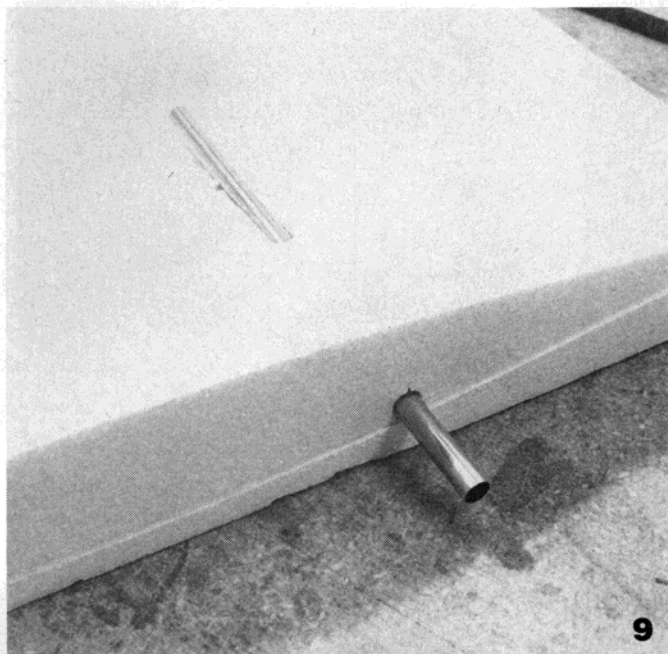
the plywood plates before gluing.

Now comes the fun part, cutting out the foam. Those of you who have done this before realize that this normally painstaking step has become easy since the cut-out shape is a simple rectangle with a flat bottom. Using 16 gauge copper wire, make a cutter as shown in Picture 6. If you don't own a Weller Soldering gun, get one now. The



depth of the cutter should be about $\frac{7}{8}$ inch since the cutout always ends up about $\frac{1}{16}$ inch deeper than the cutter, and because a little "meat" will be left on the block to sand to the airfoil shape. Plywood templates, or runners, are made of $\frac{1}{16}$ inch plywood and taped firmly to the foam to serve as guides as in Picture 7. All done? It should look like Picture 8.

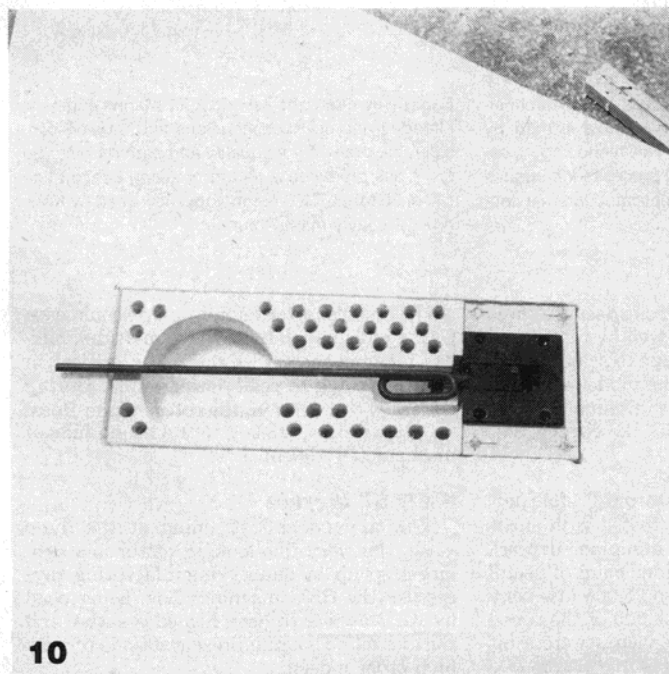




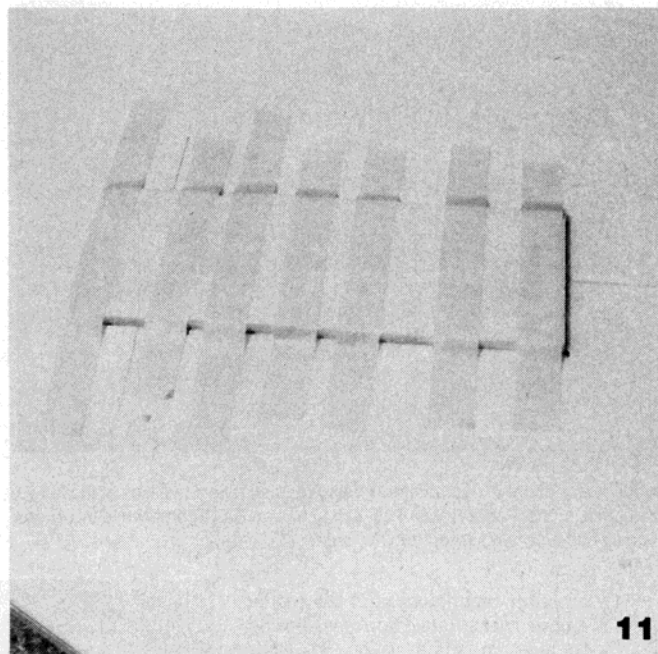
9

The next task is one of those things that are easy to do at the proper time, but become grief if forgotten 'till the end. Using a piece of $\frac{3}{8}$ inch or $\frac{1}{2}$ inch brass tubing with the end sharpened (skiving the tubing with an X-Acto blade works fine), drill the hole for the retract pushrod. It helps to assemble all the pieces and carefully decide where the retract end of the hole should be, the wing root end should be at the very top of the airfoil. **Picture 9** is self explanatory.

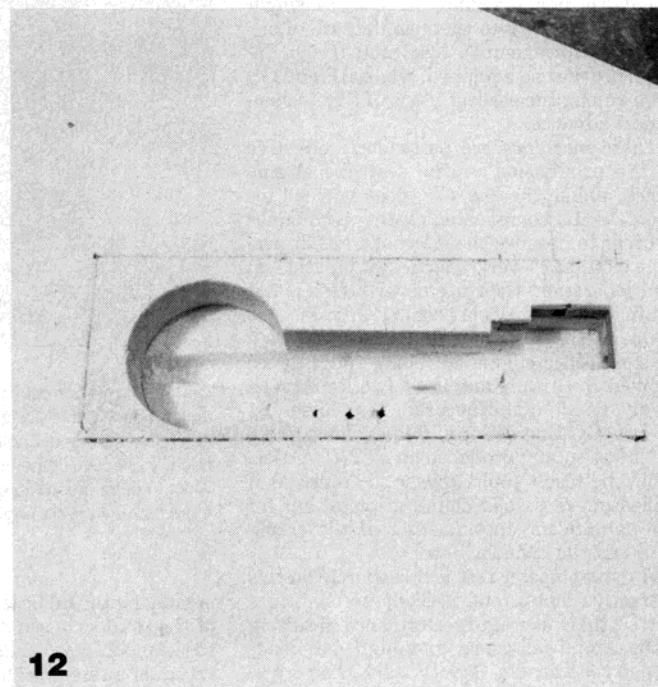
Using at most, about a half an ounce of four hour epoxy, glue the blocks into the wing. Put at least ten pounds of weight on the blocks to ensure good gluing. After this is done, you may wish to drill lightening holes as in **Picture 10**.



10



11



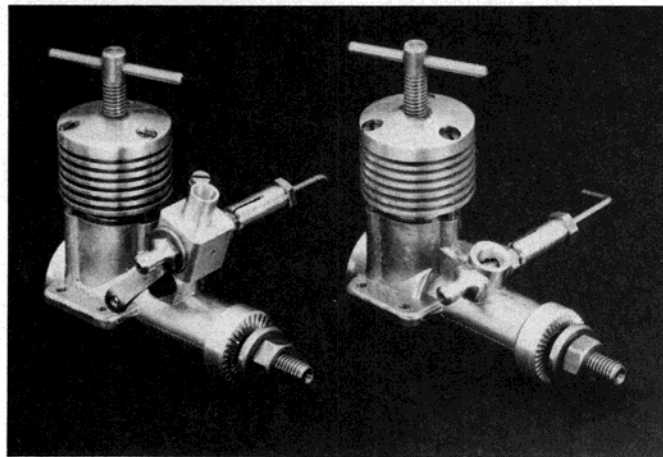
12

At this point you are ready to sand the block to the airfoil shape. Rather than do this, Bob cut the hole in the wing a little deeper than the wooden block and placed a slab of foam on top of the block with epoxy. This is shown in **Picture 11**. The foam is then sanded to the airfoil shape. Personally, I prefer to have the wing sheeting contact the mounting block directly; it should be stronger.

Picture 12 completes this month's "discourse" until next month, when foam wing sheeting with epoxy is described. While many methods are successful, none is stronger or lighter than the epoxy method.

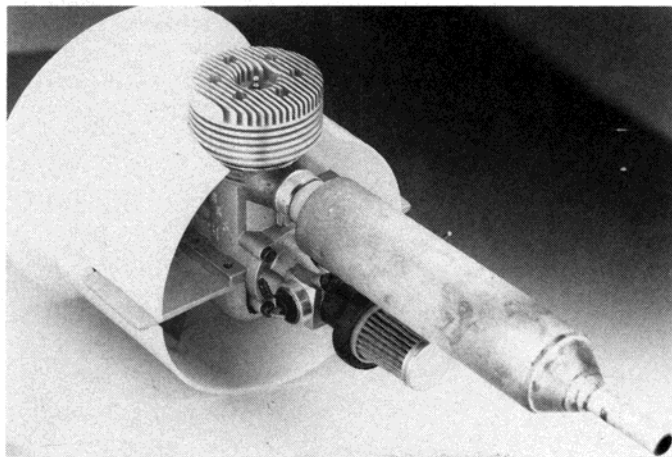
Motor Matters

By Mike Billinton



PHOTOGRAPHY: MIKE BILLINTON

A new, down-sized dynamometer is being readied to test the likes of these two small (.8cc, 1.0cc) PAW diesels. The .8cc (l) has an R/C throttle while the larger 1.0cc (r) has an open venturi for C/L stunt.



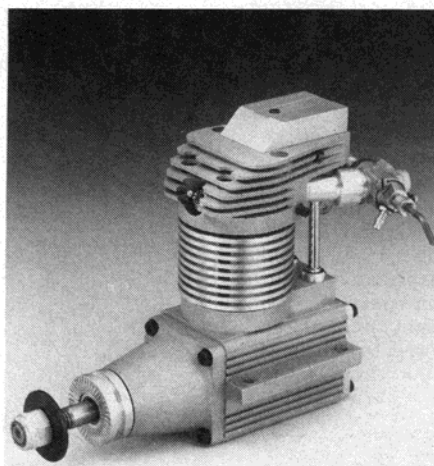
The Irvine Minipipe Silencer is shown above with the new Rossi 65 ducted fan engine in a Boss 602 fan unit. The Minipipe allows a much wider band of useful performance than a tuned pipe proper in this application.

Computer technology and the model engine were, one supposes, bound to meet at some stage. So, CNC (computer numerically controlled) milling/turning machines have increasingly found their way into the manufacture of our products; for example, K&B and Irvine Engines are now so equipped, while HP and OS were among the earliest users of this technological advance.

These machines are particularly effective in the production of the 4-stroke engine which, unlike the 2-stroke, does not call for separate and complicated casting techniques in order to produce the internal transfer passage contours. Very much "automatic" in their operation, their use nevertheless is not confined to large-scale production lines.

One of the accompanying photos shows a 4-stroke, 10cc engine currently under development in Britain, and is the work of a relatively small manufacturer. The Laser 61 (from AGC Engineering, Hemel Hempstead) is almost totally produced on a CNC vertical mill. The result could appear too much as if milled out of a solid chunk of metal but for the subsequent shot-blasting of the crankcase and the cylinder head.

A dynamometer test is due shortly on this attractive motor, and is likely to confirm a better than average performance resulting from long-dwell cams and high turbulence wedge head design. Strictly, such head cross-sections should have no power advantage over the "hemi-head" but there is some evidence that performance is maintained for longer periods before necessary cleaning of the carbon build-up is required. AGC Engineering are also in the business of compressed air tooling, and so not surprisingly have much of the know-how to be already looking towards the 'supercharging' of the Laser 61 and a soon-to-be-announced V-twin. It is of interest to observe the model engine's progress along the well-worn path already

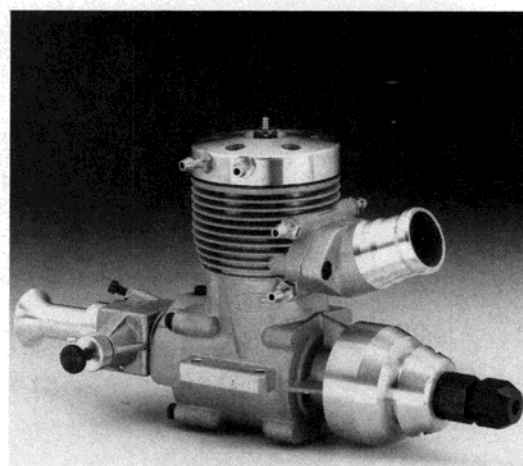


Computer numerically controlled (CNC) technology produced this Laser .61 4-stroke offered by AGC Engineering of England. This technology is especially effective in the milling process for 4-strokes which require much more complicated internal contours than two cycle engines.

created by the full-size 4-stroke because some of the routes chosen may well be fore-closed to the model sized engine due to scale effects. Of equal interest is that the model engine 4-stroke manufacturer is not immune from the competitive struggle up the HP curve!

Rossi 65 ducted fan

Reported recently, this "storming" fan unit has now additionally been tested with an Irvine Super Silencer (a 60 minipipe silencer), and as expected gave a wider band of useful performance from 17,000 to 25,000 RPM compared with the 20,000 to 24,000 of the tuned pipe proper. Actual power values were a bit lower at 2.97 BHP.



Eagerly awaited, the new K&B .67 Marine engine is already living up to expectations and earning considerable praise for its quality and performance. So far, it has produced a record breaking straight line run of 90 MPH. CNC technology, now used by K&B, gives it quality manufacture.

The much shorter minipipe style could ease C.G. problems while at the same time making fan parameters slightly less critical in their matching to peak power points. During the extra test session, the rotary drum Rossi was taken up to 28,000 RPM with no hint of mechanical problem.

K&B 67 Marine

Now arrived and straining at the dynamometer, this very fine looking motor is a definite step up in quality manufacturing processes; (the CNC machines now being used by K&B appear to have helped greatly), and the overall packaging/presentation is of very high order indeed.

Where it will really hurt the 'opposition' is however likely to be on the far more significant performance front. Much preliminary testing and use has already occurred in American marine competitions and a record breaking straight-line 90 MPH by Steve O'Donnell plus a (one-way only) 96 MPH run so far attest to the K&B's potential. So, any subsequent dyno test is likely only to confirm an already known and verified high performance. By current model engine standards, the exhaust timing is very high (at 178°) and of course this allows the tuned pipe considerable "freedom of expression". K&B do not claim any particular BHP figure (nor apparently need to!) but rumors persist of around five BHP. On the face of it, this eight BHP/cubic inch power rating is quite plausible with use of high nitro.

If I come out of the test shed alive I'll let readers know.

Small engines and a new dynamometer

At around 1/100 of the K&B's power and thus at the other end of modelers' needs lie the small "sports" diesels below 1cc capacity. A request to test this size of engine and others down to .1cc has led me to finalize construction of a much smaller copy of the dyno currently used for large motors (above 3cc). First test runs are scheduled for this month; the machine should realistically be capable of detecting small torque values down to 1/10 ounce-inches and up to a maximum around 30 ounce-inches where the much larger machine takes over.

The 2 PAW diesels shown here are the latest products from this long-established British factory. Progress Aero Works' Gig Eifflaender has long and consistently maintained an affinity for this particular small engine concept, and to anyone more used to the typical 40 or larger engine size, they open up new avenues of model airplane experience. Very inexpensive to purchase and operate, the resulting small model sizes are also undemanding of materials, flying space, and are of much restricted environmental impact.

For each dollar outlay they just have to give (like the small Cox engines) considerable flying enjoyment; and of course the diesel itself fines this down to the simplest and least troublesome level.

The 80 engine (.8cc) is shown with throttle equipped carb for R/C use, whereas the 100 (1cc) engine has open carb for sports C/L or other non-R/C use. In all essentials and appearance, both units are identical except for the bore increase around .035 inch for the larger engine. Forthcoming tests should reveal their similarities rather than any differences. Recommended propeller sizes are from 5×3 to 8×4 and advised fuel is the simple to remember 1/3 ether/1/3 paraffin/1/3 castor oil with around 1 1/2% IPN or amyl nitrite or nitrate to give clean high speed running; though this latter item can be omitted for much sports operation.

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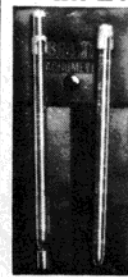
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Flyin' things for fledglings

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

Hi, gang - welcome to the old Fledgling hangar, the home of neat models and some of the nicest people in the hobby.

We've got some news from different members of our favorite "gang" and also, some neat new items to discuss. So, let's have at it.

First off, we got a letter and lots of photos from another of those great school teachers who are really doing a job on helping the newcomers to the hobby. Ray Roberts is at the Berkeley Hall School out in Los Angeles, CA and he really has a super well-organized course going. Believe it or not, his course is part of the regular school curriculum. Nice going, Ray, and I'm sure I can speak for all of the gang when I say, "Many thanks for doing a great job."

I got another letter which I really want to tell you about because it proves again what nice people are involved in this "favorite pastime" of ours. John Specht from San Francisco tells us about buying a Comet kit. He bought it while out of town and when he got home, he found that the die-cutting was bad. Since he couldn't go back to the dealer, he wrote a polite letter to the Comet Co. explaining his problem and requesting a plain sheet of paper with the patterns (which he intended to make from his own wood). A short time later, he received an unexpected package which turned out to be a new kit in fine

shape, which had been sent to him by Comet. John says that he certainly did not expect a complete new kit and that he thinks it was a fine gesture on the part of Comet. I'll tell ya, gang, I gotta agree with him, too. It's like I said a couple of minutes ago; it again proves that there are some pretty nice people involved in our hobby.

We also had a letter and photos from our old column friend, Don Ross. Don is up to his old tricks . . . mass production, that is. I gotta tell you, gang, about Don. Every once and a while, he gets on a kick and begins about six models, or so, at once. How does he do it? Just like I said . . . mass production. Don will build all the fuselages, then all the wings, all the tail feathers, etc. Then, he starts on final assembly and puts them all together. Final step in his "production line" is the paint and color trim. Don is one of the few modelers I know who builds this way, but, for him, it seems to work fine. Not only that, but when he finally goes out to fly, he's got a whole "stable" full of stuff!

Don sent a lot of photos, but, for now, I want to show you his latest Bostonian, the *Planarian Bostonian*. Don always liked canards and this one is really a way-out type. We'll have more of Don's photos in a future issue.

Oh, I almost forgot to tell you - we got a letter from another school teacher who is get-

ting a new group started. Larry Lake, who teaches at the Lincoln County School District in Elsberry, Missouri, wrote to say that he was trying to get something started and, since he was new to the hobby himself, he needed a little help. Well, I immediately put him in touch with our most experienced "teacher type", our friend Roger Wathen, in Indianapolis. Rog has had lots of experience with his school group and should be just the man to help Larry get things under way. A big tip of the Fledgling hat, though, to Larry Lake . . . especially since he is new to the hobby himself, but is still making that big effort to help Juniors. Go get 'em, Larry, you're our kind of guy!

Now, I told you that I had some new items to tell you about, so I won't make you wait any longer.

First off, we had a nice letter from Gene Dubois at Gene Dubois Models and things are really happening in the Dubois workshop. Yep, that's right . . . *big* things are happening! Yes, I said *big* things and that's exactly what I meant. Gene is working on an entirely new line of kits in one inch to one foot scale . . . biggies!

The first model scheduled to be a future kit is the *GeeBee R-1* racer. At one inch to the foot, it will have about a 25 inch wingspan, and, I guess that will give you an idea of what the size of that huge barrel-shaped fuse-

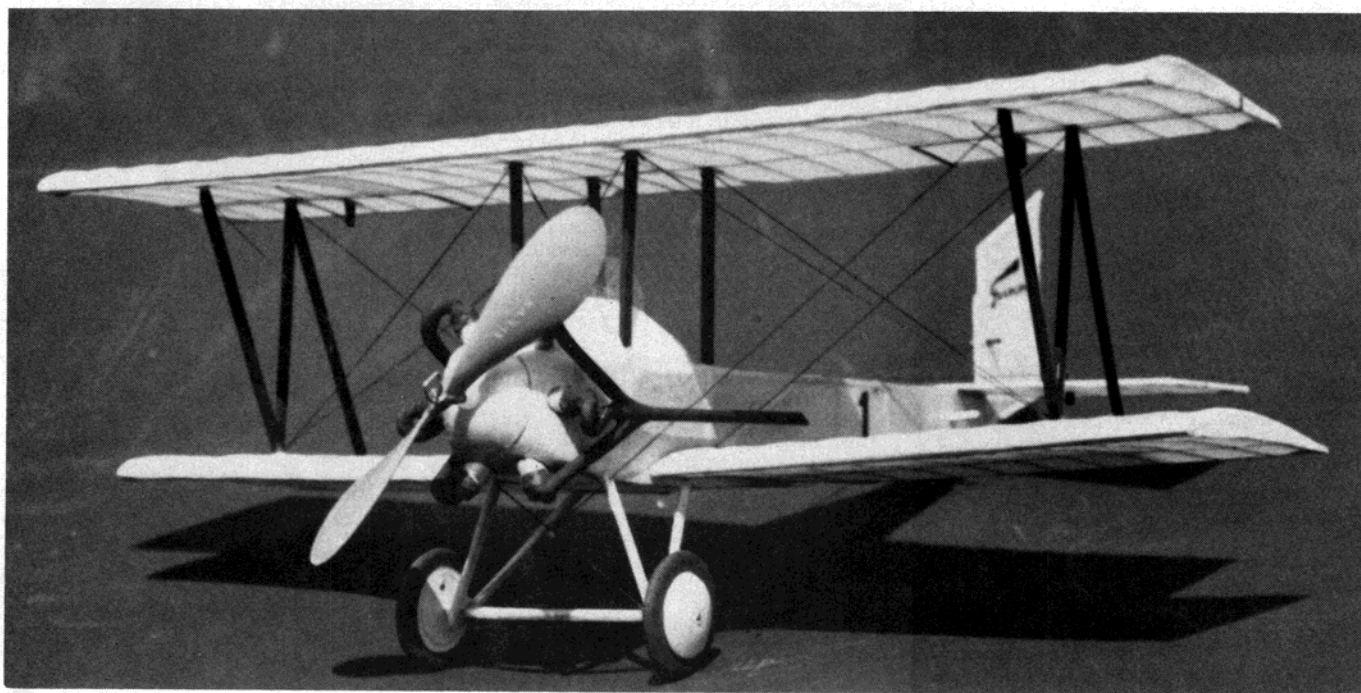


PHOTO: GENE DUBOIS

Activity at Gene Dubois Models is really beginning to pick up. There are a lot things in the works. One new kit is this peanut *Farman Sport* above.

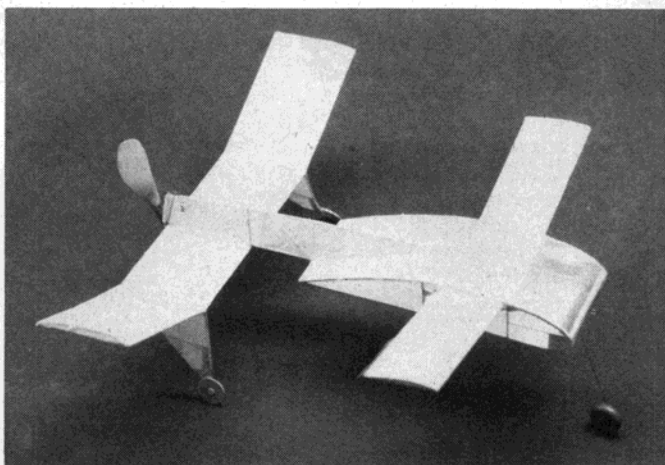


PHOTO: DON ROSS

Canards and Don Ross are starting to become synonymous. That's his new Bostonian design, the *Planarian Bostonian*. More about it in the future.

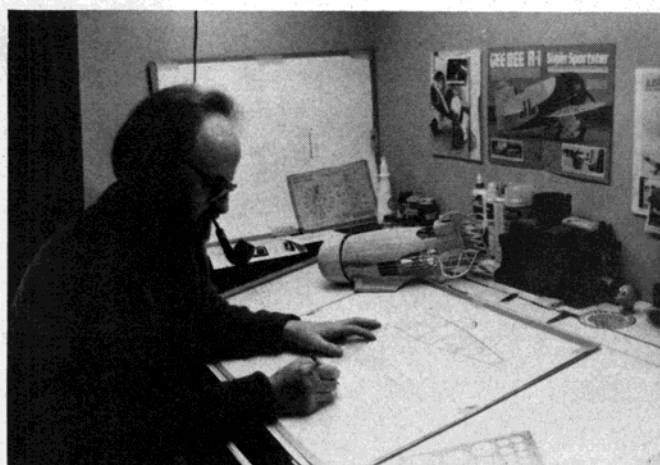


PHOTO: GENE DUBOIS

The maestro himself, Gene Dubois, at his new drawing board. He needed it to work up his new large scale kits like that *Gee Bee* you see with him.

lage will be! Wow! I'm gonna have to get myself a copy of that one just for the sheer awesomeness of it. I'm gonna show you a photo of Gene and his drawing board and you'll notice that partially finished *GeeBee* on the board . . . note the size!

Gene also informed me that the second kit in the new line will be the WWII Navy *Hellcat*. Gene tells me that the old Grumman *Hellcat* was always a favorite of his and he can't resist a one inch to the foot model.

These kits will be designed for rubber, but will also be convertible for electric, CO₂ or small glow engine power.

And, just to show us that he hasn't forgotten the peanut scale guys, Gene will also be adding a new model to the peanut line. This one is the old *Farman Sport* and it's a real cutie - very scale, too. It could well be a contest winner. A super neat little biplane with lots of great detail.

Now, gang, remember I said that these are "in the works". Don't start ordering from Gene until you hear further from me, or see the models in Gene's advertisements in FM. Since I'm writing this a couple of months before you'll read it, that ad might well appear in this same issue.

In any event, keep your eyes open, cause I know you'll be wanting some of these as soon as they're available.

Now, I told you that I had a couple of things to tell you about and here's the second thing: a new plan service and *what* a plan service! Allen Hunt (no relation to our editor) down West Virginia way, is offering all sorts of neat plans from old kits and publications of—as the ads used to say—"yesteryear". That's right, gang, all the "golden oldies" are available. There are all types, too, from contest types to special types to pure scale by some of the master designers. Allen's catalog sells for \$2.00 and it's refundable with your first plan order. Not only that, but this is *some* kind of catalog. It's 8½ by 14 inches and is sixteen pages thick. Included are almost 300 different aircraft with a small illustration of each, so you know what each model will look like. Not only that, but the first three pages are actually reduced size reproductions of three of his more famous scale plans. The first is Earl Stahl's *Spitfire*. This is followed by Elmer Pilzer's Russian *D-1* fighter, a gorgeous old biplane. And, finally, Bill Winter's Dewoitine *D-535* parasol fighter which was published in *Model Airplane*

FLYING MODELS



PHOTO: RAY ROBERTS

The success of Ray Roberts' school program for Fledgings helped make it part of the actual school curriculum. Shown as he helps a student get one ready, Ray is one of many who give our hobby a great name.

News in 1935.

After that, you get to the listings of all the plans that are available. Would you believe some plans from Comet kits of 1932? That's right, he's got the rubber-powered *Clipper* and the *Red Racer*. If that doesn't turn on the oldtimer guys and the nostalgia buffs, I don't know what will. Not only that, but Allen has updated each plan a bit, like the old rubber-powered *Clipper* has an "extra" on the plan which shows how to install CO₂ power . . . a nice touch.

Best news of all is that the prices are "right" with most plans in the \$2.00 to \$2.50 range. They do go as high as five bucks, but those are mostly the old six foot, and over, "gassie" free flights. I'll tell you, gang, you'll

get more than two bucks worth of enjoyment from this catalog if you never buy a single plan. On the other hand, I just know you'll find something in it that you won't be able to resist. So, if you want to look over the catalog—as I am while I write this—send your two bucks to this address and ask for a catalog. Tell Allen that Van sent you:

Allen Hunt Plan Service, Box 726, Dunbar, WV 25064 0720.

Well, gang, it's that time again. Time to close the hangar doors on another get-together. It's been a "fun" session and I look forward to getting together again next month. Keep in touch with your old modelin' buddy here at 10 Brothers Rd. in Wappingers Falls, NY 12590. Happy Modelin'.

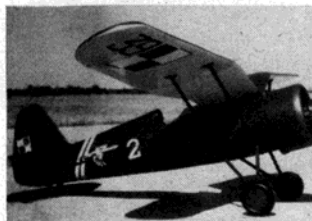
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R/C SCALE



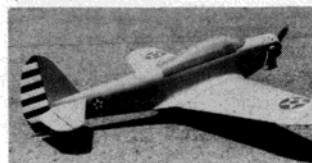
CF-604 PIPER PAWNEE BRAVE. This R/C sport-scale cropduster features a span of 49 inches and four channel operation. A fine subject for any good .40 size motor. By Arthur Heenan. FM 7-82 \$6.00



CF-617 POLISH FIGHTER. This 40 inch span R/C sport scale model features a gull type wing design. For two to three channel systems and 1/2A powerplants. By Christ Nagy. FM 12-82 \$5.00



CF-623 AMERICAN EAGLE EAGLET. A stand-off scale R/C model of an American light plane of the 1930's. With a span of 68 inches, it is designed to be flown with a .35 size motor. By Al Wolsky. FM 2-83 \$5.00



CF-627 DOUGLAS DEVASTATOR. An R/C sport-scale version of a WWII Navy veteran, for four channels and .60 size mills. Wing span is 82 inches. Foam core wing construction. By Dan Reiss. FM 4-83 \$6.00



CF-631 SYS MONOCOQUE. Designed for single channel pulse or micro multi-channel R/C systems, this schoolyard scale classic features a span of 36 inches. For .020 power. By Jim Kostelky. FM 5-83 \$5.00



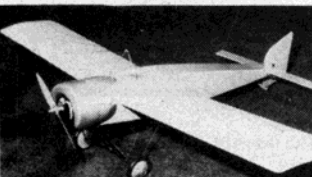
CF-636 FLETCHER FU24-950. R/C cropduster at its best with this sport-scale version of New Zealand's AG plane. Spans 63 inches and utilizes four to five channel radios and 40-45 size motors. Plans on two sheets. By Art Heenan. FM 7-83 \$12.00



CF-651 FOKKER D-XXI. This R/C stand-off scale model of a little known WW II fighter features a span of 43 1/2 inches and is designed to be flown with .15 to .21 size motors. By Kalevi Sundqvist. FM 12-83 \$6.00



CF-665 SPARROWHAWK II. A Schoolyard Scale version of an obscure but charming British lightplane. Designed for 1/2A engines and two channel R/C systems. Spans 48 inches. By Don Strull. FM 5-84 \$6.00

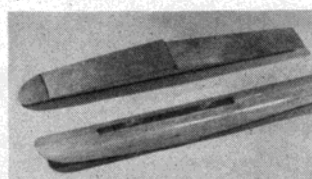


CF-621 MORANE SAULNIER MODEL H MONOPLANE. A 36 inch span stand-off scale R/C ship for .049 to .10 size motors and three channel radios. By Don Martin. FM 2-83 \$5.00

SEAPLANE

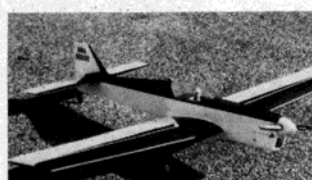


CF-600 SEAHAWK. An R/C scale-like floatplane featuring a 47 inch span. For four channel radios and .40 size motors. By Kalevi Sundqvist. FM 6-82 \$6.00



CF-602 20-40-60 FOAM CORE FLOATS. Three sizes of foam core floats for conversion use with virtually any R/C landplane type. By Dick Sarpolus. FM 6-82 \$5.00

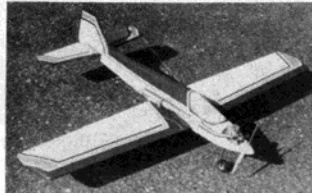
R/C PATTERN



CF-609 FAKEOUT. This hot .40 powered R/C sport pattern ship features a 58 inch span. Built-up construction. By Dom Palumbo. FM 9-82 \$6.00



CF-613 BIG ONE. A giant R/C pattern design for use with a geared .61. The wing area of this behemoth is 1200 square inches with over a 70 inch span. On two sheets. By George Buso. FM 11-82 \$17.00

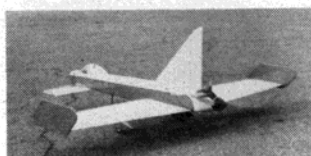


CF-637 THE HAMMER. A hot sport/pattern design which makes use of the current crop of high performance .19-.25 size motors. Plans show two versions for either internal or external pipe mount. For four channel radios. Spans 50 inches. By Dick Sarpolus. FM 7-83 \$6.50



CF-619 GAMBLER. This R/C sport/pattern design features a 700 square inch wing and .60 power. Scale-like looks add to the fun. By Bob Lobozzo. FM 1-83 \$7.00

R/C SPORT



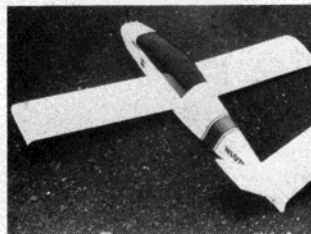
CF-597 SABREBAT. A .60 size R/C canard sportster, featuring foam core wing construction. By Dan Reiss. FM 5-82 \$6.00



CF-605 TWO SQUARE. This R/C twin features a span of 66 inches. For two .60's and four channel radios. Formed plywood fuselage. By Dan Reiss. FM 8-82 \$6.00



CF-608 COMBO BIPE. A 54 1/2 inch span R/C biplane which combines the good features of many popular designs into one. For use with four channel radios and .40 size motors. By Hans Hochradel. FM 9-82 \$8.00



CF-611 MINI MONI. A 1/2A R/C sport-scale version of a popular new homebuilt aircraft. A 36 inch span natural for schoolyard flying. By Bob Aberle. FM 10-82 \$5.00



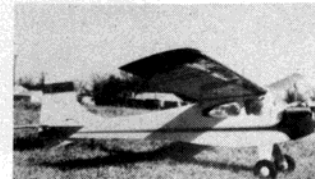
CF-634 PINE BARON. An all pine R/C trainer which features a wing span of 70 1/2 inches. For four channels and .40 size motors. By Al Trapanese. FM 6-83 \$6.00



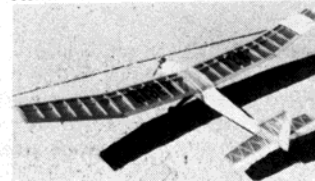
CF-640 SPINNER II. Just the ticket for pattern training, this .60 size, low wing design features a span of 63 inches. Foam wing and built-up sheet balsa fuse construction. By Mike Blackard. FM 6-83 \$6.50



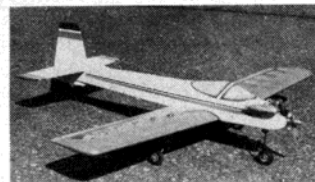
CF-615 MONOWING. A unique R/C flying wing with a span of 40 inches. Designed for three channel equipment and .15 size motors. By Kalevi Sundqvist. FM 11-82 \$5.00



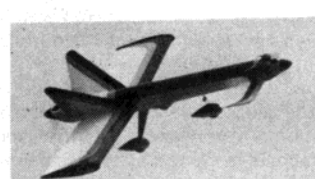
CF-624 R/C SUE. An R/C version of a perennial freestyle sport favorite for use with three channel radios. The 59 inch span ship flies with .19-.25 power. By Dr. D.B. Mathews. FM 3-83 \$6.00



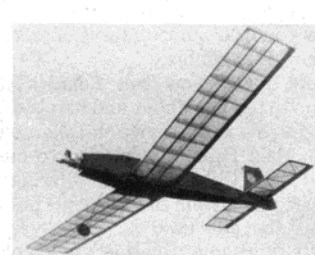
CF-629 SIG RISER MODIFICATION. Simple changes can turn Sig's popular Riser kit into a fine powered trainer for .09's to 10's. By Dr. D.B. Mathews. FM 4-83 \$3.00



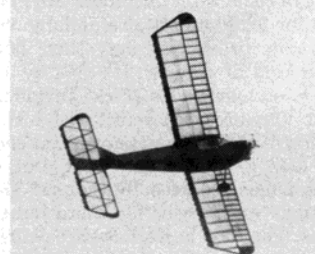
CF-642 PEPPER. This low wing R/C sport design features a 50 inch span and flies with .19-.25 size motors. An excellent choice for that first low wing ship! By Dick Sarpolus. FM 9-83 \$6.00



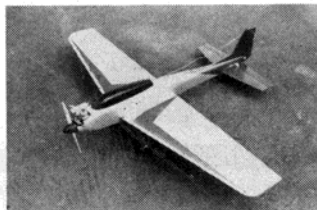
CF-648 SABREBAT TWO. A unique twin engine R/C sport canard in a push-pull configuration. Features a 60 inch span and takes two .60's for power. By Dan Reiss. FM 11-83 \$6.50



CF-665 SPARROWHAWK II. A Schoolyard Scale version of an obscure but charming British lightplane. Designed for 1/2A engines and two channel R/C systems. Spans 48 inches. By Don Strull. FM 5-84 \$6.50



CF-664 AIRKNOCKER. This remake of an old FM favorite is designed to produce scale-like flights on two channel R/C operation. Rudder only flight control with throttle adds to the fun. Spans 52 1/2 inches and takes .09-.15 engines. By Bill Winter. FM 4-84 \$6.00

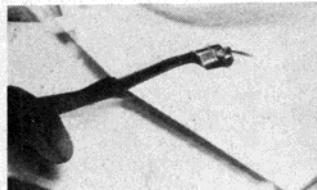


CF-653 FASER. This 48 inch span Sport/Pattern design is a perfect match for one of the hot new .21-.25 size motors. By Al Trapanese. FM 1-84. \$6.00

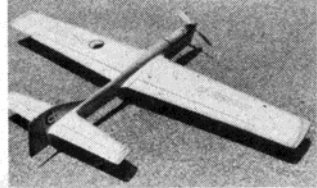


CF-662 FOUR RUNNER. This 58 inch span, four channel R/C sport model is designed to be flown with 40 size four cycle motors. By Dick Sarpolus. FM 4-84. \$6.00

CONTROL LINE



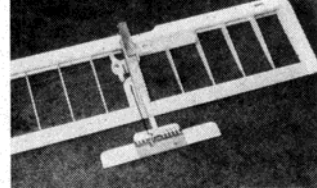
CF-598 SC-2. A top C/L slow combat design for use with .36 size motors. By Phil Cartier. FM 5-82. \$5.00



CF-606 ECLIPSE. Ultra high-aspect-ratio C/L stunter for .35 to 40 power. Features a 63 inch span and adjustable controls. By Dennis Adamson. FM 8-82. \$6.00



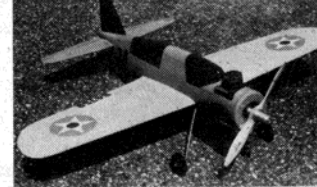
CF-614 MISS JULIET. Stylish C/L stunter for use with .40-.46 size motors. Features include a large canopy and a span of 57 inches. By John Poynter. FM 11-82. \$6.00



CF-618 MASTER KILLER. A state of the art Fast Combat model for use with the hottest .36 size motors. Features a span of 39 3/4 inches. By John Jo. FM 12-82. \$4.00



CF-639 P-39 AIRACOBRA. A control line scale version of the famous WWII Bell fighter used by the Russians. A .25-.35 mill powers this 34 3/4 inch span model. By Walt Musciano. FM 7-83. \$6.50



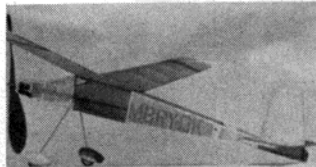
CF-630 OS2U-1 KINGFISHER. Something a bit different for C/L carrier events. Features include a sliding leadout placement and a span of 30 1/2 inches. For .40-.60 size motors. By Tom Schaeffer. FM 4-83. \$5.00

R/C BOATS

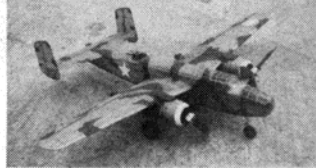


CB-15 TWINKLETOES. A sleek R/C outboard hydroplane for use with K&B outboard motors. By Richard Hanson. FM 10-82. \$6.00

RUBBER



CF-599 EMBRY-OK. Designed to compete in the F/F rubber Embryo class, this design includes many scale-like features. By Al Lidberg. FM 5-82. \$4.00



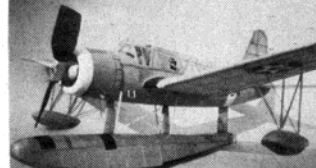
CF-601 B-25 MITCHELL. A 36 inch span, super scale, rubber powered version of a famous WWII bomber. By Mike Midkiff. FM 6-82. \$4.00



CF-607 McRAE SUPER DART. A 27 1/2 inch span rubber scale beauty. By Florent Baecke. FM 8-82. \$4.00



CF-622 GLOSTER GANNET. This rubber powered F/F scale biplane has plenty of charm. It spans 21 1/2 inch. By Don Strull. FM 2-83. \$4.00



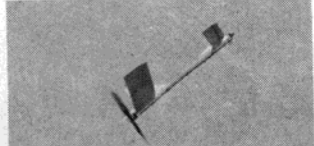
CF-628 OS2U-1 KINGFISHER. This rubber scale version of the famous Navy rescue/scout plane features either wheel type gear or optional floats. The Curtiss replica features a 27 inch span. By Mike Midkiff. FM 4-83. \$5.00



CF-620 POLISH RWD 6. Winner of the 1930's Berlin event, this design is faithfully reproduced for rubber scale competition events. Features include a 32 1/2 inch span with 150 square inches of area. By Hurst Bowers. FM 1-83. \$5.00



CF-635 FIESELER Fi-167. This unusual WWII German biplane is designed for F/F rubber scale competition and features a span of 30 inches. By Hurst Bowers. FM 6-83. \$5.00

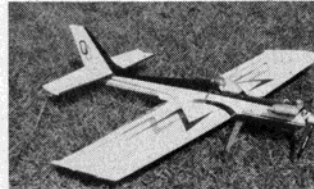


CF-616 FLECHETTE. This simple sheet balsa F/F canard features outstanding flight performance. By Don Ross. FM 11-82. \$3.00

PROFILE C/L

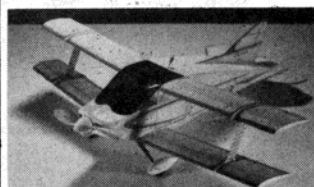


CF-633 PROFILE MISS DARA. The popular Goodyear racer is rendered in profile form for C/L sport and stunt flying. Features include a span of 51 inches, adjustable leadouts and side mounting for .36 to .46 size motors. By Allen Bruckhaus. FM 5-83. \$6.00

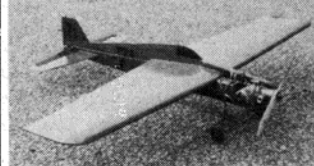


CF-625 ROOKIE. This C/L stunter features an upright mounted motor in a profile fuselage design. The ship features a 50 inch span. By Don Winfree. FM 3-83. \$6.00

NEW PLANS



CF-663 HIPERBIPE. Winner of the 1983 Nats freestyle Gas Scale event, spans 18 3/8 inches and is a replica of a full-size aerobatic homebuilt. By Dave Rees. FM 4-84. \$6.00



CF-667 BIG QUICKIE. Designed for C/L formula racing events, and modeled after "Goodyear" type racers, this plane performs with .36 size engines and spans 38 inches. By John Ross. FM 5-84. \$6.50

CF-668 F-4U CORSAIR. The venerable "bent wing bird" is modeled in a size to suit .35-.45 motors and four channel radio equipment. The model spans 36 inches. By Pavel Bosak. FM 6-84. \$6.50

CF-669 F5F-3 HELLCAT. A Rubber Scale masterpiece! This 33 1/8 inch span model of one of America's greatest WW II fighters is also a fine flying subject. By Mike Midkiff. FM 6-84. \$6.50

CF-670 KING KOMBAT. Put the thrill back into R/C flying with this 36 inch span, 19 powered combat design. By Floyd Manly. FM 7-84. \$6.00

CF-672 FIRESTAR. Slick and fictional is this sport/pattern canard design for .40-.45 engines. Features a 57 inch span foam core wing. By Dick Sarpolus. FM 8-84. \$6.50

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R/C Sport scale

By Rich Uravitch

Saw some very nice models in Scale this year at the WRAM show. By comparison to last year's edition, entries were up, more diversified in subject matter, and generally of a higher quality. Among the standouts were Bill Kolisko's F-14 *Tomcat*, Mark Frankel's Gloster *Javelin*, and an absolutely overwhelming 1/3 scale SE-5A from Jeff Troy.

Tom Cavagnaro's A6M5C *Zero* from Ziropi plans was also impressive. This 25 pounder spans 93 inches, uses Robart retracts and, although I can't say the airplane was designed around the engine, the intake of its Tartan Twin powerplant falls exactly where the scale cowl intake is located!

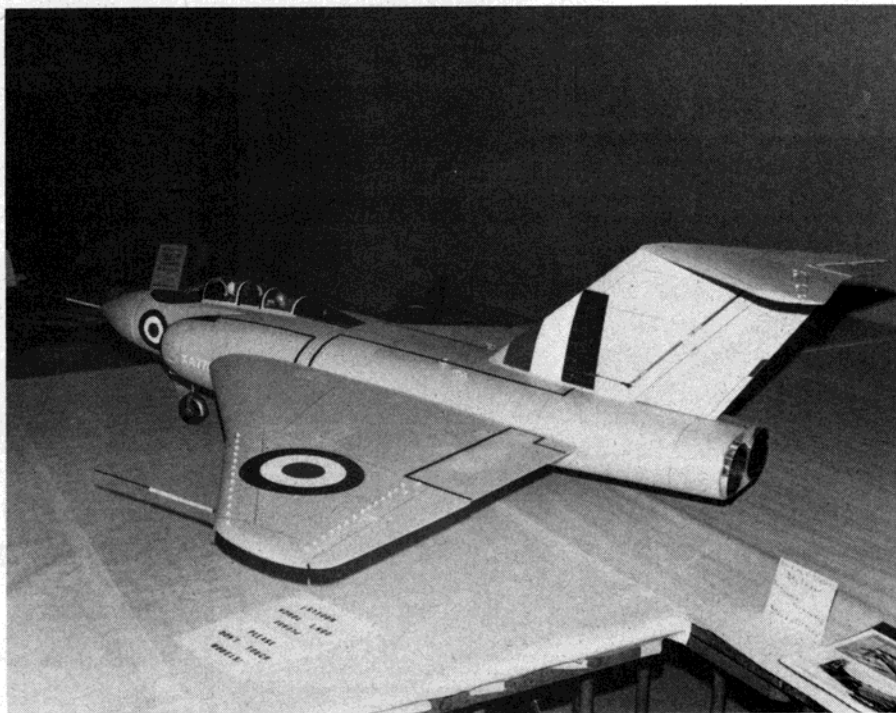
Bill Wargo's eight inch *Antoinette* had its O.S. 61 four-cycle engine cleverly disguised with dummy cylinders behind it.

Another four-cycle cutie was the 1/5th scale Stolp *Starlet* by Bill Henry. Powered by a .40, this is a 60 inch, 5½ pound beauty. I don't know whether it was scratch-built or done from the Graupner kit, but either way, it was delightful!

At the risk of saying what's already been said by others (obviously more perceptive than I), there is going to be a whole new wave of modeling with the four strokes. Although the quiet operation will go a long way to preserving some of the dwindling numbers of flying sites, the turnaround pattern flyers have already recognized the potential of an engine/prop/airframe combination which allows flying at the same relative speed whether going uphill or downhill; the use of a four-cycle in some of our sport scale machines can really make you a believer. I bolted one in my SE-5, hung a 12×5 prop on it and I was hooked!

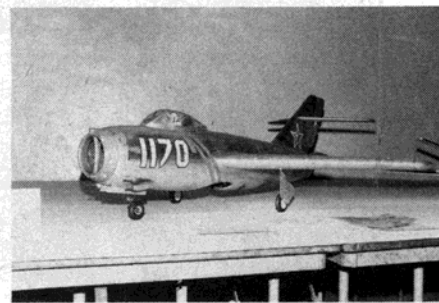
For you regular readers, "Project Clipped Cub" has progressed to the covering stage and the engine choice is the Enya .60 four stroke. Hope to have some photos for you shortly.

Keep those cards and letters coming . . . till next time. . .

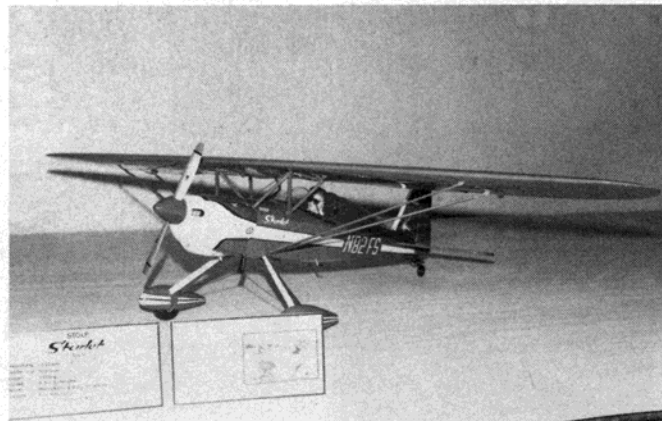


PHOTOGRAPHY: RICH URAVITCH

Second of a series, Mark Frankel's Gloster *Javelin* (above) uses twin OPS .65/Byrojets. Jeff Troy's 1/3 scale SE-5A (below left) had a whopping 4664 square inches of wing using a Sachs Dolmar 3.7 up front. This Byron *Mig-15* by Roman Jackson had a very convincing "Alclad" finish (below right).



Bill Kolisko's F-14A *Tomcat* (above left) doesn't just look very pretty, it also flies very well using twin K&B 7.5/Turbax II's inside. The wings, just like the



original can sweep forward and back in flight. A four cycle .40 pulls Bill Henry's 1/5 Stolp *Starlet* (above right).

R/C giant Scale

By Frank Costello

Since jumbo sized models have finally found acceptance at the flying field and in the modeling industry, more and more people have been unearthing info aimed strictly at the jumbo flyer. Ralph Warner of Radio Controlled Models, Inc. (the famous RAm Red line of electronic goodies) is one of these people. He's been hard at work for us doing some research on the electric current carrying capabilities of the wires we use in our radios. Ralph sent out a general letter to the modeling press with his findings and informing everyone of the risk of using the smaller standard 26 gauge wire in our high-current draw radios.

Ralph says the larger gauge wire is a must for our use because of the limited ability of the smaller wire (especially in extreme lengths) to carry the necessary current (amps) to power the larger servos we use. In short, what's the sense of using a big servo if it can't get the power it needs to work properly? A chart showing Ralph's findings is shown. Check it and save it.

Wire gauge	1 foot	3 feet	6 feet
#26	4.64 volts	4.37 volts	3.84 volts
#24	4.70 volts	4.50 volts	4.20 volts
#22	4.73 volts	4.61 volts	4.42 volts
#20	4.76 volts	4.66 volts	4.54 volts
#18	4.77 volts	4.73 volts	4.65 volts

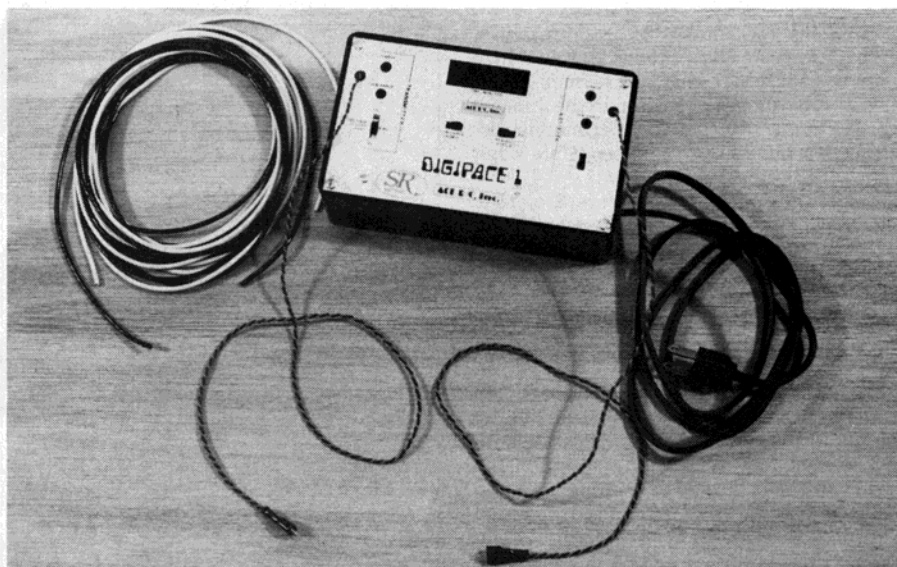
Ralph used a 4.8 volt standard nickel-cadmium pack with a two amp load on it to get his findings. As you can see, the voltage drop (and hence the drop in current carrying capability) is significant, especially in the smaller wires. When you consider that 4.4 volts is the usual cut-off on a battery cycler, you can appreciate the hazard in some of these low readings.

Making use of all this new info has been difficult though because of the lack of sources for his heavier wiring. Well we now have at least a couple of sources—SR Batteries and Ace R/C—with more to come, I'm sure.

Ace is offering 20 gauge wire (19 strand) in three different colors; black, red and blue. At \$1.19 for eight feet, it's certainly reasonable. Ace will also make these wires up into a heavy duty switch harness for you. This comes pre-wired onto a standard Noble DPDT switch with Deans plugs already attached ready to use. Price is \$8.95.

A word here about the Deans plugs. These are ideal for our use due to their heavy construction and thick, heavy duty pins capable of carrying large currents without getting overly warm. The larger size pins makes it easy to solder wires to, also. Try 'em, you'll like 'em!

Larry Sribnick of SR Batteries also has the heavier wire (24 gauge) at no extra cost with any of his batteries if you just ask for it. Unfortunately, these wires are not available for the molded plugs such as Futaba and Kraft.



PHOTOGRAPHY: BOB HUNT

Limited by charge/discharge rates too low for Giant Scale use, the ACE Digipace (above) has been specially modified by ACE for SR Batteries. JCM Specialties makes life a little easier (and probably less bloody) when starting our big engines. Their Turkey Stick (below) keeps fingers out of those big props.



The larger gauge just won't fit in them. The 24 gauge will work exceptionally well, however, on the Deans plugs (which you should be using anyway). They'll easily fit on the Deans.

Larry also has available a 16 gauge wire with many extremely fine strands in it. In spite of a heavy insulation coat this wire is very flexible and would be ideal on leads that are moved around a lot. You get a piece each of black and yellow, both five feet long, for three dollars.

A lot of us who cycle our batteries (and most serious modelers do nowadays) will appreciate SR Batteries newest offer, a heavy duty Digipace cycler. This unit looks very similar to a standard Ace Digipace battery cycler but is internally modified by Ace exclusively for SR Batteries. You can't get it from Ace.

The standard Digipace has two charging options of 20 and 50 milliamps for the standard 225 and 500 mA battery packs. This would be fine for normal batteries but our larger packs (1200 mA and up) can take (and give) at a much higher rate and in fact should do so to exercise them properly. The SR Digipace uses a 50 and 120 mA charge rate with

correspondingly higher discharge rates (300 and 500 mA) for the larger batteries. This is the first and only discharger I have ever seen that will cycle our big batteries at the proper rate. Available, as I said, only from SR Batteries, you can get one for \$99.95. If you think this is high, I can assure you that this is *not* a chintzy unit. I assembled one of the standard Digipace units from Ace and found it to be one of the most difficult, challenging (and satisfying) electronic kits I have ever done. The resulting unit is top laboratory quality in every respect and I feel the SR version is the same.

By the way, SR also has heat shrink tubing in those *really* big sizes (one, two and three inch diameters) for putting things like battery packs together. Also good for holding your finger on after getting chopped up by that 18 inch baloney slicer on the front of your plane. You still haven't learned how to keep your hand out of the way of that club, have you? Well JCM Specialties has made it easier for you. Instead of a chicken stick for our turkeys, they have come with (you guessed it) a *Turkey Stick*. Clearly a novel (and quite useful) item, I intend to use mine faithfully. See you at the field.

R/C pattern

By Dean Pappas

This weekend past (May 5-6) saw the first contest of the season in AMA District II, and a few fliers asked me about the column in the June issue of *FLYING MODELS* about trimming airplanes that pull to the top in one Knife Edge and to the bottom in the other.

Ooops... It seems that Figure 3 of that column should look like the correction shown in this month's column, rather than the mirror image of Figure 4. So, if you weren't confused by the drawing, then you didn't understand! Someone asked me if I was suggesting that pattern planes don't have to be straight; nothing could be further from the truth! There is no substitute for the straight airplane that trims well from its initial flights. The simple fact is that this perfect airplane is a rare animal indeed; in the meanwhile, the plane you are flying has to be made "livable". This is especially true in the Advanced Class, where one is learning to do point rolls for the first time. Keep building, and hope that the... ahem... back-up flies better.

On the never ending subject of noise, I have the extra wide blade 12-9's I was telling you about, trimmed to about 11 inches diameter and, at about 12,000 RPM, this looks to be a great combination for AMA patterns, although the level flight speeds are down just a bit. Testing will be delayed while the next *Turn-arare* gets built; everything I said about having a second airplane in case of something like radio failure comes back to haunt me.

It's time for my favorite subject within the realm of "Pattern-dom"—*Placement*. This first contest of the season all too clearly pointed out how utterly cruel we Pattern fliers are when it comes to straining the necks of, and scaring the daylights out of judges. Treat your judges gently; their continued health is vital to the sport so treat them to a "movie."

I don't mean that literally, for they may think you are trying to sway them, but try to make your presentation look like the best seat in the movie theater. Go to your local movie theater (better bring the wife or girl friend along, she's become something of a widow now that it's contest season) and sit in the middle of the room. Go to a theater with a great big wide screen. Notice how the screen fills the space about forty-five degrees either side of center, and how the bottom of the screen is about fifteen or so degrees above the horizon. Try to make the maneuvers themselves fit into the frame. You'll know you've got it right when you find that the calling of "start", and "complete" co-incide with the edges of the imaginary movie screen. Now imagine a second screen cut in half and stuck like ears into either side of the original maneuver screen. These boxes should contain the turnarounds. For now, we will ignore the subject of what maneuvers should be used for the turns. This way of "boxing in" the flight will make clear that it

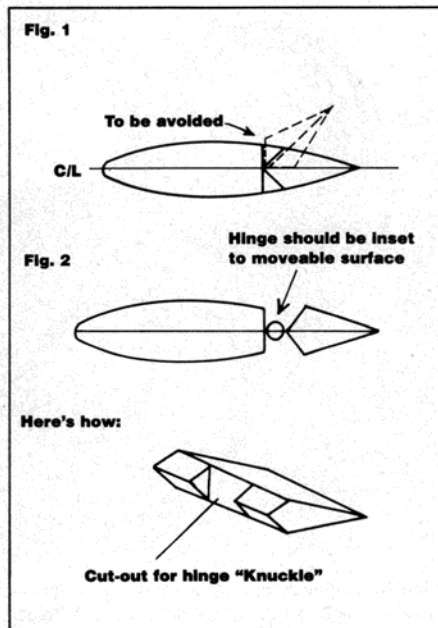


Fig. 3
Correction to June Pattern column
In left rudder knife edge, the top
of the stab can be seen. I.e. positive pitch



is pleasing to the eye to make the turnarounds in the same place each time. The flight begins to take on a "planned" look.

Matching MonoKote

Getting paint to match MonoKote™ has always been difficult, although the people at Hobbypoxy have made it easier; but I prefer to use lacquer (even I can't seem to goof it up) with a coat of clear epoxy over it. The *Turnarare* was done in Orange, White, and Metallic Brown MonoKote on the wings and tail and the following matches can be found for these colors on the DUPLI-COLOR rack at the auto parts store.

Metallic Brown = DS-GM #286
Orange = VW #47
White = DAL-1675 Appliance White
Lacquer.

In general, all but Ford and Chrysler colors are lacquer, and can be inter mixed without adverse reaction.

Hinge to gaps

This month's technical subject is hinge gaps and airflow around a hingeline. There is no question that sealing hinge gaps is good; I am not the first person to tell you this, nor, will I be the last. Somewhat more subtle is the effect that the shape of the moving surface near the hingeline has on control response about neutral, and how apparent differential problems can occur when the ailerons are improperly carved.

The basic rule is this: anything that allows you to reduce the throw on a surface and still keep the control effectiveness is preferable. First on this list is matching the airfoil surface with the moving surface fully deflected.

Figure 1 shows an elevator cut out of its core and sanded as we usually do; please note that when fully deflected, the leading edge of the elevator protrudes above the surface before it. The first way to reduce this is to bevel the leading edge only as much as necessary: 30 degrees is all you'll ever need on a rudder, and 20 degrees on elevators and ailerons. The second is to make the hingeline tight, seal or no seal. Figure 2 shows what happens. Now seal the hinges with MonoKote. Don't skimp, do the rudder too!

Now, what happens if you don't take all this good advice. For one thing, control effectiveness near the ends of travel is reduced; this means that in order to do that spin, or to get a good flare with a heavy airplane, extra elevator throw will be necessary that will make the plane sensitive around neutral. This is bad news, even with dual rates. Another place this shows up is in airplanes that take a lot of rudder to knife edge: less rudder throw means less drag and more speed maintained in the point and slow rolls. As a result, less rudder throw is needed. If you are having trouble learning slow and point rolls (Advanced Class), remember that both rudder throw and airspeed keep the airplane up in this extremely draggy attitude.

All this holds true for the ailerons but with an added twist: the drag increases more on the aileron that drops. The result is an airplane that behaves like it needs differential, both upright and inverted! Tell-tale signs are wobbly rolls on top of Immelmans and Square Loops with half rolls, as well as sloppy aileron response on landing.

The real kicker is that some airplanes can't be trimmed for three straight loops without sealing the ailerons.

Till next month, *Practice*.



R/C Sport.

By Dick Sarpolus

Do you know me?

As the new R/C Sport columnist and after having written the past three months' columns, I'd like to introduce myself to you - so you have an idea what kind of modeler is writing this material. I enjoy R/C and all other forms of aircraft modeling, and have been doing so for more than thirty-five years. I started by carving solid models, and went on to build a lot of *Thermic 18* and *Thermic 20* hand launched gliders. I built and flew some 1/2A F/F, towline glider, Jetex models, Jim Walker folding wing *Interceptors*, and a lot of control line models.

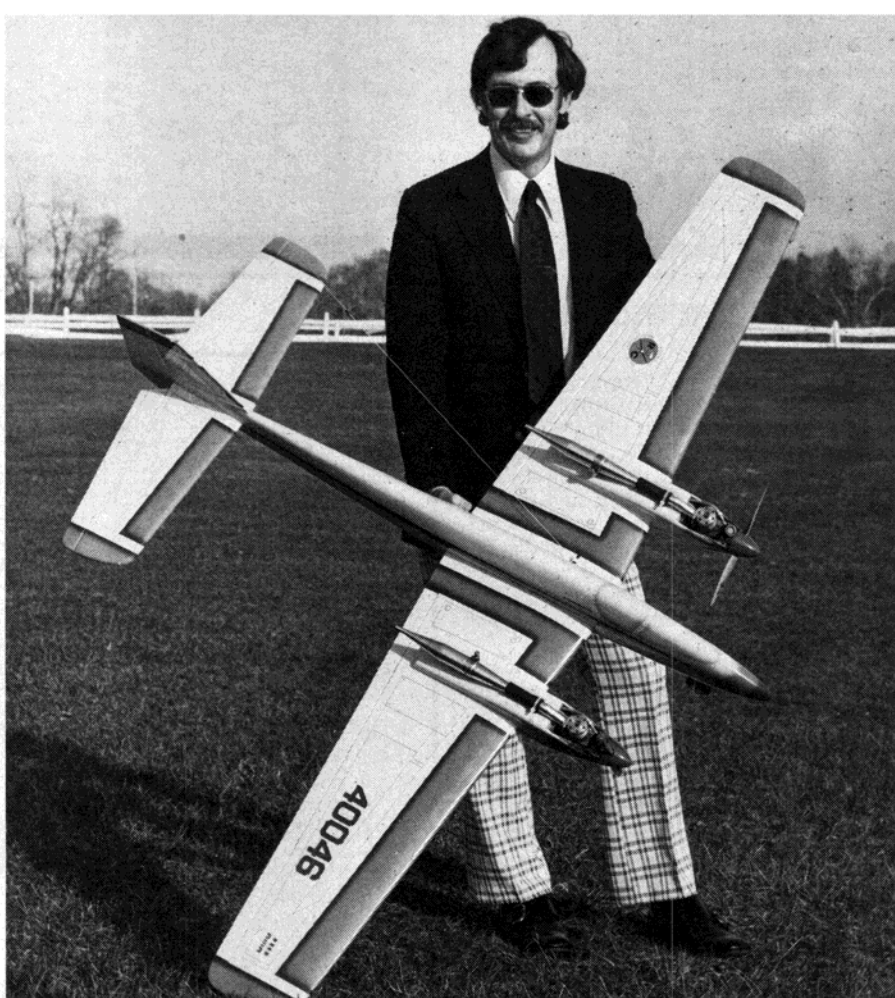
My first engine was a Baby Spitfire .045, replaced by an OK Cub .074 after the Spit wouldn't fly my first C/L model. A GHQ ran fine on my workbench with a flywheel, but never got started with a prop (Join the club!—Ed.). Later engines were more successful; I used McCoy, Ohlsson, OK Cub, Forster, K&B, Drone, Fox, and others. C/L flying was, and is, great - it provided my first competitive modeling experiences.

The first R/C gear I had was tube type; ground based transmitter, single channel, lots of high voltage batteries, escapements, and very few really successful flights. The transistor brought success and I fought my way through Galloping Ghost, reeds, and finally into proportional. The first flight with my scratchbuilt Digitrio showed me that this was how R/C aircraft were meant to be flown. I don't look back on good old days; every day brings new challenges, new projects, and more fun. After competing in every type of R/C aircraft event and accumulating some trophies, my main interests now are designing, building, and flying for fun. I've had quite a few aircraft designs published and kitted, and enjoy developing new aircraft, trying new products, materials, and ideas.

I'll try to make this column informative, helpful, and hopefully interesting - it will be open to any R/C sport topic. We can treat it as one side of a conversation; you're invited to send in your comments, questions, opinions, pictures, etc. I can't promise to reply due to time constraints, but your inputs will definitely help, as a guide to what you want to read about in this column.

I don't have a favorite R/C event; I think the best part of R/C is the variety of flying that can be experienced. Sailplanes to me are both thrilling and relaxing; searching for lift to make a max in a contest provides enjoyable tension, while soaring for an hour on a lazy summer afternoon can be the most peaceful way to spend some time. I like flying the maneuvers with a piped .60 powered pattern ship and I like practicing slow touch-and-goes with a big biplane. I like any kind of pylon racing, have three different seaplanes ready to fly, two ducted fan aircraft, a four-cycle powered sport job, a twin engined pattern ship, a pusher canard, and others. I'm building some more Old Timers and planning an .049 project, along with a Quadra powered quarter scaler, another canard, and a special

FLYING MODELS



PHOTOGRAPHY: DICK SARPOLUS

Dick Sarpolus needs no introduction—to modelers, at least. A prolific designer/author and competitor, he has influenced most areas of R/C and C/L. He poses with his Magnum 80 design, published in the Sept. 78 FM.

fun fly ship. If only more time was available to spend on our hobby.

Novice, pilot, instructor, test pilot

Our club's flying field is located close to a major parkway on one side and close to several private residences on another side. The other sides consist of dense wooded areas. Because of the potential dangers of having a model crash on a highway or near a home, the club instituted a pilot rating system, feeling that by close control of beginning fliers most crashes into hazardous areas could be avoided. Anyone joining the club is automatically a Novice pilot; this means that when he flies, he must have an Instructor standing by to assist and instruct him. It also requires that his new aircraft be inspected and test flown by a Test Pilot. While a Novice is flying, his Instructor shares the responsibility of operating the plane safely; not flying over the pit area or parking area; away from the highway and away from the nearby homes.

For a Novice to obtain a Pilot rating, which will allow him to fly his aircraft at the Club field at any time, unassisted, he must pass the Pilot's test, as witnessed by two Instructors. He must take off, go through the straight flight out, procedure turn, straight flight back, stall turn, Immelmann turn, three inside loops, traffic pattern, and landing - without crashing or requiring assistance. By demonstrating that he can handle these maneuvers, which can be done or at least attempted by almost any aircraft, he has shown the ability to fly and maintain full control of the model. This should permit safe flying at our club field.

When a member passes the Pilot's test, he literally gets his wings; AMA wings, presented at a club meeting. To get an Instructor's rating, any member who is a Pilot and feels he is capable of instructing requests the higher rating and is voted on by the club's board of officers. Test Pilots are also granted their rating by vote of the board of officers. The mix of ratings in the club varies over the years; currently, out of 71 members, there are 35 Novices, 21 Pilots, 7 Instructors, and 8 Test Pilots; the Test Pilots also instruct. It looks right now as though the Instructors would be pretty busy when they're at the field. There are a number of sailplane fliers in the club, but sailplane flying is done at another field without the rating requirements. The few helicopter pilots in the club also operate at another location.

This may seem like a lot of rules and restrictions, telling a modeler that he can't fly his own airplane by himself if he wants to. That may be; anyone not wanting to abide by the club's rules doesn't have to join. About ten years ago, the club paid to have a 40 by 300 foot macadam runway installed on the field. Without any guarantees of continued use of that field, they wanted to protect their investment as much as possible. This meant preventing any accidents which could result in loss of flying rights at the field. The majority of the club's members believe the rules are very necessary, and over the past ten years they have certainly worked out well.

Depending on your flying location, rules like this may not be necessary or desirable; each club is different. The aim should be to have flying fun - safely.

R/C Soaring

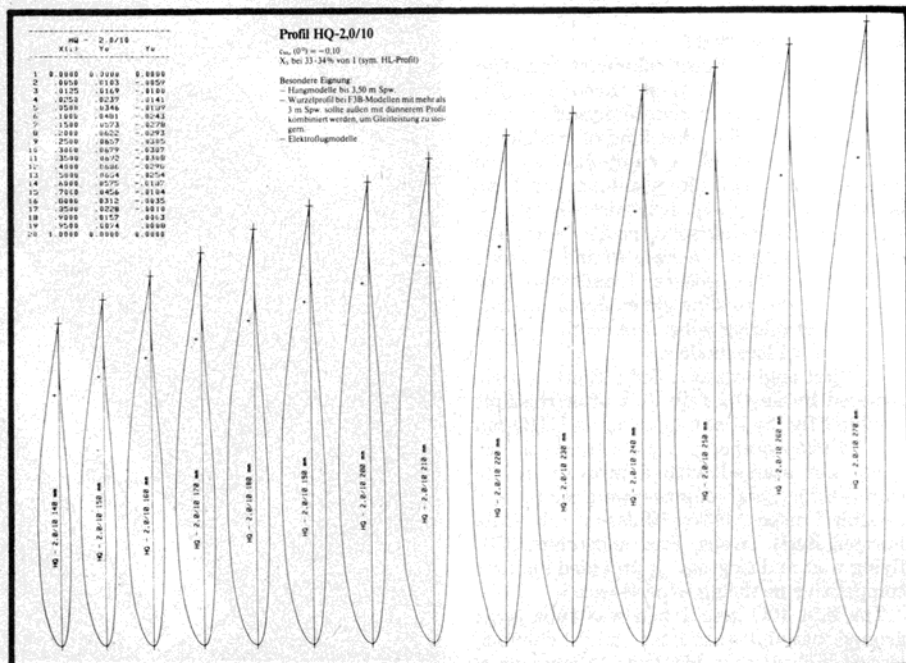
By Herk Stokely

There are some interesting problems that our eyes have when they are trying to handle the problems of seeing small objects at long distance. I learned a bit about this subject years ago when I was a Navy pilot and dealing with the problem of trying to see other airplanes at long distance. (In other words; before they saw me!) I've learned even more since my eyes (which used to be perfect) got into their forties. I'm only 39 of course, but my eyes have lived a fast life!

The problem with our eyes comes from the fact that nature equipped us to give highest priority to objects in our immediate surroundings. We have been given eyes that focus automatically on the objects to which we are giving our attention, but when we look into a blank visual field, like an overcast or clear sky, our visual mechanism goes to "Parade Rest". What I mean is; for each person, the eyes focus at some "rest" distance. I think that healthy young eyes settle into focus at about 20 to 30 feet. That's far short of the distance to our sailplanes when they're way out or high up in a featureless sky, but it's not as bad as it seems. In bright light, normal eyes that are focused at 25 feet will see objects in fairly sharp focus on out to infinity. To see a small sailplane at great distance however, may need more than "fairly sharp" focusing, and many of us don't have perfect eyes!

Most people have eyes that require some kind of correction for near or far-sightedness. That means that the eye's lens muscles have to squeeze the lens into a different shape to get focus at sailplane distances. Some have eyes that won't focus at all at that distance so they need glasses to see their model clearly. You might be asking why I'm going into all this, so here's the bottom line. When you look into a blank field with no visible object to set the focusing mechanism, your eyes may go out of focus automatically in a matter of a second or so. If you look away from your model, or momentarily lose sight of it as it turns, the empty sky can cause you to lose your focus making it impossible to find the model again. We don't usually fly that far away, but anyone who has gone to the limits knows that panicky feeling when you look right at the spot where you know the plane is, and you can't see it!

Fortunately we can take advantage of the fact that the focus system doesn't change instantly. Re-set your eyes by looking to the nearest object that will let you re-focus your eyes at long distance. A friendly nearby cloud with a sharply defined edge is the best bet. Murphy's Law, however, says that there won't be one there when you need it. The horizon is usually around (pun intended) and it, or a tree, or building at distance makes a good subject. Another model in the sky is also a good idea. Look quickly to the nearest sharply visible shape, and give your eyes a second to focus clearly on it. Now quickly shift your gaze back to the place where the



The Quabeck airfoils helped win the '83 R/C World Soaring Championships for Ralf Decker. Some of them are reproduced above and first appeared in the German publication MTB-7. See the text for more details.

model should be. Try to do that without blinking. If you don't pick up the model right away, go back to your object and re-focus before trying again.

For those with less than perfect eyes, a prescription can be obtained that lets your eyes focus at long distance with no muscle action required. That means your eyes will focus perfectly to find a small model in a blank field. I recently got a set of contact lenses to do that, and they are a super help. (if I remember to blink enough—they get a bit cloudy if they get too dry.) The depth of field in normal light is good enough to let me work on the model while I'm setting it up, and still see clearly at long distance.

MTB-7: the complete Quabeck

Those of you who have studied Dr. Eppler's airfoils over the last few years, could probably find that MTB-1 and MTB-2 were the source of most of your information on his model profiles. The title MTB stands for *Modell-Technik-Berater* which is loosely translated "model technique advisor". These publications are produced by the West German publisher *Verlag für Technik und Handwerk GmbH*, Fremersbergstrasse 1, 7570 Baden-Baden, West Germany.

The MTB series publications each concentrate on a particular facet of model information, and it was MTB-1 and MTB-2 which introduced to many of us the technical details of Doctor Eppler's model airfoils. These books have a section with detailed background narrative and technical information (in German of course); the remainder of each

is then devoted to pages and pages of accurately plotted airfoils which can be used as templates for ribmaking or patterns. MTB-7 is devoted totally to the Quabeck airfoils which are credited with making a major contribution to the winning of the 1983 World R/C Soaring Championships by the West German team. Quabeck airfoils are designated by the letters HQ followed by two numbers which designate camber and thickness. Thus the HQ 2.5/9 (which was used by Ralf Decker to win the Championships) has a camber of 2.5% and a thickness of 9% of the chord length.

Twenty eight different HQ airfoils are presented as accurate plots with each having 14 different sizes individually plotted. These plots step up from a chord length of 5.5 inches to 10.6 inches. The airfoils range from the HQ 1.0/8 to the HQ 3.5/12. Also listed are the coordinates for each of the airfoils, its pitching moment coefficient, and Dr. Quabeck's concept of the best application for each type. Also illustrated are the three views of the planes used by the West German team at the 1983 Championships.

Order your copy of MTB-7 by getting a money order from a full-service bank which will pay in West German deutsche marks. The advertised cost of the book is 18 marks. At the time I'm writing this, the exchange rate is 35 cents per mark. That means it costs \$6.30 US Dollars. Surface mail takes forever, and airmail for a book like this will be about \$5, so I recommend that you send the money order for 36 marks and ask that the book be returned by air mail.

F/F sport

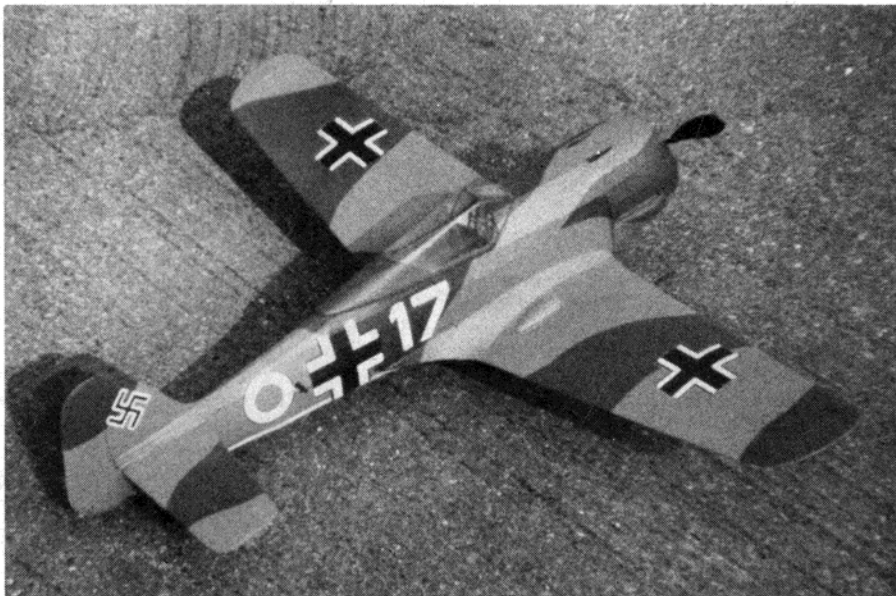
By Gene Sellers

This month's column consists of pictures from a sport flier's scrapbook. Bruce Burroughs of Glen Cove, New York, was kind enough to let me go through his pictures from the last year or so and share some of them with you.

These pictures show the kind of models that Bruce and others are building in the metropolitan New York area. Some of the shots were taken at Floyd Bennett Field where the Metropolitan Sport Squadron flies occasionally. Floyd Bennett was the scene of some famous contests in the history of model aviation. It is still used as a flying site by R/Cers and sport fliers.

You can see that Bruce likes to build WW II models. At the Aero Picnic at Bear Mountain, last year, he was the one with the Comet A-26. Like many of us, Bruce was once a lone wolf flier, but has since made contact with others in the New York area through the One Design Contests at Galeville. Bruce's models are known for their great appearance and good markings as well as their flying ability.

If you would like to see pictures of your models in this column, send them to me, care of FLYING MODELS. I'll try to use them in as timely a manner as possible.



PHOTOGRAPHY: BRUCE BURROUGHS

Guillow's kits have been around for quite a while. Here's what they can look like. Bruce Burroughs, of Glen Cove, NY did a fine job finishing this Guillow's Focke-Wulf 190.



This A-26 Invader, from a Comet kit (above left), suffered several crashes before Bruce Burroughs tamed it down. Another Burrough's model (above right), a Guillow's Me-109 with nice camouflage and markings. Gene Schep-



pers scratch built this O-2 observation plane (bottom left). Bruce Burroughs holds his Black Bullet (bottom center), ready for the toilet paper tow. Ed Rowe (bottom right) holds his P-7 at the Galeville contest.



CA combat

By Rich Lopez

From time to time I run across an idea or invention that really is exciting. I recently went to the inaugural opening of the control line flying site at Whittier Narrows Park in South El Monte, California. The Parks and Recreation Department, through prodding by several modeling clubs, paved an area for three circles. The three circles are all well painted and have a fitting for a speed pylon in the center. During the inauguration weekend, numerous people came out to fly at the new facility. Among them was Charlie Mackey. Charlie has developed a combat/stunt kite that is really a high performance unit. I am very impressed and excited about this kite.

Charlie Mackey began flying and designing control line stuntships about the time World War II ended. He dropped out of the hobby to do a hitch in the Navy and started modeling again in 1953. His first published article was right here in FM, September, 1957. Since that time he has been published in *American Modeler*, *Model Airplane News* and *Model Builder*. It is ironic that in 1961, in *American Modeler*, he had a combat design published called *The Kite*. *The Kite* would do 94 MPH with a Torp 35 combat and a 9-8 prop. Charlie designed the 1958 Nats stunt champion model (Junkers *Gobbleswantz*). His designs have reached the winner's circle many times. He worked for L.M. Cox for 13 years where he managed the Quality Control, Manufacturing Engineering, and Customer Services departments. Right now Charlie has two goals: to start a successful kite company that manufactures good controllable kites and to complete a book about the development of control line flying.

I thought I would mention Charlie's background to let you know that he is one of us

and not some chap off the street selling kites. The kite comes with an owner's manual that is 19 pages long. It explains the kite and bridle assembly in a step by step manner with good illustrations. The manual tells you where to fly it and gives safety advice. It describes how the controls work, what you need to do to learn how to fly it and land it. There are also instructions for Precision Aerobatics, Combat, and Team Stunt. There is also a brief history on kite flying that makes interesting reading.

The kite itself is made of red, rip-stop nylon and has a beautiful silk-screened Fokker *Dr. 1* on it. The bracing is done through the use of fiberglass rods. The kite utilizes two, non-stretching Kevlar lines that are 100 feet. The control handle is 16 inches long and is made from one inch diameter dowel stock.

It was Dale Kirn who introduced me to Charlie just as they arrived at the Whittier Narrows flying site. Charlie demonstrated how the kite flew and then turned the stick over to me. It flew so well that I had to have one right then and there. It turns as good as most combat models I have flown. It does real tight loops, wiggles, squares, and anything else a control line model would do down wind. Charlie demonstrated the crash resistance by flying the kite straight into the ground. It just makes a "thunk" sound and stops.

I was so enthusiastic about this kite that I quickly went over and gathered up Charlie Johnson so that he could have a go at it. He was positively impressed also. It was only a matter of minutes thereafter that a second kite was in the sky to do battle. We flew combat for a while, but then lost the wind. Our impression is that this is a great way to practice your combat skills. In a heavy wind, the

kite pulls as much as a fast combat model would. If you want to get your arm in shape for combat this is the way to do it. I have even started teaching myself how to fly left handed. Your arm will get sore after about an hour's worth of non-stop flying.

To purchase a kite send to: Mackey's Trade Wind Kite Company, PO Box 2698, Mission Viejo, CA 92690. The price of the kite is \$24.95. It is an excellent investment. Remember, there are no fuel costs or any additional operating costs. It is an excellent way to introduce non-flyers to control line flying. You will never get run off a field for making too much noise. There is a park two blocks from my home where I go to fly the kite. Everyone is amazed that a kite can be controlled so well.

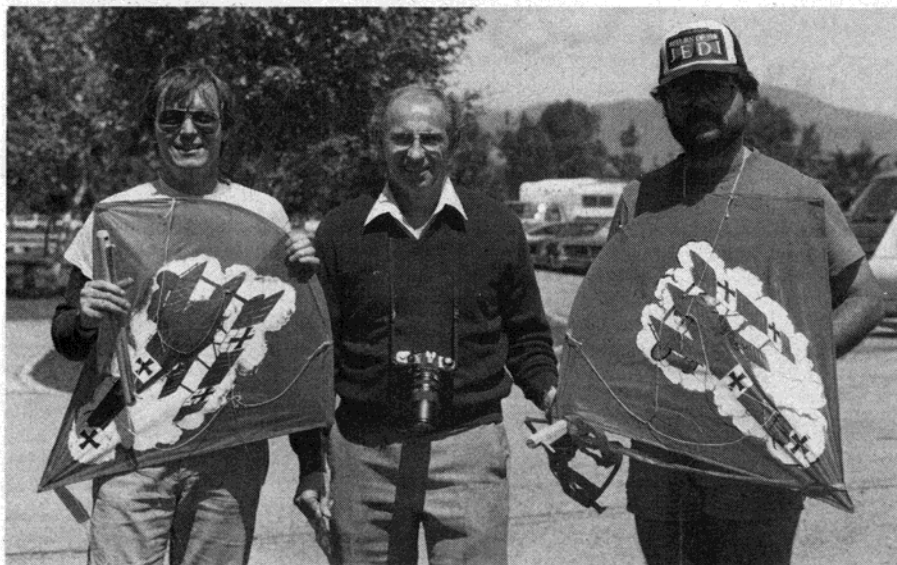
As soon as Bob Hunt reads this column, I am sure that he will send away for one of these kites to see if he can fly a stunt pattern using only wind power. Tell us how you liked it Bob.

Cox Hobbies will once again sponsor 1/2A Combat at the AMA National Model Airplane Championships in Reno, Nevada. I received a letter from Bill Selzer, the new owner of Cox Hobbies, confirming the continued sponsorship of the event. We combat flyers owe much to Cox for having been so generous to us in past years. New Tee Dee.049s will be given out through 6th place this year as will other goodies. I hope your fleet of 1/2A models is ready to go by the time you read this column. We will have at least the first round as double elimination. See the '84 - '85 AMA rule book for line length. I know the rule book does not allow the use of .051 engines but, as in the past, we really don't care. Perhaps we should try to make it legal that .051s are acceptable. There is really no difference in performance and you might be able to find an .051 just laying about.

FAI pilots need to read this item. Myles Lawrence is producing and selling custom fiberglass props for .15 size engines. His props are some of the best I have ever seen. They are just what the doctor ordered for those high revving Rossi and Nelson motors. These props are made one at a time in a special mold. Each prop will cost you \$6.00. They are the best money can buy. Try one and let me know what results you get. To order props send to: Myles Lawrence, 29031 Consuela, Mission Viejo, CA 92692.

FAI Combat has gotten to the point where you need every little advantage possible. I am certain that we will see everyone running at 120 MPH within the next few years.

If you are going to the Nats, read your rule book! I am going to be the Event Director and cannot have sympathy for you if you have not read the rules. This is the largest combat contest in the world, with people traveling from many different states and countries. They will expect strict enforcement of the rules and they shall have it. Rich von López 8920 Villanova Ave. Los Angeles, CA 90045.



PHOTOGRAPHY: CHARLIE JOHNSON

No stranger to control line modeling, Charlie Mackey (center) has designed a high performance combat/stunt kite that really is impressive. Charlie Johnson (left) and Rich Lopez (right) hold this novel "aircraft".

C4 stunt

By Windy Urtnowski

Metamorphosis

Trends in our event seem to have regular cycles of change. We go thru a kind of metamorphosis every so often, shedding the cocoon of tradition, and then boldly displaying our new butterfly form. This is a normal cycle, influenced by many things and there are obvious advantages to be had, if you can predict which way the pendulum will swing.

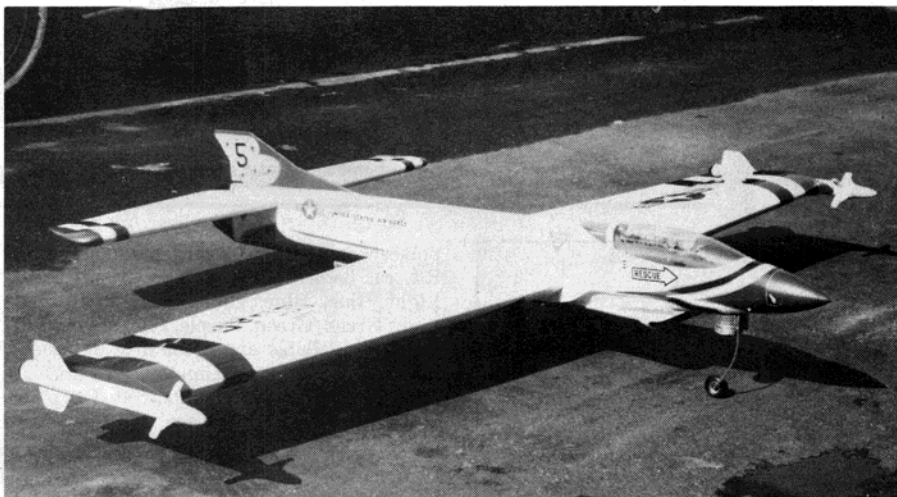
In the last year or so, I've noticed a trend among the pace setters to build helium filled airframes. Virtually everyone building a special ship for Reno has his airframe going to "Weight Watchers" meetings.

Melting down all the feedback I've processed to put together *Pro-Stunt News* for PAMPA, has led me to believe Reno will be an influence in our technology for years to come, in many subtle ways, and will cause a beneficial mutation to the way we approach the event, even to pilots having no interest in flying competition stunt at high altitude.

Had there never been Reno, maybe fewer of us would be so preoccupied in making our ships "lighter than air." Technology would be stalemated, it would be business as usual, and we'd all be back trying to out découpage each other with gallons of "Lite Coat." Reno caused a re-think. Reno made us all be inventive, and get out of the ruts we're in.

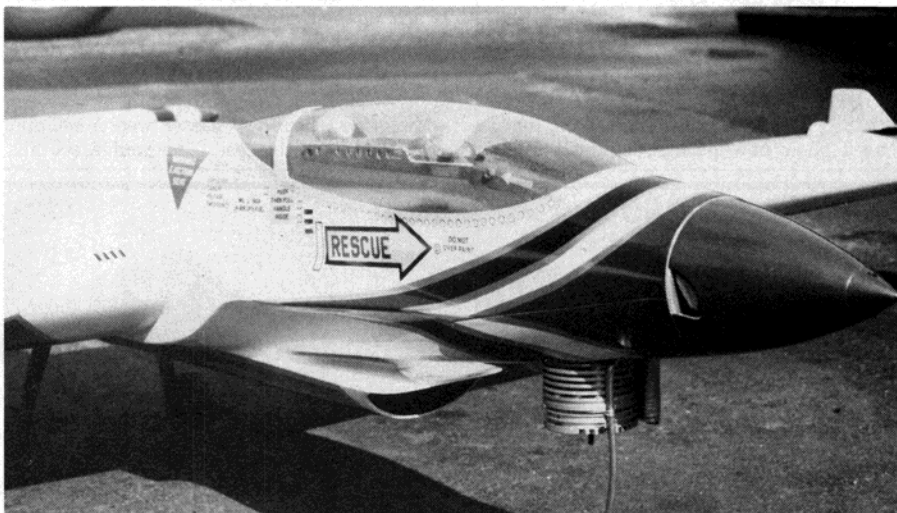
Anyone seriously contending the Walker Cup in Reno would need creative technology, to bring in that "butterfly" under 50 ounces. MonoKote™ was the choice of many, a logical way to trim ounces, but requiring a more rigid structure, as it does not provide anywhere near the strength of silkpan/dope. Bob Whitley experimented with his twin engine ship, with positive results. Paul Walker had his ultra-light ship ready early, with many innovative features. Bill Werwage and I both made experimental ships with unique wing structure, and they both were very light and rigid. Ted Fancher had a unique structure for his Reno ship. Jim Casale built several different airframes to defend his national championship title. Even Bob Gieseke has changed to an S.T. 46 to conquer Reno. I know Dennis Adamisin's brain was working overtime in an Atlanta windtunnel for the competitive edge. Reno has already *changed* stunt, made us think of new ways to trim weight and strengthen structure. My opinion is that the *fallout* of Reno technology will improve the breed for years to come. We'll sort out the ideas that worked from the ones that didn't. We'll make strides in motor technology, finishing, and structure itself that will be with us long after we come home.

The new, lighter ships will fly better under all conditions. Another piece of handwriting on the wall for our event was the F.A.I. trials in '83. The judges were buying *good flying*, and that too will influence the movement in the event. When good flying wins, we all tend to think of aerodynamic technology. When showmanship wins out or découpage impresses, we all get diverted from advances in



PHOTOGRAPHY: WINDY URTNOWSKI

Titanium landing gear . . . and carbon fiber wing spar, no less, in Windy Urtnowski's latest stunter, the F-16 (above), illustrate this month's discussion about "creative technology". That's an ST .60 poking out of the F-16's nose (below). The canopy came from a Byron Originals F-16 ducted fan kit.



performance. Judges influence our event more than they might suspect in what impresses them. When they buy good flying, the event moves toward advancing the art of designing and building airframes. Since so much judging is subjective, and the job itself a truly thankless one, is it any wonder we all try different approaches to impress them.

I'm not implying that judging standards be monolithic, but I'm recognizing the trend to more corner and tighter maneuvers. It's a trend and if you recognize it you can slant the odds in your favor. Nobody wants "monolithic stunt" where all ships look like 2x4's. Now the inventive appearance must be light and fly well too. Creativity moves on; judging and Reno have diverted the stream, I hope for the better, as we all start to fly lighter and higher performance lunarlanders. We may all someday thank the forces that made us make our ships truly "high performance." Having flown my light Mig I can assure you I'm *not* going to try to build heavier in the future. Lighter is better. . . . Once you get your hands on a light straight ship you'll wonder how you ever did outside squares with that lead-sled.

Had the 84 Nats been in Chicopee, and the judges been less impressed with corner and 45 degree maneuvers, we might all have missed the chance to flex our technological muscles. Stunt would be stalemated and we

all might be ordering gallons of lite-coat and blocks of foam.

We might all fail, all the ultra-lights might fold, but we will learn from this season one way or another. It's a year more of us crossed the rickety bridge of the unknown than ever before, and the odds are good more of us will fall into the canyon of failed experiments, to forever lie beside the old *Arrowana*.

But some *will* make it over, progress is inevitable, we *will* learn from this season. If we share that knowledge, the event will move forward. Maybe someday we'll all have ships that do great hourglasses. . . .

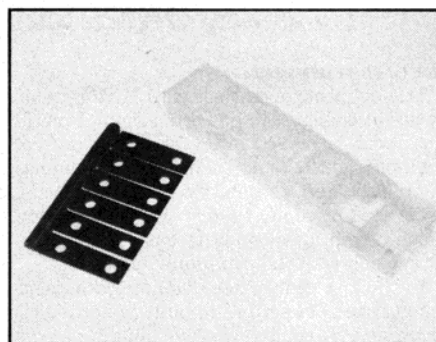
This column might require a re-read or two, if you want to understand what I'm *really* trying to say. I'm in favor of trying new approaches, even if they fail spectacularly. Light weight airframes present the greatest challenge of all. Making things rigid and strong without being heavy, where can you use less material, what you can reasonably omit, what aerodynamic formulas will work best on these airframes, what aspect ratio, what moments, how do you beef up the structure of a MonoKoted wing, how thick a stab will be optimum, how to blend all this into a ship that works. . . . *Yes, weight is the final frontier.* In future columns, I hope to share with you the "journey" to the other side of the bridge, or the trip to the canyon below. Thank God butterflies *can* fly. . . . Windy

Pit report



MODEL RECTIFIER CORPORATION, P.O. Box 267, Edison, NJ 08817, has just released their new paints designed for the

polycarbonate/lexan bodies found in many R/C car bodies. Twelve colors (White, Red, Light Blue, Blue, Black, Yellow, Orange, Light Green, Green, Purple, Pink, and Silver) are now available and come in wide mouth jars containing approximately $\frac{3}{4}$ ounce of paint. Each jar has a color coded cap for quick identification. These paints can be brushed or sprayed and use the same X-20A thinner as the MRC/Tamiya acrylic line of paints. Quick drying, water soluble, and non-toxic, they have a vinyl resin formula for greater adhesion to the surface of the polycarbonate car bodies. Retail price for the new polycarbonate paints is \$2.98. See your local hobby dealer or contact Model Rectifier Corp. at their address above.



three gradations, 1°, 2°, and 3°, to allow adjustment of front end caster. The wedges are #5502 in the Parma catalog. The crystal case will hold seven sets of crystals. Look for #5016 in the Parma catalog. For more information, contact Parma at their address above.

PARMA INTERNATIONAL, 13927 Progress Parkway, North Royalton, OH 44133, now offers their new caster wedge set and frequency crystal case. The wedge set has

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WHAT IS ROAR?

For the benefit of you first-timers out there ROAR is the national governing body for Radio Operated Auto Racing. The members (you!) vote to set the rules by which the cars are built and raced, and to select officers and regional directors. ROAR sanctions major races around the country and you must be a member to participate in the sanctioned events. In addition, membership in ROAR provides you with the following:

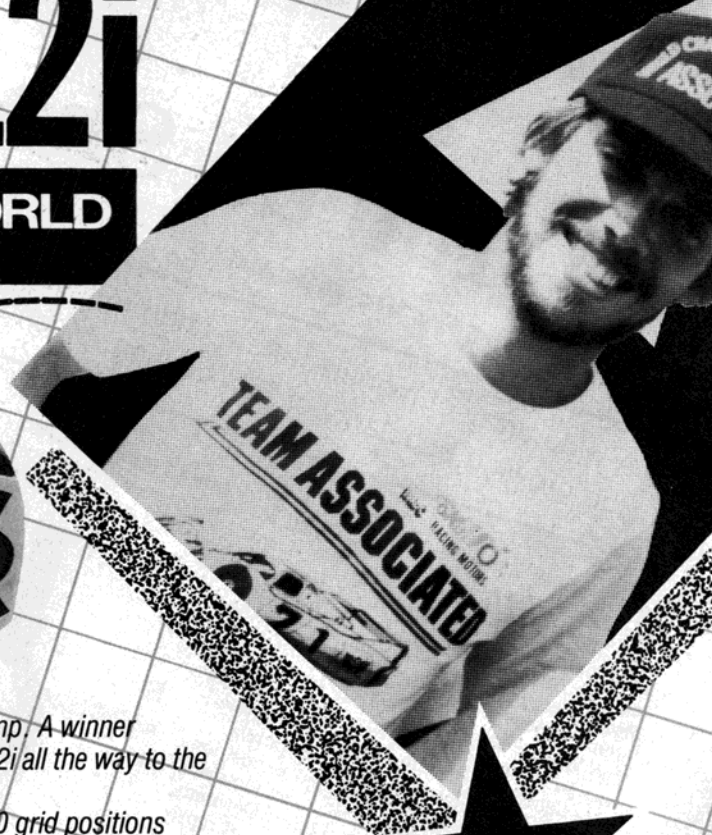
- Bodily Injury/Property Damage Liability Insurance
- Membership Booklet (rules, bylaws, body list, etc.)
- REV-UP, the official ROAR magazine

CLAUSEN AND RC12i

OUT HANDLE THE WORLD

IFMAR INTERNATS / 1982 Stock Class World Championship

- | | |
|----------------------------|-------|
| 1. Kent Clausen / USA | RC12i |
| 2. RePete Fusco / USA (TQ) | RC12i |
| 3. Frank Killam / USA | RC12i |
| 4. Jimmy Davis / GB | RC12i |
| 5. Mike Lavacot / USA | Parma |
| 6. Bud Bartos / USA | JoMac |
| 7. Ralph Burch, Jr. / USA | RC12i |
| 8. Mike Toland / USA | RC12i |
| 9. Bruce Hickman / USA | Delta |
| 10. Art Carbonell / USA | |



WHAT MAKES A WINNER?

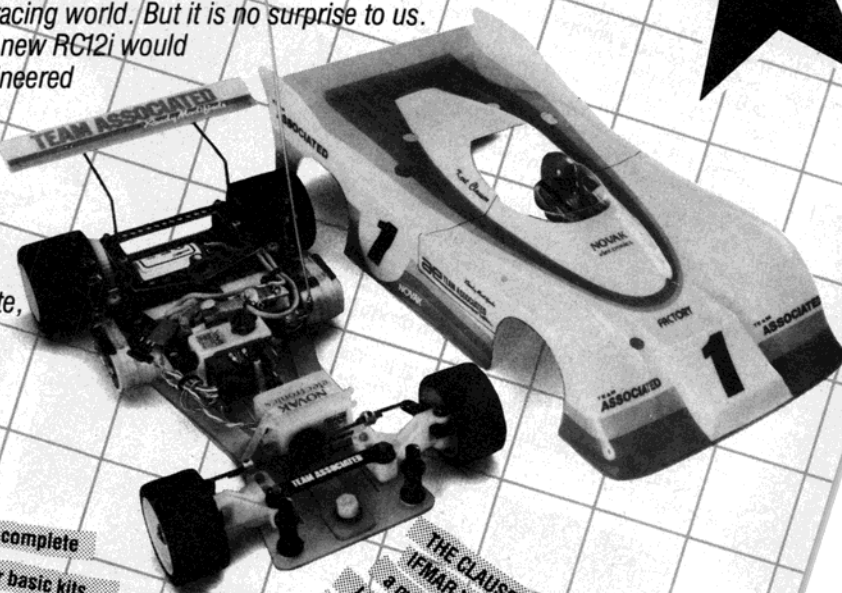
Ask Kent Clausen, two-time 1:12 Scale National Champ. A winner indoors and out. And Kent took his Team Associated RC12i all the way to the World Championship stock class title.

Or ask the Team. Team Associated RC12i's filled 7 of 10 grid positions for both the stock and modified Championship main.

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WORLD'S 1/12th CHAMPIONS...



TEAM ASSOCIATED

Associated Electronics

R/C Boats at the 1984 Toledo Show

By Vic Macaluso

A wide array of manufacturers and products reflect the growing popularity of R/C boating. Much to see.



PHOTOGRAPHY: BOB HUNT

I'm either a hungry 10 year old in a candy store or I just died and went to modeler's heaven! Even if you have only a casual interest in model building, you can't help being impressed walking into a show like Toledo. Not only is this the premier show of its kind, but the host club, The Weak Signals R/C Club go out of their way to make the entire show a very positive experience for the manufacturers, competitors, and especially the attending public.

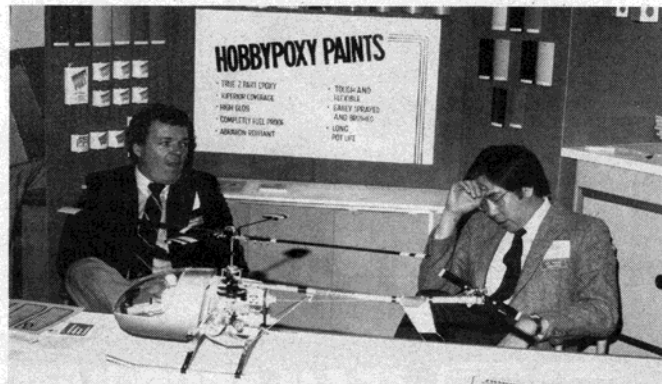
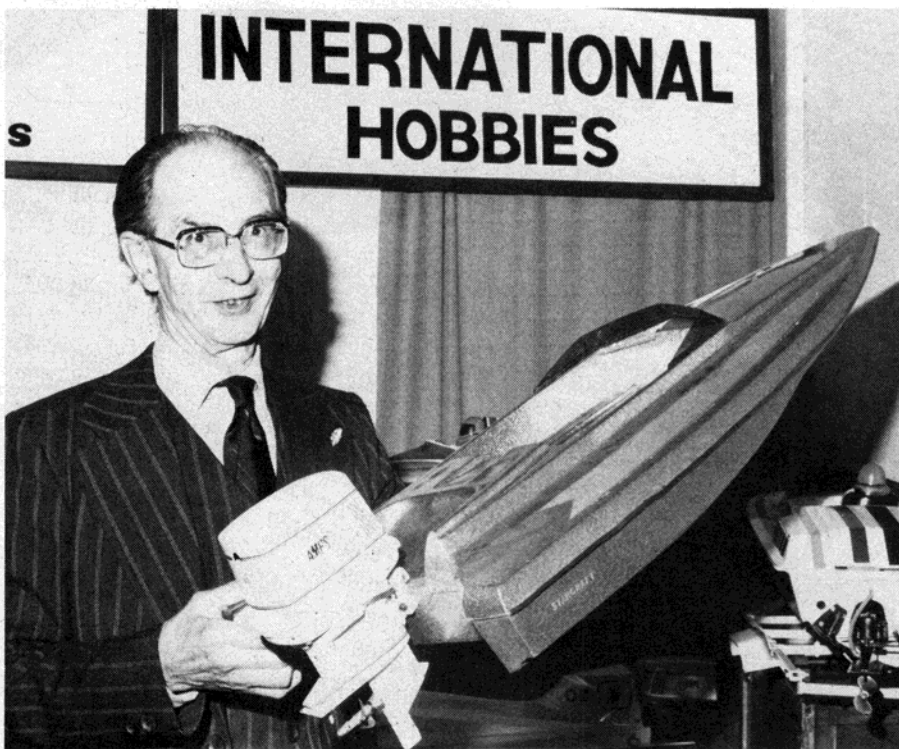
This is truly an international exposition, being attended by most of the manufacturers from this country and England. Germany, Japan, and Canada had their share of representation.

The part that I enjoy the most about these shows is the modelers competition. It's here (especially at Toledo) that you see the best of the best. Any modeler who captures some "hardware" at Toledo can truly feel he has competed with the best. Even the losers come out winners because of the exposure they receive and they see what they have to strive for to beat the best.

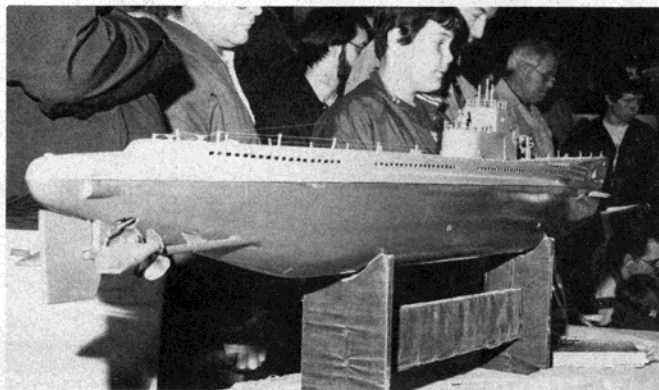
Unfortunately, I was unable to attend Toledo this year because of a last minute crisis caused by Mother Nature, but that didn't stop me from contacting many manufacturers personally in order to get a pretty good feel for how the show went and to discuss some of the details of their new product releases.

Without further discussion, I'll let the pictures do the talking! I'll make it there next year!

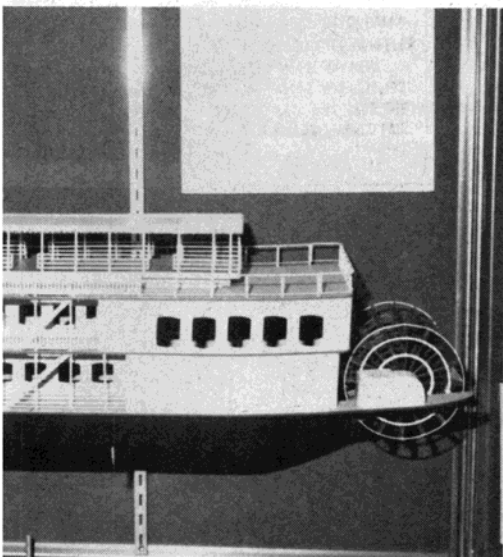
DUMAS PRODUCTS INC., 909-C East 17th St. Tucson, AZ 85719. The *Creole Queen* (above) is one of five new kit/hull offerings from this energetic company. **INTERNATIONAL HOBBIES LTD.**, 111 East Drake, Suite 7051, Fort Collins, CO 80525 had Miller Agnew (below) displaying their new Starcraft™.



HOBBYPOXY PRODUCTS, PO Box 378, Rockaway, NJ 07866. Ken Williams consoles Don Typond with the thought that boaters won't notice the helicopter.



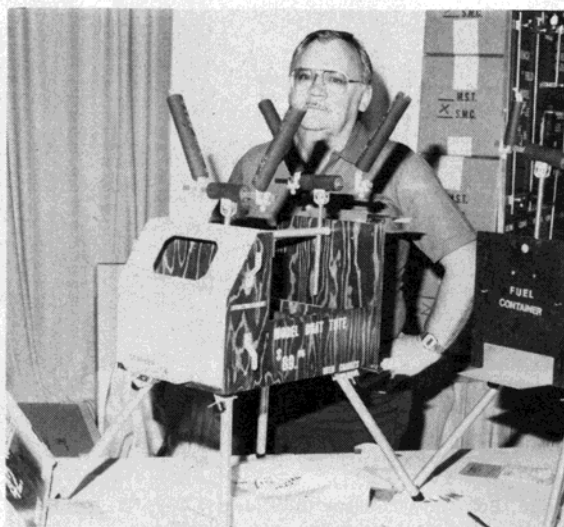
MODEL RECTIFIER CORPORATION, 2500 Woodbridge Ave., Edison, NJ 08817, displayed their new "super sub", the USS Gato, loaded with detail.



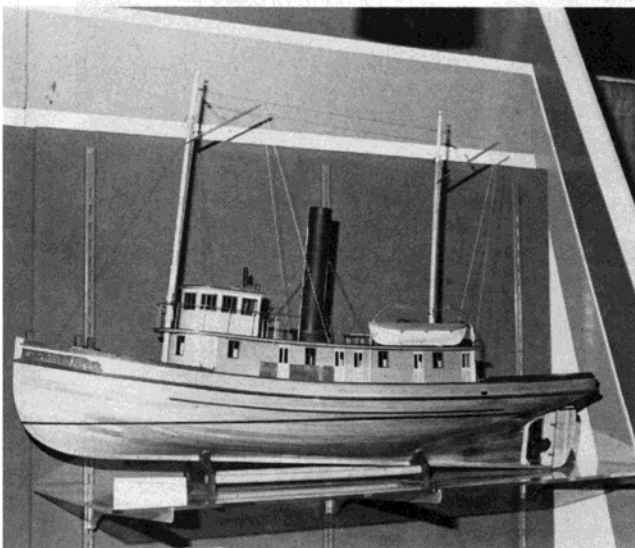
ROBBE MODELSPORT, The Office Suite 2D, Princeton Meadows, Plainsboro, NJ 08536, produces a varied line of scale kits with pre-molded detail.



OCTURA MODELS, INC., 7351 N. Hamlin Ave., Skokie, IL 60076. Lovely Trudy Perzentka displays two of her dad's new products. In her left hand is the 4-65 motor mount for .65-.67 engines. In her right, the 7° angled strudder for tunnels.



DACA MODEL PRODUCTS, 14573 Grover St., Omaha, NE 68144. Known for their aircraft field boxes, DaCa now has a Model Boat Tote. Owner Truman Berkland stands behind it with its special boat cradles and removable storage area.

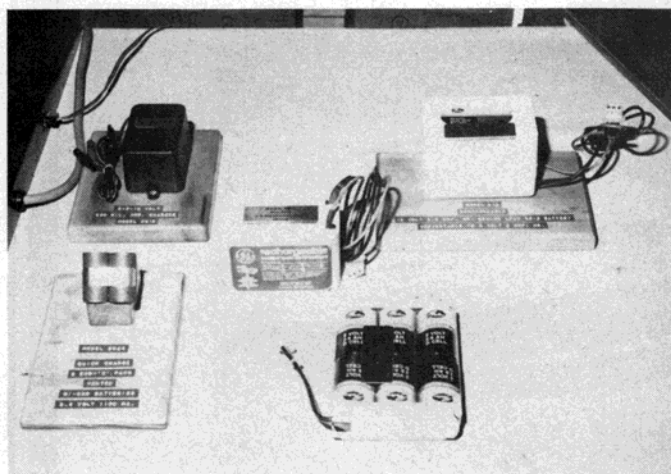


MIDWEST PRODUCTS CO., INC., 400 South Indiana St., Hobart, IN 46342 has joined the boating world with some of the Laughing Whale line of kits. These are all wood kits, primarily of work boats, such as the tug, *Seguin*, above.

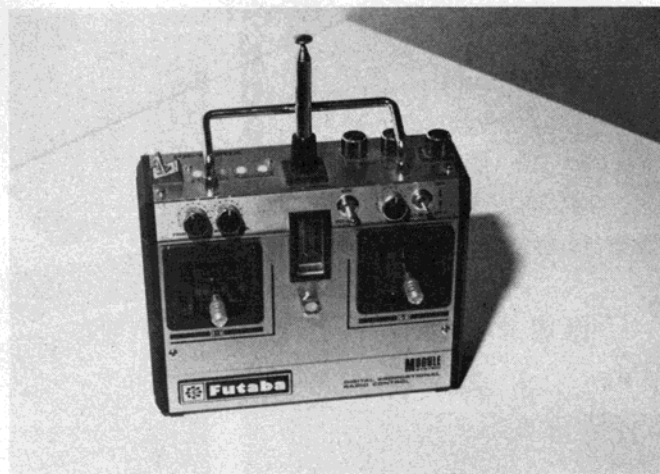
FLYING MODELS



SHAMROCK COMPETITION IMPORTS, INC., PO Box 26247, New Orleans, LA 70186 distributes the OPS line of engines. Mark Daniels holds the OPS Marine .90 in his left hand and the OPS .65 Marine in his right.



M.A.C.K. PRODUCTS, PO Box 33A, Rahway, NJ 07065. Added to their line of marine drive trains is a line of 12V, 2.5A sealed, lead-acid batteries.



FUTABA CORPORATION OF AMERICA, 555 West Victoria St., Compton, CA 90220. Shown is the FP-T3EGX Marine radio.



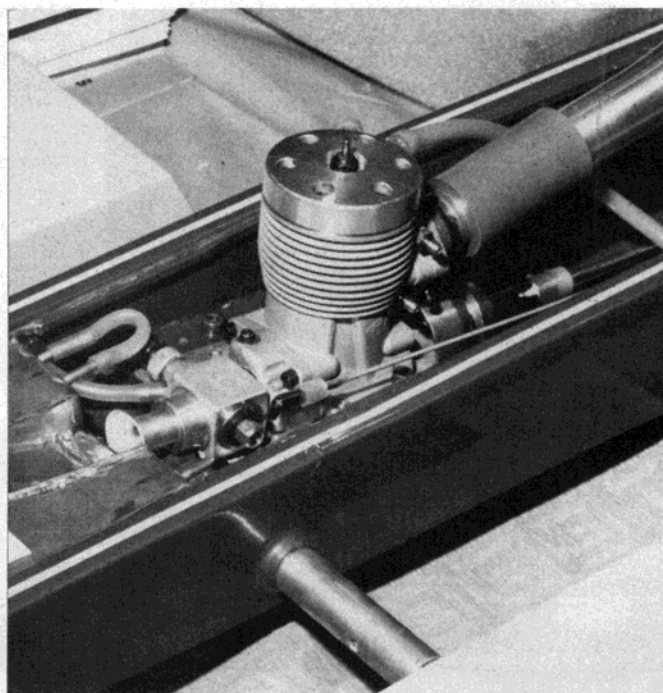
TAUBMAN PLANS SERVICE, Box 4G, 11 College Drive, Jersey City, NJ 07305, always has the plan you're looking for no matter where it comes from.



SR BATTERIES, PO Box 287, Bellport, NY 11713. Larry Sribnick shows off his new nickel-cadmium Sullivan starter. Uses a fifteen minute charge rate.



AIRTRONICS, INC., 16191 Construction Circle West, Irvine, CA 92714. Bob Renaud holds the Championship Series Boat/Car radio.



K&B MANUFACTURING, 12152 Woodruff Ave., Downey, CA 90241. That's the new .67 Marine which is already making quite a name for itself.

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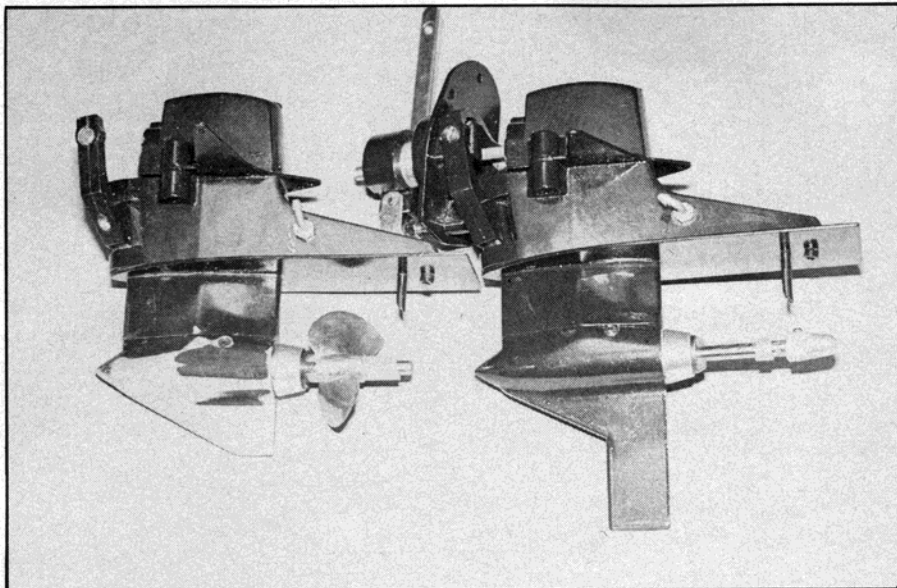
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PHOTOGRAPHY: VIC MACALUSO

The A.M.P.S. outdrive unit allows the option of removing the deep skeg which is not necessary in most installations. It also allows much more scale appearance as can be seen in the photo.

An FM Product Review:

International Hobbies LTD's A.M.P.S. Outdrive

By Vic Macaluso

Versatility, performance, and maneuverability
combined in a super scale drive train system.

In radio control boating, as in any sport or hobby, we usually have a great deal of latitude as to what we can build and run. The only problem with much of this latitude is that if we decide to specialize in a specific area (scale, racing etc.) we are now restricted to using specific hardware or

hull designs in order to be successful. Of course there are exceptions, but generally speaking if you race you are restricted to two or three different types of drive arrangements and if you are a scale builder, if you can't scratch build it or buy it you're really stuck!

As you probably know from my past work, I mainly build racing boats but I also have an affinity for very scale like appearances. My *Scarab S-Type Turbo* (Dumas-Scarab 60) is a perfect example of what my priorities are in the sport of R/C Boating. If I can refer back to what I said in the above paragraph about being restricted with certain scale items, you can see the frustration I experienced with using a suitable drive train on this type of model.

If you expect to have a competition model that looks good then by all means you should be quite satisfied with the standard drive arrangements on the market. When I built my *Scarab* I was not aware of the drive that will be reviewed here.

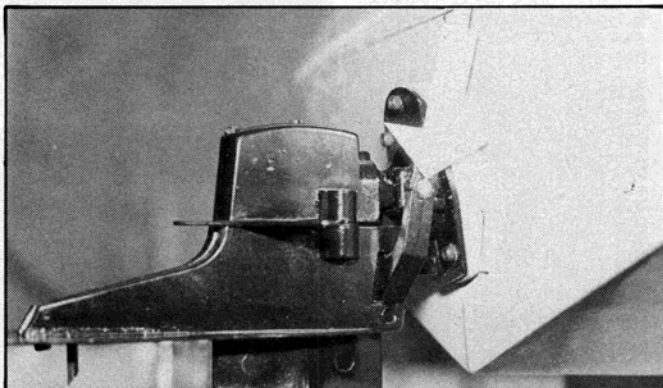
This type of drive was developed about 25 years ago by the full-sized boating industry to meet the increasing demands for versatility, performance, and maneuverability. These units are known by three general terms; Z-drive (because of the direction the drive line takes), stern drive/outdrive, and I/O (inboard/outboard.) All three could correctly describe the new A.M.P.S. unit but for the duration of this review and because of what the boating industry calls them, I'll refer to this unit as an outdrive.

In full-sized boats, the main features of an outdrive are; more room inside the boat (no engine box in the middle of the cockpit), better weight distribution (most deep vees run better with an aft weight distribution) and the ability to trim the angle of the outdrive while underway to change the running angle of the boat so you can compensate for water conditions or weight distribution (i.e., burning off gas).

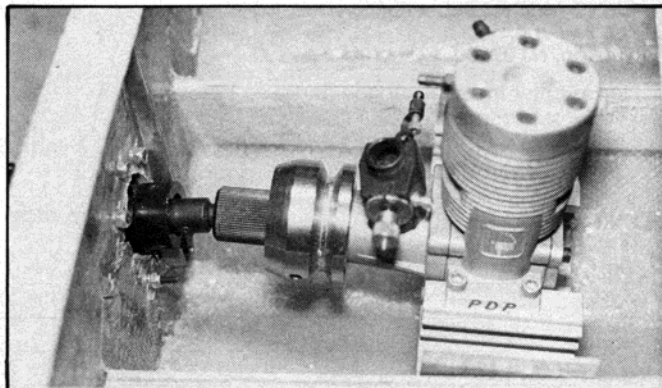
While the benefits are many and far outweigh the disadvantages, outdrives in general (especially full-sized ones!) are very complex units and need judicious maintenance to keep them intact.

After reviewing this outdrive unit from A.M.P.S., I can honestly say that they have managed to incorporate most of the positive features of the full-sized drive while cutting the complexity down to a manageable level for the average modeler.

My first impression of this unit was that it looked like a miniature Mercruiser™ outdrive unit, just like the one on my full-sized Sea Ray™. This immediately turned me on to the possibilities for this drive unit, but more about that later. I think it is the intent of the manufacturer to have this look, and he succeeds. Stand back five feet and it's difficult to tell the difference between this unit and its full-sized counterpart.



There are many scale similarities to the full size unit. For example, it attaches to the hull with only two pivot pins.



Engine goes in the rear with this unit. No need for long drive shafts. The coupling is simply a ball and socket.

Description

The A.M.P.S. outdrive is slightly over six inches in height with the deep skeg untrimmed (this skeg is there for use on surface drive application where the prop is mostly out of the water) and 5¼ inches with the skeg trimmed for a more scale like appearance. I ran my outdrive at scale depth so the skeg was unnecessary, therefore I trimmed it. (A hack saw and file makes this job easy.)

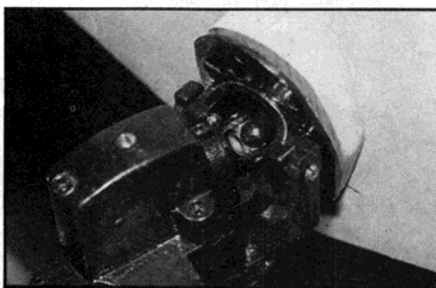
The entire drive unit consists of three major components. The hull unit attaches permanently to the hull and supports the intermediate drive shaft on two sealed bearings. Also mounted on the hull unit is the trim lever which is inside the hull and can be used to trim the drive angle while underway. (A third radio channel and servo are required for this.)

Next is the coupling which connects the hull unit drive shaft with the outdrive drive shaft. While this is a very small item physically, it's the most critical in the operation of this unit. This coupling is a three part, universal type unit and has two separate but equally important functions. The primary function is, of course, to transfer power from the intermediate drive shaft (engine) to the drive unit itself. The universal feature enables the outdrive to steer through an arc of 40° (+/- 20°) and to be trimmed while underway (+/- 3°). While the trim arc is only 6°, this is more than adequate for most deep vee hulls. Of course as in full-sized boats, different hulls will react differently to outdrive trim. By the way, you don't have to use this trim feature. Locking the outdrive at 0° trim and using trim tabs is OK also. The secondary purpose of this nylon universal is to act as a weak link in case an "immovable object" is struck with your prop. There are a lot of expensive little gears, shafts, and bearings whirling around inside this drive unit so I really agree with the manufacturer about this function. It's better to replace an inexpensive coupling than a drive unit or prop.

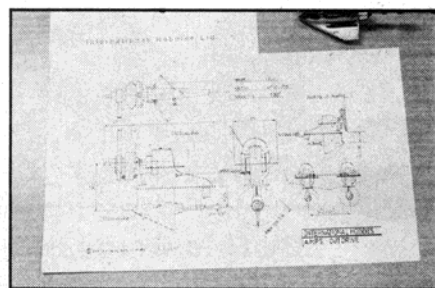
Another intelligent feature of this unit is its kickup ability. In the event an underwater object is struck the drive unit will kick up approximately 40° and, in most cases, simply slide over the struck object without even stalling the engine. I refused to do this with my boat, (I really hate to scratch my paint jobs) but it's been demonstrated where these units were driven right up on the beach with no danger whatsoever and the engine still running!

The third major component is of course the outdrive itself. Here is where all the action is mechanically. The power is transferred from the coupling to the upper gear case drive shaft, through bevel gears to a three inch vertical drive shaft, through another set of bevel gears to the prop shaft. It sounds like a nightmare of shafts, gears, and bearings, but actually the unit is quite simple and robust and should give you few if any problems with proper lubrication. (At this writing I have over five hours running time on my unit with my only breakdown being one blown coupling because of improper lubrication, my fault!) For the nylon coupling supplied with this unit, water is the best lube, and the manufacturer's instructions should be followed in directing the engine cooling water to this coupling.

In the same location found on full-sized drives, you'll find a water pickup to supply cooling water to the engine. In its location right behind the prop this arrangement will pump water through the engine even at idle. Forward motion of the boat is not required to



Note the filler block (left) which has been added. It's necessary when the outdrive is used with vertical transoms. It tilts the unit 12°. International Hobbies, the makers of the outdrive have included a wealth of technical literature (right) complete with illustrations to assist installation and maintenance.



cool the engine.

With its overall height (less deep skeg) of slightly over five inches, this drive looks perfect on hulls in the 35 to 45 inch length range. Again, depending on the scale of the model, single or twins would look good on just about any hull. Speaking of twin installations, these drive units can be ordered in either left hand or right hand rotation at the prop. The largest prop this unit will handle is 2.5 which covers just about any prop a 60-65 motor will handle.

The manufacturer recommends a minimum of .40 engine size to this drive (There is some power loss through the gear sets). My drive coupled to an HB 61 PDP on a 45 inch long Aeromarine Laminates deep vee hull yielded surprising performance (Engine used a standard muffler, no tuned pipe). The maneuverability of this unit on a deep vee hull is outstanding. The +/- 20° steering arc is more than enough for any purpose. At idle I can turn my boat in a 10 foot circle either left or right (Try that with our standard rudder setups!).

My subjective opinion of this drive is that I wish it came along five years ago when I built my first *Scarab*.

The performance is incredibly realistic and is about as close in performance to a full-sized outdrive that you can get!

As in all good things there is always something that's not just right. In this case, the only feature that mildly annoyed me was the prop attachment arrangement. Instead of a threaded shaft and lock nut, A.M.P.S. chose

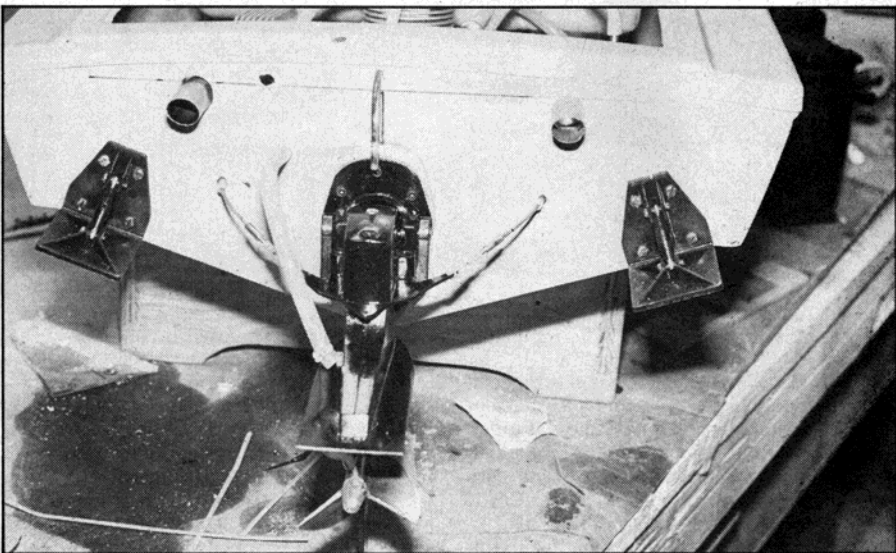
to use a smooth shaft with a flat ground into it for a streamlined collar and set screw. This arrangement is perfectly adequate but a hardened steel set screw in an aluminum collar demands very careful attention when tightening that set screw. Other than this one little annoyance (for me anyway) I rate this outdrive very high for the sport R/C boater who wants a very realistic model both in performance and appearance. For the scale builder who wants to dabble in the pleasure boat category but has stayed away because of the lack of a realistic looking drive—your prayers are answered!

Supplied with the drive unit is a small bottle of gear case oil that A.M.P.S. recommends for this unit. Also supplied are two sheets printed on both sides with operating and maintenance instructions as well as mounting templates and recommended steering and trim installation.

It's obvious that a lot of research and development went into this unit and it's complexity is relatively minor for what it gives the modeler in realism and performance.

At \$149.50 this unit is more expensive than most drive trains but what else, at any price, can give you the realism and features that this unit can?

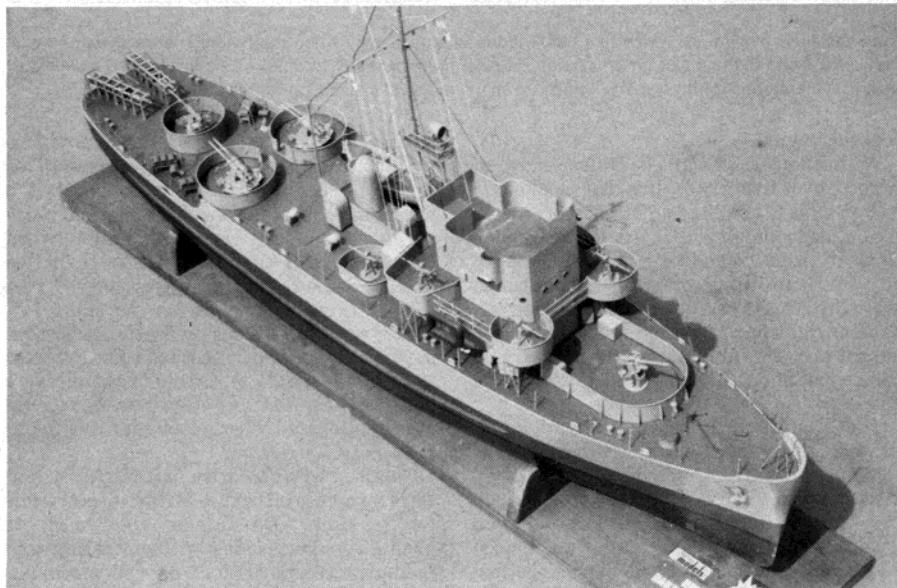
For more information and prices, call or write A.M.P.S., International Hobbies, Ltd., 111 East Drake, Suite 7051, Fort Collins, Colorado, 80525, (303) 223-1233. A.M.P.S. has a whole line of hulls, outboards, and accessories coming on line very soon. Look for more reviews in F/M in the near future. ☐



Engine cooling water is directed at the rear coupling as seen in the photo above. Note also the trim plates. With these and the aft weight distribution, you can achieve very scale like appearance and performance.

R/C Scale Boats

By Eric Goldschrafe



PHOTOGRAPHY: ERIC GOLDSCHRAFE

The author's Patrol Craft Escort, PCE-842, (above) has sailed many contest "seas" since first launched in a September 81 article in FM. Richard and Carol Goldschrafe are starting early (below) and enjoying it!



First off, I must offer a correction to the Scale Boating column in the May, 1984 issue, concerning the Sunlux speed controls mentioned in the comparison report. Hank Gallo was quick to point out the several amp ratings available, not just two as I reported. Hank gets his Sunlux units from Polk's Model Craft, 346 Berger Ave., Jersey City, NJ, 07304.

Now that the boating season is in full swing, let's not forget that this hobby may be shared with the whole family. Scale boats have none of the risks of serious damage to

the model when operated by children or beginners, unlike planes or race cars. With the recent wave of prefabrication in boat kits, there's no reason why the kids can't build their own boat with a little supervision from Dad. Some of the Robbe kits are easy enough for absolute beginners, especially the ones with the outboard motors. These have no hull penetrations to seal, and make R/C hookup a snap. That old two-channel laying around gathering dust could be put to good use. Think they'd be interested? Ask them!

The main topic for this month's column is

Scale Boat shows, and many of these are only a few weeks or months away as you read this. It's not too late to get that favorite model cleaned up, or put the final touches on your newest creation, but don't forget to put as much TLC into the *inside* of the boat as well. A few minutes of extra labor inside the hull could save a lot of embarrassment and possibly loss of the model.

As director of the largest scale boat show in the world, I can safely say I've seen a good cross-section of the model boat world, and the problems that arise at such a meet. I remember them because I'm the one that has to start juggling things around to keep the show moving. We can't wait for a contestant to troubleshoot his model when there are about a hundred other boats waiting to run in the six hours left, and must send him to the end of the line for another shot. Other problems involve boats breaking down or running wild over the course, with the resultant time lost waiting for recovery. The real bummer is when a model sinks on the course, in fifteen feet of murky water. Now all activity ceases while the owner takes an impromptu swim, listening for his model under the water. I make a lousy stand-up comedian, so it's hard to ad-lib the show along while the rescue effort is in progress. Most of these incidents could have been avoided with a little pre-show testing. I find myself wondering if some of these models in the show were ever in the water before, or are they R/C shelf models? I've been to lots of other meets where the same things happen, and I guess the bottom line is a lack of preparation.

If you are going to a show, especially with a new model, it pays to run it a few times before the big day. Don't just cruise around, make some hard turns, zig-zags, circles, and straight-line runs. Does the boat straighten out when you ease off the stick? Does it stop quickly if you back down? Can you control direction while backing up? These things will become important when you try running through a navigation or conning event, and hitting those buoys that always seem to get in the way can ruin your whole day. Make a written or mental check list the day before you leave: check to see that all batteries are charged, all necessary tools are with the boat, and the R/C system checks out okay. A vial of instant glue wouldn't hurt, either, for those mishaps that always seem to happen.

A lot of people ask me what kind of model makes a good-sailing contest boat, and how much detail is it going to need to be competitive in the scale judging? Stay away from light models with a high freeboard as they get blown around easily, and avoid extra large boats which will have trouble fitting through a course layout. My personal favorite, a Scale Model Ships Unlimited *Patrol Escort* has competed many times, and earned its share of the spoils, both in and out of the water. Some readers will recall seeing this model in the September, 1981 issue of FM, and it has been going strong ever since. I've

included the photos of the vessel opened up to show how simplicity and reliability in a set-up like this makes all the difference between having fun and thrashing a model to make it run. The simple twin rudder linkage without long pushrods keeps its adjustment, and it is fully accessible with the deck off. Up forward, note that all wiring is kept high in the hull to keep any moisture away from connections and connectors. The twin speed controls are mounted where they may be easily serviced if necessary, and the motors have room to get a little air circulation for heat dissipation. A mercury switch is glued to a servo wheel to operate an electronic horn—no switches to fuss with, or contacts to adjust. When the servo rotates, the switch energizes and sounds the horn.

I prefer the twin-screw, twin-rudder setup, with independent throttles, for competition events because of the added control that may be obtained. Backing down on the inside prop going into a turn will make this craft turn on a dime, and where maneuvering must be done at slow speed, the rudders lose effectiveness and steering must be done with the engines. By using engines and rudder in the right combination, the vessel will rotate in a pivoting fashion while dead in the water.

This boat weighs about twenty-five pounds and is 48 inches long, apparently a good combination, since it performs so well. I generally run it every time the gang goes out sailing, and I practice docking, getting underway, and sailing in formation. It will fit into any car and is no hassle to carry around, and it has enough scale detail to stand up with typical operating scale models. You can



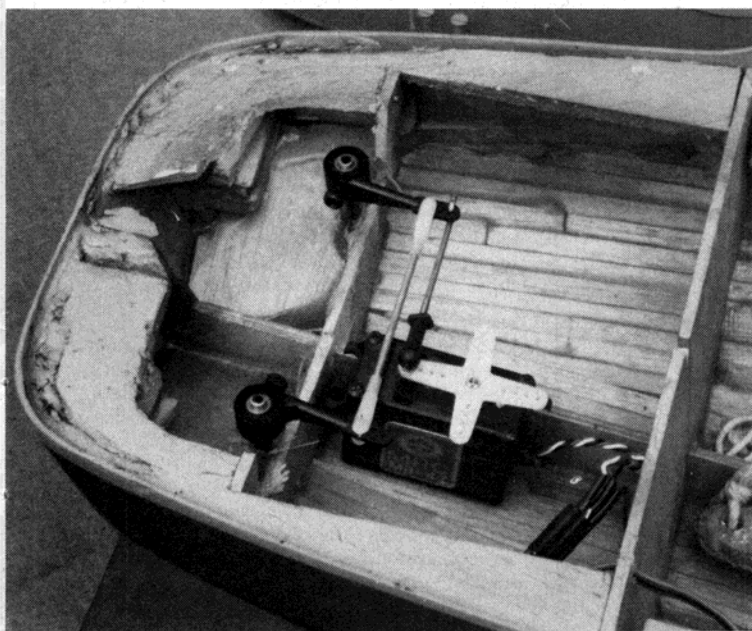
Well thought out layout eases maintenance tasks which increases reliability, a key ingredient for successful contest participation. Easy access avoids the necessity of digging around to find or fix components.

go overboard with detailing, but the model starts to look shabby from all of the repairs. Duplicating this ship, or its close sister, the minesweeper version, should be fairly easy, as Dynamic has this type of hull in fiberglass.

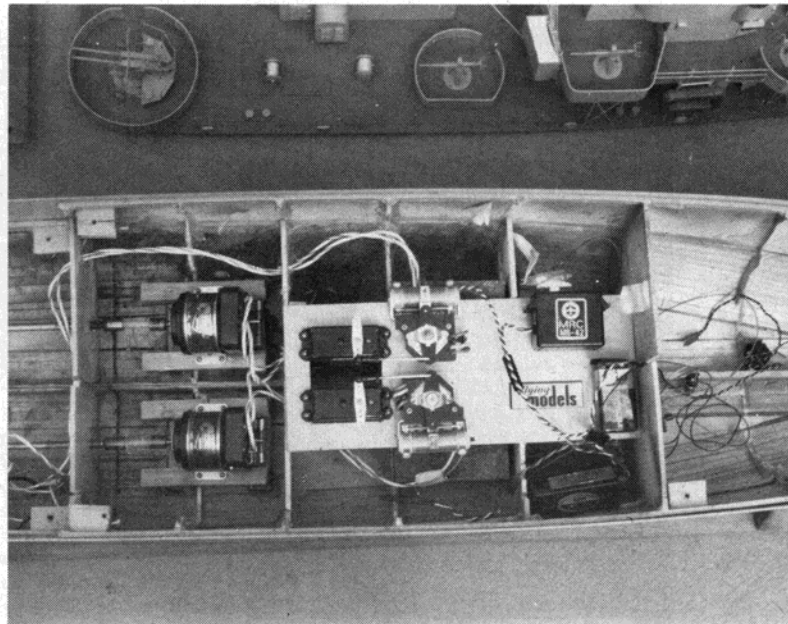
In short, the main ingredient is *reliability*. The less-complicated it is, the less likely it

will be to malfunction. Save the "trick" stuff for operating accessories, where a problem won't sideline the model. Use quality parts and take care of the batteries, and practice the maneuvers that you will have to do in a contest. Now, start looking in the Timetable for the shows in your area, and go out and have some real fun!

CE

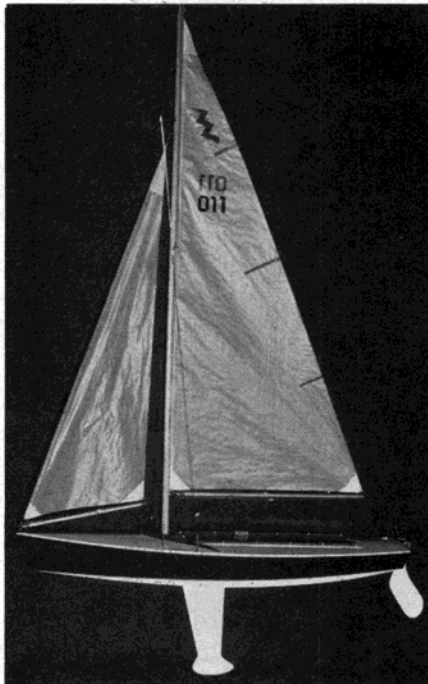


Many of our scale boats offer all kinds of room to install neat, uncomplicated layouts. This twin rudder arrangement keeps its adjustment.

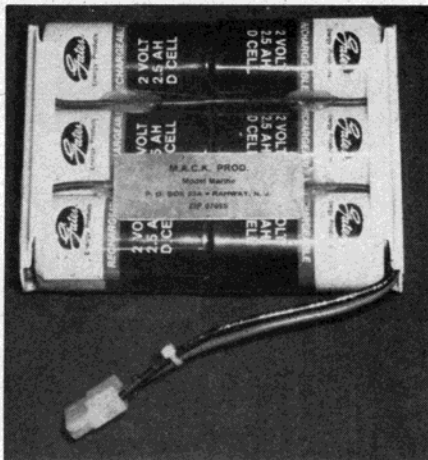


The midship section shows dual everything; motors, servos, and speed controls. This all helps maneuverability when the boat is going slow.

Letter rip

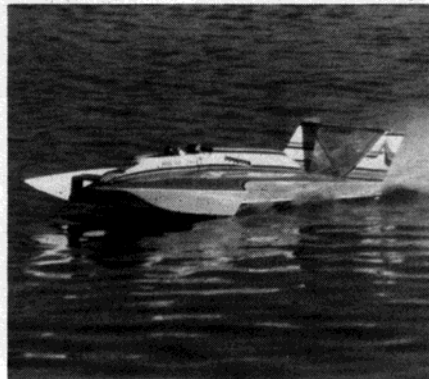


M.A.C.K. PRODUCTS, PO Box 33A, Rahway, NJ 07065, has announced a new concept in R/C boat modeling with the introduction of its 38 inch international Lightning Class R/C sail boat plan kit. The plan kit concept enables the modeler to build the entire boat, including sails, for under \$100.00 complete. If, however, the modeler wishes to build only the hull, mast, and booms, M.A.C.K. products has supplement kits of pre-made sails, weighted metal keel, or rigging kit to offer the option of what the modeler wants to build. Plan kit model #ML-38 lists for \$13.50 and is available from your local hobby dealer. If not, contact M.A.C.K. Products at their address above.

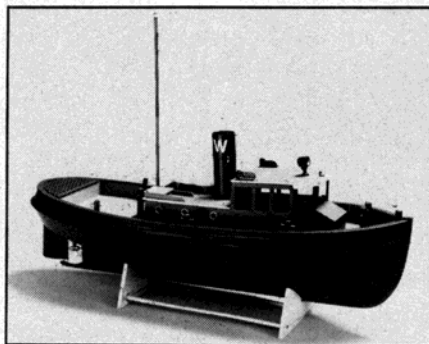


M.A.C.K. PRODUCTS, PO Box 33A, Rahway, NJ 07065, has added a new battery pack

to its product line for 1984. The Gates/G.E. pack, Model #F-12, is a sealed lead acid battery, rated at 12 volts, 2.5 amps., and rechargeable to 500mA. Because of its cell configuration (5"l x 4" w x 1 1/2" h), the flat packs are more compatible in models with limited height for battery power. List price for the pack is \$26.00 and it's available from your local dealer. If not, contact M.A.C.K. Products for further information.

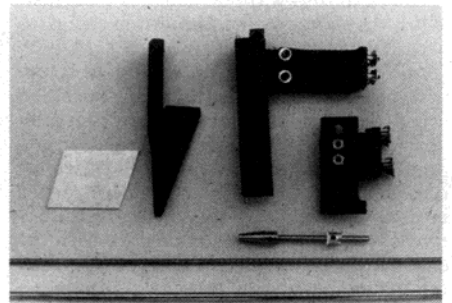


DUMAS PRODUCTS, 909 East 17th St., Tucson, AZ 85719, has announced the release of the *Atlas Van Lines* kit which reproduces the 1982 and 1983 Unlimited Hydroplane National Champion in 1/8 scale. Specifications: length - 43 inches; width - 21 inches; and engine - .60 to .67 (two cycle). Made of mahogany and birch, this kit uses the Dumas hardware package #2342 and is listed in the Dumas catalog as #1321. For price and availability, contact Dumas at their address above.



MIDWEST PRODUCTS CO., INC., PO Box 564, Hobart, IN 46342, has released another in its Midwest/Laughing Whale boat line. The newest all wood kit is a working model of a 50 foot long *Harbor Tug*, designed specifically for single channel radio control. Specifications: length - 25 inches; beam - 7 1/4 inches; and, scale - 1/2" = 1'. This deluxe kit includes Midwest's own Micro-Cut™ basswood and balsa parts, simplified plank-on-frame construction, die-cut and machine-cut material for frames, deck, keel, and rudder, plus all

material for planking, moldings, gratings, rub rails, hatch, bitts, mast, and pilothouse. Besides these, there is also a complete fitting set which includes running lights, search light, mast head lights, bow light, brass port-holes, and brass whistle parts. Complete full size plans, and an illustrated step-by-step instruction booklet permit the beginner to fully construct and set up the *Harbor Tug*. Steam or electric power can propel it and the Laughing Whale VI Steam Engine, Boiler and Burner kit (Midwest #980) suits this boat well. The *Harbor Tug* lists for \$49.50 as Kit No. 956 from Midwest. For additional information, contact Midwest at their address above.



POWER PRODUCTS, 766 Broadway, Seaside, CA 93955, has released their universal running hardware for outrigger or sport .40 type hydroplanes. The major components of this new product are molded from fiber filled nylon which saves weight but yields great strength. The 4200 hydro hardware kit contains the following components: 3/16 inch flex cable 18 inches long, cable ferrule, 3/16 inch hardened stub shaft, drive dog, teflon thrust washer, a 9/32 inch brass hull tube, a 1/4 inch brass stuffing box tube 18 inches long, an adjustable strut assembly. A turn fin assembly, a wedge rudder assembly, and complete mounting instructions. Motor mount, engine, cable nut, and propeller are not included. The 4200 universal hydro hardware is guaranteed against breakage in normal usage and lists for \$51.95. See your local hobby dealer, or contact Power Products at their address above for additional information.

ARTISTIC AIRBRUSH, PO Box 3318, Portland, OR 97208, has recently issued its 1984 catalog. This company directly markets airbrushes and related materials. The catalog is 40 pages and illustrates the products of eight airbrush manufacturers (Ebbe, Paasche, Iwata, Thayer & Chandler, Badger, DeVilbiss, Binks, and Sata) who offer over 70 airbrush models ranging from the finest double action retoucher's airbrush to the light industrial spray gun. Complementing the listings and exploded views are a full line of accessories and materials. To obtain your free catalog, contact Artistic Airbrush at their address above or call, toll free, 1-800-547-9750.



SATELLITE CITY, PO Box 836, Simi, CA 93062, has introduced an "in-between" size bottle for their Super "T," slow setting cyanoacrylate. The new size, 3/4 ounce, comes in an "E-Z Squeeze" bottle for \$3.95. It's catalog number HST-7. See your local hobby dealer for availability.

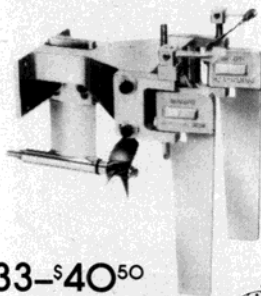
VACO PRODUCTS CO., 1510 Skokie Blvd., Northbrook, IL 60062, has recently published its 1984 *Newest Products* catalog. (No. SD-294) This full color catalog of 24 pages contains the new 1984 pliers and hex key programs along with others such as ball end hex tools, specialty screwdrivers, heat sinks, crimpers, etc. For a free copy of the SD-294 *Newest Products* catalog, contact Vaco at their address above, or call 312-564-3300.

An FM book review:

ARGUS PUBLISHING, Wolsey Rd., Hertfordshire, England, has released an updated, soft cover publication *The Glassfibre Handbook*, written by R.H. Waring. This book is an in depth, though concise, explanation of fiberglass technology from the resins used to actual lay-up procedures and methods of making molds. The 160 pages are divided into 25 chapters and nine appendices. Profusely and clearly illustrated, the book is aimed at anyone who is interested in practical fiberglass applications for the home, the auto body, or more specifically, the hobbyist. Later chapters explain the repair procedures for fiberglass or the use of fiberglass as a repair material. Finally, a comprehensive troubleshooting guide, complete with illustrative pictures helps the user to diagnose and remedy the problems encountered. The appendices list the statistical data and graphs necessary for the calculations of thickness needed for approximate strength, heat properties of fiberglass, resin formulations, aging characteristics, and weight properties.

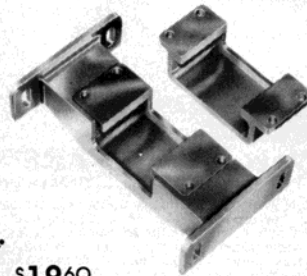
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HBR - 2 Outdrive Assembly



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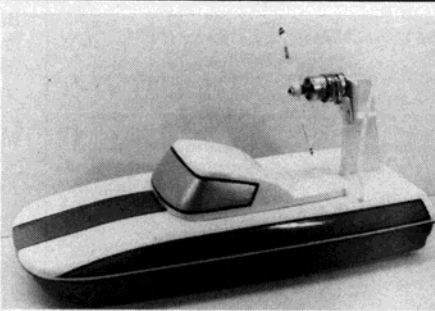
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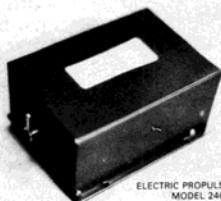
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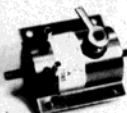
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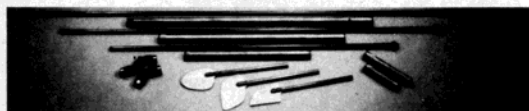
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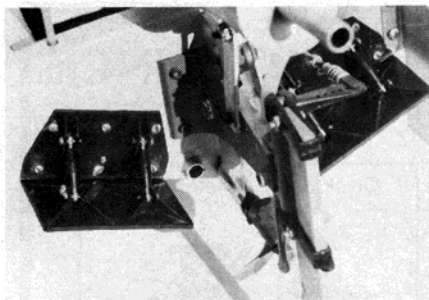
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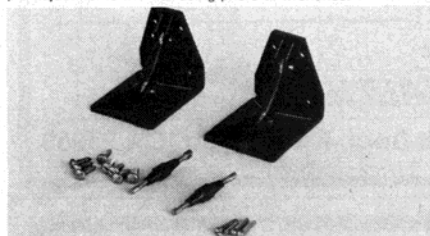
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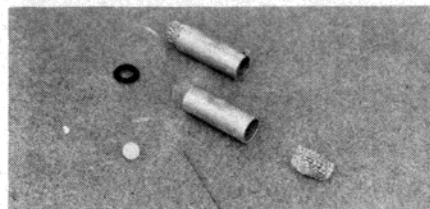


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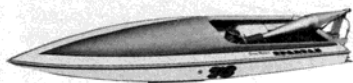
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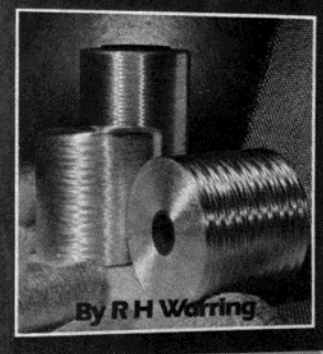
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The Glassfibre Handbook



By R H Warring

Perhaps the only drawback to this book is, for American users, the British terminology for this technology. That's a minor inconvenience and the American equivalent terminology quickly becomes self-evident. *The Glassfibre Handbook* is one of those little "jewels" of books that packs a lot of useful information into a small package. For modelers, fiberglass has become a widely popular medium, not only in kit form but also in scratch-building as more and more hobbyists experiment and utilize its unique advantages for all aspects of R/C. This book will help any who use it. Don't overlook it.—FRANK FANELLI

timetable of coming events

WICHITA, KANSAS—June 30-July 1, NAMBA District 7 points, heat racing, hosted by Air Capitol R/C Model Boat Club at Windmill Lake. Contact: Ernest Nickens, 2428 Cedar Crest Dr., Wichita, KS 67223; 316/722-1974.

CALGARY, ALBERTA, CANADA—June 30-July 1, NAMBA District 16 points, enduro, heat race, deep vee, outboard OPC, unlimited hydro, Super X hydro, hosted by Calgary Model Boat Racing Assn. at Carburne Lake. Contact: Brian Jessup, 639 Canterbury Dr. SW, Calgary, Alberta, Canada T2W 1J4; 403/281-4193.

SAN DIEGO, CALIFORNIA—July 1, NAMBA District 19 points, unlimited hydro, hosted by Southern California Scale Thunderboat Assoc. at Model Yacht Pond. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

SPRINGFIELD, MISSOURI—July 7-11, NAMBA R/C warship combat maneuvers, hosted by R. C. Warship Combat Club at Sequoia Lake. Contact: Terry Darby, Chilhowee Ranger Station, Tallassee, TN 37878; 615/856-3133.

FREMONT, CALIFORNIA—July 7-8, NAMBA District 9 points, heat racing, sport 40 unlimited hydro, hosted by Model Mariners Inc. at Kaiser Kove. Contact: Keith Lingscheid, 32715 Lake Mead Dr., Fremont, CA 94536; 415/487-1942.

FT. WAYNE, INDIANA—July 7-8, IMPBA oval heat racing classes, hosted by Driftwood Model Boat Club at the 3 Rivers Festival, starts 9 a.m.; muffling devices required. Contact: Larry Eubank, P.O. Box 266, Grabbill, IN 46741; 219/627-5270.

SAN ANTONIO, TEXAS—July 7-8, IMPBA hydro 20 - 40 - 60, mono 20 - 40 - 60, 20 outboard, scale hydro, open deep vee enduro (2 rounds), 4 entries per event, hosted by San Antonio Model Boaters at Loop 410 South at Interstate 35 South. Contact: John Borden, 10362 Sahara Dr., Apt. 4901, San Antonio, TX 78216; 512/341-4417.

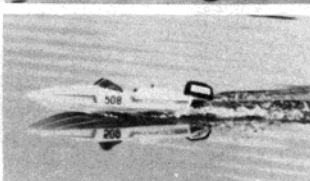
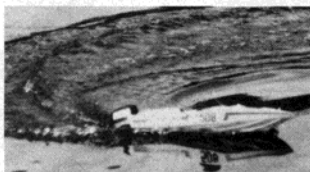
BARTOW, FLORIDA—July 7-14, IMPBA Internats, all classes, hosted by Florida Associated Speed Team, from daylight til dary (1/2 hour drive from Disney World, Cypress Gardens, Sea World, etc.). Contact: Don Pinckert, 9 North Grant Ave., Masaryktown, FL 33512; 904/799-0595.

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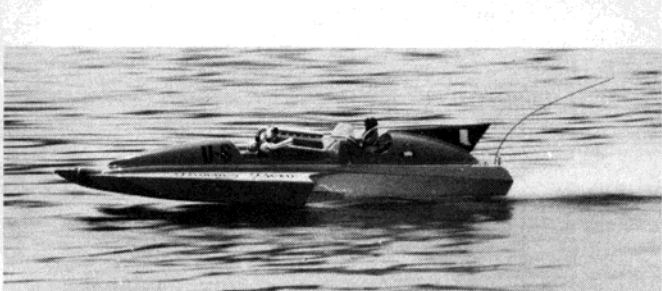
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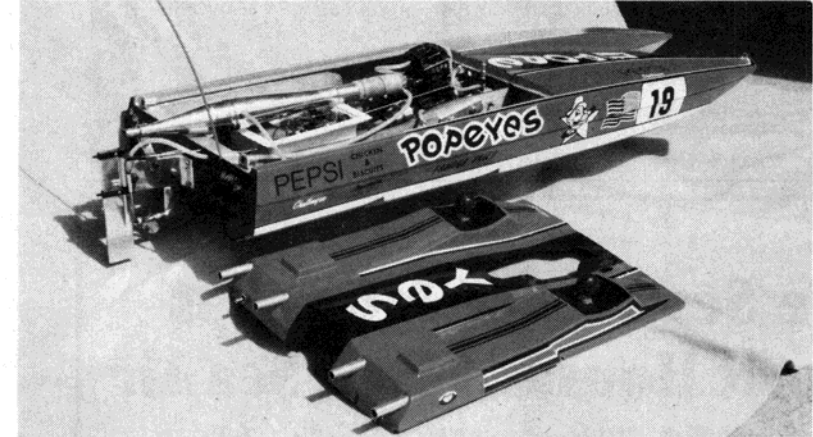
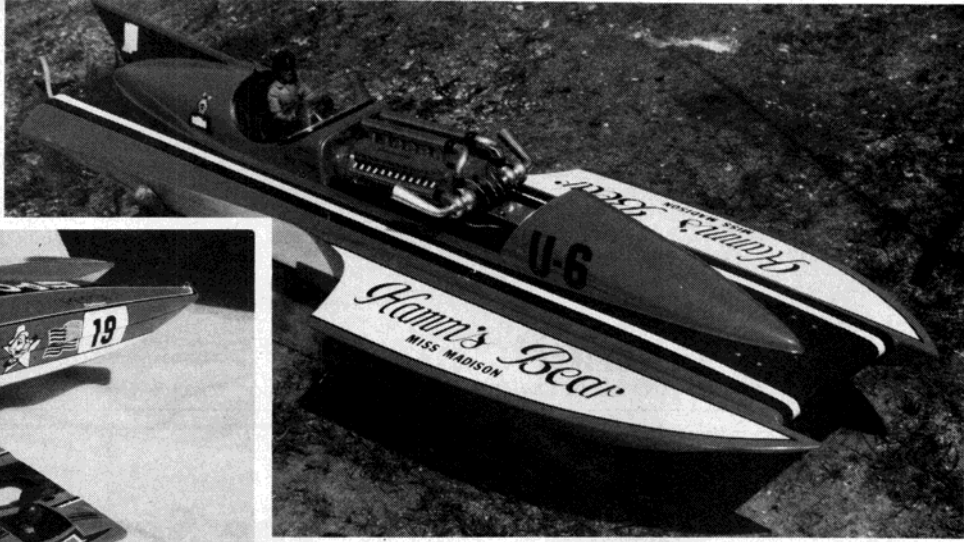


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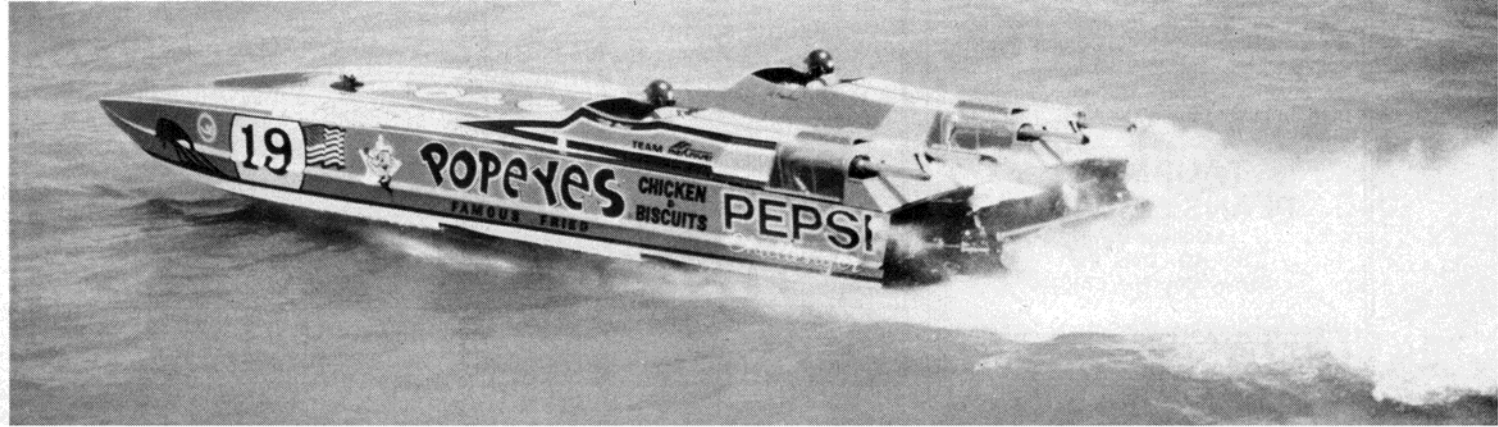
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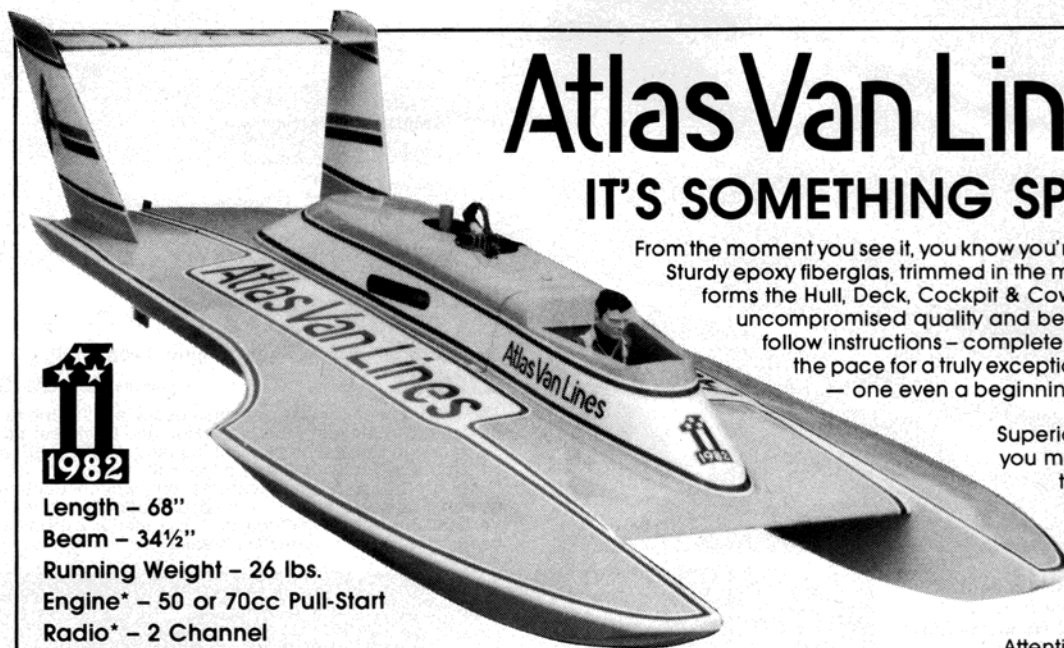
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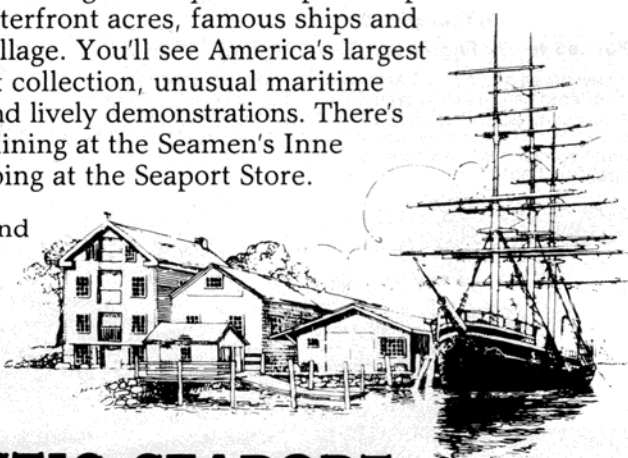
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ANCHORAGE, ALASKA—July 8, NAMBA District 11 points heat race, offshore, outboard, deep vee, record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/248-2643.

OLYMPIA, WASHINGTON—July 14, NAMBA outboard OPC, outboard championships, hosted by Evergreen Model Boat Club at Lake Capital. Contact: Tom Dudley, 4112 - 60 St. E., Tacoma, WA 98443; 206/922-1486.

BELLE ISLE PARK, MICHIGAN—July 14, IMPBA hydro race, all classes, hosted by Wolverine Miniature Race Boat Assoc. at Blue Heron Lagoon; tuned pipe or muffler required. Contact: Jo Ellen Gault/Rick Grenier, 5444 Kreger, Sterling Heights, MI 48077; 313/268-1297.

KENOSHA, WISCONSIN—July 15, IMPBA closed course heat races, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd Street, Greenfield, WI 53221; 414/384-8587.

FLINT, MICHIGAN—July 21-22, IMPBA record trials, AB-CD-EF scale, hosted by Wolverine Miniature Race Boat Assoc. at Thread Lake, starts 9 a.m. Contact: Greg Bailiff, 15410 14th St., Detroit, MI 48238; 313/867-6879.

KENT, WASHINGTON—July 21-22, NAMBA District 8 points, heat race, offshore, outboard, sport 40, unlimited hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Pete Ferguson, 17331 SE 136th, Renton, WA 98056; 206/932-6031.

DALLAS, TEXAS—July 21-22, NAMBA District 7 points, endurance, heat race, outboard, outboard OPC, scale, unlimited hydro, deep vee, hosted by Big "D" Boaters at L. B. Houston Park. Contact: Don Farmer, 2717 Willow Way, Mesquite, TX 75150; 214/270-7926.

EDMONTON, ALBERTA, CANADA—July 21-22, NAMBA District 16 points, heat race, offshore, outboard, outboard OPC, unlimited hydro, deep vee, hosted by Edmonton Model Boat Racing Assoc. at Lake Hermitage. Contact: Louis Omertzu, 10801 - 150th St., Edmonton, Alta. T5P 1R6, Canada; 403/483-8392.

ANCHORAGE, ALASKA—July 22, NAMBA District 11 points heat race, offshore, outboard, and record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

SOUTH EL MONTE, CALIFORNIA—July 22, NAMBA District 19 points, unlimited hydro, hosted by Southern California Scale Thunderboat Assoc. at Legg Lake. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

BELOIT, WISCONSIN—July 22, IMPBA 3.5 class: mono, inboard rigger, junior tunnel for 15 years and under, tunnel hull, and outboard rigger (must have 3 or no class); 7.5 class: tunnel hull, outboard rigger (must have 3 or no class), inboard rigger, mono; and 1/8 scale, hosted by Rock Valley Racing Assn. at Riverside Lagoon Park, starts 9:30 a.m. Contact: Dick Gabrielson or Chuck Beecher, 1305 Eleventh St., Beloit, WI; 608/365-7962.


ROSEDALE, WASHINGTON—July 26-29, NAMBA Scale Naval Warship Combat & Maneuvering, hosted by North American Scale Warship Combat Club at Meyer's Pond. Contact: Hal Smith, 826-A - 34th Ave., NW, Gig Harbor, WA 98335; 206/858-5221.

KENOSHA, WISCONSIN—July 28, IMPBA closed course heat race, 1/8 scale hydro race, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd St., Greenfield, WI 53221; 414/384-8587.

FREMONT, CALIFORNIA—July 28-29, NAMBA District 9 points, heat racing, unlimited hydro, sport 40-I, hosted by The Pipeline Racing Team at Kaiser Kove. Contact: Bill Pringley, 39624 Lahana Way, Fremont, CA 94538; 415/656-7072.

ABERFOYLE, ONTARIO, CANADA—July 28-29, IMPBA

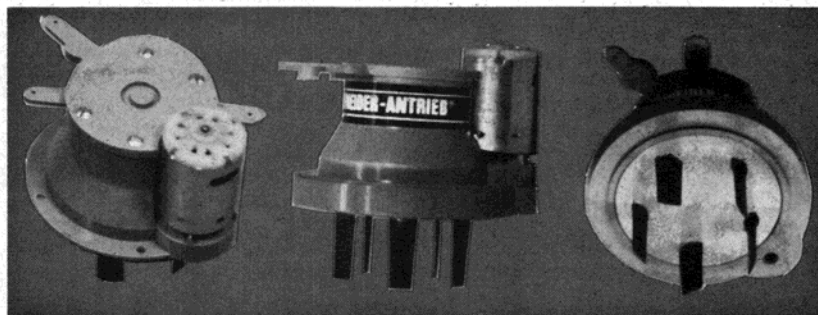
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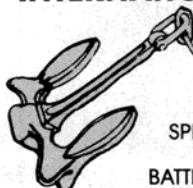
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KENOSHA, WISCONSIN—July 29, IMPBA heat races for hydro, mono, outboard tunnel, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd St., Greenfield, WI 53221; 414/384-8587.

INDIANAPOLIS, INDIANA—August 4-5, IMPBA record trial (Sat.) Sunday: must have run within 10% of record on Sat., hosted by Indy Model Boat Club at Lake #3, starts 9 a.m.; a muffling device or tuned pipe is required, also no short stacks or open exhaust permitted. Contact: Bill Lefebvre, 8135 Warbler Way, Indianapolis, IN 46256; 317/842-3591.

NEWARK, NEW JERSEY—August 4-11, NAMBA District 1 host for the 13th Annual NAMBA International Nationals at Weequahic Lake. Contact: Douglas Twait, 23 Elm St., Stanhope, NJ 07874; 201/347-5765.

ANCHORAGE, ALASKA—August 5, NAMBA heat race, offshore, outboard, deep vee, record trials, District 11 points, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

WHEELING, ILLINOIS—August 5, IMPBA heat racing, AB-CD hydro and mono, hosted by Racing Dolphins at Potawatomi Lagoon, starts 9 a.m.; 95 DB limit. Contact: Bob Oaks, 220 Lewis Ave., Wauconda, IL 60084; 312/526-8526.

TOLEDO, OHIO—August 11-12, IMPBA Scale Internats, electric/steam only, hosted by Maumee Valley Model Boat Club at Walden Pond, Ottawa Park, from 9 a.m. to 5 p.m.; no gas. Contact: Robert Noble, 1808 Strathmoor, Toledo, OH 43614; 419/385-1710.

ST. LOUIS, MISSOURI—August 11-12, IMPBA Twin Mania '84, twin engine hydro only, straightaway and oval and heat racing, hosted by St. Louis Thunderboaters at Water Co. Pond, 8 a.m. check-in; mufflers must have alternate frequency, no back-up boat. Contact: Richard Zimmerman, 2555 Greenbriar, Florissant, MO 63033; 314/921-3824.

ROSEDALE, WASHINGTON—August 15-19, NAMBA 2nd Annual North American Scale Warship Combat Championships, hosted by North American Scale Warship Combat Club at Meyer's Pond. Contact: Hal Amith, 826-A 34th Ave., NW, Gig Harbor, WA 98336; 206/858-6221.

KANSAS CITY, MISSOURI—August 18-19, NAMBA District 7 points enduro, heat racing, outboard, scale, unlimited hydro, deep vee, hosted by Kansas City Radio Control Boat Club at H & S Sporting Lake. Contact: Gary Harmon, 7739 Kessler, Overland Park, MO 66204; 816/649-5179.

EDMONTON, ALBERTA, CANADA—August 18-19, NAMBA District 16 Thunderboat Regatta Trophy, heat race, enduro, outboard OPC, hosted by Chinook Model Boat Racing Assoc. at Lake Hermitage. Contact: Dave Arsenault, 671 Abbottsfield, Edmonton, Alta. T5W 4R4, Canada; 403/474-3307.

GREELY, ONTARIO, CANADA—August 18-19, IMPBA oval heat racing, 20-40-60 mono and hydro, 20-40 08 tunnel, 60 scale, hosted by Ottawa Remote Control Club at Spratts Pit, starts 10 a.m.; tuned pipe or muffler required. Contact: Al Hacker, 2030 Garfield Ave., Ottawa, Ont. K2C 0W8, Canada; 613/224-1218.

KENT, WASHINGTON—August 19, NAMBA heat racing, offshore, outboard, unlimited hydro, sport 40 ABC, mono and

hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Dough Smith, P.O. Box 352, Enumclaw, WA 98022; 206/825-6497.

ANCHORAGE, ALASKA—August 19, NAMBA District 11 points heat race, deep vee, offshore, outboard, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

CHINO, CALIFORNIA—August 19, NAMBA unlimited hydro, District 19 points, hosted by Southern California Scale Assoc. Thunderboats at El Prado. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

RENO, NEVADA—August 25-26, NAMBA District 9 points heat racing, unlimited hydro, sport 40, hosted by Reno Model Boaters at Lake Paradise. Contact: William Samuels, 2190 Prater Way #9, Sparks, NV 89431; 702/359-2507.

LONDON, ONTARIO, CANADA—August 25-26, IMPBA mono's, hydro's and V8 scale race, hosted by Thames Valley Model Boat Club at Triune Investment Pond, starts 9 a.m. Contact: Walter Marcon, 343 Berkshire Dr., London, Ont. N6J 3R5, Canada; 519/473-1371.

CLOVIS, NEW MEXICO—September 1-2, NAMBA enduro, heat race, outboard, scale, unlimited hydro, sport 40, District 7 points, hosted by Clovis Model Boat Club at Green Acres Lake. Contact: Kenny Cross, 2917 Mandell Circle, Clovis, NM 88101 505/769-1039.

EDMONTON, ALBERTA, CANADA—September 1-2, NAMBA heat race, offshore, outboard, OB OPC, unlimited hydro, deep vee, District 16 points, Muscular Dystrophy Race, hosted by Edmonton Model Boat Racing Assoc. at Lake Hermitage. Contact: Louis Omerzu, 10801 150 St., Edmonton, Alta. T3P 1R6, Canada; 403/483-8392.

SPOKANE, WASHINGTON—September 1-2, NAMBA heat racing, offshore, outboard, unlimited hydro, sport 40, deep vee, District 8 Championships, hosted by Lilac City Model Boat Club at Riverfront Park. Contact: Alex Lesine, E. 2928 62nd Ave., Spokane, WA 99203.

SAN DIEGO, CALIFORNIA—September 1-3, NAMBA heat racing, unlimited hydro, District 19 points, hosted by San Diego Argonauts at Model Yacht Pond. Contact: Eddie Paten, 111-32 Madrigal, San Diego, CA 92129; 619/487-3646.

SEASIDE, CALIFORNIA—September 8-9, NAMBA heat racing, unlimited hydro, sport 40, District 9 points, hosted by Gold Coast Model Boaters at Lake Roberts. Contact: Howard Power, 2031 Marsala Cr., Monterey, CA 93940; 408/394-1200.

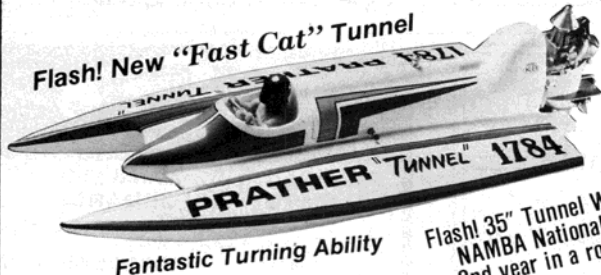
SOUTH EL MONTE, CALIFORNIA—September 8-9, NAMBA outboard, outboard OPC, District 19 points, hosted by Alii Racing Team at Legg Lake. Contact: Steve Vala, 14640 Firestone Blvd., #G, La Mirada, CA 90638; 213/949-5303.

MEMPHIS, TENNESSEE—September 8-9, IMPBA open outboard, open mono, open hydro and twin hydro, hosted by M.M.P.B.A. at Epping Forest Lake, starts 9 a.m. Contact: Dave Clark, 9515 Autumn Trail Cove, Memphis, TN 38134; 901/372-8937.

NAPERVILLE TOWNSHIP, ILLINOIS—September 8-9, IMPBA Midwest Council District 4 Championships, heat racing A-B, C-D, E, F mono and hydro, and scale, hosted by Midwest Council at Tollway Pond, EW Tollway & River Rd., from 8 a.m. to 6 p.m.; no separate outboard class. Contact: Bob Oaks, 220 Lewis Ave., Naperville Twp., IL; 312/526-8526.

MARKHAM, ONTARIO, CANADA—September 8-9, IMPBA

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BELL ISLE, MICHIGAN—September 8-9, IMPBA Miniature Boat Race, all classes, hosted by Wolverine Miniature Race Boat Assn. at Blue Heron Lagoon; tuned pipe or muffler device required; starts 8 a.m. Contact: Dwight Holien or Dick Grenier, 14351 Petersboro, Sterling Heights, MI 48078; 313/263-4917.

ANCHORAGE, ALASKA—September 9, NAMBA District 11 points, heat race, offshore, outboard, deep vee, record trials, hosted by Anchorage R/C Model Boat Assn. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

SAN FRANCISCO, CALIFORNIA—September 9, NAMBA scale, hosted by San Francisco Model Yacht Club at Spreckels Lake. Contact: Ina Hansner, 159 20th Ave., San Francisco, CA 94121; 415/221-3674.

INDIANAPOLIS, INDIANA—September 14-16, IMPBA National Hydro Championships, record trails on Fri. and Sat. determine qualifying for Sun. heat racing, B, D, E and F hydro only, hosted by Indy Model Boat Club at Lake #1, starts 9 a.m.; muffling device or tuned pipe required, no short stacks or open exhaust permitted. Contact: Bernard Bathauer, 1042 S. Muessing Rd., Indianapolis, IN 46239; 317/894-1892.

PORTLAND, OREGON—September 15, NAMBA unlimited hydro, sport 40, hosted by Rose City Model Yacht Club at Force Lake. Contact: David Blackstan, 698 Knights Bridge, Canby, OR 97013; 503/266-4186.

KENT, WASHINGTON—September 15, NAMBA heat racing, offshore, outboard, unlimited hydro, sport 40, ABC mono and hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Doug Kirk, 1725 NE Naomi Pl., Seattle, WA 98115; 206/527-2297.

SAN DIEGO, CALIFORNIA—September 15, NAMBA unlimited hydro, hosted by Southern California Scale Thunderboat Assn. (District 19 points) at Model Yacht Pond. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

THREE VALLEY GAP, BRITISH COLUMBIA, CANADA—September 15-16, NAMBA District 16 all clubs Triple Point Race & Annual General Meeting, enduro, heat race, outboard, unlimited hydro, sport 40, deep vee, at Three Valley Gap. Contact: Gary Jeffery, #31-76 Cedardale Cres., SW, Calgary, Alta. T2W 3Z5, Canada; 403/238-3413.

NAPERVILLE TOWNSHIP, ILLINOIS—September 16, IMPBA Silver Cup Race for 1/8 scale and 3.5 outboard tunnel hull only, no rigger, hosted by Minute Breakers Inc. at Tollway Lake, #5 EW Tollway & River Rd., starts 9 a.m. Contact: Douglas, Riha, 609 Chippewa Ln., Darien, IL 60559; 312/887-1997.

ST. LOUIS, MISSOURI—September 22-23, IMPBA heat racing, mono A-B, C-D, E and F, hydro A-B, C-D, E and F, outboard tunnel hull 3.5cc and 7.5cc, hosted by The St. Louis Thunderboaters Heat Racing at MO-VA-CO Lake, from 9 a.m. to 5 p.m. Sat. and 9 a.m. to completion on Sun.; IMPBA racing rules, no backup boats, expansion chamber pipe or equivalent required to run. Contact: Leon Kettle, 2000 Avon Dr., Florissant, MO 63033; 314/838-8358.

FLINT, MICHIGAN—September 22-23, IMPBA record trials, A-B, C-D, E-F, scale, hosted by Wolverine Miniature Race Boat Assn. at Thread Lake, starts 9 a.m. Contact: Greg Bailiff, 15410 14th St., Detroit, MI 48238; 313/867-6879.

KINGSBURG, CALIFORNIA—September 22-23, NAMBA heat racing, unlimited hydro, sport 40, District 19 points, hosted by Central Valley Model Boaters at Riverland Lake. Contact: Tom Anderson, 17911 Lane Dr., Madera, CA 93638; 209/674-0776.

CALGARY, ALBERTA, CANADA—September 22-23, NAMBA enduro, heat race, outboard OPC, deep vee, unlimited hydro, super X hydro, District 16 points, hosted by Calgary Model Boat Racing Assn. at Lake Carburne. Contact: Brian Jessup, 639 Canterbury Dr., SW, Calgary, Alta. T2W 1J4, Canada; 403/281-4193.

LAS VEGAS, NEVADA—September 22-23, NAMBA heat racing, hosted by Las Vegas Mini Mariners at Sunset Lake. Contact: Ray Rajm, 4383 Paramount, Las Vegas, NV 89115; 702/643-9697.

ANCHORAGE, ALASKA—September 23, NAMBA heat race, offshore, outboard, deep vee, record trials, District 11 Championships, hosted by Anchorage R/C Model Boat Assn. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

LANSING, MICHIGAN—September 23, IMPBA hydro only, A-B, C-D, E, F 1/8 scale, 3.5 outboard open, 7.5 outboard open, hosted by Lansing Model Boat Club at Lansing's Crega Park, starts 10 a.m.; muffler or tuned pipe required. Contact: Kevin Sheren, 515 Winifred, Lansing, MI 48917; 517/321-6230.

CHARLOTTE, NORTH CAROLINA—September 29-30, IMPBA class heat racing, all classes, mono, hydro, scale hydro, hosted by Piedmont Model Power Boat Assn. at Parkers Cove, Mt. Island Lake, starts 9 a.m.; tuned pipe or muffler required. Contact: Ken Draughn, 2834 McKinney St., Burlington, NC 27215; 919/227-5414.

SALISBURY, MARYLAND—September 29-30, IMPBA 1/16 straight, hosted by Fast Boats, Inc. at Pusey Pond. Contact: Ed Baker, Morris Rd., Pittsville, MD 21850; 301/835-2386.

TACOMA, WASHINGTON—September 29-30, NAMBA District 8 points, heat racing, hosted by Puget Sound Model Boat Club at Lake Waughop. Contact: Jerry Dunlap, 119 Crestwood Dr., SW, Tacoma, WA 98498; 206/584-7131.

AMARILLO, TEXAS—September 29-30, NAMBA heat racing, District 7 Championships, hosted by Muddy Rudder RC Boat Club at Thompson Park Lake. Contact: Charles Mobley, 4430 Clearwell, Amarillo, TX 79109; 806/352-7166.

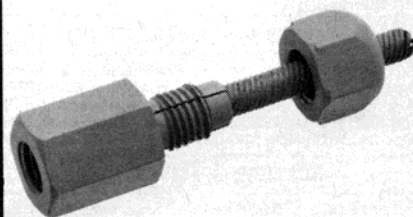
BAKERSFIELD, CALIFORNIA—September 29-30, NAMBA outboard, outboard OPC, District 19 points, hosted by the Wavemakers at Costerisan Farms. Contact: Wally Stewart, 347 Cypress St., Bakersfield, CA 93306; 805/322-6972.

VICTORIA, BRITISH COLUMBIA, CANADA—September 29-30, NAMBA District 16 points, heat racing, outboard, sport 40, A, B, C hydro, hosted by Vancouver Island Model Boat Assn. at Elk Lake. Contact: Greg Hansen, 1056 Heslam Ave., Victoria, B.C. V9B 2N4; 604/474-1866.

SAGINAW, MICHIGAN—September 30, IMPBA Staudacher Cup, 1/8 scale only - hydro, hosted by Saginaw Bay R/C Boat Club at Lake Linton Reservoir, starts 9 a.m.; tuned pipe or muffler required. Contact: Ron Selk, 203 Mead St., Saginaw, MI 48602; 517/793-9883.

BELOIT, WISCONSIN—September 30, IMPBA 3.5 class: junior tunnel hull for 15 yrs. and under, tunnel hull, mono outboard, outboard rigger, 7.5 class: tunnel hull, outboard rigger; 1/8 scale and .67 1/4 scale outboard, hosted by Rock Valley Racing Assn. at Riverside Lagoon Park, starts 9:30 a.m. Contact: Chuck Beecher, Dick Gabrielson, 1305 Eleventh St., Beloit, WI; 608/365-7962.

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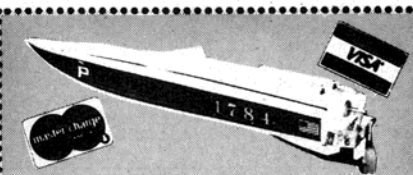
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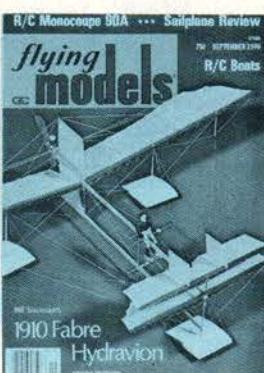
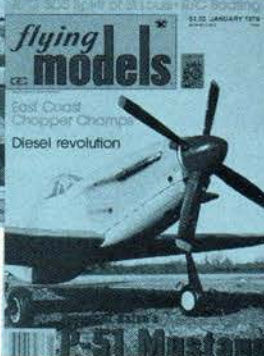


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