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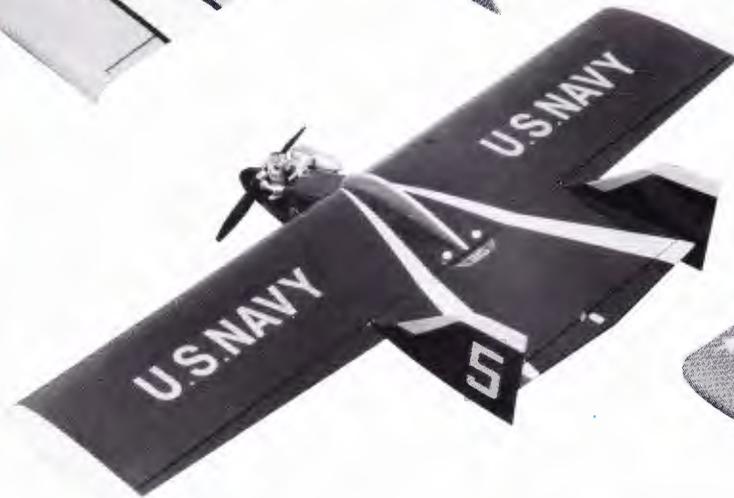
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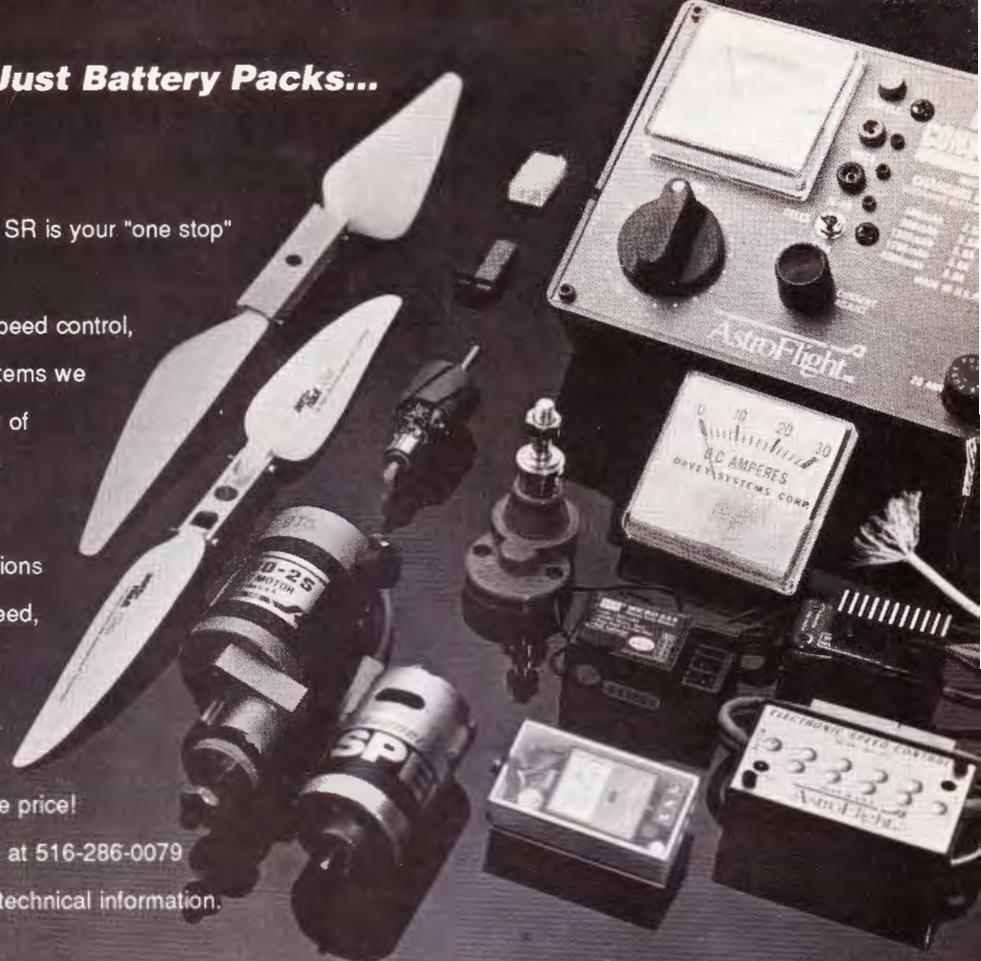
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**Shipping and Plans:** John Loux, Dominick Bianco

**FLYING MODELS** (ISSN 0015-4849) Incorporating FLYING ACES and R/C Model Boating, is published monthly by Carstens Publications, Inc., Fredon-Springdale Road, Fredon Township, P.O. Box 700 Newton, New Jersey 07860. Phone: 201/383-3355. Harold H. Carstens, President; Marie L. Merkle, Vice President; Phyllis M. Carstens, Secretary; Henry R. Carstens, Treasurer. Second class postage paid at Newton, NJ 07860 and additional mailing offices.

**POSTMASTER:** Send address changes to FLYING MODELS, P.O. Box 700, Newton NJ 07860. Copyright 1994 by Carstens Publications, Inc. Printed in the U.S.A.

**SUBSCRIPTIONS:** U.S.A. and possessions: \$23.00 per year, \$43.00 for two years, \$62.00 for three years. Single copies \$2.95. Canadians add \$6.00 per year postage and GST (GST #124725060). Postage outside U.S.A. \$4.00 extra per year. All communications regarding subscriptions and changes of address should be sent to Circulation Manager, FLYING MODELS, P.O. Box 700, Newton, NJ 07860-0700. Please allow six weeks for change of address.

**CONTRIBUTIONS:** Articles and photographs are welcome. Contributors are advised to keep a copy of manuscripts and illustrations. When requested we will endeavor to return all material in good condition if accompanied by return postage. FLYING MODELS assumes no responsibility for unsolicited material. Payment is normally made upon publication. The contents of this magazine may not be reprinted without the written permission of the publisher.

**ADVERTISING:** Main advertising offices: FLYING MODELS, P.O. Box 700, Newton, NJ 07860. Phone: 201/383-3355.



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**On the Cover:** Dr. D.B. Mathews has produced the Bingo in almost every size, and it has been a hit each time. Here his lovely granddaughter, Stephanie Taylor, proudly displays the Bingo 20, latest in the design series. Photo: Chris Clark

# editorial



Remember the oft quoted adage of not so very long ago—"Electrics are good for only sailplanes"? Well, it ain't so no more! Proof? Check Art Thoms' magnificent 111-inch Boeing 314 with four electrics.

**"P**ioneers usually end up with arrows in their heads." That was the sage observation of a fellow competitor a few years back when I was embroiled in a controversial development program which involved a radical approach to a traditional set of problems. The status quo of the particular event in question, for the most part, really didn't want, or think they needed a change. I won't go into specifics here, but the final results of that bit of pioneering was gratifying in that a new, and accepted, vista of performance was reached. Also, for the record, I've just finished pulling the last of the arrows out of my noggin.

I guess it's human nature to accept things just the way they are. There is a certain security in set standards, and we've all been brought up with the notion that security is a good thing. But, where would we be now, and how secure would we be, if there weren't any pioneers to discover that which lies just

over the next hill? Fortunately, this particular hobby/sport is blessed with more than its share of pioneers. Unfortunately, there are enough arrows to go around...

I'm always amazed when new modeling horizons are discovered, or when known horizons are extended. What prompted all this pontification was the Electric Flight column submitted this month by Don Mott. In that column, Don covers the annual KRC Electric Fly, held in Quakertown, PA. This affair has become the largest of its type on the East Coast. Electric flight is no longer in its infancy, in case you haven't noticed. The types of models being flown electrically is truly impressive. Everything from sub-miniature, single channel craft that resemble competition indoor rubber designs, to geared Giant Scale behemoths, to multi-motored ducted fan speedsters, to fully aerobatic pattern craft, to helicopters, to seaplanes. It's that last category that caught

*continued on page 6*

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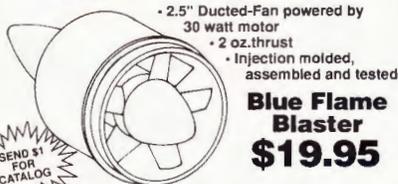
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my attention this month.

Several years ago one of the original electric pioneers, Mitch Poling, submitted an electric powered seaplane design for publication. His *Electric Tern* was featured in the May, 1980 issue of FLYING MODELS. It was a cute little design for .020 electric motors, and micro two channel R/C gear. The intro for that piece stated that the ship "...has even been known to ROW (rise off water) in the right conditions".

The plans for that design returned modest sales. Mitch continued to develop designs for electric powered seaplanes, and, with the advent of more powerful motors and batteries began to achieve very good results, bringing electric seaplane flying from the realm of pioneering to the security of an accepted mode. He deserves more than just a little credit for that achievement.

In Don's Mott's column on page 68, we are treated to a few examples of multi-motored electric beauties, two of which are scale seaplanes. Don Bosquet and Ray Canton modified an Easy-Built Models' PBY *Catalina* for electric operation, and had over thirty successful flights on the model at the time of the KRC meet. The model which really caught my eye was the Boeing 314 *Yankee Clipper* built and flown by Art Thoms. This gorgeous, and successful model features a wing span of 114 inches and is powered by four AstroFlite Cobalt 05 motors. I asked Don to expand his coverage of this particular model, and to give us the low down on electric seaplane flying in a special piece entitled *Hydro-Electric*, which is located on page 18 of this issue. As you read it, give a thought to Mitch Poling and his large collection of arrows.

**They did it**

Late word comes that ducted fan modelling will shortly be recognized as an official competition class by the Federation Aeronautique Internationale (FAI). Mike Cherry, Editor of Traplet Publications' *Radio Control Jet International* faxed the following

information to fill you in on the details.

"Due to the meteoric increase in interest, reliability, and capability of ducted fan and gas turbine powered jet aircraft over the last couple of years, an international committee was formed in 1993 to promote worldwide recognition and seek approval of a new official competition class from the FAI/CIAM. The 'International Jet Model Committee' includes representatives and support from Germany, England, France, Austria, USA, Italy, Belgium, Switzerland, Denmark, and Australia. At the most recent meeting in Bonn, Germany, a provisional set of rules for the new class was determined, and it is hoped to hold the first 'World Scale Jet Masters' competition in Europe in 1994, based on these rules.

"On Thursday, December 2nd, the Committee's spokesman and representatives (Mike Cherry, Philip Avonds, and Paul Ratajczak) made a presentation to the Bureau of the FAI Aeromodelling Commission in Paris, and gained overwhelming support for a new 'jet' class.

"The existing International Jet Model Committee is now recognized by the FAI Bureau as an official 'Working Group' and it should become an FAI Technical Sub-Committee in march 1994, at the Plenary meeting. At this time a Chairman will be elected, who will then select representatives from all interested countries."

Mike continued with the fact that jet modelling, under the FAI aegis and to be known provisionally as F4J, would then achieve a more official stature in national aeromodelling organizations. We at FM congratulate the International Jet Model Committee for advancing the stature and the popularity of ducted fan modelling.

**Futaba expands**

The Futaba Corporation of America has released an announcement that Futaba Corporation of Japan has acquired Ogawa Seiki K.K. (known as the manufacturer of O.S. engine and steam engine locomotive) by pur-

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chasing 100% of their stock on December 13, 1993.

Ogawa Seiki was established in 1941 and has a revenue of approximately \$30 million per year. They employ about 150 people, and have been a dominant factor in the manufacturing of model airplane and model boat engines for many years.

We are told that the acquisition was a friendly buy out requested by the stockholders of Ogawa Seiki. Futaba has taken this opportunity to play a broader role in both the radio control equipment and engine manufacturing to help expand the hobby industry worldwide. They expect to meet user's demand and satisfaction out of the new products to be created by the combined

technologies of radio control and engines in the future.

The following Futaba personnel have been appointed to the Board: Mr. Michihiko Etoh, Director & Chairman of the Board (Executive Vice President at Futaba Corporation); Mr. Tetsuya Sugawara, Director (Assistant General Manager, Sales & Marketing of R/C at Futaba Corporation); and Kazuyoshi Saito, Auditor (Director and assistant General Manager of Corporate Administration at Futaba Corporation).

We would like to extend our congratulations to Futaba and their forward thinking staff. I'm sure the future will hold many exciting new developments for them and for us as well.—BOB HUNT

# flying report



**KRESS JETS**, 4308 Ulster Landing Rd., Saugerties, NY 12477, has released its new electric P-38. This small R/C model (48-inch span) features a unique belt drive system with a 3½:1 gear ratio that powers both

props through a single Astro 035 motor. The P-38 weighs (with eight 1100 mAh SR Max cells) 54 ounces, with a wing area of 305 square inches, and flies on a 25.5 ounce/square foot wing loading. The structure of the P-38 is also unique. The basic components (fuselage, nacelles, etc.) are foam core profiles that are sheeted with 1/32 balsa sheet. Thin vacuum formed plastic shells are glued to this to give the final scale appearance. The Kress Jets P-38 basic kit sells for \$137.50. The twin engine drive system (with a gear ratio dependent on the motor used) sells for \$47.50. A pair of specially designed Kress Jets P-38 3-blade props (9-7) sell for \$31.90. For more information about the Kress Jets P-38, contact Kress jets at their address above, or call 914-336-8149.

continued on page 8

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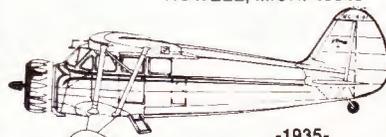
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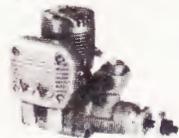
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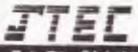
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**LONE STAR MODELS**, Route 9, Box 437, Lubbock, TX 79423, announces the release of the Choice Cut, Giant Sport R/C kit. The Choice Cut is a popular Dick Sarpolus design for Quadra 40/42 class engines. Featuring straightforward balsa/foam construction, the Choice Cut offers the sport flier a large size aerobatic model with super flying characteristics. The standard kit includes precision cut wood parts, foam cores, aluminum landing gear, and pre-formed canopy, cowl, and wheel pants. The Choice Cut has a wing span of 90 inches, a wing area of 1440 square inches, and requires a 4-channel radio control system. The Choice Cut kit is retail priced at \$249.95, but it is being offered for a limited time at the introductory price of \$149.95. For more information please write to the address listed above, or call: 806-745-6394.

attaching weights and fittings to helicopter blades. Blade ZAP is six times stronger than it has to be for these applications and cures in 30-90 seconds without the aid of a kicker (accelerator). A half ounce bottle of Blade ZAP sells for \$4.99 and is listed as Pt-26 in



the Pacer technologies line-up of hobby products. Check with Frank Tiano Enterprises for additional information, or call 407-795-6600.

**FRANK TIANO ENTERPRISES**, 15300 Estancia Lane, West palm beach, FL 33414, announces that Pacer technologies has released its new Blade ZAP, a high-tech cyanoacrylate formulated specifically for

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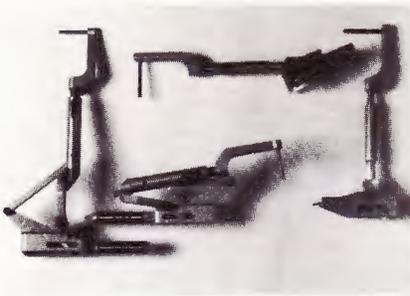
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**FRANK TIANO ENTERPRISES**, 15300 Estancia Lane, West palm beach, FL 33414, has expanded their line of Bearcat and Bull dog retractable landing gear. The Grumman Bearcat retractable landing gear with articulating action that shortens the strut while retracting, just as the full scale plane does. The gear is air operated (air control kit required) and comes complete with axles. two sizes are available, one for the popular 77-881-inch Bearcat like the one designed by Jerry Bates (\$458), and a larger set for the Model Aviation Technology and Zirolu Bearcats (\$558). The Bulldog line of retracts (struts not included) feature zero slop and are available in 85, 90, 95 degrees of retraction. These gear are servo/pushrod operated—an Airtronics or Futaba sail winch servo seems to work best—and are easily installed in any new project. The Bull dog retracts retail for \$175. and will accept any scale strut with a 1/2 inch diameter plug and will support models up to 40 pounds. Check with Frank Tiano Enterprises for additional info at their address above, or call 407-795-6600.

**DREMEL**, 4915 21st St., Racine, WI 53406, is now producing the #2750 Single-Speed Moto-Tool Kit. Along with either a foot or hand operated speed control, this tool can help the modeler to achieve professional results. The Single-Speed Moto-Tool Kit



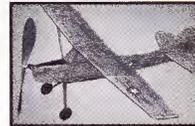
includes a 15 piece accessory/bit assortment and a bit holder. When combined with the model 221 Foot Operated Speed Control or the model 219 Table Top Speed Control, the user can achieve precision speed control from 0 to 28,000 RPM. This range of speed allows the user to work in styrene plastic, wood, and other modeling materials at

*continued on page 10*

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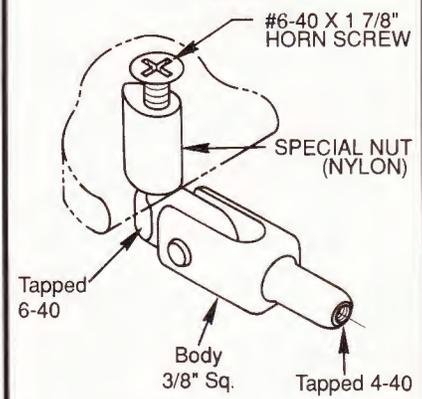
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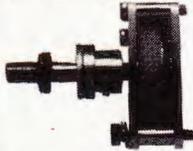
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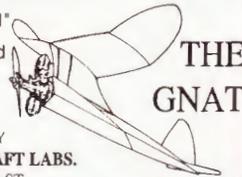
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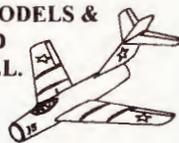
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**ASTROFLIGHT, INC., 13311 Beach Ave., Marina Del Rey, CA 90292,** announces that the new Cobalt FAI-60-T motor is now available. This high-powered airplane motor is now built on a solid titanium armature shaft, saving 60% of the weight of the previous stainless steel shafts. This brings the FAI-60-T's weight down to 19 ounces, com-



pared to 22 ounces with the steel shaft. The FAI-60-T features a distinctive asymmetrically-machined magnetic ring, which also

saves weight without reducing the strength of the motor's magnetic field. The endbell and endcap are also machined to further reduce the motor's weight, and to allow airflow to cool the motor. The FAI-60-T also features four heavy-duty brushes, and AstroFlight's "TackStack" precision-trued armature stacks for improved balance and greater RPM. The Cobalt FAI-60-T would be an ideal choice for any world-class F3E competition airplane. The suggested retail price of the Cobalt FAI-60-T is \$499.00. For more information please write to the above listed address, or call 310-821-6242.



**PROCTOR ENTERPRISES, 25450 N.E. Eilers Rd., Aurora, OR 97002,** has introduced two new Laser engines, the 160V and 200V Twin cylinders. Both of these new engines use the proven "wedge" shaped combustion chamber with valves inclined to the

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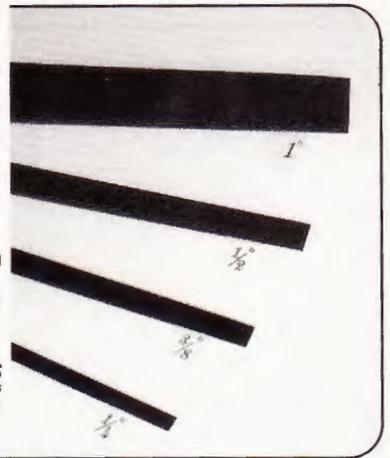
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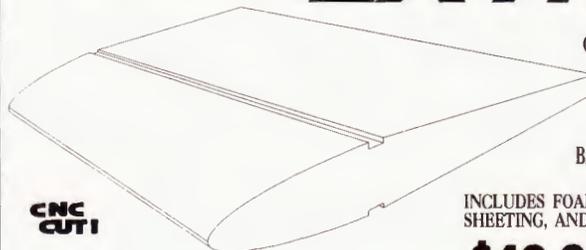
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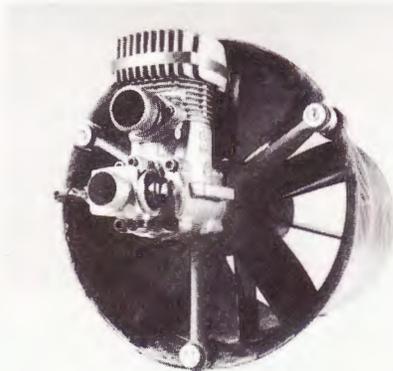
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**GREAT PLANES MODEL DISTRIBUTORS COMPANY**, PO Box 9021 Champaign, IL 61826, announces Top Flite's almost-ready-to-fly (ARF) Sierra trainer. The Sierra features all-wood major components (wing halves, fuselage, stabilizer, and rudder), prebuilt by Top Flite's best craftsmen. The Sierra includes a full complement of American-made hardware, such as steel rod-in-tube pushrods, clevises, control horns, foam tires, wheels, wheel collars, and fuel tank. The pre-built components are covered with a richly colored, high-gloss polyester film. Except for the engine, propeller, radio control system, glue and tools, everything else needed to make the Sierra flight ready is included. A photo-illustrated

instruction manual is included. The adjustable engine mount simplifies the engine installation. The Sierra has a wing area of 660 square inches. It is retail priced at \$199.95. For more information please write to the above listed address, or call 217-398-3630.



**ADVANCED HULL DYNAMICS**, 3632 Airport Dr., Hood River, OR 97031, is pleased to announce the release of a new high-thrust ducted fan unit. The 10-ounce units will allow Giant Scale enthusiasts to increase the size and weight of their models. The AHD HT-6.5" fan unit puts out over 15 pounds of static thrust. The SHT-7" unit puts out over 19 pounds of static thrust (bench tested with O.S. 91). AHD designer, Harry Gehrman claims that the record static thrust levels were reached through a

*continued on page 84*

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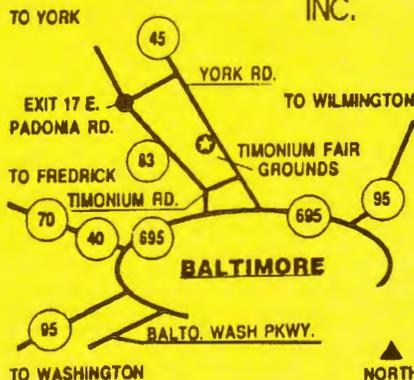
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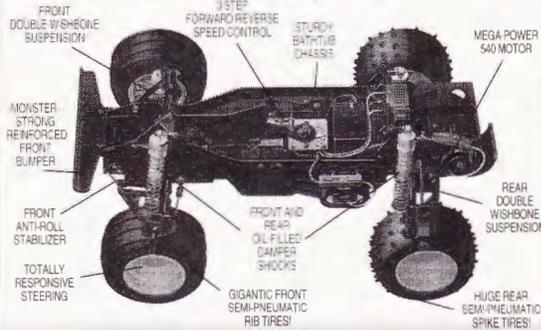
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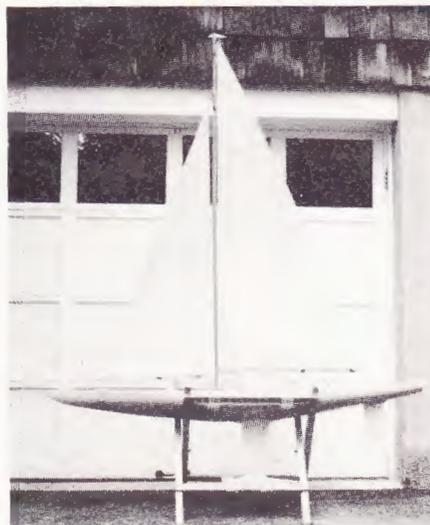


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## First scratchbuilt

Enclosed is a photo of the sailboat "Amy". The article and plans for this boat were presented in the May and June 1987 issues of FLYING MODELS. This is the first scratchbuilt sailboat that I have constructed. It was a very easy boat to build as E.E. (Bud) Salika,

the designer, said in the article.

I bought some of the deck fittings from "Pop Up Manufacturing", 27 Emerson Ave., Amityville, NY 11701. They make and sell kits and parts for sailboats. They were also very helpful with advice. I bought the sails from "Rod Carr Sails", 3011 177th Ave. NE, Redmond, WA 98052.

This boat (Amy) really moves. The plans were good, and I recommend it to any one as a "first" sailboat project. It is large, and I can send it way out on the lake where I live.

ROBERT BEHME  
Newton, NJ

## Nose job

Lynn McCauley's B-58 is a magnificent model without doubt. However, I doubt he himself claims that the landing gear "...is a true to scale set of retracting gear" as stated by Frank Fanelli in your February 1994 issue.

The B-58 landing gear, particularly the nose gear, were quite complicated in design and operation. The nose gear shock strut was suspended by arms or links at each side (forming a Y-shape when viewed from the front) to permit the lower portion to swing

continued on page 20

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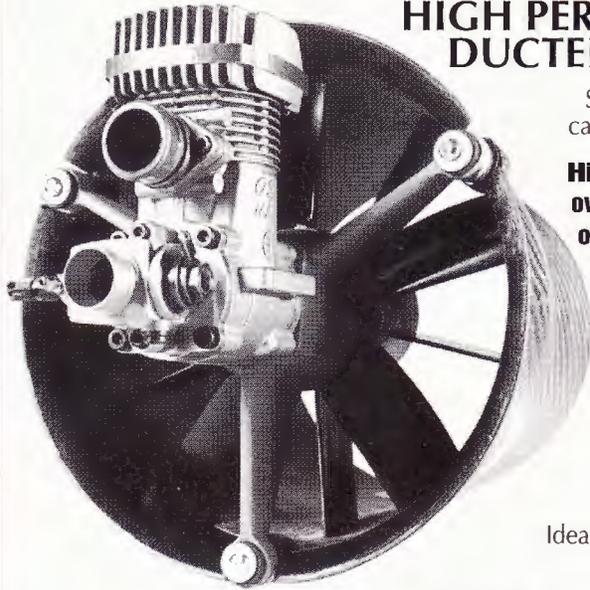
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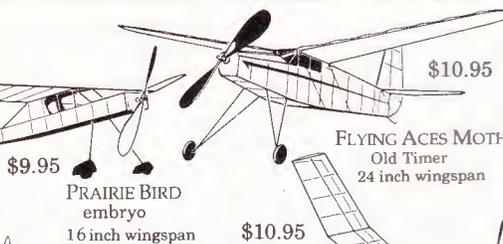
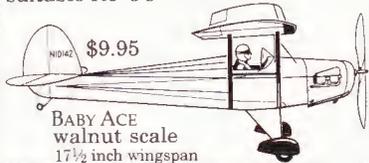
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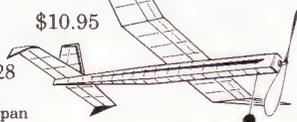
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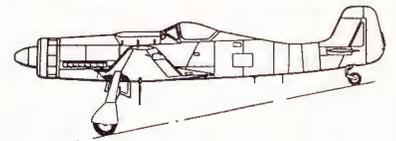
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PHOTOGRAPHY: DON MOTT

With all four Astro 05G cobalts turning its 10-6 3-bladed props, Art Thoms' 114-inch Boeing 314 comes up on the step before take-off.

# Hydro-Electric

By Don Mott

**T**he alpha and omega of the electric powered seaplane spectrum, so to speak. The *Ace Puddle Master* by Don Mott at the diminutive end of the range and Art Thoms' Boeing 314 flying boat, the *Yankee Clipper*, as the last word—well, maybe not the “last” word. I’m sure that someone will build something larger and more spectacular just to prove me wrong. However, Art’s beautiful *Yankee Clipper* is an example of what is being accomplished today with electric power.

The full size Boeing 314 *Yankee Clipper*

was number three of twelve built from 1938 to 1940 by the Boeing Co. of Seattle, WA, for Pan-American Airways. It could carry 74 seated passengers or 36 in sleeper berths. Four Curtiss Wright GR-2600 engines, of 1500 horsepower each, produced a top speed that was claimed to be 199 mph, but in actual practice was quite a bit slower. The not too heart stopping climb rate of 565 feet per minute was still quite good for an airplane of its size and era, and yielded a service ceiling of over 13,000 feet. The wingspan of 152 feet and wing area of 2867 square feet supported

an airframe weight of over 50,000 pounds, and a useful load of over 30,000 pounds. These figures yield a wing loading of approximately 29 pounds per square foot. The big flying boat carried a crew of six to ten persons.

The Boeing 314 differed from the usual flying boat planform in that it didn’t use the usual wing tip floats to keep it stable while resting on the water or moving at low speed. Instead, the hull had short wing-like structures called sponsons on either side of the fuselage. These sponsons were located below the wings and at a height that caused them to be partially submerged when the aircraft was at rest on the water. In practice it was found that the sponsons had insufficient buoyancy to keep the wing tips out of the water. Damage to the wings and frequent “water loops” on landing were the result. Much redesign by the Boeing factory failed to resolve the problem and the 314 was plagued by the sponson problem for its entire service life. The model reflected the same problem, it is scale even in that regard.

The *Yankee Clipper*'s flying days ended on the Taugus River in Portugal on February 22, 1943. The Portuguese authorities insisted on aircraft maintaining a six hundred foot ceiling while over the river. During a night landing, while making a 180 degree turn the pilot, Captain Rod Sullivan, caught the wing tip and crashed. Twenty-four people died. Most passengers aboard were US performers or diplomats traveling to Europe.

Arthur Thoms' replica of the 314 is powered by four Astro Cobalt 05G motors turning Grish three-blade 10-6 props. The wingspan is 114 inches and the model weighs



Don Mott's little *Puddle Master* may not be as exquisite as the Boeing 314, but with an 05 motor it leaps off the water and proves a not so obvious point: water and electrics *do* mix.

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between 14 and 16 pounds depending on the battery pack used. Art has used up to 32 cells for power and has the motors and batteries wired in series.

Art found on the first flight that he could not turn to the right. With full right aileron he managed a slow turn to the left until he could reduce power and set the model back down on the water. After a successful landing he rewired the motors to turn two clockwise and two anti-clockwise. This change canceled out the torque effects and turns were made easily in both directions. The full size *Clipper* had all engines turning clockwise, but flew with higher pitch on the left props than on the right.

On the other hand, you have the *Puddle Master*. From near the top of the electric powered hydro list to the bottom. This cute little seaplane is powered by a lone Astro Cobalt 05. However it flies just as good with the less expensive, ferrite, can-type 05 motors. With the cobalt motor and seven cells, it leaps off the water with a very short water run and flies with authority. Landings are best done by adding a little power just before touchdown.

The point here is that electricity and water *do* mix very well when the catalyst is a model seaplane. The electric modelers are proving over and over that the combination of electric motors and nickel-cadmium batteries is a very viable combination for aircraft models of various types. Electric, the wave of the future, catch a wave!

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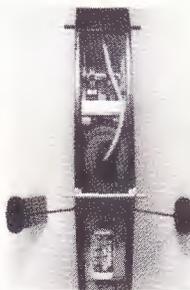
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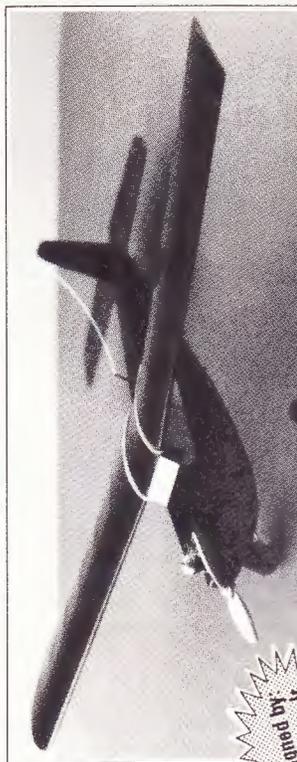
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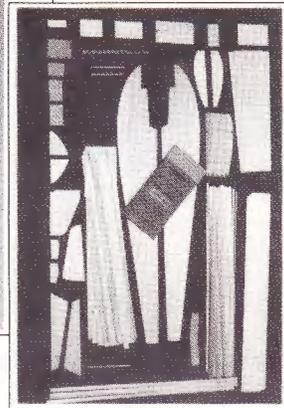


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**S**o there are *Big Bingos* and *.60 Bingos* and *Bingo 40s*, so why on earth would anyone add yet another *Bingo* to the series? Simply because the things all seem to fly well, are so simple to build, look neat, and have earned the respect of thousands of builders and fliers all over the world. Besides, if anything works this well why not develop it in all sorts of sizes?

My interest in developing a *.20 size Bingo* was stimulated by observing George Sauer, a member of my flying group, fly a thin wing section *Quicke 500* design using an O.S. *.20* four cycle. This neat model flies very well and is remarkably aerobatic using what most would consider inadequate power. This led me to wonder just exactly why we tend to think 350 square inch wing area when designing models for *.20* to *.30* engine sizes?

My development of the *Bingo 20* leads me to conclude that powerplants in this size range are vastly more powerful than commonly credited, and that many of the models designed just a few years ago for these engine sizes are now grossly overpowered. Surprising, isn't it?

To spare you the effort of thumbing back to the flight report to find out if this *Bingo 20* is worth building, let's start right out with it now. These have to be the simplest tail draggers to take off ever. The *Bingo* series tend to come up on the mains as power is added until they just sort of take off by

themselves. This is likely attributable to the landing gear placement.

Aerobatics are clean, with absolutely no nasty traits. Snap rolls, upright or inverted, are just a matter of full everything with instant return to level after neutralizing the sticks. Spins, power on or off, inside or outside, are just like the snaps. Axial rolls are a bit slower than some of the thick sectioned hot rod designs, but comparable with most *Stik* types.

This roll rate makes for beautiful Cuban Eights. Inside and outside loops are almost identical which contribute to neat horizontal eights. Vertical eights are possible with careful speed management, but one must also be careful to slow down on the downhill legs as the *Bingo 20* is a very clean design and accelerates rapidly.

For something far out, try a "Wichita tumble". Start with a  $1\frac{1}{2}$  inside snap roll, then, at its apex, immediately jam in full down elevator. If the speed and timing are correct, the model will start tumbling horizontally. Sort of a horizontal Lomcevac, and lots of fun to watch.

Landing the *Bingo 20* requires a bit more skill than the earlier *4-20*. The latter has the landing gear located with the axles just behind the wing leading edge. For construction simplicity and to avoid placing the landing gear in the wing, I chose to move the axle line forward onto the fuselage, a technique commonly used on jumbo gas powered type sport models.

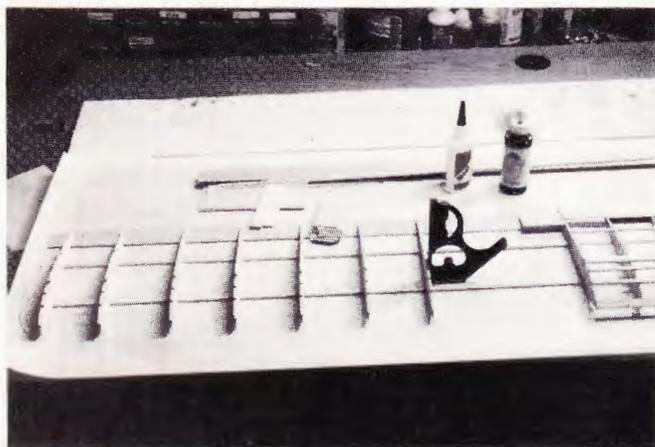


PHOTOGRAPHY: DR. D.B. MATHEWS

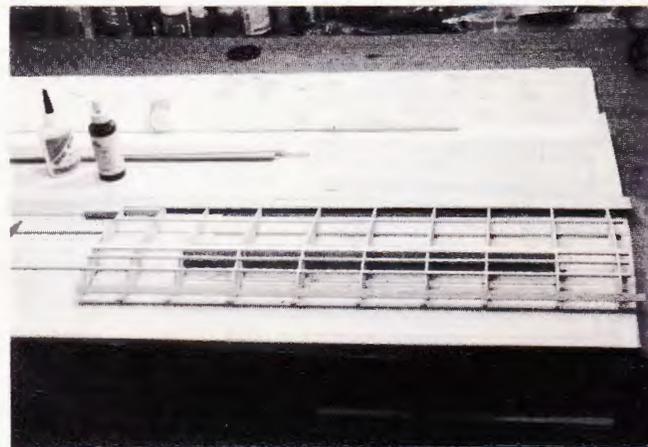
# Bingo 20!

By Dr. D.B. Mathews

Success breeds success. Proven popular in a variety of larger sizes, it now takes form in *.20*. Features interlocking light ply fuse construction.



While gluing the ribs to the bottom spars and bottom trailing edge, use a square or triangle to keep the ribs perpendicular (**above left**). Once the ribs are in place,



start adding the top spars, leading edge and top trailing edge sheet (**above right**). Note the shear webbing and the filler blocks in the center trailing edge.



This requires that a slightly different landing approach technique be used. The model must be slowed down farther out in the pattern (it will fly remarkably slow without any tendency to snap, so don't worry) and setting it down on the wheels with less flare on touchdown. In other words make wheel landings!

The worst that will happen should you miss and end up in a three point attitude is an extra bounce or two. Lovely landings can be done if the speed is bled off farther out and minimum up elevator is used on touchdown.

I don't mean to imply the *Bingo 20* is at all difficult to land, rather I am trying to gently tell you the usual "bang the nose gear quickly" sloppy landings we all see won't work here. You will have to learn to actually land a model airplane.

The thing is flat dabbled gorgeous when it is wheel landed, rolls down the runway tail

up, then slowly settles onto its tail wheel. A little practice will make the flier proud, as a matter of fact this whole project will make him proud!

So what we have here really, is a compact sized *Bingo* that builds and flies very much like its larger sisters. This seems to prove a simple to build, soundly designed model will fly well in darn near any size.

### Now to the nuts and bolts

Though at first glance this design may look a bit flimsy, it actually is light and very strong. One must realize light ply and spruce are many times stronger than equivalent sizes of balsa. Under *no* circumstance should balsa be substituted for the hardwoods in this design without *grossly increasing* their sizes!

Hardware items are standard and should be available at any well-stocked hobby shop. Personal preferences can certainly be sub-

stituted. Many of the specialized items such as the landing gear and pants, are available directly from ACE R/C, Box 511, Higginsville, MO 64037.

Read and study the text and drawings carefully to avoid any confusion. Cut out a kit of parts by transferring the shapes to the appropriate wood by placing carbon paper under the drawings and over the wood. Use of a good straight edge is mandatory. All holes and cut outs should be made at the time of the parts fabrication.

A simple jig saw (such as a Dremel, etc.) is helpful in building this or any other scratch project, a good knife will work, however. Cut outs can be made easily by drilling 1/4-inch holes in the ply, threading the saw blade into the hole and re-attaching the blade. Tabs and slots can be cut using a sharp modeling knife.

This model is very easy to construct and keep in good alignment. Use a smooth flat building surface and follow sound principles of construction. A straight building job results in a straight flying model. The prototypes were constructed almost entirely with medium and thin cyanoacrylate adhesives.

### Wing

Since the wing will be needed early in the fuselage construction sequences, I prefer to build it first.

Stack cut the ribs using a master plywood or metal template as a guide. Notice that *two* rib patterns are needed. Carefully cut out each spar notch, as the spars must fit snugly for medium CyA to work properly. For improved adhesion on the spruce parts, sand the surfaces to remove residual oils that tend to come to the surface after milling.

The wing panels are mirror images of one another and are built flat on the board from the front spar rearward. Obviously, the building surface must be perfectly flat as the wing will match any warps of the building board. Wing construction is from the bottom up. Pin the sheet trailing edge and center section sheet over the plans. Position the bottom spars and then the ribs. Use a small 90 degree triangle or a House of Balsa "Upright" to keep the ribs square. Fit the hardwood trailing edge filler and adhere it to the bottom center section trailing edge sheet.

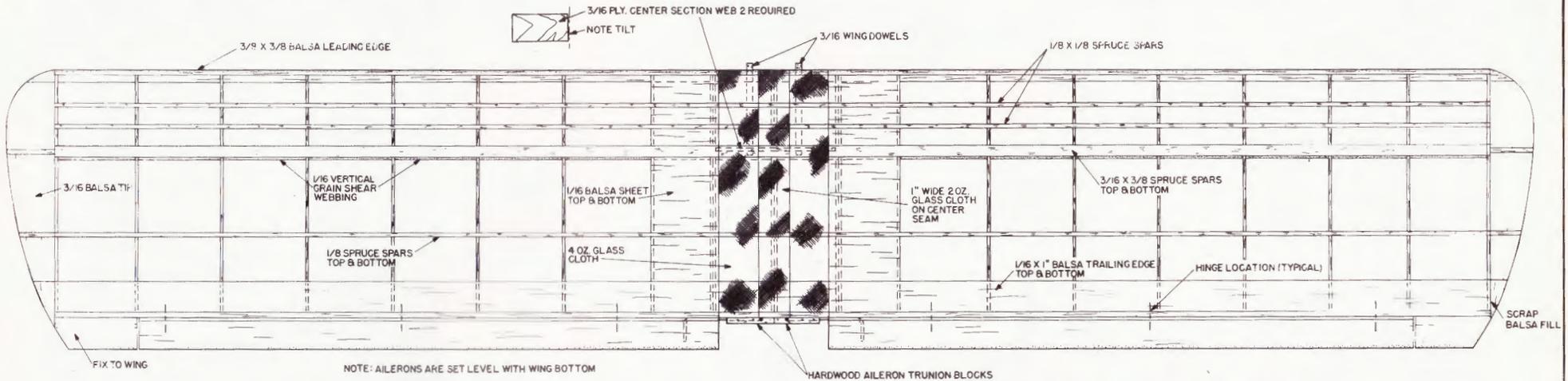
Add the top trailing edge sheeting and



No doubt, there's extra effort in making the pieces for the interlocking tab fuselage (above left), but the advantage is a much more easy to assemble structure

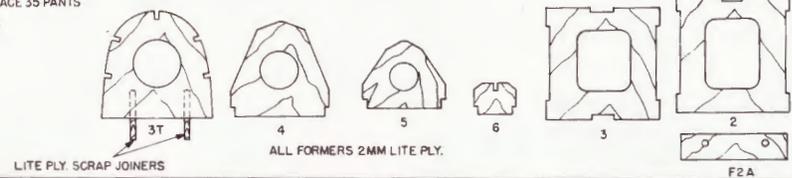
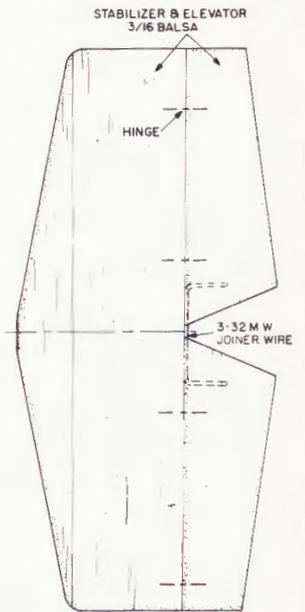
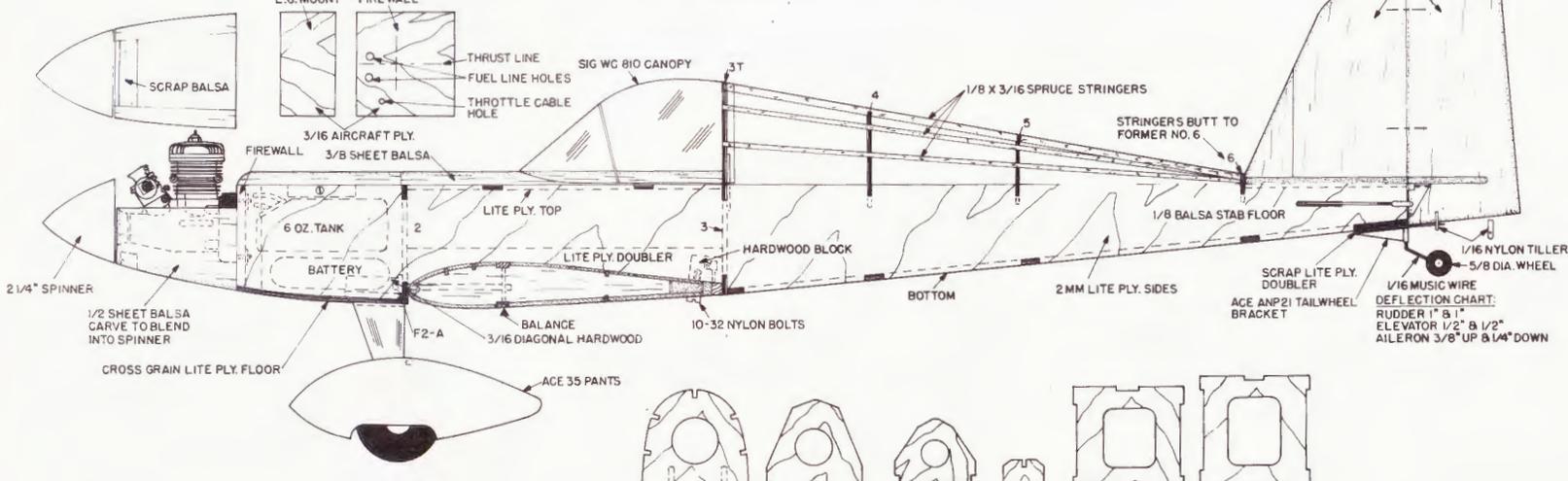
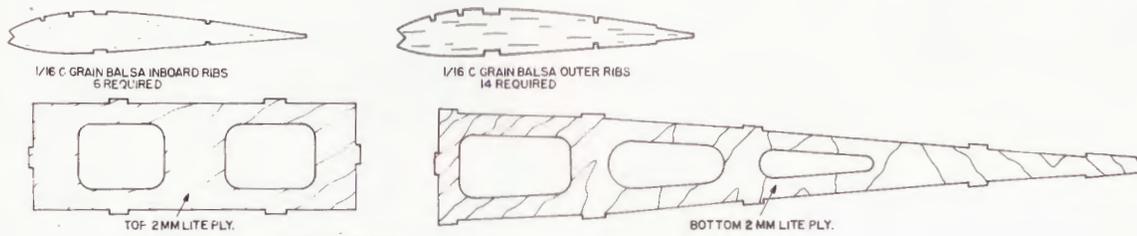


that really doesn't require building over plans. Start the fuselage (above right) with the firewall, sides, and cockpit floor taped together before gluing.

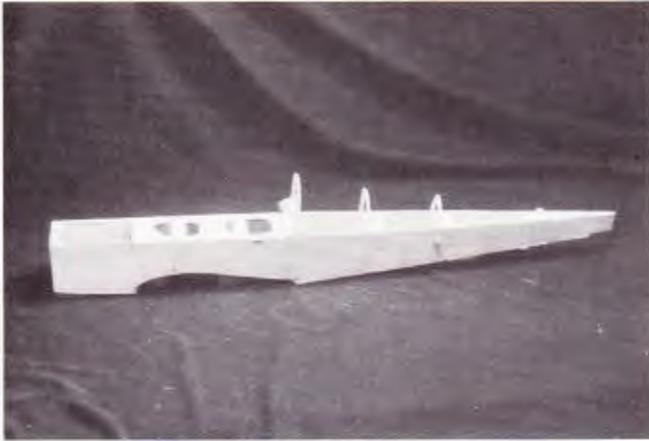


# BINGO 20

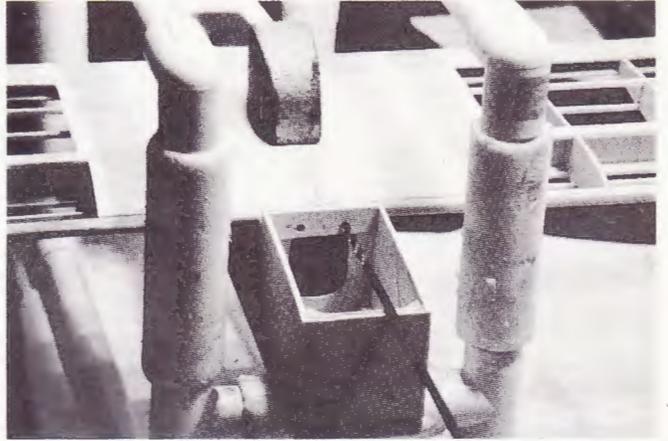
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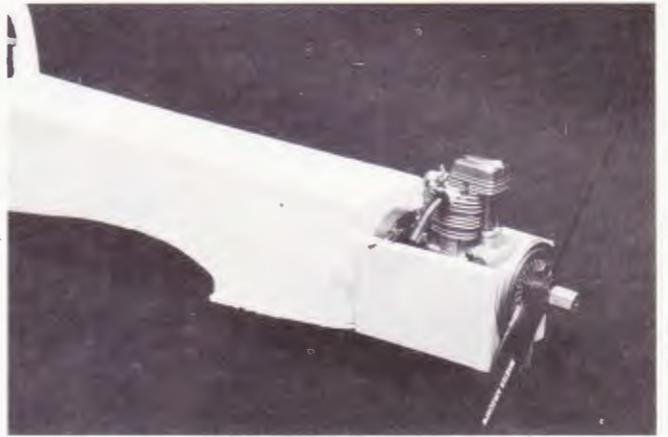
# Bingo 20!



The rest of the fuselage formers and rear bottom piece are then added and taped (above left) before gluing. With the wing aligned to the fuselage, in its saddle (above right), the holes are drilled for the  $\frac{3}{16}$  wing dowels, before the lite ply

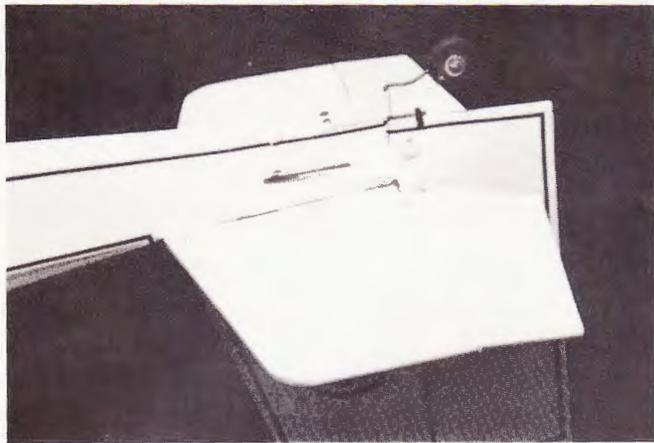


floor is added. A convenient way to secure the hatch and make access easy (below left). Put in some rails and "T" nuts. With the engine in place (below right), the cowl side and the spinner sheets are added, then shaped.



Ready to dress 'er up! At this point the canopy is only taped on. It will be glued on after the model is covered.

# Bingo 20!



The author used an ACE nylon tail wheel bracket, and locked the tail wire tiller arm to the bottom of the rudder for ground steering (above left). Note the hole in the cockpit headrest (above right). It stabilizes the air in the cockpit and keeps it



from deforming. The 6-ounce tank fits neatly in the forward compartment (below left). The battery goes underneath it, ACE #35 wheel pants dress up the aluminum gear (below right). The engine is a K&B .20 Sportster.



spars followed by the leading edge and turbulator spars. Center ribs are angled using the ply sheer webs. No dihedral braces are used. I have followed this technique for many years on hundreds of models and have yet to have a center section fail. In crash situations the wings always break off outboard of the glass and epoxy!

All that is required to create a solid and accurate dihedral joint in these designs is to block up the panels tip against a flat table edge, sand in the angle, and join the panels with five-minute epoxy. This is exactly the same technique used in building hand launched gliders. The center section is then wrapped with glass cloth and epoxy.

Using pre-notched basswood trunnion blocks (wing gear mounts as used on trike aircraft), make a left and a right aileron torque rod assembly. Make sure the nylon tube is on the wire before bending it! Roughen the outside of the nylon with coarse sandpaper.

Apply a small drop of warmed Vaseline (use your MonoKote heat gun and the jar lid) to spread between the wire and the inside of the tubing. This helps prevent any adhesive that might seep into the barrel of the nylon hinge from locking the wire into the tube.

Hold the assembly against the trailing edge cap with masking tape, flow thick CyA on the joint. When cured, carve away the

excess basswood and sand to match the contour of the trailing edge cap.

The ailerons are beveled at the hinge line and only slightly rounded at the trailing edge. This configuration seems to help prevent any potential high speed flutter. The hinge gap lines should be kept to an absolute minimum or even taped closed after covering.

## Fuselage

Make a right fuselage side by tracing over the plans with carbon paper onto a sheet of light ply. Mark the bulkhead and slot locations at this time. Cut out the side then use it as a pattern for the opposite side and for the needed doubler.

Note that the ply is referred to as 1/8-inch when in reality light ply is a true 3mm in thickness. This is slightly less than 1/8 inch. The slots should fit snugly, therefore allow for this slight variance when cutting the fuselage slots.

Similarly, trace and develop the other parts, then trial fit everything before final assembly. Cement the doublers, firewall triangular stock braces, and the landing gear block in place using epoxy.

Do not neglect the necessary holes and cut outs in these parts.

Without gluing, fit the fuselage sides, F-2, F-3, the firewall, and the cockpit floor into the appropriate slots in the sides. The whole unit is self aligning, but double check with a

square. Adjust by moving the masking tape as needed. When satisfied, flow medium CyA along all the joints.

Fit the rear bottom section, and again adjust it as needed. Clamp the tail post together with clothes pins or clamps. Keep all edges aligned and square with masking tape. Repeat the gluing sequence. Add the turtle deck, formers, tail wheel mount, and spruce stringers.

The firewall should have been previously drilled to place the engine thrust line as drawn. Install 4-40 blind nuts and bolts and drill the appropriate holes for the fuel lines and throttle pushrod. Do not install the front-bottom sheet just yet; it will provide access to the wing hold down dowel holes and the hatch hold downs later on.

## Wing to fuselage mating

Mark a centerline onto the bottom of F-2 and F-3. Measure out 1 1/16 inch from the center line of the wing, marking this on the bottom of the wing. Place the wing into the saddle flush with F-2, centered on the mark. Repeat for F-3 making sure the wing center matches the fuselage center.

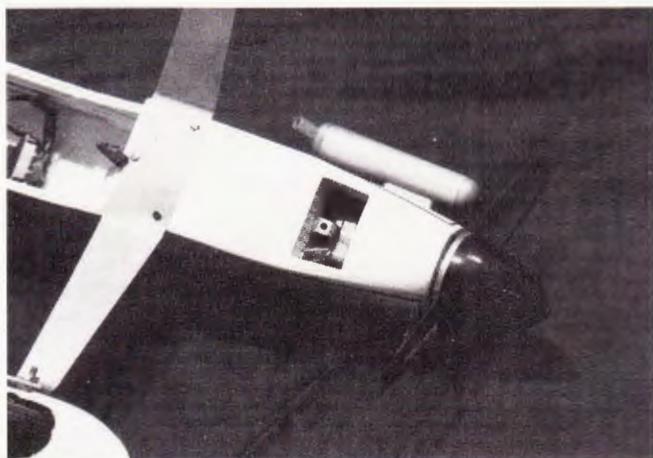
Weight the wing down in the saddle to stabilize it, then place a pin into the exact center of the tail post. Use a length of string to square the line in the left/right plane. The distance from one tip must be exactly the same as the distance to the opposite identical point.

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That large rectangular hole in the chine block (above left) is just a large drain hole to let all the glop in the engine compartment drain. Be sure to fuel proof the



compartment. With the battery up front, there's ample room and depth in the radio compartment (above right) to put the receiver and three servos.

When everything is just right, place a 6-inch drill bit through the holes in F-2 and drill through the wing and ply shear web. Remove the wing.

Round one end of the  $\frac{3}{16}$ -inch dowel and sharpen the other in a pencil sharpener. Push the sharpened end into the holes in the leading edge, inserting it all the way into the ply web (leave about  $\frac{3}{8}$  inch protruding).

Return the wing to the fuselage and recheck the fit. If necessary, file out the hole in the leading edge until the wing seats cleanly into the fuselage saddles. Remove again, mix epoxy and work it into the wing hold down holes with a scrap of wire, then insert the dowels. Return the wing to the fuselage and recheck while the epoxy cures.

Remove the wing again and epoxy the hardwood wing hold down blocks to the fuselage sides with their tops flush with the wing saddle. Return the wing and mark the proper location of the bolt holes onto the wing. Re-check the alignment using the tail post string. Drill down in to the blocks following a slight rearward angle. Remove the wing and tap the block holes 10-32. Enlarge the wing holes to  $\frac{3}{16}$  inch. Use nylon washers with the nylon bolts to spread the forces over a wider area.

Complete the wing by adding the tips, the glass center section reinforcements, and giving everything a careful sanding.

The wing depends on its covering for some of its torsional strength and rigidity. I strongly advise against the use of low heat, softer covering materials. Use MonoKote, Oracover, or Ultracote!

### Fuselage completion

Glue the  $\frac{3}{8}$  inch top block on to the cockpit floor but not to the hatch area. Carve and sand to a rounded contour and final sand. Using a razor saw cut loose the tank hatch.

Sand the sawn edges and return the hatch to the fuselage, holding it in place with masking tape. Reaching up through the uncovered bottom, attach two hardwood blocks to the hatch with CyA. Drill  $\frac{1}{8}$  inch through the light ply sides and into the blocks. Place 4-40 blind nuts into the block holes, then some bolts, and tighten. Remove the hatch and reinforce the blind nuts and

blocks with additional CyA.

Using cross grained light ply, close off the tank hatch area bottom. Epoxy the landing gear block inside the light ply.

Install the engine and spinner. Protect the edges of the spinner while carving and sanding by wrapping it with tape.

Rough cut the nose blocks to outline and establish a block sanded bevel, front and back, so that the outside edge of the nose block meets the mid-line of the spinner about evenly and is flush with the firewall end. Adjust the front to clear the spinner back plate by approximately  $\frac{1}{8}$  inch. Mark the bottom block to fit inside the side blocks by running a pencil along the juncture. This block should be level with the bottom center of the spinner.

Mark the outline of the spinner, then remove the engine and sand the blocks to rough shape. Remount the engine and final sand the cowl to a pleasant contour. I don't use ply faces on the cowl/spinner joint, but if you wish, it is easily enough done. Obviously, length and shape of the nose blocks is a function of the exact length and type of engine being used.

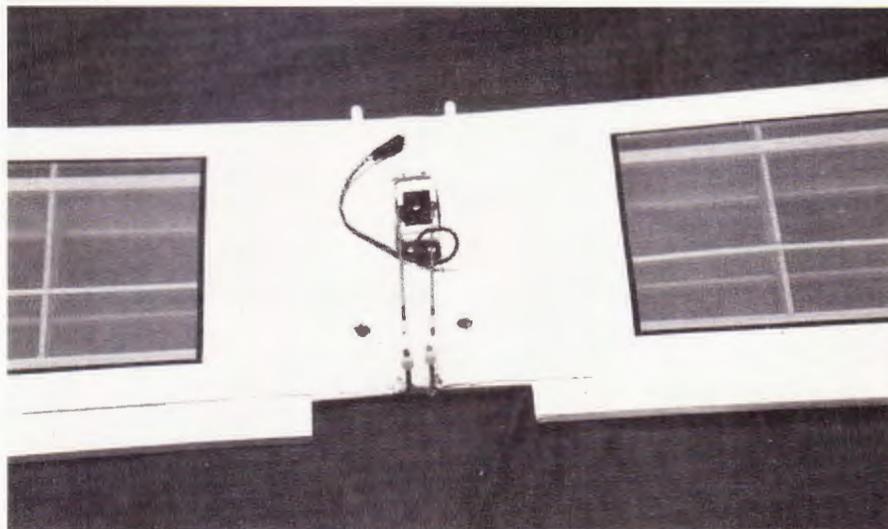
The landing gear is mounted with #4 x  $\frac{1}{2}$  inch sheet metal screws. Be sure they do not run into the wing hold down dowels; if they do, shorten them with a cut-off wheel or file.

### Tail surfaces

These are all sheet and totally simple. Select medium density sheet balsa and join as required to make up the proper width. Join the elevator halves with a formed wire. Watch out that the wire doesn't induce a twist into the elevators. Hinges are the builders choice, but I highly recommend ACE Hot Hinges or similar. These are so easy to install if a "hinger" as illustrated in the photo is used. The only precaution is to be sure to adhere them with *thin* CyA, not-ing else!

Control hook-ups are easily done with a standard nylon rod in a rod. Cross them over about half way back in the fuselage and use an anti-flex brace in that area.

Easy and clean looking exits can be done by drilling the exit holes on an angle that matches the run of the rods. A 6-inch or even a 12-inch drill is perfect for this function. After the outer rod has been adhered to the



There isn't enough depth to the wing to allow the aileron servo to fit entirely inside the wing, so check how much it will intrude in the radio compartment space. Mount the servo just aft of the main spar.

# Bingo 20!



This *Bingo 20* was covered in MonoKote, any similar covering like Ultracote or Oracover is acceptable. Don't, says the author, use low-heat coverings.

fuselage exit, sand it down smooth to match the side. A professional appearing exit will result.

I have been sort of fumbling about for years trying all sorts of tail wheel tillers, and think I have finally hit on one that works beautifully while being easy to install and very durable. It also allows for quick removal of the tail wheel, a real virtue when the model is being converted from wheels to floats.

I cut a  $\frac{3}{16} \times \frac{1}{4}$ -inch strip of surplus servo horn long enough to bury an inch or so into the rudders bottom. I then drill  $\frac{1}{16}$ -inch diameter holes in several spots; these anchor the unit in the rudder while the ones that protrude are used for the tiller wire. CyA will adhere this unit very well and it all stands up just fine in daily use. Of course, the easiest way to install this rig is after the rudder is covered. Try it, you will like it.

## Covering and finish

Individual builders have their own preferences in finishing and I am not about to state "the only way to do this is ..." I will, however, describe my pet technique and perhaps you will find something worth trying out.

The entire model should be coated with a thin coat of Balsarite; this seems to moisture proof the wood and prevent much of the

wrinkling and creeping that can occur with environmental temperature changes. This coating should be thinned; the formula out of the can is, frankly, too thick for this use as supplied.

The fuselage is covered turtle deck first, and the overlaps trimmed even with the belt line. Side strips are cut from the roll with a straight edge to provide a smooth line over the turtle deck covering.

The rear and front bottoms are covered with their overlaps on top of the side overlaps. I heat and pull the material around to the nose block center lines. Interior portions of the nose and tank areas are given two coats of K&B Superpoxy clear, then the nose interior is finished with an appropriate color of the same paint.

Wheel pants can easily be spray painted with Rustoleum if a suitable color is found.

The heat, pull, stretch and stick technique described in the film's packaging is also helpful when covering the wing tips.

The canopy is attached by cutting away a  $\frac{1}{16}$  inch strip of film, leaving a border of raw wood in the areas where it will be touched by the R/C 56 glue on the canopy edge. After the glue sets, this edge is trimmed with contrasting or matching trim tape. Leave the rear of the canopy open as this allows heated air to escape rather than expand the plastic.

When gluing the tail onto the fuselage and the fin to the stab, clear the covering film at the joints. However, be very careful not to "score" the wood with the knife. This provides a natural fatigue/fracture line.

## Pre-flight & in the air

The balance point has considerable latitude on the *Bingo 20*: forward of the middle of the main spar for safety, rearward for increasing control sensitivity and wild aerobatics. Nominal surface deflections shown on the drawings; these are averages and will provide plenty of action for all the most jaded fliers.

The flight comments are at the beginning of this article! Fooled you didn't I?

This is another in the *Bingo* family directed at the "keep it in the car" flyer who enjoys models small enough to stick in the car head directly to the flying site after work, at lunch hour, or to the flier who enjoys smallish designs that fly much "bigger" than they are.

If you find this model attractive you would like to build one, the *Bingo 20* is an easily done scratchbuilt project. It would also be an excellent first try for any of our readers who have never before tackled such a project.

She's a nimble, spirited and attractive design, not at all difficult to enjoy!

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# Spring 1994 R/C Digest

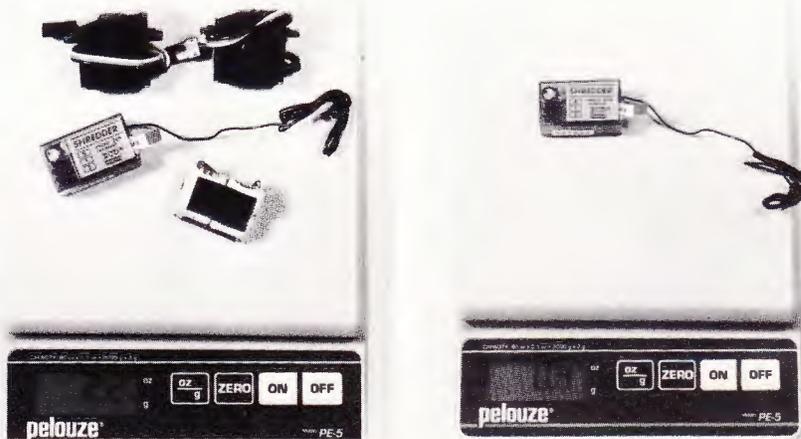
By Bob Aberle

A micro radio, hard-to-find hardware items, spark plugs, and resurrected old time kits are the subjects of this fourth installment about R/C bits and pieces.



PHOTOGRAPHY: BOB ABERLE

**Indoor R/C? Why not** with HiTec's Ranger 2-channel system (above) that includes the transmitter, Shredder receiver, two HS-80 micro servos and a 4-cell 50 mAh battery pack that all weigh just 2.2 ounces (below left). The scale doesn't lie (below right). The Shredder 2-channel receiver weighs just 0.4 ounce.



FLYING MODELS

**T**his is my fourth digest article in a series that I started over a year ago. Although I have been gratified by the response, I still find myself searching around for new material to write about. I was especially looking for those hard to get items that are generally not advertised on a regular basis. If you have a small accessory item, please send it in. If I feel our readers will be interested you can be assured that a photo or two, along with a couple of paragraphs of descriptive text will be published, with no strings attached.

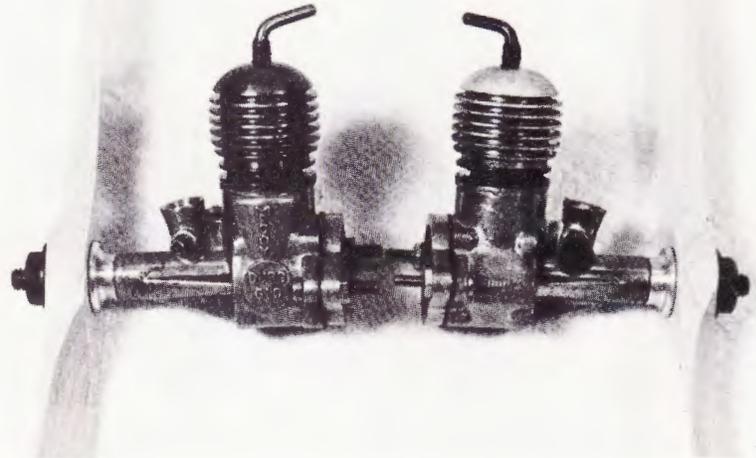
First on my current digest list is a new radio system that Hitec RCD Inc. (10729 Wheatlands Ave., Suite C, Santee, CA 92071) recently announced. In my article on lightweight, small size R/C equipment (that hopefully will appear before this digest) I mentioned the Hitec Challenger 250 system with their tiny Shredder receiver and the possibility of substituting the new micro HS-80 servos. Mr. Chun Park, President of Hitec RCD Inc. informed me, after reading the advance text of my article, that he now has a new upgraded system which he calls the Ranger. This is also a two channel system operating on 27MHz. As a convenience for those interested in small R/C models, Mr. Park will be offering the Ranger system with the Shredder receiver and two HS-80 micro servos. So if you don't have any plans for the larger servos, you won't have to be stuck with them.

By the way, several readers wrote in to say that the Hitec brochure states a weight of 0.7 ounce for the Shredder receiver. That is an error. Please believe me, it registers 0.4 ounce on my digital scale. I did have one that measured 0.5, but that was probably 0.46, which rounds out to 0.5 ounce. At any rate be advised that the Shredder receiver is both light in weight and small in size. Should you be contemplating a small R/C model, possibly for indoor flying in the winter, the weight of a Hitec Shredder receiver, two Hitec HS-80 micro servos and a four cell 50 mAh Ni-Cd battery pack is just 2.2 ounces. That will give you about 15-20 minutes of flying time, after which the battery can be fast charged in about 15 minutes. To keep the system as light as possible you might as well delete the on/off switch and charging jack. Just simply plug in the battery when you want to fly.

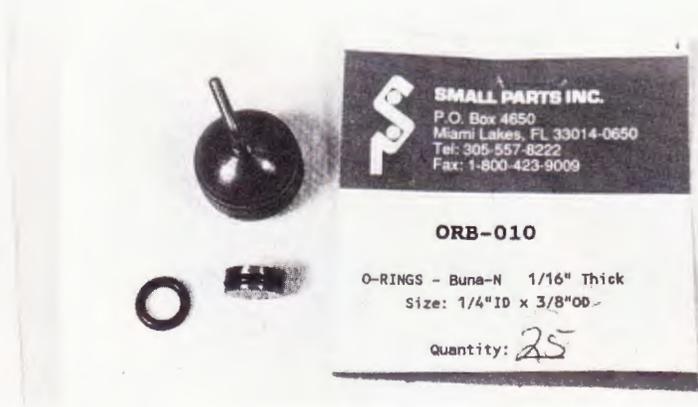
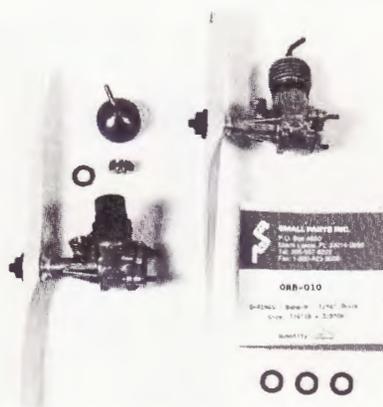
# Spring 1994 R/C Digest



It sometimes helps to look for parts in other than the mainstream. Case in point is Small Parts Inc. whose 300-page catalog (above left) is filled with all kinds of useful hardware items, some of which proved useful for Bob's 40 year old McCoy



.049 diesels which run amazingly well (above right). But the contra piston needs frequent "O" ring seal replacement (below left). A closer look (below right) of the contra piston and the "O" ring which came from Small Parts.



Thanks to the MECA Swap Sheet and my good old friend (maybe not that old!) Norm Rosenstock, I was able to obtain two McCoy .049 diesel engines, which were very popular in the fifties. I won several 1/2A free flight events at local and regional contests (including the old New York Mirror Meet), using a McCoy diesel. Later I went on to fly a Hal DeBolt R/C Kitten, powered by a McCoy .049 diesel for hundreds of flights. My intention in acquiring the diesels was to build another Kitten.

The one problem with those little diesels is that the small contra piston requires a rubber "O" ring seal. As I recall from the old days, these seals never lasted very long, having to be replaced about every month or so when actively using the engine. If I was to use my "acquired" McCoy diesels I had to find a source for the "O" ring seals. Thanks to that very active free flight modeler, Dave Acton of Mahopac, NY, I learned of a wonderful catalog offered by a mail order outfit based in Florida. It is known as Small Parts Inc. (13980 N.W. 58th Court, PO Box 4650, Miami Lakes, FL 33014-0650). Their catalog of over 300 pages is worth having for far more reasons than the "O" ring seals for the McCoy diesel. I'll leave the details to your imagination.

But if you are looking for those .049 diesel seals let me tell you exactly what you want

to order. On page 282 of the catalog you want Part No. Q-ORB-010, which has an I.D. of 1/4 inch and an O.D. of 3/8 inch, with a thickness of 1/16 inch. You can obtain 25 of these seals for just \$3.43, but there is a \$15.00 minimum on any order. Although several types of seal material are offered, I found that the "Buna-N" worked best. The bottom line is that both of my McCoy diesels are now running like I remember in my youth.

In my last digest article I talked about Bob Kress (Kress Jets, 500 Ulster Landing Road, Saugerties, NY 12477) and his new computer program which was developed to help select the correct combination of motor, battery pack and prop for all types of electric flying applications. Initially Bob selected the Trinity Sapphire ferrite 17-turn motor for me when flying the SAM limited motor run (LMR) event.

The other SAM event which has also been voted in as an official special event is Electric Texaco. To fly in this event you are allowed a seven cell 800 mAh battery pack which you can run until exhaustion, in pursuit of a total flight of 15 minutes. With this type requirement it behooves you to get the very longest motor run possible on a full charge. Bob Kress came to my rescue again with a very surprising choice, a Graupner Speed 400 motor. The gear box he selected

was another surprise with a ratio of 6 to 1. The final and equally big surprise was the prop choice of a 14-8 (Zinger brand that is considerably thinned in the interest of reducing weight). This combination drew only 4 to 4.5 amps from my SR SAM- seven-cell battery pack.

In actual flying I have been able to obtain motor run durations of 12 minutes or more. That means I only have to glide three minutes to obtain a max flight. Besides all, the relatively small Graupner Speed motor is so light that I actually had to add an ounce of lead to bring my Lanzo Electric Bomber up to the prescribed minimum weight of 35 ounces. If you are into electric old timers and want to try this combination Bob is offering both the motor and gear all timed and ready for flying. The cost is little you won't believe it.

Cal Orr of Custom Electronics (R.R. Box 123B, Higginsville, MO 64037) appears to be continually building on the success of his CEU connectors. He just announced a new series of Universal Radio Adapter connectors which will allow you to mix and match individual servos and receivers. A total of 12 adapters will be offered with connector one end for Futaba "G", ACE/Deans, H JR, Futaba "J" and Airtronics. On the other end of these 4-inch long adapter cables is Cal's CEU connector that will mate

**SMALL PARTS INC.**  
 P.O. Box 4650  
 Miami Lakes, FL 33014-0650  
 Tel: 305-557-8222  
 Fax: 1-800-423-9009

**ORB-010**

O-RINGS - Buna-N 1/16" Thick  
 Size: 1/4" ID x 3/8" OD

Quantity: 25

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Airtronics, Futaba "J", JR, Hitec, World Engines servo or receiver batteries. These adapter cables come fully assembled for \$5.00 each.

Just as I was completing this digest article I learned of one more Cal Orr product. It is called the "Servo Driver JSM". What it does is allow you to operate a single servo separate from your R/C system. A control stick is mounted on the "Driver" to allow you to exercise the servo, exactly as you would from your transmitter. The unique feature of this driver is that a 0-400 mA meter is included. The basic idea is to use the Servo Driver JSM to locate problems of binding control linkages that cause excessive servo current drain. Binding controls can rob you of a lot of power and place a great deal of strain on the servo gear trains, which in some cases might even cause a crash. This new product will sell for \$49.95 without connectors or \$54.95 with two of the CEU universal connectors.

In my 1993 WRAM Show report I mentioned that Herman Spivey (Bubba Spivey's dad), who has his own model kit business known as Aero Engineering (1303 Tuscaloosa Ave., Birmingham, AL 35211), is now bringing back on the market all those wonderful kits that were first introduced years ago by the Veco Engineering Co. In fact, all of Herman's new kits are made from the original Veco dies.

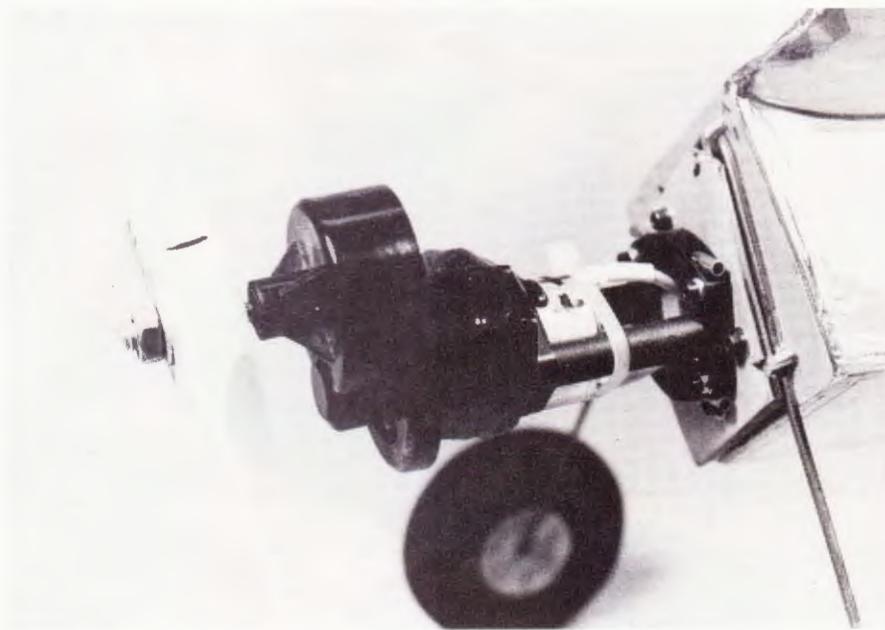
Just recently, I received one of his first Veco "Dakota" free flight biplane kits. As you can see in the photos, I still have one of my original *Dakota* models dating back many years. The new Aero Engineering kit appears to be faithful to every detail of the original. For those of you who may not be aware, the *Dakota* and many of the other Veco kits, were designed by Joe Wagner, who still writes those wonderful articles to this day in *MAN*. Herman Spivey has indicated that he will be gradually producing each of the original Veco kits, including the *Sioux*, *Comanche*, *Navajo* and *Taylor Cub* along with all of the old favorite control line models including the *Chief*, *Brave*, and *Warrior* to name a few. You should definitely write Herman and request his complete catalog and price schedule. Many of these kits would make excellent subjects for R/C models, powered by glow or electric motors.

All of us who fly on Long Island, and especially those who are members of SAM Chapter 75 (and the parent club, the Long Island Radio Control Society) are especially proud of their fellow club member, Larry Davidson, who this past October in Taft, CA, won an unprecedented third consecutive SAM R/C Grand Championship. Larry and I go back to the early fifties and the Long Island Gas Monkeys freeflight club, which met in the basement of my house. I doubt if you could find a better builder, flyer and general all around sportsman as Larry. Over the past half dozen years Larry Davidson has very effectively promoted SAM (old timer) activities, both locally and in his travels, with his lovely wife Elaine, all over the country.

In an attempt to get more people involved with the old time ignition engine events, Larry realized that one essential item was in very short supply, namely reliable spark plugs. Towards that end he is now acting as



Thanks to the Kress computer analysis program for electric motors, Bob found that the best choice for his *Lanzo Electric Bomber* (above) was the Graupner Speed 400. It drives a 6:1 ratio gearbox that turns a 14-8 prop (below). The combo gives 12 minutes with the prescribed seven cells for SAM Electric Texaco.



a distributor for an excellent line of replica spark plugs. At the present time in the offering are three of the most popular sizes. Each is the familiar old Champion style, as you will note in the accompanying photo.

The first is a V-2 size with 1/4-32 threads and a long reach which sells for \$10.00. I have one of these in my Klause/Orwick .64 replica engine. The second is the V-3 model which also has a 1/4-32 thread, but with a short reach. Again the price is \$10.00. Finally there is the V style with the larger 3/8-24 thread which goes for \$13.95. I have one of these in my Miller/Anderson Spitfire engines.

Larry has indicated that the V style is currently in very short supply. He advises, with respect to just that particular plug, that you not send in any money. Just drop him a note

and your name will go on a list for first come, first served, as they become available. There is a single charge per order for postage and handling of \$3.00 and a minimum order requirement of three plugs. Believe me these spark plugs are a work of art. My engine performance has improved with their use and they seem to last a lot longer as well. You can write to Larry Davidson at: 1 Salisbury Drive North, East Northport, NY 11731.

I've had several inquiries from both readers and local friends asking for information about the Half-A-Lock glow plug connector that I mentioned in my field kit article (*FLYING MODELS*, September 1992, page 40). It is made by Model Products Inc. (PO Box 100, Alamuchy, NJ 07820) and the proprietor of MPC (as it is called) is Dick Remington. This

# Spring 1994 R/C Digest



Using Custom Electronics' new Universal Adapter cables (above left), you can now easily mix and match various brands of servos to different receivers and bat-

tery packs. Custom Electronics' Servo Driver JSM (above right) helps detaching servos by measuring current draw while operating them individually.

spring action type connector is intended to fit the Cox .049 size engine glow heads. When attached to the glow head I guarantee you it won't fall off until you depress the spring for removal. Everyone who has tried this device is completely sold on it. I believe they are available through dealers, but if you can't find one locally I'm sure Dick

would sell direct. This is just another case of an excellent accessory product that just isn't advertised that often.

My final item for this month involves the graphics services offered by my friend and fellow SEFLI club member, Clyde Geist. Clyde, a very accomplished R/C electric flyer, owns a business known as A.M.P. Graph-

ics Inc. (24A Nancy St., West Babylon, NY 11704 which happens to be a new address). Although involved with all types of commercial graphics, Clyde, has set up a division in his organization to basically cater to the model builder. He can offer a wide variety of custom computer cut vinyl lettering and numerals, which come attached to



Veco Engineering kits, like this *Dakota* freeflight biplane, live again thanks to Herman Spivey and his Aero Engineering company's line of reproductions.

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masking tape backing material. All you have to do is peel off the protective covering paper, press your decal on to the model surface and then peel off the masking tape. The result is a decal, that is all spaced evenly to your specifications. Also available are multi-colored decals that are made up in layers with the proper registry.

Pictured in this article is the multi-colored decal that Clyde made available to all of us who attended and flew in the 1993 KRC Electric Fly in Quackertown, PA. I might suggest that you write to Clyde and ask for a copy of his current catalog. But just keep in mind, if you don't see what you want in the catalog, just ask Clyde. In most cases he can accommodate you regardless of your requirements.

Before closing this digest article I'd like to ask for help from my readers. In the course of flying my old timer models I generally favor having my fuel tanks on the outside of the fuselage. It may not look nice and it may add to the overall drag, but at least I can observe the entire fuel system. All of these external fuel tanks are held in place with rubber bands. Trouble is that when using gasoline or diesel fuels, most rubber bands don't last very long. In fact I have had some new rubber bands fail on a single flight. Could anyone recommend a

**"DAKOTA" SPECIFICATIONS**

WINGSPAN.....24"	LENGTH.....19 1/2"
WING AREA....161 sq. in.	WEIGHT.....6-7 1/2oz.
POWER......035-.075	

**AERO ENGINEERING**

THE BR...

**DAKOTA**

**ITEMS NEEDED TO COMPLETE THIS KIT**

Engine and Engine Mounting Screws  
Cement, Covering, Propeller, 2-1 to 1 1/2 in. Tires.

**TOOLS:**

Screwdriver, Long nosed Pliers, Hobby Knife, Sandpaper and Sanding Block, Drill and Drill Bits.

The *Dakota* freeflight biplane kit is identical in every respect to the original, even to the original Veco dies used to stamp the parts. Eventually Aero Engineering will reproduce the entire Veco F/F and C/L designs.

special type of rubber band that might be more resistant to these fuels? If you have any ideas please write to me in care of the

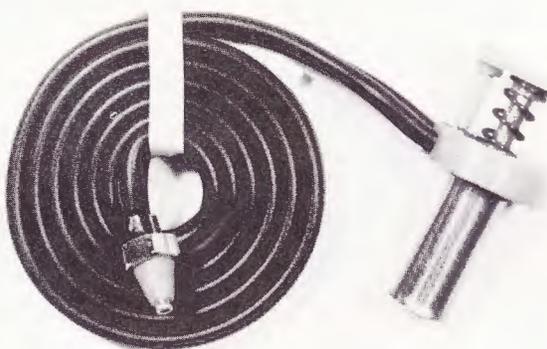
magazine. That's another wrap for this digest. Please keep those letters and products coming.



Larry Davidson distributes these Champion style spark plugs (above left) for ignition engines. Speaking of Larry, he and his wife Elaine show the plaque (above right) awarded him for winning his third consecutive title as SAM R/C



Grand Champion. Here's a must for any 1/2A enthusiast, the Model Products' Half-A-Lock glow plug connector (below left). Besides electric motors, Clyde Geist also offers excellent decals (below right) through his A.M.P. Graphics company.





PHOTOGRAPHY: BOB HUNT

Bob Hunt's son, Brian, is quickly turning into an R/C ace thanks to the latest update to the venerable *Falcon 56* trainer. This design has successfully soloed pilots from the 1960s to the present.

minimum dihedral and full four channel function. Bill opted for the three channel version, and assembled the kit in what seemed like but a few hours. With it he learned the rudiments of R/C flight and even went on to basic aerobatic maneuvers. His next plane was a four channel pattern type design, and it was a success for him because of the good training he received with the *Falcon 56*.

Several years later (1981 to be exact) I found myself bitten by the R/C bug as Bill had been. I also chose the *Falcon 56* as my first model, only now it was the Mk II version. It seems that the original wing design, while easy to build and aerodynamically successful, wasn't up to the challenge of the stresses being applied by the modern Schneurle engines. The higher speeds and greater loads were snapping the old design wing too often.

Carl researched the problem and found that by adding a  $\frac{1}{8} \times \frac{1}{4}$  basswood cap to either side of the robust "I" beam main spar a tremendous amount of strength was gained. I've never heard of any of the Mk II wings folding. While he was updating the wing, Carl added a larger, more stylish swept fin and rudder in place of the smaller, straighter, original unit. The landing gear mount was also beefed up, and the *Falcon II* was born.

I built my *Falcon II* as a four channel ship and powered it with a hot Enya Schneurle engine. The combination worked great together, and with the coaching of Frank Granelli, I soloed on my third flight. Several days later I tested the strength of the new wing by dumb thumbing the *Falcon II* full bore into a hill at the edge of our local

## An FM Product Review:

# Carl Goldberg Models' Falcon 56 III

By Bob Hunt

Generations have learned to fly R/C on this venerable trainer. It's still as fresh and valuable as ever in its third updated version.

I've said it before in print, but it bears repeating: no one has produced more legendary designs than the late Carl Goldberg. Carl had a knack of knowing exactly the type of model needed by the modeling masses at any given time, and the talent to produce it in an easy to build, quality kit. That's always been a trademark of Carl Goldberg Models, and I'm sure Carl would be proud of how the company's continued in the traditions he established.

Recently, Carl Goldberg Models released an updated version of their all-time favorite advanced R/C trainer/sport design, the *Falcon 56*. Actually this is the second revision of

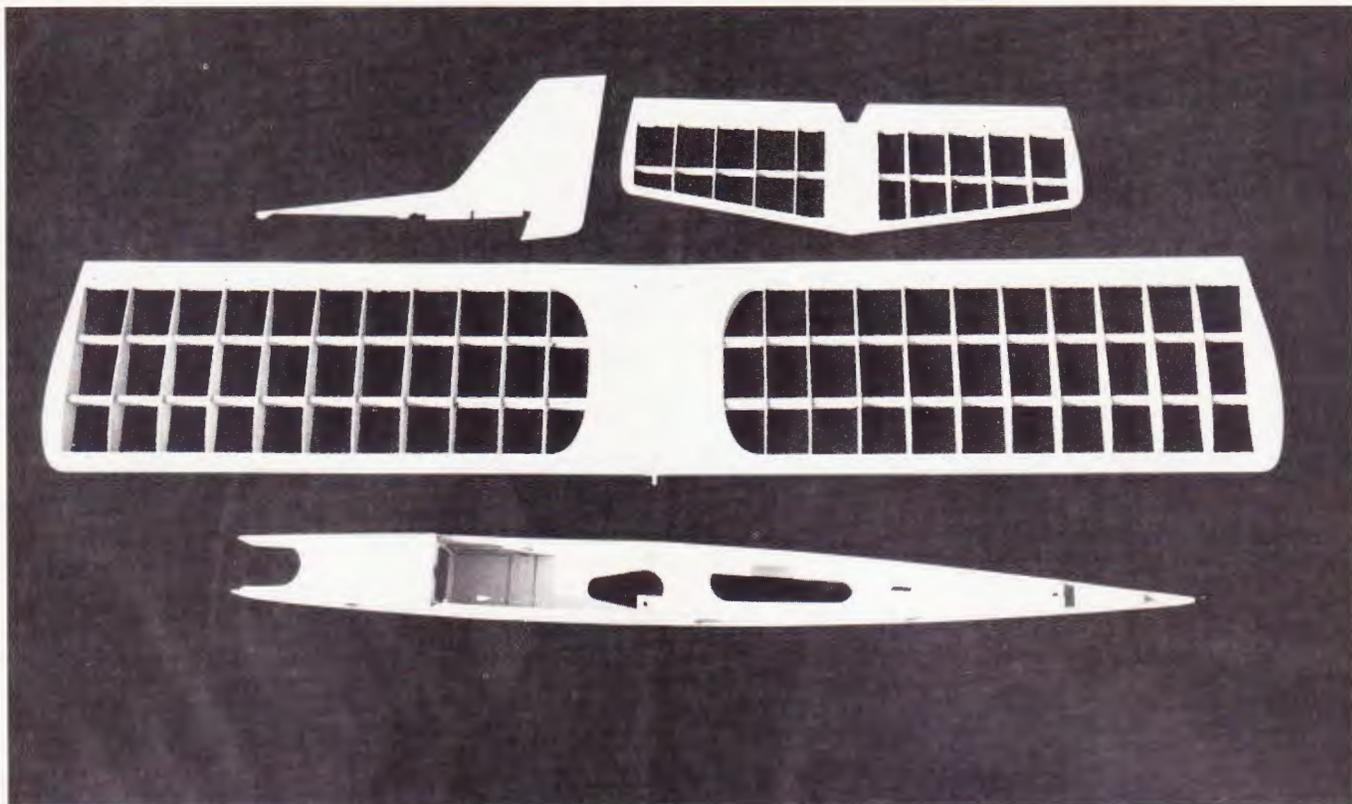
the popular design. I remember my first glimpse of the *Falcon 56*. A close C/L Stunt buddy, Bill Simons, decided to see just what all the excitement was about concerning this R/C craze back around 1967, and purchased the hottest R/C trainer on the market.

Unlike most of the trainers available at that time, the *Falcon 56* had a sporty look about it, and featured a very aerobatic semi-symmetrical airfoil. The rest of the primary ships on the market featured high-wing configurations and flat-bottom, lifting airfoils. The *Falcon 56* could be built as either a three channel trainer with extra dihedral, or as a more advanced trainer/sport ship with

field. The total damage was a break in the rear of the fuselage, some cracks around the wing mount area, a couple of splits in the covering, and a broken prop. The ship was back in the air the next day.

I went on to learn all the rudiments of maneuvers with that model, including loops, rolls, stall turns, Cuban Eights, inverted flight, and even spins—once we added some tail weight. My very next ship was a hot pattern design, and like Bill's experience years earlier, I found the lessons learned with the *Falcon II* helped me to handle the high performance model easily.

Now the story has come full circle. A little



The *Falcon's* popularity as a trainer is partly based on its resilient, strong structure, made better by an interlocking tab, ply fuselage.

over a year ago my youngest son, Brian, expressed an interest in learning to fly radio control, and he asked me if we could build a trainer for him. Ironically that request coincided with the release of the latest update of the *Falcon 56*. Now a part of the Carl Goldberg Heritage Series, the *Falcon III* has been tweaked in just the areas where even minor problems had been noted, and the result is yet another instant classic.

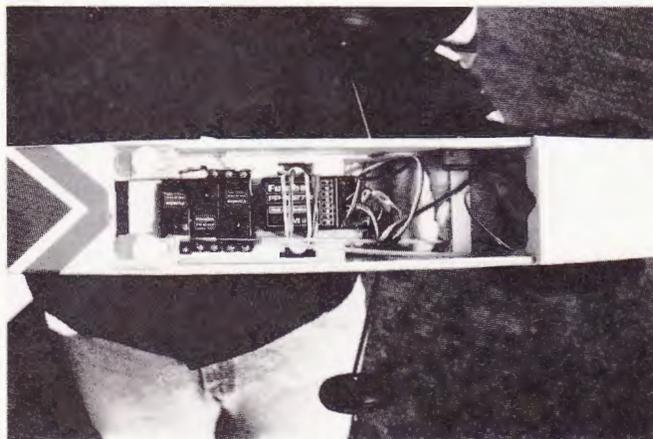
The fuselage on the first two versions of the *Falcon* were built-up balsa assemblies. They were light, but were prone to break in even mild ground encounters (as mine did!). The *Falcon III* features an all interlocking 1/8-inch thick light ply (poplar plywood) fuselage which is extremely strong and easy to assemble. The first two *Falcons* featured a removable top hatch to allow access to the tank compartment, but that also made the

assembly weaker than it might have been. The newest version has no removable cover, and it is very rigid in the nose area as a result. The tank is installed during the assembly of the fuselage, and it can be easily removed for servicing through a hole in the first fuselage former. To further update this grand old design for the 90s, a bolt-on wing was added to replace the ancient dowel and rubber band method. Tail dragger landing gear is becoming popular once again, and the plans for the Mk III show an optional tail gear installation.

What they didn't change was the always great flying characteristics of the design. Brian was able to learn enough in a couple of sessions to warrant a try at a solo flight. It was a great success, and the next few days found him learning loops, rolls, and stall turns. Sound familiar?

### The kit

Like all Carl Goldberg models, the *Falcon III* comes packaged in a beautiful, four color, illustrated box. Everything is carefully arranged in the box, and none of the parts were damaged. The kit features both a fully detailed full-size plan, and a 31-page illustrated instruction booklet. This booklet is very well planned out, and has a section which tells the builder what items he or she will need to complete the kit, as well as what tools will be required during assembly. One page of the manual is devoted to a layout of the die-cut sheets, and the position of each part on its respective sheet. Each assembly of the *Falcon III* is covered in detail in separate sections of the manual, and check-off boxes are provided so the neophyte builder will not get confused when returning to the project.

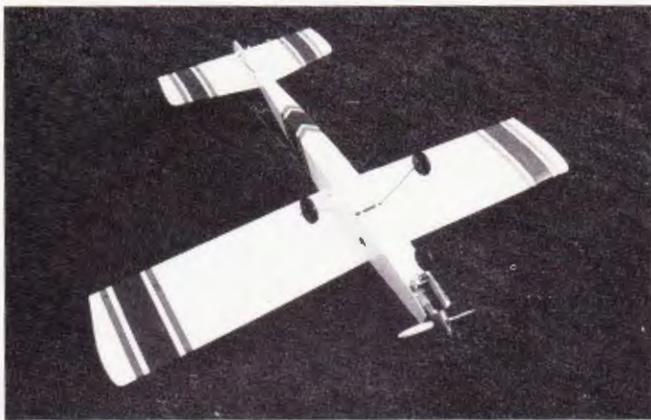


Included with this latest version of the *Falcon* is a ply radio tray (above left) which mounts three servos and the receiver. The battery is just forward of that.



Any of the current crop of .40 size two cycle engines, like the O.S. .40SF that Bob installed (above right) will power the plane with authority.

# Carl Goldberg Models' Falcon 56 III



Still retained with the new *Falcon* is the sprung wire landing gear (above left). It takes quite a beating, an automatic fact in a trainer's life, and can be bent back



into shape. When setting up the gear, Bob found it was best to have the airplane sit in a level attitude, on the ground (above right). Prevents bouncey landing

The kit includes a really clever beveling tool to allow accurate hinge line bevels to be made easily. Also included are control surface travel gauges to allow the builder to set up the correct control throws accurately and quickly. The kit contains very good quality balsa and plywood parts, with fair to good die-cutting. A complete hardware package is provided. All in all, a very well engineered kit.

## Construction

Just like its ancestors, the *Falcon III* features a built-up, symmetrical airfoiled, stabilizer with a formed balsa elevator. The leading and trailing edge stock for this component is pre-shaped, and the leading edge is notched to accept the  $\frac{1}{16}$ -inch thick ribs. Four of the ribs are furnished with jig "feet" to allow you to build an accurate assembly on top of a flat workbench. A plywood center section joiner and  $\frac{1}{16}$  center section sheeting make this an extremely strong but light unit.

The wing is a double "I" beam spar design with formed and notched balsa leading and trailing edges. As previously mentioned, the front spar is capped with basswood strips for exceptional strength. Both spars are doubled with  $\frac{1}{8}$ -inch plywood dihedral braces, and the assembly is topped off with  $\frac{1}{16}$ -inch center section sheeting and then a strip of fiberglass cloth. You may break something in a crash, but it won't be the center joint of this wing!

Like the stabilizer, several of the ribs are provided with balsa jig feet to allow warp free, accurate construction. The feet are removed after assembly. Formed balsa ailerons are hinged to the wing and are actuated by the normal strip aileron horns which are provided. The only mistake we found in the kit was the angle of the threaded portion of the strip aileron horns. Set up as shown, the aileron differential would be in the wrong direction. The wires should sweep back, not forward. Remember, this is a shoulder wing design, and the aileron horns are on the bottom of the wing. I mentioned this to the manufacturer, and they assured me it would be corrected.

The fuselage is a very easy to construct, interlocking light ply unit. In fact, it is practically self-aligning as you build it. The

parts fit is excellent, and the result is a very strong, accurate, and surprisingly light unit.

The fin and rudder are simple sheet balsa components. The fin is designed to key into the center section of the stabilizer, making alignment easy, and adding significantly to the strength of the rear end.

We chose the tricycle landing gear configuration for the added ruggedness that would probably be needed for training duties. Make sure that the model sits exactly level on the landing gear. Ours initially had the nose set too high, and the result was a model that was difficult to land smoothly without bouncing.

Brian and I covered the *Falcon III* with Carl Goldberg's Ultracote. I really like the properties of this covering material. It has a good surface finish, but not one that is so glossy as to look like plastic. It really reminds me of a rubbed dope finish, and that's pretty good! I've also found that Ultracote isn't prone to wrinkle when left out in the sun for extended periods. We used white Ultracote as a base color, and trimmed it with red and blue. This scheme is highly visible in the air, and it was easy to apply.

## Flying

A Futaba 6-channel Conquest FM radio system was installed, along with an O.S. Max .40SF engine. The combination has proved reliable for over a year.

The *Falcon III* flew literally off the box with but only a tiny bit of aileron trim. It balanced it at the forward-most extreme of the suggested balance range. Better to have a slightly sluggish model than an oversensitive one for initial training.

I couldn't resist seeing just what the *Falcon III* was capable of, and so I ran through most of the aerobatic maneuvers that I know. Predictably, the ship was too nose heavy to spin or snap, but it did delight in loops, eights, stall turns and rolls. I'm confident that this model could be competitive in Novice Pattern events with the c.g. placed just a bit farther aft.

Brian has learned all the R/C flight basics and the primary maneuvers. He can now move confidently on to a hotter ship and advanced maneuvers. Maybe now I'll have more stick time on the *Falcon*! It sure brings back memories.

If you're looking for an excellent first ship for R/C, please consider the *Falcon III*. It may be just a bit hot with the semi-symmetrical airfoiled wing, and four channels, with some experienced help you can learn more than just the basics with it.

It builds easily, looks very modern, and has a heritage that goes back a long way. Carl would have approved.

For more information about this kit, your local hobby dealer, or write to Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60651; phone 312-626-9550.



There's enough stability built into the *Falcon III*, but it will let you do any maneuver that doesn't involve a snap or spin. It also handles wind pretty well with its semi-symmetrical wing, without flitting around like

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PHOTOGRAPHY: BILL HANNAN

Symbolic of the nostalgia of a long ago modelling era, the author's finished D-VII "Time Machine" sits atop some of the familiar names of that era—Comet

and Amco. These original kits come from the collections of David Lynch Jr., Dick Baxter, James Poché, and Dick Sherman. A tower of treasures.

# Ten Cent Time Machines ...

## Part V

By Bill Hannan

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In this the final installment of a trip down modelling's memory lane, the author finishes the Fokker, and adds all the details.

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**R**eaders with long memories may recall the four earlier parts in this series, concluding in the February, 1992 FLYING MODELS. Audience response has been gratifying and your patience and encouragement has been truly appreciated.

To briefly review, the series began with a nostalgic look back at my boyhood recollections of building stick and tissue kit models during the 1930s and 1940s. It was decided, for old-time's sake, to construct a fondly-remembered Comet ten-cent Fokker D-7, redesigned to resemble a 1930 *Hell's Angels*

motion picture aircraft. Our proposed mini-project mushroomed into a massive research effort, urged along by enthusiastic letters from readers who supplied missing information as well as their own modeling memories. Eventually, my model was constructed, and photos of its framework were presented along with a summary of the research findings.

### Finishing the Fokker, then and now

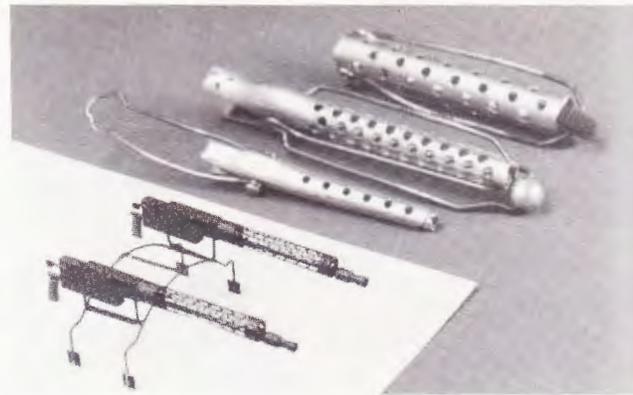
Completing the model took much longer than anticipated, for a variety of reasons including my own inefficiency. In the "good old days" of my youth, a typical ten-cent kit

required as little as a day to build, and seldom more than two days. Ah, but those were *full* days in the relatively carefree 1930s, unhampered by the many distractions of our modern world. Things are vastly different now and time passes more rapidly, doesn't it? Then too, we tend to become more aware of craftsmanship as we mature. Looking back, I realize my workmanship as a youth was marginal at best, and my patience was short. Although my patience is greater now, my attention span is not. Thus, I prefer to work in short sessions rather than to drudge doggedly over the building board. Still, my

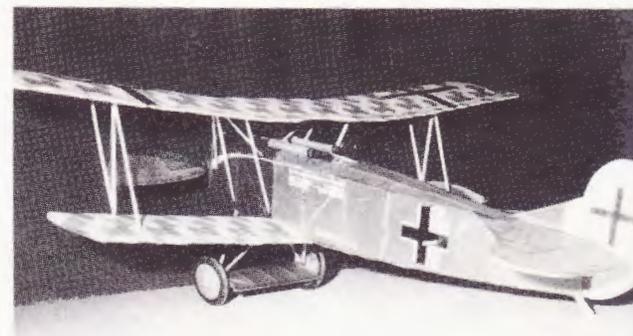
# Ten Cent Time Machines Part V



These are the parts of the author's *Hell's Angels* D-VII (above left), waiting for assembly. At the top of this photo (above right) you see 1930s state of the art model accessories, women's hair curlers used for dummy machine guns. Below



them are current Fotocut Spandaus. Walt Grigg decorated his Nieuport (below left) in the markings of Errol Flynn's aircraft in *Dawn Patrol*. Millard W. based his Fokker D-VII (below right) on a "composite of everyone's plans".



enjoyment of these unsophisticated models remains undiminished.

The emergence of new materials and techniques add interest to traditional model building, but may also extend the time requirements, at least until they become more familiar.

My little D-7 was covered with black Japanese tissue, employing thinned white-glue as an adhesive. No, it doesn't have the "romance" of old-time banana oil; however it keeps the house free of fumes. The white markings were cut from opaque white tissue paper and applied with clear dope, entailing a move to the well-ventilated garage. Control separations and small panel outlines were cut from gray tissue for a more subtle contrast with the black covering.

### Details

"Half of art is knowing when to stop" said Arthur Williams Redford, and that comment pertains to flying models also. While details add greatly to a model's appeal, an excess of them can add weight penalties and extend construction time. So you must be your own judge of how much is enough! My model features a reasonable amount of engine detail, a few minor additions such as fuselage lift handles, plus a carved-balsa representation of "Lt. Von Bruen". Since all of the *Hell's Angels* Fokkers had spoked wheels, I added a pair of Fulton Hungerford's fine products. Alternatively, you could make your own if you have the persistence.

In the olden days we employed grid screens from radio vacuum tubes to simu-

late radiators, but tubes are collectors' items now! A more realistic-looking substitute was made from a replacement foil-screen for an electric razor, inlaid into the balsa nose block.

During the 1930s women commonly employed hair-curlers that resembled Spandau machine guns, in a general sort of way, some of which found their way onto models of German aircraft. Those shown in the photograph were discovered in a local antique store. By contrast, look at the authentic appearing Spandaus in the foreground made from modern etched brass Fotocut kits. Available in various sizes, the 1/2" scale proved about right for the D-7. Be aware that the delicate metal parts require patience and dexterity to assemble, but aren't the results worth the time and effort? The Hollywood movie planes had easily removable non-standard mountings, as does this model.

### Assembly

Assembling a biplane is not easy, and I now marvel that any of us were able to accomplish that difficult task as youngsters, often holding the parts by hand in "mid-air" while the glue ever-so-slowly dried. My D-7 was pre-assembled with the aid of cardboard jigs, however much "fiddling" of strut lengths was required to achieve the desired incidence and alignment. (Rest assured my next model will be a monoplane).

A careful examination disclosed no serious warps, and only a small amount of ballast was needed to achieve proper balance.

Our next chapter will feature more complete coverage of flying the Fokker, but suffice to say, it did *not* "fly right off the building board", and served as a humbling reminder that regardless of one's experience, any new model can offer fresh challenges.

### Reader feedback

Following are a sampling of extracts from letters received in response to earlier chapters:

"I have read your articles on the "Ten-Cent Time-Machines" with great interest and remembrance. I too started as a kid in modeling with ten-cent Comet kits. Your articles on the D-7 were fascinating, and it will be my next model once I get this latest R/C model out of the workshop."—H. CARLIN HULICK, Pittsburgh, Pennsylvania

"I have flown my stable of Comet 16-iners until they are all war-weary. Funny, they all fly so much better now than they did years ago. Think maybe it's the rubber!" JOHN BLAIR, Warne, North Carolina

"I remember building the ten-cent Comet Fokker D-7 as a kid. It even flew a short distance! The craftsmanship was, of course, pretty crude. As I recall the small kit featured a logo showing a boy launching a SPAD 13."—DR. BILL FUNCKE, Beaver Dam, Wisconsin

"There is no doubt that you touched a nerve with your articles. ... There is something about those models that still evoke pleasant memories even after 50-plus years. I guess you could say it is because we were kids then and didn't have problems

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because the world was less complicated and more innocent then, or any of the other time-worn cliches. But I think the real reason is that those kits provided fun, anticipation, rewards (when they flew); disappointments (when they didn't) and through it all, learning. A dime was never better spent."—THOMAS J. GREEN, Wayne, Pennsylvania

"I was in my teen years and building them. I'm 75 now, and still building. Thanks for bringing back all those wonderful days. The young people don't know what they missed."—JIM PULLEY, New Palestine, Indiana

"In 1934, my sister, two friends and I went to the drugstore to buy candy or ice cream cones. We were waylaid by the ten-cent Comet kits, and each of us bought one. I drew a SPAD (which ever since is what a proper airplane looks like) but others got the D-7. ... I've never been able to understand how those kits sold for only ten cents."—JOHN PEDLAR, Mt. Aukum, California

"My friend and I built them all in the 1930s. We worked hard to have them fly 'over the ocean' (the street in front of our homes ... it was four cars wide). We flew from my front porch, as it was ten feet above the street. You felt so good when your model made it."—JOHN WALKER, Charlottesville, Virginia

"I think the challenges in both building and flying, plus the great diversity of subjects makes scale modelling much more rewarding to true modelers and lovers of all things aeronautical. Keep up the inspirational flying, mate!"—GARY GOODWIN, N.S.W., Australia

### Closing thought

According to FLYING MODELS Old Timer Topics columnist Jim Alaback, "When you return to your boyhood models, you find it wasn't the models you longed for—it was your boyhood." Hmmm.

Note: Fotocut Spandau kits mentioned in the article, are marketed by Rosemont Hobby Shop, Box 139, Trexler Mall, Trexlertown, PA 18087. Write for size and pricing information. Construction plans for the Fokker D-7 "Ten-Cent Time-Machine" with "Hell's Angels" markings are available for \$5 postpaid, or as part of the *Stick & Tissue*, Volume 1 publication, for \$11.95 postpaid, from Hannan's Runway, Box 210, Magalia, CA 95954. 



Artist Constance Hummel pitched in to help decorate her husband Ron's Fokker D-VII (above). Fred Komlosy's Curtiss Falcon (below) has no tissue covering on the bottom of its wings, just like the original Comet kit.



PHOTO: FRED A. KOMLOSY



PHOTOGRAPHY: DON MOTT

The allure of old Comet kits spreads as far away as Australia where Jaime Herder built this 16-inch span Stearman 76 (above left). A Comet 10-cent Far-



man Stratoplane (above right) is not often seen. We have George Benson to thank for sharing his with us. Notice the deep undercamber of the wing ribs.

**T**here comes a time when you've taken your basic 2-meter sailplane about as far as it will go. Maybe you want to try the features available in advanced radios. Maybe you want to fly a more capable and versatile sailplane but maybe you're not ready to spend \$300 on it. The *Spirit 100* made by Great Planes Model Manufacturing Company (PO Box 9021, Champaign, IL 61826-9021; phone 217-398-6300) lets you far exceed the limitations of typical standard class built-up sailplanes, and it does this at a relatively low cost.

This kit provides parts and instructions to construct your choice of polyhedral or ailerons for roll control, and to select spoilers or flaps for glide path control. Two sets of wing ribs are provided: Selig 3010 ribs for higher lift, and Selig-Donovan 7037 ribs for higher speed.

You can get by with a simple radio or make good use of a full-blown computer radio. In addition to personal taste and experience, finances may enter the picture, as the poly version needs only two or three servos for rudder, elevator and optional spoilers, while the aileron version with flaps takes five servos, two standard size in the fuselage and three small servos inside the wing.

The aileron/flap version can take full advantage of modern computer radio tech-

nology, including aileron/rudder mixing, flap/elevator mixing, full span camber control, and crow landing options. The *Spirit 100* gives you options.

I like simple radios so rudder and elevator ships have served me well over the last three contest seasons. For this project I built a polyhedral wing with flaps—not one of the suggested options, but one that works for me, as this was my third sailplane with that configuration. I modified a standard size servo to fit in the wing, and now I have a sailplane that's competitive in club contests with the simplest of four channel radios.

#### Kit contents

The kit includes all the balsa, light poplar plywood, birch plywood, and much of the hardware needed to build wing version. A tow hook, stickers, a clear canopy and molded pilot are included, while the builder provides his choice of pushrods and hinges. Careful wood selection, quality machine cutting, and good die-cutting make high grade parts. The pre-cut shear webs really fit well as do the ribs and die-cut ply parts.

The full size, rolled plans are particularly clear, comprehensive, and informative. The exhaustive 54-page instruction manual takes the builder through the construction process with 190 photographs and 20 diagrams. It includes information on trim



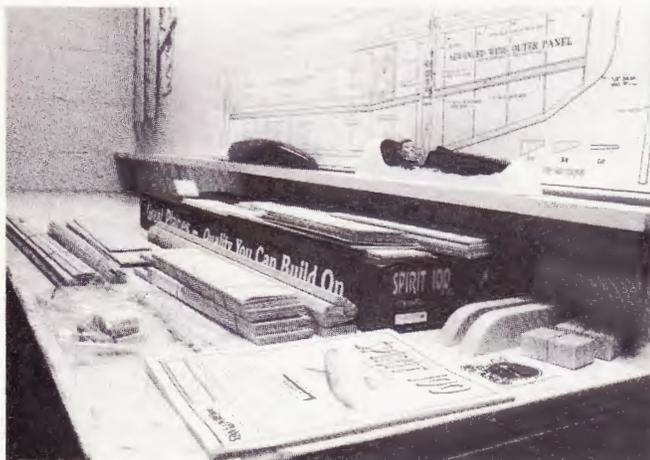
PHOTOGRAPHY: DAVID GARWOOD

#### An FM Product Review:

# Great Planes' Spirit 100

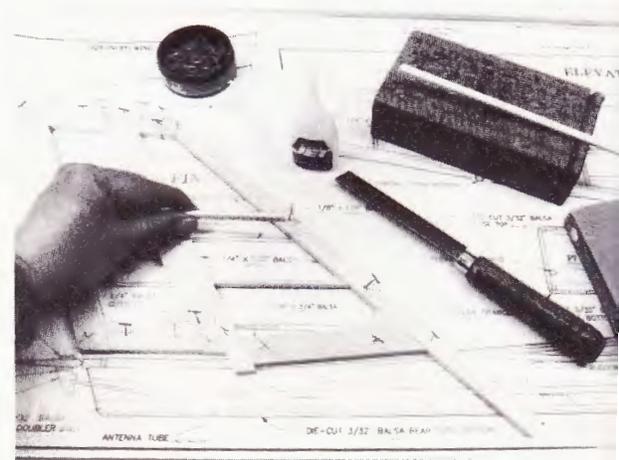
By David Garwood

Got two meter burnout? The author reports that this new 100-inch plane may light your fire again. For standard 4-channel or computer radios.



PHOTOGRAPHY: DON MOTT

Lots of good, high-grade balsa and ply lumber in the *Spirit* kit (above left), plus basic hardware, plans, and extensive construction manual. While the fin, rudder,



and horizontal stabilizer are built-up structures (above right), the elevator is a solid balsa sheet. As seen, the plans are clear and well detailed.



flights, slope soaring, and thermal soaring. Great Planes has done an excellent job on the plans and the manual, making this model a practical project for the less experienced builder as well as old pros.

### Construction

With high grade parts, clear plans and outstanding instructions, *Spirit 100* construction goes quickly and easily. The model is built entirely of balsa and plywood using traditional techniques with thin, medium and thick CyA adhesive and epoxy. I used Jet CA glue and Jet epoxy. (Carl Goldberg Models 4734 W. Chicago Ave., Chicago, IL 60651; phone 312-626-9950).

The fin, rudder, and stabilizer are built up from sticks and die-cut parts. Tapered balsa is provided for the elevator. The fuselage is a long box built up from interlocking balsa sides and doublers with light ply formers, and birch ply blocks to receive the wing

mounting bolts. Compared to other similar sailplanes, this fuselage builds easy, straight and strong, especially with the gauges and clamps provided.

The wings are built up from balsa ribs with basswood spars and shear webs. Balsa sheeting covers the top leading edge of the inner panels (for strength and stiffness), but not on the outer panels (to lighten the tips for quicker turning). The wing leading edge stock comes shaped, but the four pieces are connected and require some precise knife work to separate. Great Planes covers this in the manual, but they've done 95% of the milling work here, why not finish the job?

One building tip is in order: the wing mounting bolts are located close enough to the fuselage sides to interfere with the control pushrods if you're not extremely careful. I suggest locating the bolt holes  $\frac{1}{8}$  or  $\frac{3}{16}$  inch closer to the fuselage center line to give an extra margin.

Wing and empennage were covered with Coverite 21st Century film (420 Babylon Road, Horsham PA 19044; phone 215-672-6720) and the fuselage was painted with spray-can enamel. Striping is Trim Tape (Pactra Hobby, 1000 Lake Road, Medina, OH 44256; phone 216-349-4241).

### Strengthening the wing

During the last year, reports of *Spirit 100* wings breaking on hard launches appeared in the model press and in discussions on CompuServe. I contacted Paul Carlson, the model's designer, who acknowledged there had been wing failures in cases of "gorilla" winch launches. Paul suggested that to prepare the *Spirit 100* for extreme stress launches: 1. add carbon fiber to the main spar; 2. add it to the sub trailing edge; 3. replace the balsa shear webs with unequal length  $\frac{1}{16}$ -inch plywood braces near the wing root; and 4. enlarge the rear wing hold down plates. Paul sent me a drawing and I made these modifications to my model.

The factory now includes this information in a "Performance Addendum" sheet packed in *Spirit 100* kits, or available for the asking. The kit builder can chose to make the modifications or not, depending on how he expects to use the airplane. Bravo Great Planes!

Even with the wing strengthening modifications there's nothing complicated about

building the model, but I wouldn't classify it as a beginner's kit. The process is carefully explained in the manual, and seems to me well within the capabilities of the average modeler. Construction and covering took me 55 hours over 12 evening and weekend sessions in less than two weeks.

### Radio installation and balance

Modern standard size radio receivers and servos fit easily in the *Spirit 100* fuselage, but small servos are called for in the wings. I used an Airtronics 92765 receiver with three 94102 servos, one modified to fit inside the wing by removing three of the four mounting ears. (Airtronics, Inc., 11 Autry, Irvine, CA 92718; phone 714-830-8769). The elevator and rudder servos are attached to servo rails with screws, and the flaps servo is mounted to a plywood hatch with double stick servo mount tape.

My *Spirit* took 8.5 ounces of nose weight to balance at the point recommended on the plans. The flying weight for my flapped polyhedral version is 59.5 ounces, yielding a wing loading of 9.06 ounces per square foot of wing area.

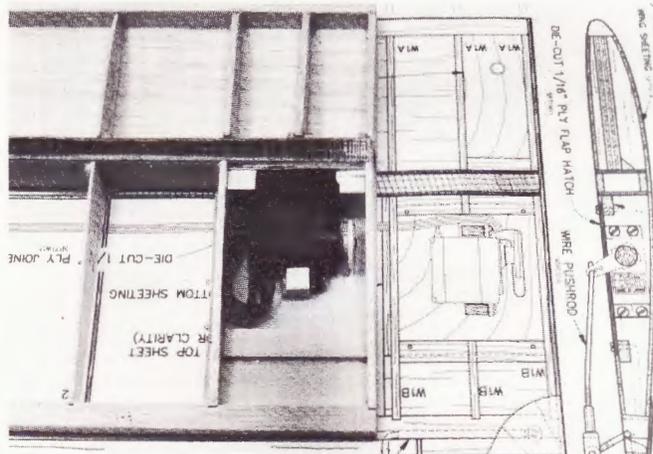
### Flying the Spirit 100: both versions

On the first hand toss trim flight the *Spirit 100* gave a long, smooth, stable, docile, flat glide twice the length of a soccer field. Its high-start and winch towing manners are impeccable. The *Spirit 100* tows up straight and sure, and with flaps deployed 30 degrees, climbs as steeply as any standard class glider I've seen launched.

After more than 200 flights I find the *Spirit 100's* flight is smooth, predictable, and efficient. Thermal turns are solid and tight with no sign of tip stall. It has a substantial speed range, greatly enhanced with use of the optional flaps—up 3 degrees for speed, down 5 degrees for high lift, and down 90 degrees for a slow and steep landing approach. The model maintains excellent directional control with flaps deployed.

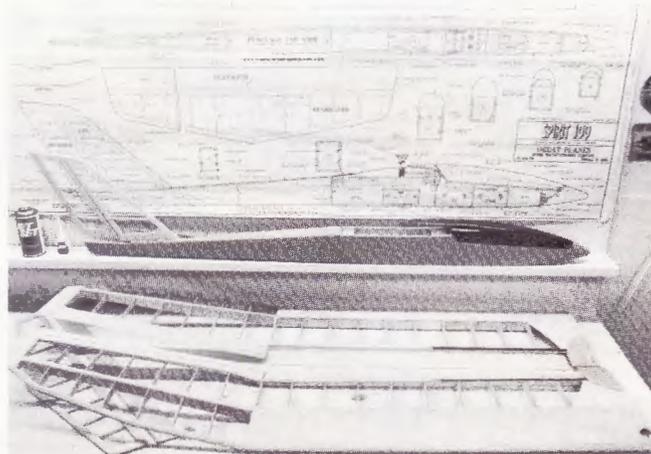
I campaigned the *Spirit 100* on the 1992 New England club contest circuit, and competed at the AMA Nationals in Massachusetts. The *Spirit 100* design is well suited to the task, and with it I was able to capture a third place trophy at the Wintonbury Flying Club's Fall Sailplane Challenge in Simsbury, Connecticut.

Flying buddy and master model builder



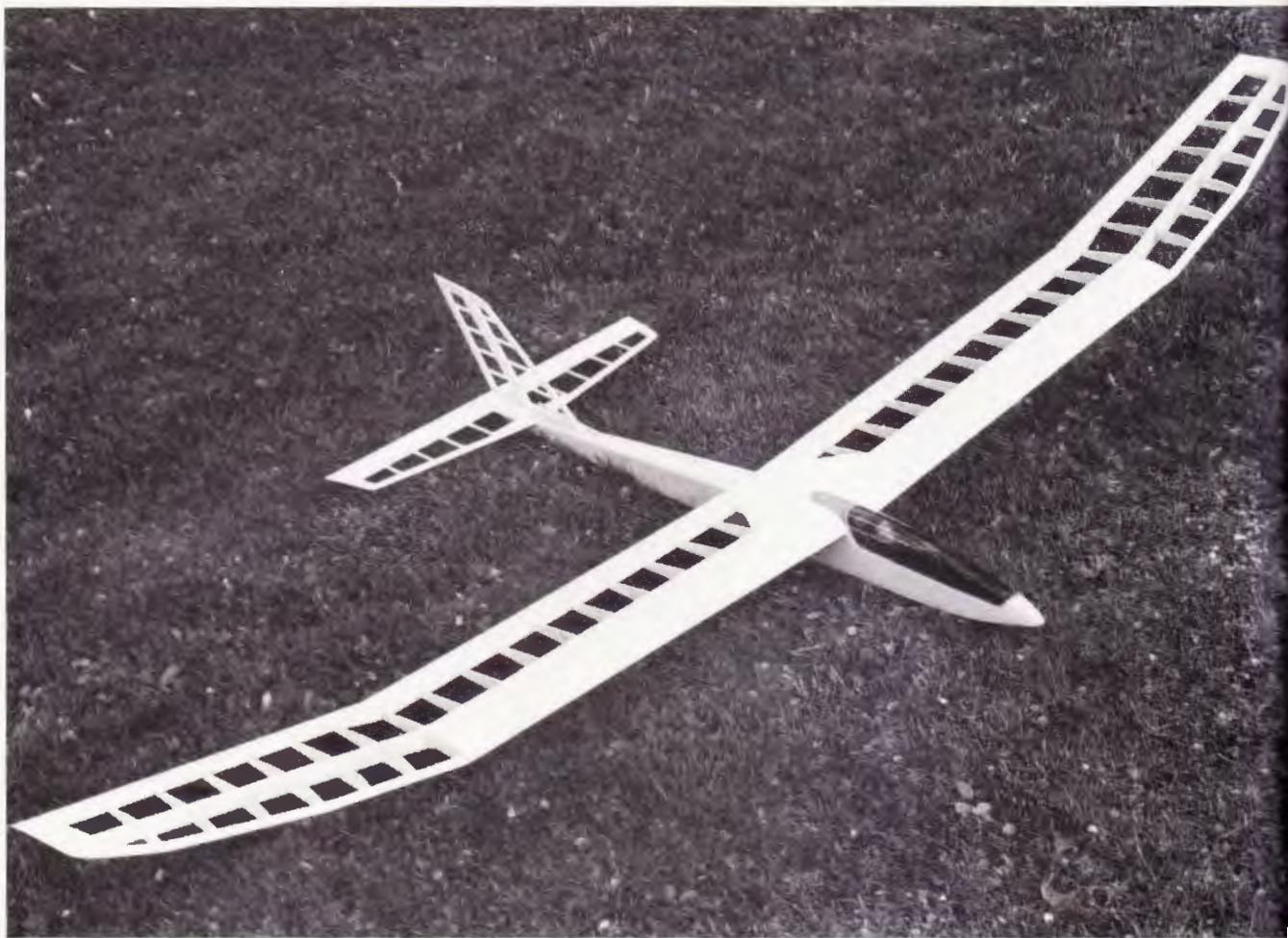
PHOTOGRAPHY: DON MOTT

Fitted in the wing, a single servo operates the flaps (above left). A standard servo like the Airtronics 94102 needs a little case modification in the form of



some mounting lug removal to fit into the Selig 3010 airfoil. All the major sub-assemblies framed, the *Spirit* is ready for final assembly (above right).

# Great Planes' Spirit 100



Leading edge sheeting on the inner panels keeps the wing strong, while open bays on the outer panels keep them light.

Mike Tadman gave me some time on his aileron/flap version *Spirit 100*. His five servo sailplane weighs 72 ounces for a wing loading of 10.96 ounces per square foot. This version has two additional servos behind the center of gravity, and thus needed more compensating nose weight. In Mike's model the first two nose compartments are completely

filled with weight, and the radio receiver is fitted in the compartment under the wing. This model was also covered with Coverite 21st Century film.

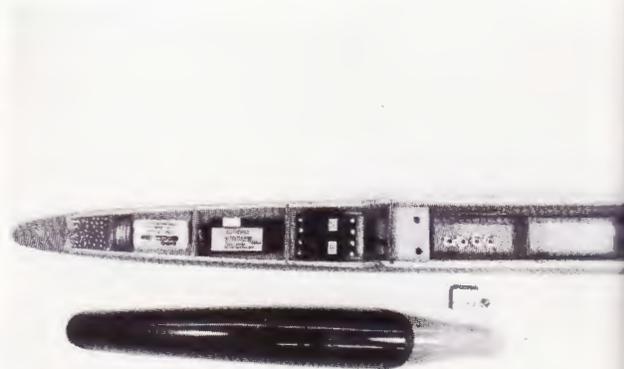
We used the Northeast Sailplane Products (16 Kirby Lane, Williston, VT 05495; phone 802-658-9482) large size Pinnacle High-Start. This muscular high-start really hauls

a 100-inch sailplane into the sky, and Mike's *Spirit 100* (built according to original instructions, no competition modification) was launched into a 12 mph wind and showed no wing strength problems.

The aileron version *Spirit 100* rolls much quicker and thus turns faster than the flap version. The aileron version will perform



A mixed finish for Dave's *Spirit* (above left) consisted of painted fuselage, Coverite 21st Century film, and wing lettering from AMP Graphics. With the



canopy/hatch removed (above right), you can see that there's ample space for the battery, rudder/elevator servos, and nose weight. Ballast box is under the

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PHOTOGRAPHY: MATTHEW MCCARTHY

"See that spot," asks Don Ross of a budding pilot, "just let go of the prop, and gently aim for it." You can tell this lovely young ace is seriously in earnest by her one-eyed concentration.

a unique event.

Spearheaded by Tom O'Connell, Don Ross, and Mike Darden of the Park Service, we made contact with a scout troop led by Kathleen Schnaars of Brooklyn. The boys and girls of the troop ranged from 10 to 14 years old and had no experience with model planes.

We created an original concept that was very anxious to try out. The youngsters were organized into five teams of four each: Red, Yellow, Blue, Green and Gold just like attack wings on a carrier. Each "Pilot" built his own model and each team had at least one adult supervisor. We chose the *Canary Canary* (From my book, *Rubber Powered Model Airplanes*) as a rugged, sure flier that was simple enough to build in a half hour.

We partially prefabricated "kits" by cutting the wings to size, scoring the dihedral breaks and tapering the motor stick. This reduced building time and made the models easier to line up and flight trim. Each pilot got enough supervised trimming flights to ensure that his model would fly a regular pattern. Then all "Wings" were briefed on the "Mission".

Each wing would be called to the flight

# New Kids in the Hangar!

By Don Ross

Using a novel, creative approach this group of modelers introduces the fun and wonderment of modelling to some future, potential aces.

**M**arch 21, 1993 and you might think the weather would be seasonal. Cool, windy, maybe even cloudy but with a hint of spring. How about 37 degrees indoors?

This was to be a different kind of indoor contest built around a group of kids who had never flown and had probably never seen a free flight model. Instead of a quickie *Delta*

*Dart* building session, a couple of minutes of flight trim and "Away we go", this was to be a combination seminar, closely supervised building session and *team* competition. The Metropolitan Sport Squadron (FF), combined with the Silent Electric Fliers of Long Island (R/C), had worked closely with the administration of Gateway National Recreation Area at Floyd Bennett Field to create

line as a team and each pilot would fly ten timed missions. The highest and lowest times of the eight flights would be thrown out, then the remaining six times were averaged. This gave us the "Consistent Average Team Time" (CATT) which became the score for each flight. A "Top Gun" award was made for the longest individual flight of the day and each pilot was awarded a certificate



It wasn't exactly arctic conditions in the Floyd Bennett hangar (above left), but it was cold. Kids and instructors, like Carl Steinberg (above right), persevered



and by lunch time all of the models were complete. The kids came from a Brooklyn, NY scout troop, and had never seen, built, or flown a free flight model.

performance.

The fun began when young fingers, almost frozen in the bitter cold of the hangar, tried to handle light balsa. The arthritic "Instructors" weren't much better and we were all amazed to learn that white glue simply won't dry at those frigid temperatures. Somehow, with parkas, gloves, mufflers and some good natured complaining we persevered and almost all the models were completed by lunch time.

During lunch while the glue finally dried, we put on a demonstration of all types of indoor models including Bob Bender's rubber powered ducted fan and a couple of indoor electric RC's.

Each Wing "trained" in a separate area of the hangar and, by that time, we had more than a dozen "Instructors" ready to participate. Models were carefully trimmed for best flight with a 12-inch rubber motor (made up with the kits) and exactly 400 turns. With the CATT scoring we taught a bit of teamwork and concentration. Many of the instructors who were not familiar with the *Canary* were very surprised at the flight times of 22 to 28 seconds with such a simple model. The *Canaries* zoomed to the rafter height of 45 feet and easily made three or four wide circles before gliding down.

It's hard to adequately describe the excitement shown by a 12-year old who has just broken the 20-second barrier with his very first model. The careful planning broke down a bit during the scoring flights but we held it together long enough to get each team on the board. Alan Abriss took some wonderful video footage of the event and will



While Bob Bender (L) and Don Ross (R) observe, a member of the Gold squad launches his *Canarsie Canary* on a mission. Another ace waits his turn while a mom (in the background), times the flight.

be incorporating some of it into an Indoor Flying Video he hopes to market. This could be a very useful item for any club that wants to solicit indoor sites and arrange a similar contest.

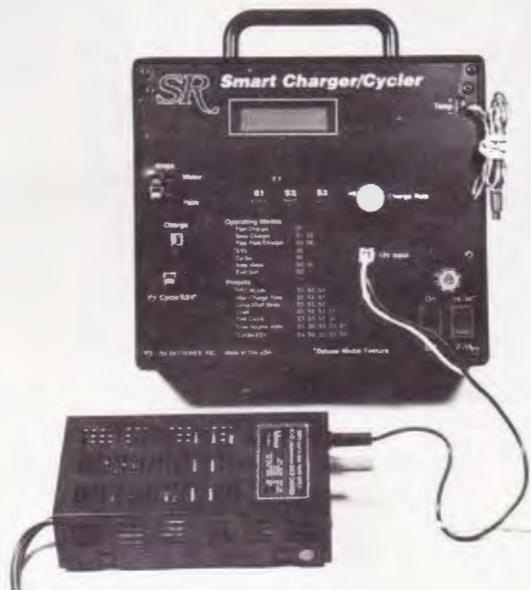
Leo McCarthy prepared some really im-

pressive certificates that brought a real glow to the eyes of each pilot. Matt McCarthy's photos tell the story much better than any words I could write. These kids not only had a great time and learned something, they participated in a wonderment. 



**Mission accomplished.** Fun, some new knowledge, and a unique experience for all, instructors as well as kids.

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PHOTOGRAPHY: BOB ABERLE

Shown with its optional AC power supply, the new deluxe version of the Smart Charger/Cycler works equally well from a 12-volt DC power source. It also incorporates plenty of new features and improvements.

11713) thought he could. In fact during original offering two years ago Larry promised that he would accumulate model suggestions and periodically include them as upgrades to the basic unit. With the SC/C now firmly established in the hobby marketplace he decided it was time to incorporate series of new features and certain improvements.

For existing SC/C owners, like myself, an upgrade to the new deluxe version will cost you \$50.00. If you are about to become a SC/C first time buyer you will be given a choice of owning the standard (or original) version for \$299.95, or the new deluxe version with all the new features for \$349.95. In either case, the AC power adapter will cost an additional \$65.95.

What you will find out shortly in my review article is that both the standard and deluxe versions have now been cleverly merged into a single package. All of the special functions are silk screened on the front panel, along with the appropriate sequencing necessary to evoke the particular function. The deluxe model features are simply highlighted with an asterisk. When my unit was upgraded it received basically a new front panel and a new "brain" (microcomputer).

### An FM Product Review

# SR Batteries' New Deluxe Version Smart Charger/Cycler

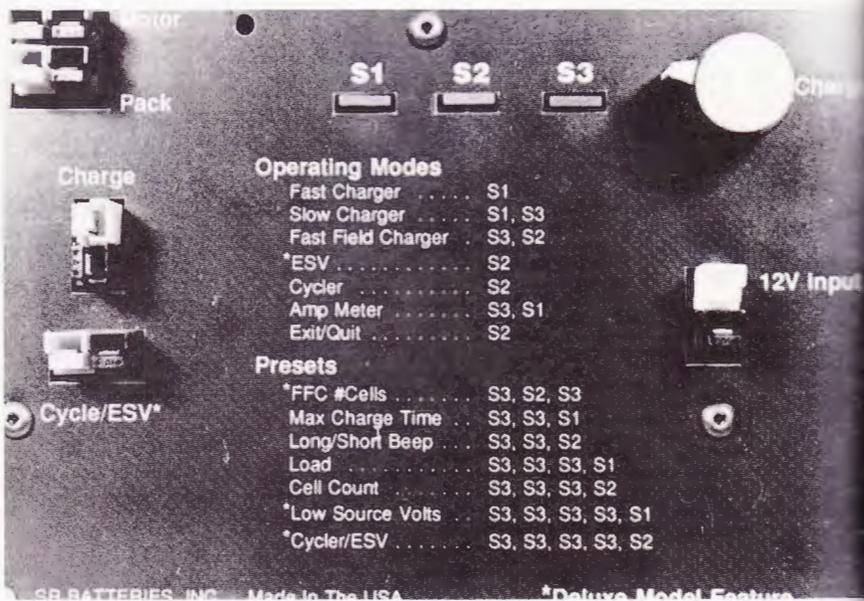
By Bob Aberle

Smarter than the first, this updated version can charge 2 to 36 cells, has an adjustable and automatic ESV, and battery temperature sensing.

Almost on a daily basis my SR Batteries Smart Charger/Cycler (SC/C) gets put to some kind of good use, be it at the field or in my shop operating from its companion AC power supply. I'm able to use my SC/C for fast or slow charging, battery discharge testing (also known as cycling) and even for measuring electric motor current. I was one of the first to use this microprocessor controlled charger/cycler back in late 1991. In fact, I took one of the first prototypes with me to the SAM 77 Winter Fly contest in Florida in January 1992.

Although an expensive piece of equipment, costing as much as a premium R/C system, it still has become one of the most popular charging/battery testing units offered on the hobby market today. Surprisingly, its application has not been limited to just electric power enthusiasts. I now see pattern, glider, helicopter and even general sport flyers all using the SC/C for fast charging and capacity checking purposes.

Starting out with all those good comments, could you possibly make the SC/C any better? Well Larry Sribnick of SR Batteries Inc. (P.O. Box 287, Bellport, NY



One of the improvements to the SC/C is a new front panel. Features specific to the deluxe version are marked with an asterisk. Existing standard versions can be easily and inexpensively upgraded.

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In the future all new units will have the same new front panel, the difference being the type of microcomputer inside (for standard or deluxe features). In fact the SC/C can actually be considered a long term investment. Subsequent updates will likely involve only the swapping of the microcomputer chip. So even though initially a little more expensive, you end up with something that isn't going to become obsolete in a couple of years, it's only going to get better!

My review of the SC/C standard version appeared in the July 1992, *FLYING MODELS* (pages 41-45). That was an extensive five page write-up which covered all aspects of the unit from a user viewpoint. Although there will be some overlap in this article, I would urge you to read the original article as a starting point of reference. It will definitely help you understand the new features now incorporated into the deluxe model.

In the standard version of the SC/C there are five basic modes of operation. Each is a menu item that can be easily called up from the computer memory system. The five modes are: automatic cut-off fast charging; slow or overnight rate charging; a special field fast charger intended specifically for 4-cell receiver battery packs; a discharge tester (or cyclor as some call it); and, finally, a high rate digital amp meter that will allow you to measure electric motor current (to very high levels). In the deluxe version, a sixth mode has been added to provide an ESV or expanded scale voltmeter function. In addition, the field fast charge mode, which is a more conservative way of fast charging R/C system packs at the field (as opposed to fast charging motor battery packs), has been expanded to handle 5- and 8-cell packs (as well as 4-cells).

Standard version SC/C units were designed to provide fast charging of battery packs from 2, up to 28 cells. That initial range was established by Larry Sribnick to accommodate all of the SAM (old timer) flyers who operate spark ignition systems from 2-cell packs. To do that at the time required a limit on the top end to 28 cells maximum. Now, 28 cells is likely to be more than the average electric flyer will ever need. But because more and more modelers are expanding up to cobalt 60 size motors it was felt that a higher cell count capability was needed. Towards that end the deluxe SC/C now covers the charging range from 2 to 36 cells. This is done in two ranges, 2 to 14 and 14 to 36.

One of the neatest new features of the deluxe SC/C is a battery over-temperature circuit. A temperature sensing probe (which is supplied) can be attached to a battery pack (about to be charged) or the probe can physically be built right into the pack (additional probes can be provided by SR at modest costs). As you well know, when a battery pack has been discharged at a high rate during a flight it can get quite hot. Recharging a hot pack is the worst thing you can do to it and in some cases it can be unsafe.

The deluxe SC/C now has the ability to read the battery pack temperature. All you do is attach the pack and initiate fast charging. If the pack is too hot you will hear an audible beep followed by a message "Pack Too Hot". At that point you can select "Set" and set the fast charge current of your choice. But get this, the deluxe SC/C will then turn itself off, display the temperature of the pack and wait for the pack to cool to an



"Boot-up", i.e. power on, gives you this basic menu (above). S1 gets you right into fast charging mode, S2 to the cycling feature. Like an expensive transmitter, the SC/C benefits from the protection of a transmitter case like the ACE Trans-Guard (below). Plenty of room for AC power adapter, cables, and manual.

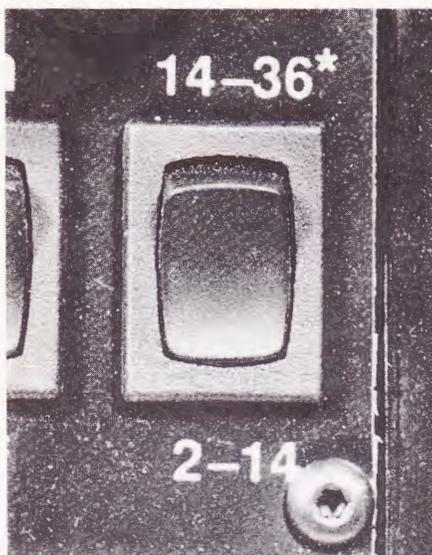


acceptable temperature. When that point is reached the SC/C will automatically start the fast charge cycle. With this scheme the decision of whether the pack is at a safe temperature to charge or not is taken away from the modeler. To quote the SR manual, "You'll never ruin a pack again because you tried to fast charge a pack that was still too hot!"

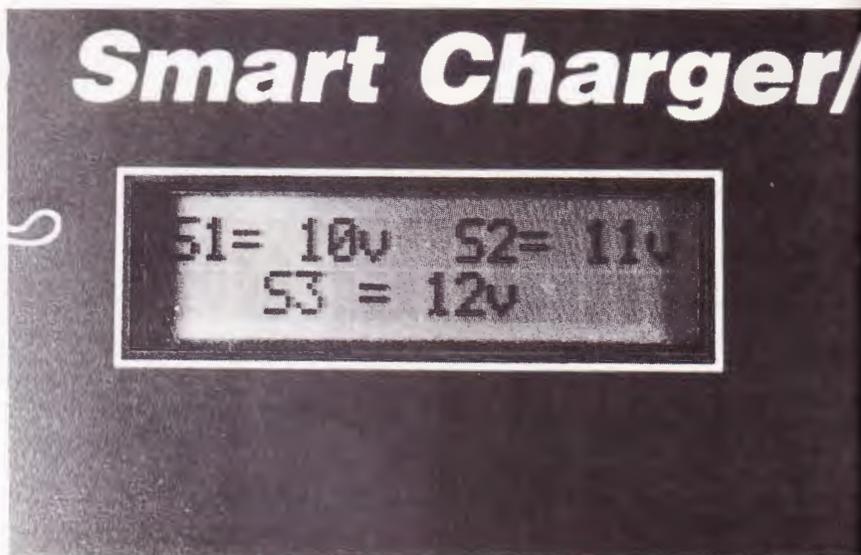
The standard version of the SC/C has an

interesting feature relating to both safety and convenience. If you use your car battery as the power source for your charger, you could conceivably run it down at a flying session, such that there isn't enough power remaining to start your car. It's easy to get carried away when you are getting some good flights and forget about such a detail. Well again that wonderful microcomputer

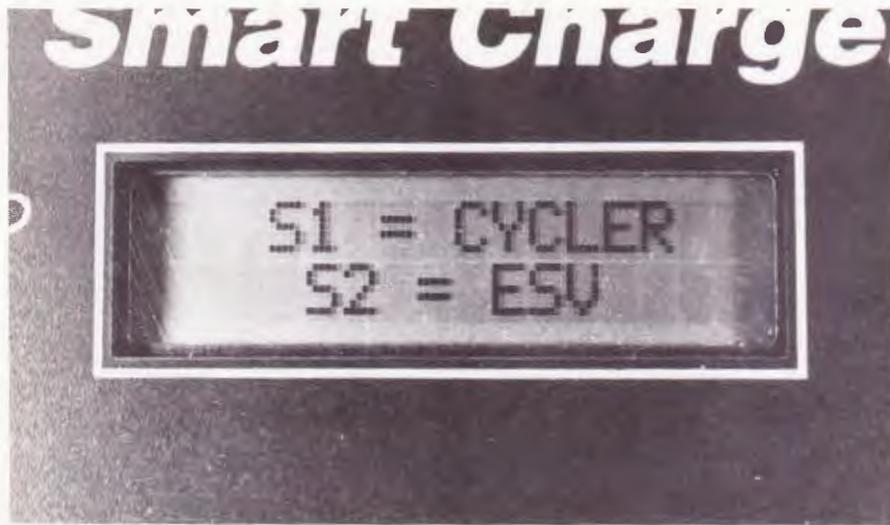
# SR Batteries' New Deluxe Version Smart Charger/Cycle



The selector switch at the bottom right corner of the deluxe version (above left) can select 2-14 cell or 14-36 cell charging modes. The menu display (above



right) shows the choice of 10, 11, or 12 volt cut-off point for the source low voltage warning. This setting ensures you'll have enough power to start your



The Deluxe Smart Charger/Cycler now has an added ESV (expanded scale voltmeter) function (above). First set the load you want, attach the battery and then press S2 for the ESV function. In this specific case (below), a load of 300 mA (displayed as .3A) is applied to a 4-cell pack for 10 seconds. Time expended when the photo was taken was six seconds (0:06M) and the voltage under load at that instant was 5.2V.



inside the SC/C will come to your res. Should your car battery voltage fall below 10 volts, the SC/C will terminate charging and beep at you and display a message, "Source Voltage".

Although an excellent feature, some modelers asked Larry for a couple of extra choices for the cut-off point. To satisfy these requests, the deluxe SC/C now gives you a choice of 11 or 12 volts for the low battery source voltage cut-off. When you first get your deluxe SC/C or have your standard version upgraded, I would suggest you call up "Low Source Voltage" (press switches on front panel in sequence: S3, S3, S3, S3, S1) and set either 10, 11 or 12 volts (I personally chose 11 volts for my unit).

One of the best new items on the deluxe version is the inclusion of the ESV function. Most modelers I'm sure are aware of the term, but in case you aren't here is a brief run down. As a Ni-Cd battery pack charges, its voltage increases. As it discharges, its voltage decreases. A point is eventually reached where it will no longer be safe to fly without recharging. Over the years various types of analog and digital voltmeters have been offered, but none include a "dummy" load. Without a load placed on the circuit, the voltmeter reading would be meaningless. Unfortunately, many of these ESV devices were never designed properly. Many applied loads were so nominal, as to make the reading useless. Some loads were far too high for the small capacity Ni-Cd packs. And finally even the most accurate is generally confused as to what is the "safe to fly" voltage level, below which you should not fly.

Well, when the standard version of the SC/C first came out, many of us used it as a charger or discharge mode as a form of cycle. We were able to set any load of our choice from 100 to 1000 mA and then obtain a reliable voltage readout under that load. The "safe to fly" point was still the modeler's decision and you had to manually stop the discharge cycle after about 10 seconds. If you got distracted and walked away, the pack would be taken down to the full charge cutoff point.

In the new deluxe SC/C Larry Sri

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was able to come up with a dedicated ESV function. You first establish any load current from 100 to 1,000 mA. This is especially helpful because the tiny Ni-Cd packs shouldn't be hit with a 300 mA load. I generally set the load at 100 mA for 50-150 mAh packs; 200 mA for 225 mAh packs; 300 mA for 500-700 mAh packs and as high as 500 to 700 mA for the big 1200 mAh battery packs. Once you have the load set, just evoke the ESV mode and initiate the test. You will immediately see in the display the load current selected, battery voltage of the pack under that load and a timer that counts up to 10 seconds. When the 10 seconds is up the voltage reached at that point will freeze on the display and a message will appear, "OK to Fly". If the charge should be low you will get a continuous beep alarm and a message that basically tells you not to fly. For those interested the safe voltage cut-off point selected for this unit is 1.198 volts per cell. To me this one extra feature is worth the entire \$50.00 price difference between the standard and deluxe versions of the SC/C.

Although I'm not going to get into all the "nuts and bolts" of how you call up and operate each mode, I do want to mention that the 30-page instruction manual is truly excellent in every respect. It is written in such a way so that it covers both the standard and deluxe versions. Functions peculiar only to the deluxe version are clearly pointed out. The SC/C is covered by a full one year limited warranty.

One of the things that may not be obvious at first glance is the fact that the SC/C provides a considerable amount of valuable data on the LCD screen. You can easily leave this charger unattended at the flying field. That means you can be safely charging one battery pack, while flying with another pack. When you return to the charger it will tell you how long the pack was on fast charge and what the peak voltage was at the time of automatic cut off. If the charger had terminated prematurely for any reason, it would be obvious when observing the LCD screen. Unattended, safe, fast charging is a great advantage at a busy flying session and especially when participating in contests.

Taking those comments one step further, the actual value of the peak charge and the time it takes to get to that point can provide some valuable insight into the capacity of the particular battery pack. Many of us now record the peak voltage and charge time (from the SC/C LCD screen) with a grease pencil on the pack casing. One of the things that we have observed is that as the peak voltage increases (before cut off), the time to charge tends to diminish. For example I might have a 7-cell 800 mAh pack that when new peaked at 11.3 volts and it generally took 23 minutes to get to the point. About a year later the same pack was noted to peak at 12.5 volts, but in only 16 minutes. At that point it became obvious by observed performance that the pack no longer had the rated capacity of the year before. So by noting the increase of the peak charge voltage you can retire battery packs long before you start losing contests. These types of observations can't be made by most of the chargers now on the market.

One last comment concerns the care and well being of your SR Smart Charger/Cycler.



The ten seconds of the ESV mode has elapsed and the judgement made by the SC/C is "OK to fly". The voltage at cut-off was 5.2. Had the pack needed recharging, the display would warn you not to fly.

It is a precision device and as such, it should be protected during its routine travels. I found that the Trans-Guard case offered by ACE R/C Inc. (116 W. 19th. St., Higginsville, Missouri 64037), at \$18.25 is a bargain. The inner protective foam material can be easily cut away to accept both the SC/C and the AC adapter. I also found room for the cables and the instruction book. So when I head to the field I simply grab this one case, knowing that everything I need for charging and testing is in one place.

I have always been happy with my SR Batteries SC/C from day one. The unit has never, ever failed me, in all of my contest travels around the East Coast. The new deluxe features only make a great product better. To be honest I'm ready for a second one to handle my usually heavy hobby workload. If you get a chance at one of the upcoming trade shows, look up Larry Sribnick or Steve Anthony at the SR booth and ask for a full demo. I think you will quickly get hooked, as I did!



Using the supplied temperature sensor, the SC/C determines if your battery is too hot to recharge. At this point you press S1, set your desired charge current, and the SC/C will automatically initiate fast charging at the rate you selected. Because of this feature you can't ruin a pack because of excessive heat.

# A C/L Semi-Scale Profile Wedell Williams Racer

By Michael D. Garmon

The classic elegance of one Golden Age racer inspired this profile C/L Stunter. It uses .40-.51 size engines and uses the most modern of moments.



Striking color schemes characterized the Golden Age racers and the Wedell was no exception. The author poses with his model of Jimmy Wedell's black and red 1933 #44 racer. All the trim was done with MonoKote.

**T**he National Air Races held during the 1930s spawned some of the most exciting and beautiful aircraft designs in the history of aviation. Notwithstanding, most of the racing planes of the era were built by small companies on a very limited budget. Their performance exceeded that of the first line military aircraft then in use.

Although, not as well remembered as the *Gee Bee's* and *Travel Air Mystery Ships*, one of the most successful of these race planes was the Wedell Williams series of racers. Built by the Wedell Williams Air Service Corporation and powered by a Pratt & Whitney Hornet Engine, the Wedell Williams racers were flown by the top racing pilots of the era such as Jim Haizlip, Jimmy Wedell, and Roscoe Turner. Although they were as fast as some of the *Gee Bee's*, the Wedell Williams was a better handling aircraft and was much safer to fly than the dead-end *Bee's*.

Since the Wedell Williams racers were flown by many different pilots, there were more than one or two scale color schemes available to the model builder. My favorite is the black and red 44, as flown by Jimmy Wedell.

Looking at a three-view drawing of the Wedell Williams, I realized that due to its constant chord wing and generous fuselage side areas and long tail moments it would make an excellent subject for an easy to build semi-scale profile stunter. Designed for .40-.51 size engines, the model is 59 1/4 inches long and has 650 square inches of wing area. The design utilizes no hard materials and does not require the expensive contest balsa.

If you want to build a Wedell Williams *Stunter*, I recommend you order two sets of plans and build from one set and cut the other up for patterns to speed the construction.

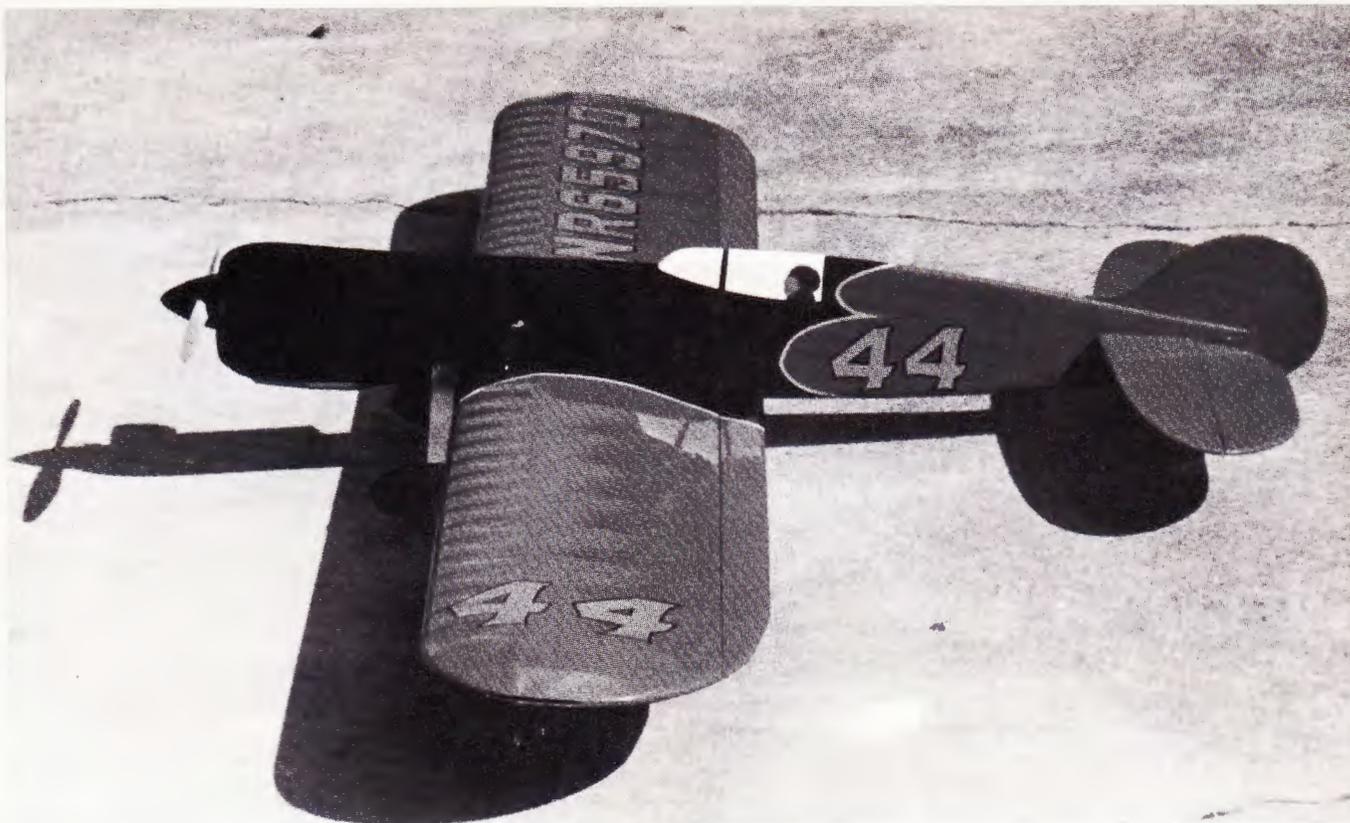
## Construction

The fuselage is cut from one 1/2 x 6 inch balsa sheet or two 1/2 x 3 x 36-inch balsa sheets edge glued together. Epoxy the 1/2 x 9-inch maple engine mounts in place and when dry, install the right and left 1/2 inch ply doublers with epoxy. Drill holes for the engine mounting bolts and install the blind nuts. Drill holes for the main landing gear mounting and then add the 1/2 inch sheet balsa tripler to the left fuselage. Round the outer edges of the fuselage to shape the left side of the balsa tripler to blend in with the fuselage.

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PHOTOGRAPHY: MICHAEL GARMON

A definite touch of the Golden Age characterizes this semi-scale stunter. The airfoils and moment arms are decidedly modern, though.

Start the wing by splicing together the  $\frac{1}{4} \times \frac{3}{8}$ -inch spars, the  $\frac{1}{2} \times \frac{1}{2}$ -inch leading edge, the  $\frac{1}{4}$ -inch square trailing edge and  $1\frac{1}{2} \times \frac{1}{16}$ -inch trailing edge sheeting. When dry, mark the rib locations on spars, leading and trailing edges. Lay the bottom spar on the building board and glue ribs to spar with instant glue. Add top spar, leading edge and  $\frac{1}{4}$ -inch square trailing edge and allow to dry. Using a sanding block taper the trailing edge to match the contour of the ribs. Install the  $1\frac{3}{8} \times \frac{1}{16}$ -inch trailing edge sheeting and  $\frac{3}{32}$ -inch vertical grain sheet balsa spar webbing. Install the  $\frac{1}{4}$ -inch sheeting reinforcements to the inside edge of the two center ribs and install the  $\frac{1}{8}$ -inch plywood bellcrank mount.

Install all half ribs and install the bellcrank, leadouts, flap pushrod and sheet center section with hard  $\frac{1}{16}$ -inch sheet balsa. Glue on the wing tips, tip braces and tip ribs and block sand them to shape. Install leadout guides in the location on the plans or install an adjustable leadout guide. Add one ounce of weight to the outboard wing tip. Cut wing flaps from firm  $\frac{1}{4}$ -inch sheet balsa and join with a crossbar of  $\frac{3}{32}$ -inch music wire.

The main landing gear is made from  $\frac{3}{32}$ -inch tempered sheet aluminum as shown on the plans. When bending the landing gear legs, ensure the bend has a large radius to prevent cracking.

Cut the stabilizer and elevators from firm

$\frac{1}{4} \times 3 \times 36$ -inch sheet balsa. Join the elevators together with a  $\frac{3}{32}$ -inch music wire cross bar. Round all edges and hinge the elevators to the stabilizer. Cut the fin and rudder from hard  $\frac{3}{16}$ -inch sheet balsa and round edges.

### Assembly

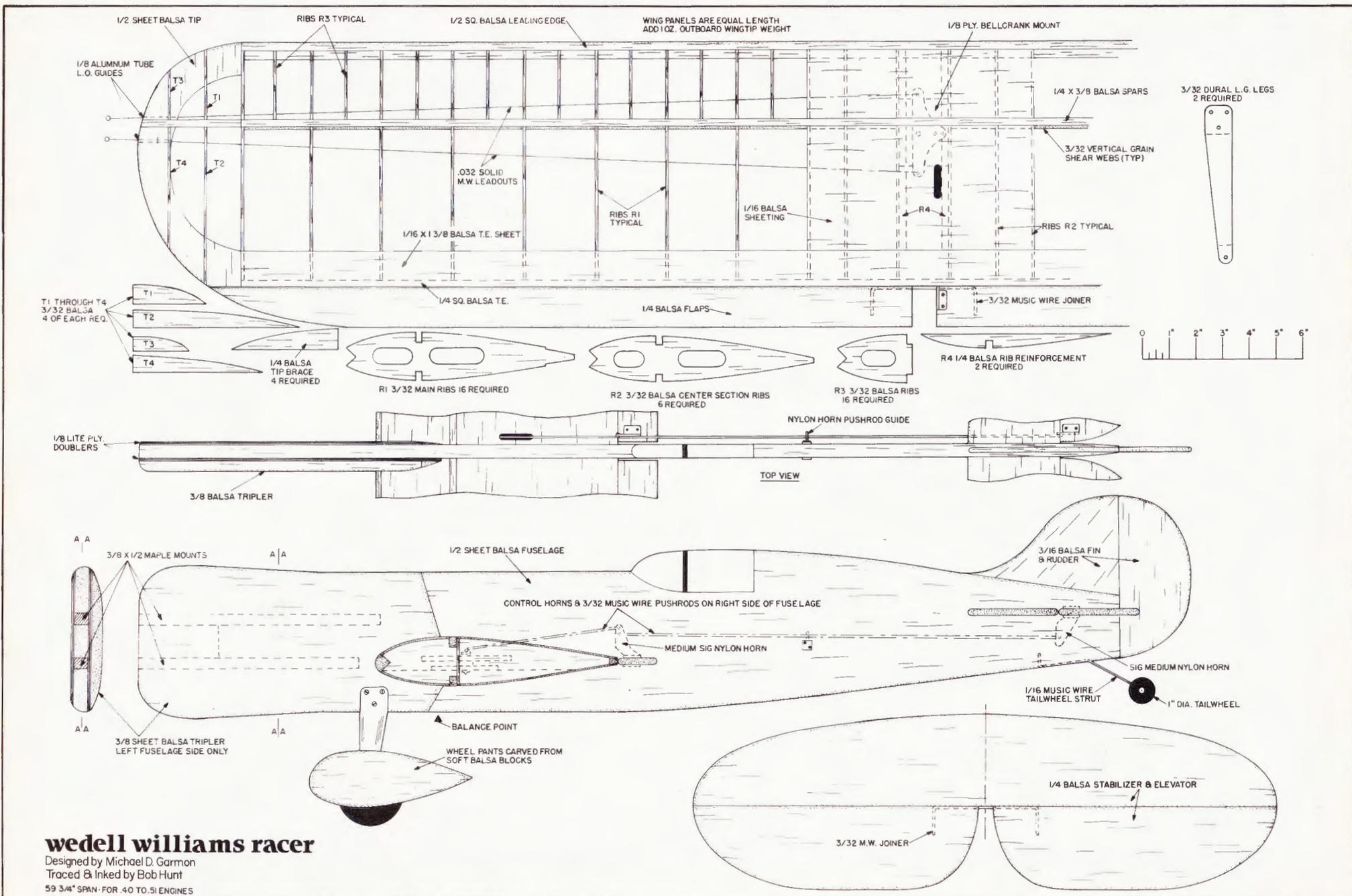
Install flaps in the fuselage wing cutout and then slide the wing into fuselage, and when satisfied with the alignment, glue it securely in place. When dry, hinge the flaps to the wing trailing edge. Slide the stabilizer and elevators into the slot in the fuselage and when satisfied with their alignment, glue in place and allow to dry. Glue scrap



A standard Stunt engine installation is shown here (above left), but with the addition of an R/C engine, and 3-line control system, the Wedell could be a good



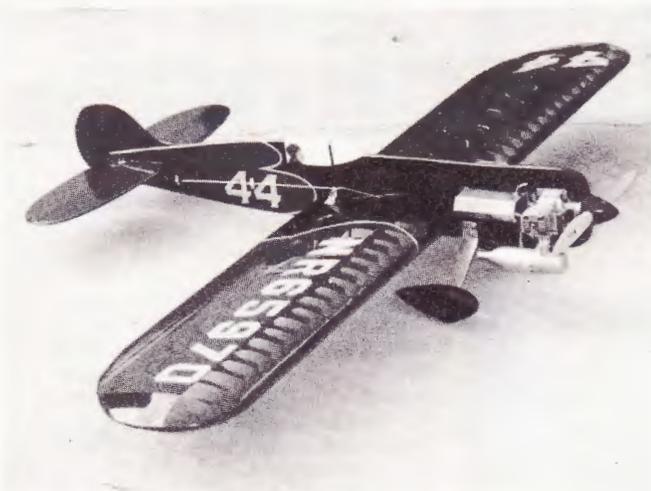
profile scale model. Can't deny the easy access to the control system with a profile (above right). Note the nylon bracket which eliminates pushrod bowing.



**wedell williams racer**

Designed by Michael D. Garmon  
 Traced & Inked by Bob Hunt  
 59 3/4" SPAN FOR .40 TO .51 ENGINES

# Wedell Williams Racer



Screwed to the nose of the Wedell Williams is a SuperTigre .51 (above left), but a variety of engines, from the Royal .40 up to the .51, have proven they can

balsa filler into the aft end of the stabilizer slot and glue on the fin and rudder. Install a medium Sig R/C type control horn on the flaps and elevator. Make the pushrod from  $\frac{3}{32}$ -inch music wire and connect to the control horns. Install the two pushrod braces and ensure the controls operate freely. Install the main landing gear, wheels, wheel pants and adjust for proper tracking. Install  $\frac{1}{16}$ -inch music wire tail wheel strut.

The original model was finished entirely

with MonoKote. If you feel you must use a painted finish, apply the paint sparingly as paint equals weight. Many builders in our club have had great success painting their fuselages with Rustoleum and using MonoKote on the flying surfaces.

### Pre-flight & flying

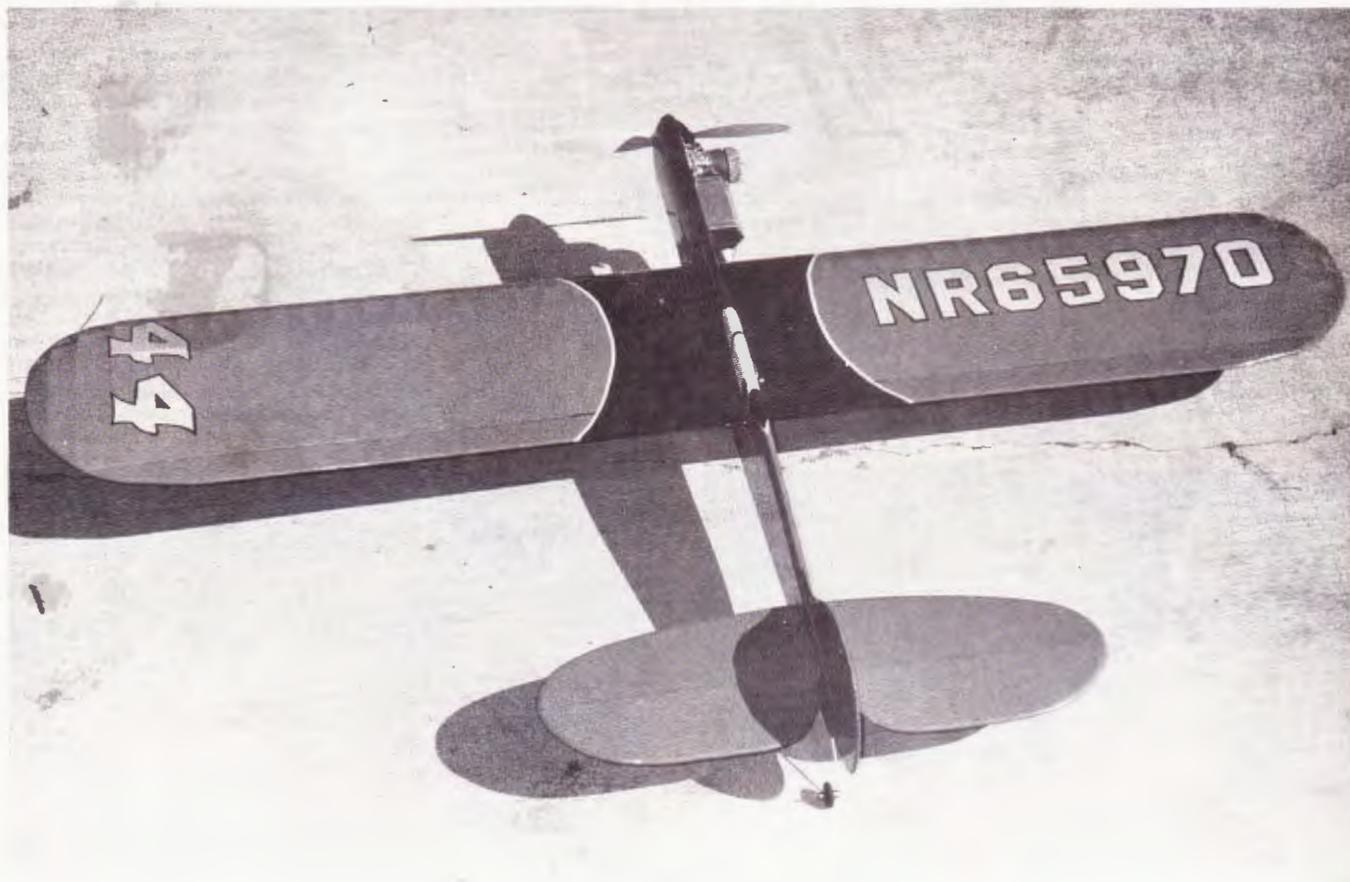
Inspect the airplane for warps. Check the balance of the model. It should balance  $\frac{1}{2}$  inch to  $\frac{1}{4}$  inch forward of the wing spar.



handle the plane. Fire engine red and black are the main colors (above right) separated by a thin golden stripe. The numbers are silver with a black outline.

Inspect the control system for freedom of movement, pushrod flexing etc., test run the engine, ensuring that the tank is adjusted to provide the same engine rpm upright or inverted. After engine shut down, check all bolts, nuts and screws for tightness.

The model as presented is capable of flying the AMA Stunt pattern with ease. With the installation of a three-line bellcrank, it would make an excellent competition profile scale model.



The Wedell racers were flown by more than one pilot so there was a variety of color schemes to choose from, besides Jimmy Wedell's #44.



# Flyin' things for fledglings.

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

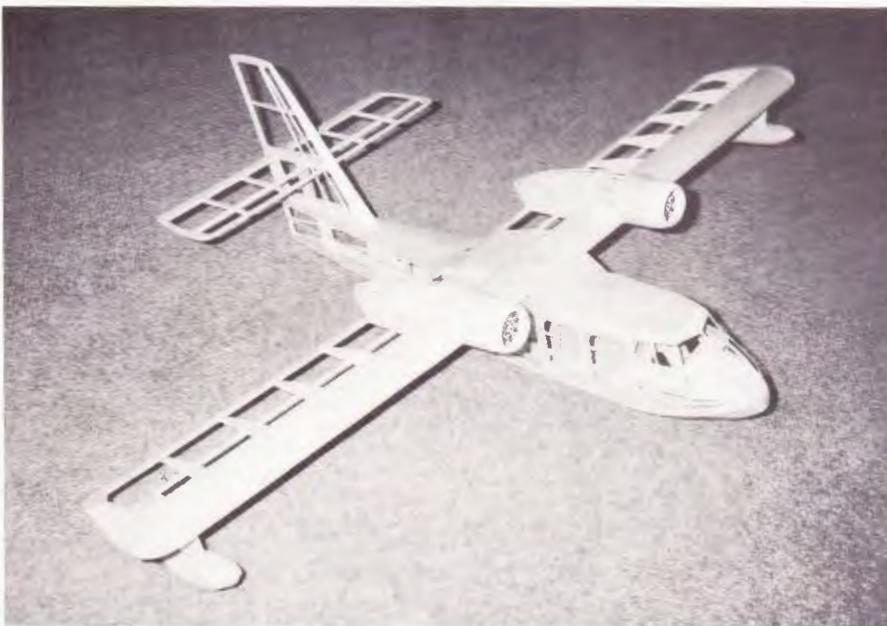


PHOTO: G. WALLBRIDGE

**Canadair's CL-215** gained its fame as an aerial fire fighter, and is now going to kit form thanks to SAMS of England. It's only in the bones stage right now, and not due to be released until the summer.

**H**ow about putting down the X-Acto and the sanding block for a few minutes. I know you're tryin' to put the finishing touches on some of your new stuff for the upcoming season, but we got a few things to kick around. So, kick back and relax, fill the old coffee cup (I just did), and let's have at it.

The mail's been as heavy as usual lately and there are some items that I promised I'd tell you about and one thing I need some help on. Let's go to the latter one first. Craig Baker has written to say he'd like to buy

some more of the great plans from Dave Haught Graphics, but his mail came back marked "forwarding address expired". He had used a Munsing, MI address and asked if I had a new one. Well, that's the same address I have, so I'm asking all you guys for some help. If you've got a new address, send it to Craig Baker, 515 No. Carpenter Rd., Titusville, FL 32796. How about sending it to me, too. And, hey ... if you're out there Dave, let me hear from you.

While on the subject of addresses, I've gotta fill you in on an address change for Al Lid-

berg and his great model plan service. Al's new address is A.A. Lidberg/mps, 1008 E. Baseline Rd., Suite 1074, Tempe, AZ 85283. Now write that down somewhere so you have it. Bill Dahlgren checked in to tell us that he was one of the purchasers of the old Megow plan for the FW-198 that I told you about a few months back.

Bill said that he really liked the plan, and further said, "Count me among those taking a stab at building the thing should be a ball for all!"

This particular plan offering caused quite a flurry, as a lot of the troops started doing some real research on this "did it really exist" aircraft. The general consensus was that it was a Dutch aircraft known as the DeSheldt. It was subsequently captured by German Forces and apparently used for propaganda purposes. There's no record of any more being built. I gotta tell you, gang, that particular plan offering sure stirred up a lot of interest.

We also heard from Jim Caley, at JC International, the guy who sells that super tissue. He tells me that orders from our gang exceeded his highest expectations. In fact, he said he got behind on filling orders but was getting caught up on both tissue orders and orders for the color sampler pack. Jim said he was working on improving his service and should be right up to date by the time you read this. Just in case you're waiting for an order that hasn't come through ... Jim has authorized me to give out his phone number, so you can trace it. His number is 714-229-9957.

Let's move on now. We also heard from Don Ross who tells us that the choice for the "One Design" contest this year is the *Jabberwock*. You can get a "scoop sheet" on the contest by sending a SASE to Don at this address: Don Ross, 38 Churchill Rd., Cresskill, NJ 07626.



PHOTO: WALT LEONHARDT

Built from **Golden Age Replica** plans—which come from the old Scientific kit—Walt Leonhardt's 20-inch *Mureaux* (above left) is a model of the in-between-the-



PHOTO: JOE VACCARO

wars French fighter. Another aircraft of French origin, the dainty *Demoiselle* (above right) comes from the handwork of Joe Vaccaro, who says it flies fine

Don also had some additional interesting news. He has written a terrific four-page booklet on electric power for rubber kits. It is highly detailed, beautifully printed, and includes all sorts of neat drawings and diagrams. Also included are drawings and measurements of the various power units available and the names and addresses of the manufacturers.

Now, can you send to Don for a copy? The answer is a big *NO*. The booklet will appear in about 2000 of the Series 300 and 700 Guillow kits.

Now, maybe you do, and maybe you don't like Guillow kits—but, in any event, it may be worth the purchase of one to get the booklet, if nothing else. I can tell you, though, that our cartoonist, John Downer, has had some great success with Guillow models. He makes some modifications, but I'd guess that 90% of us, who like to build from kits, do some sort of modification regardless of the manufacturer. In any event, I pass this on as it's a great information source for anyone using, or considering using, electric power in small free flight scale models.

Hey troops, I've told you before that there are members of our gang all over the world, and, now I'm gonna show you a photo of one of the troops in Belgium. His name is Paul DeMars, but he likes to be called Joe. The photo was taken during a model exhibition at the Brussels Air Museum. Paul is shown with some of his great scratchbuilt 3/4 inch to 1 foot models. And, hey ... check those copies of our favorite magazine right out in front! Paul is a "fun" guy, and if any of you want to drop him a note, his address is: Paul J. De Mars, Brussegemsesteenweg, 24... 1861 Wolvertem (Meise), B-Belgium.

And, if any of you are WW II veterans of the 9th Air Force, Paul would especially like to hear from you. After the liberation of Belgium, he worked, as a civilian, for our Ninth Air Force for quite a while during the occupation period.

Okay, let's see what else is new. Well, Gene Dubois has come out with a new Peanut scale kit. This time, Gene has gone back to World War I and done a neat kit of the Fokker D-VII. The kit is the usual complete package that we've come to expect from Gene. The price is \$13.95 plus \$2.50 P&H.

I'm gonna show you a photo of the little Fokker. This is Gene's own prototype model and he reports that it is a fine flyer.

Gene also mentioned that my last mention of his "transparent bond paper" brought so many orders that he's gonna have to restock. I sure hope you guys like the stuff. It works great for me! Incidentally, Gene's address is: Gene Dubois, P.O. Box 30053, Acushnet, MA 02743.

Now, I promised that I'd have some more news from SAMS, in England. The news is that a new kit from SAMS own kit company, Aerographics, is in the works. Now this one won't be ready for sale until early summer,

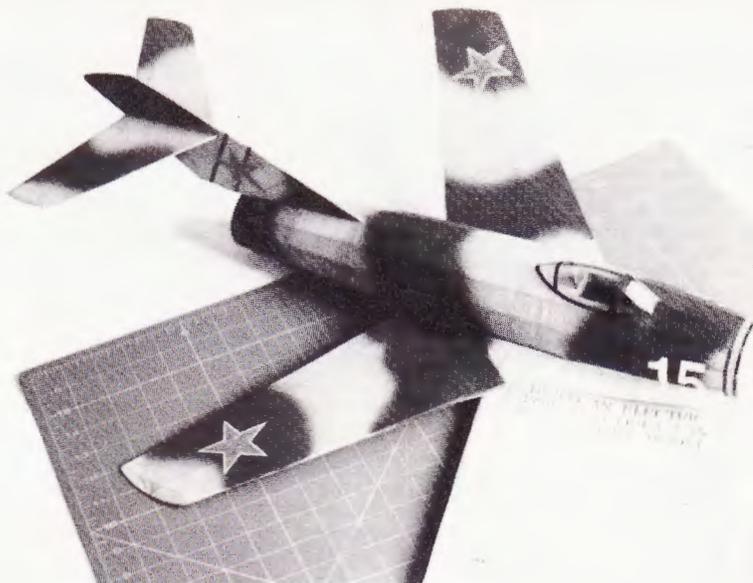


PHOTO: FERRELL PAPIC

**Of course there's no prop!** Ferrell Papic's little MiG-15 is a free flight, electric powered ducted fan model of the MiG Alley namesake. It comes from Ferrell's unique book that describes its construction.

but I thought you'd like to see the bones shot of the prototype. The model is the Canadair Fire Fighter and is a neat looking flying boat. I can imagine some of the gang who are into electric power taking longing looks at this one. Hold off, though, until you hear more. George Wallbridge, of SAMS, is busy with a lot of things and can't possibly get

this one out before summer. The plan may be available before the complete kit, but neither for a while yet. I'll let you know as I hear more on this.

Speaking of flying boats just naturally makes me think of Peter Wank at Scientext. Did you take my suggestion and send for Peter's Accessory List? If you didn't, I'd sug-



ARTWORK: JOHN DOWNER

"And what do you think I meant when I told you to check your six?"

# Flyin' Things for Fledglings



PHOTO: GENE DUBOIS

That's the prototype model of Gene Dubois' newest Peanut kit, the Fokker D-VII (above left). Even in that little package there's still plenty of nice detail. How

gest doing it right now. It's yours for just a business size SASE and you'll find loads of neat items. For example, Peter is now handling the Ballard propellers and you might want to look into these. They are almost perfect scale models of the three-blade Hamilton Hydromatic prop in a 5-inch diameter making them great for electric power. They also come complete with a nice "snap-on" spinner. Not only that, but the price is right!

Peter also tells us that his new DC-3 should be ready by the time you read this. Now, there's a thought for those Ballard props. In the meantime, get your SASE off for the Accessory List. The address is: Scientext, 48 Whitney St., Westport, CT 06880.

It's beginning to seem that everything I mention, leads me to something else I wanted to tell you about. The mention of electric power brought to mind the great new book that Ferrell Paptic is producing. This is a 60-page instruction manual and full-sized building plans for an electric, ducted fan, MiG-15 free flight scale model.

The book contains loads of exploded isometric drawings and describes, in detail, all sources for building materials and component parts. Also included is all you'll need to

know for building and balancing a ducted fan, and much, much more. Plan furnished is enlargeable to produce everything from a peanut scale type for the Kenway motor to a 45-inch R/C job for the large electrics.

As a matter of fact, there's also a "semi-profile" plan for building a rubber powered "trim test" model. If you find yourself getting interested in electric ducted fan modeling, you should have this very professionally done book. Price for the 60-page manual and the plans for the model is \$24.00. It's a fairly heavy package, so there's a shipping and handling charge of \$4.00 additional.

You can order direct from the author at this address: Ferrell Paptic, 300 W. Lincoln #82, Orange, CA 92665.

Hey, troops, I'm gonna show you a photo of Ferrell's own model which he flew at the last FAC Nats. I gotta tell you, people... if you thought that electric powered ducted fan scale was just for the experts, this book will change your mind.

Now, before we get into any other items, I want to tell you about the rest of this month's photos.

One of the "good guys", Joe Vaccaro, sent me my annual "CARE package". What's



PHOTO: DAN FLINTJER

does it fly? Great, says Gene. Kathy Marsh poses with Dan Flintjer's gigantic kite design (above right), which he sold to a collector for \$4000!

that, Chauncey?.. You want to know what he sent to me? He sent 40 29¢ stamps, that's what it was. Joe says he likes to help me out with all the gang who forget to send a SASE. Many thanks, Joe, you're truly a Santa Claus!

Joe also sent a photo of his little *Demoiselle* from which he is getting great flights. He says the covering tissue came from SAMS. Real pretty little model, Joe, and I'm sure the rest of the gang appreciates you letting us all have a look at it. As of the time Joe wrote, he was working on an all-balsa Sommer *Monoplane* from Bill Hannan plans.

Walt Leonhardt, up New England way sent us a shot of his "between the wars" French Mureaux fighter. He built it from Golden Age Replicas plans and it was originally a Scientific kit "way back when". These kits were all about 20 inches span, as I recall, and were extremely lightly built. Walt verifies this and says it's a great flier. He had about two dozen flights on it when he decided to take the photo before he "stuck it in a tree", or something.

Now, the last photo is a bit different. Why? Because it's a kite! Dan Flintjer, who lives fairly close to me is a stick and tissue modeler, but he also runs a company known as "Buffalo Cody Kite Co." He says that few people realize that Samuel Cody, who built the first powered aircraft for the Royal Flying Corps, in England, did a lot of experimenting with kites. Dan's kites (while definitely not cheap!) are models of some of these. The photo I'm showing you is of Kathy Marsh, posing with a kite that sold to a collector for \$4,000.00!

Whoa! That's out of my league! I won't bother giving you Dan's address, cause don't think too many of you are in the market for \$4,000.00 kites! If you are interested, drop me a note for his address. Not Chauncey, you don't get Kathy with the kite.

Well, pilgrims, time and space have snuck up on us again and it's time to close the hangar doors.

Hang loose, good friends, and I'll be lookin' for you to check in again next month. In the meantime, send me photos of your project and any neat tips you might have come across. Of course a SASE is always appreciated and the address is still 2 Holley Lane, in Tonawanda, N.Y. 14150.

See ya soon and keep your nose into the wind.



PHOTO: HORST ROSSLER

Lined up in front of Paul De Mars are some of his favorite things, including—what else!—his favorite mag, FM. Paul, who hails from Belgium, posed everything in the Brussels Air Museum.

# Interceptor 2000

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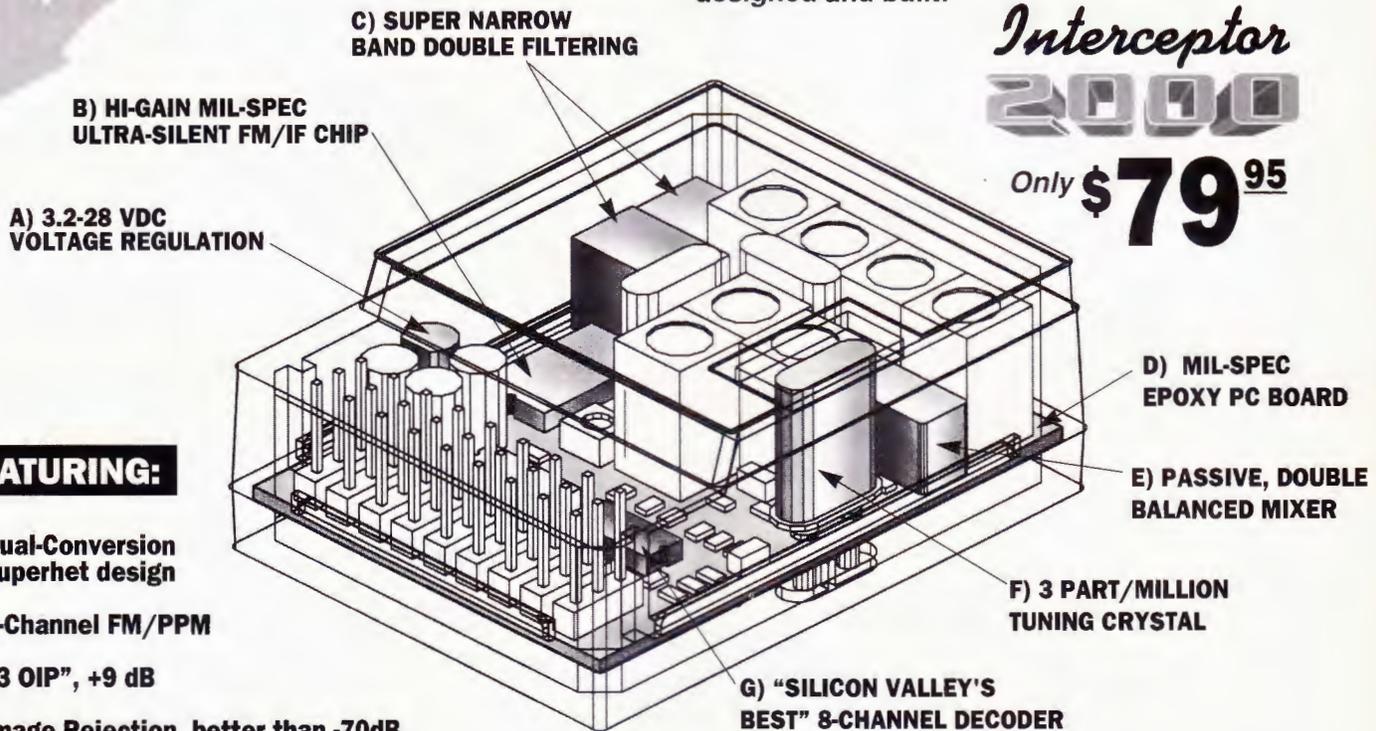
Recently all imported R/C receivers were obsoleted by the FCC's warning to their manufacturers: "The manufacture and/or importation of this (receiver costing \$100 to \$700) device must cease on June 23, 1999, pursuant to new section 15.37 adopted (into law by the FCC) in Docket 87-389."

The R/C importer/distributors declared "An R/C receiver *SO GOOD* that it is 40,000 times less noisy, will certainly cost 10 times more to make." They then formed a committee and hired a lawyer to "fight the FCC"...

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- D) **3-LAYER MIL-SPEC EPOXY PC BOARD**  
2-Layer, resin base PCBd
- E) **PASSIVE, DOUBLE-BALANCED MIXER**  
Complicated, noisy amplifiers
- F) **3 PART/MILLION TUNING CRYSTAL**  
10 Part/million tuning crystal
- G) **"SILICON VALLEY'S BEST" DECODER**  
Commercial-Grade, analog device

#### Source:

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- Singapore?
- California, USA
- Hong Kong?
- Kansas, USA
- Korea, Taiwan?
- California, USA
- Korea, Taiwan?
- New York, USA
- Somewhere else
- Oklahoma, USA
- Japan?
- California, USA
- Hong Kong?

# Carstens Flying Plans

## RC SCALE



**CF334 1920 DAYTON-WRIGHT RACER.** 1/2A pylon or stand-off scale R/C, 30" span, Cox Tee Dee .049 eng. Bob Aberle. FM 6-74. \$6.00.



**CF339 BARLING NB-3.** 33" span stand-off scale open cockpit monoplane for .010 to .020 eng., rubber, pulse radio, or F/F. Hurst G. Bowers. FM 7-74. \$5.00.



**CF341 HANRIOT HD-1.** WW1 R/C scale biplane. 56" span for Ross Twin or .40-.60 engine. Tony Eck. FM 8-74. \$8.00.



**CF348 AERONCA L.** Stand-off scale R/C with 72" span for .45-.60 engine. Bruce Lund. FM 10-74. \$11.50.



**CF349 HIPERBIPIANE.** R/C stand-off scale, 45" span for .40 engine. Stan Hines. FM 11-74. \$8.00.



**CF350 CURTISS ROBIN.** R/C scale monoplane. 61-1/2" wingspan, .45 engine. Bill Antoine. FM 11-74. \$11.50.



**CF353 CITABRIA PRO.** Stand-off scale R/C for Ross Twin .60 with 63" span. Bob Godfrey. FM 12-74. \$12.50.



**CF357 STUKA JU-87.** Stand-off scale R/C for .60 engine, 64" span. Tony Eck. FM 1-75. \$8.00.



**CF364 EAA HEADWIND.** Stand-off scale R/C for .15 engines with 48" span. Al Wolsky. FM 4-75. \$6.00.



**CF373 LINCOLN SPORT.** Scale classic, .020 powered with 30" span for pulse/light R/C or F/F. Hurst G. Bowers. FM 6-75. \$5.00.



**CF375 FOCKE-WULF 190D.** Stand-off scale R/C, 62-1/2" span for .60 engines. Tony Eck. FM 7-75. \$12.50.



**CF377 YAK-9.** R/C stand-off scale for .60 engines with 61" span. Dan Reiss. FM 8-75. \$8.00.

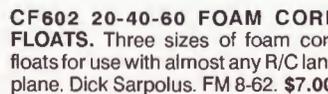
## SEAPLANES-2



**CF450 THE SEE BEE.** 1/2A camera plane for R/C with 42" wingspan. Dave Katagiri. FM 9-77. \$6.00.



**CF539 ELECTRIC TERN.** Electric powered R/C seaplane for use with Astro Flight .020 motor. Mitch Poling. FM 5-80. \$6.00.

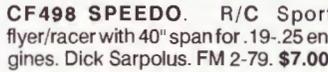


**CF602 20-40-60 FOAM CORE FLOATS.** Three sizes of foam core floats for use with almost any R/C land plane. Dick Sarpolus. FM 8-62. \$7.00.

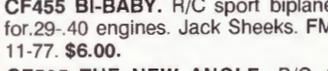
## RC SPORT



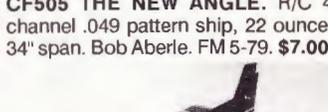
**CF483 MAGNUM 80.** Twin .40 power R/C pattern ship with 76" span. Dick Sarpolus. FM 9-78. \$8.00.



**CF498 SPEEDO.** R/C Sport flyer/racer with 40" span for .19-.25 engines. Dick Sarpolus. FM 2-79. \$7.00.



**CF455 BI-BABY.** R/C sport biplane for .29-.40 engines. Jack Sheeks. FM 11-77. \$6.00.



**CF505 THE NEW ANGLE.** R/C 4 channel .049 pattern ship, 22 ounce, 34" span. Bob Aberle. FM 5-79. \$7.00.



**CF272 JOEY.** 64" span R/C with .50 engine, Ply and foam construction. Dick Sarpolus. FM 8-72. \$8.00.



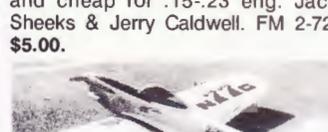
**CF249 INTIMIDATOR.** R/C pattern ship for .60eng., 7-1/2 lbs. Marty Meyer. FM 1-71. \$8.00.



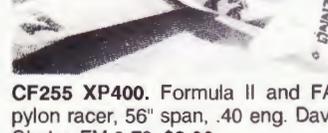
**CF252 D. D. T.** Sport R/C design easy and cheap for .15-.23 eng. Jack Sheeks & Jerry Caldwell. FM 2-72. \$5.00.



**CF255 XP400.** Formula II and FAL pylon racer, 56" span, .40 eng. Dave Gierke. FM 3-72. \$8.00.



**CF256 SPRINTER.** Sport R/C V tail 2 channel, 42" span for .049-.15 eng. Gene Rogers. FM 3-72. \$5.00.



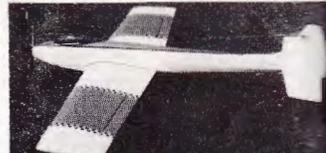
**CF261 ASTEROID.** R/C sport, 61" span, K&B .40. Dick Johnson. FM 4-71. \$8.00.



**CF266 DREAMER.** R/C sport biplane with 38-1/2" upper span, 37-1/2" lower with .40 eng. Don Foster. FM 6-72. \$8.00.



**CF345 DESPERADO.** R/C flag equipped .60 powered sailplane with 99" span. For Ross opposed twin-piston .60 engine. Gene Rogers. FM 7-74. \$11.50.



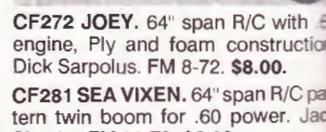
**CF269 FAIEMESTER.** 65" R/C pattern ship with .61 power, retract gear. Bob Caplan. FM 7-72. \$11.50



**CF270 ESCAPE.** R/C tail dragger with Goldberg retracts and 60 engine. Gene Rogers. FM 8-72. \$8.00.



**CF281 SEA VIXEN.** 64" span R/C pattern twin boom for .60 power. Jack Sheeks. FM 11-72. \$6.00.



**CF282 TYCHO 400.** Altimeter equipped R/C trainer with Enya .45 Orbit R/C, 62" span. Don McGovern. FM 12-72. \$8.00.



**CF280 SPIRIT OF ILLUSION.** 120" span R/C wing soarer for towline winch, slope. Hal Cover. FM 11-72. \$11.50.



**CF337 WILD BLUE.** 100" span slope and thermal soarer that fits the sun case. Don McGovern. FM 7-74. \$8.00.



**CF337 WILD BLUE.** 100" span slope and thermal soarer that fits the sun case. Don McGovern. FM 7-74. \$8.00.



**CF345 DESPERADO.** R/C flag equipped .60 powered sailplane with 99" span. For Ross opposed twin-piston .60 engine. Gene Rogers. FM 7-74. \$11.50.



**CF359 SPORT PRO.** 100" span R/C soarer with 605 sq. in. area. Harley Michaelis. FM 2-75. **\$8.00.**



**CF369 BOMMEL.** 114-1/2" R/C soarer with full wing flaps. Peter Keim. FM 5-75. **\$8.00.**

### CONTROLINE STUNT -7



**CF212 STUKA JU-87.** Famous German WW2 dive bomber C/L for .40 eng. Jack Sheeks. Semi-scale. FM 7-70. **\$8.00.**



**CF213 MYSTERE II.** C/L stunt with 55" span, .29-.40 eng. Jim Van Loo. FM 10-70. **\$8.00.**



**CF225 VULCAN.** C/L stunt. Optional foam or built-up wing, 56" span, Fox .35. Bob Lampione. FM 6-71. **\$8.00.**

**CF246 STUNT MACHINE.** 2nd place '71 NATS in sleek C/L pattern for .35. Gene Schaffer. FM 12-71. **\$8.00.**



**CF248 F-14 TOMCAT.** C/L stunt Navy fighter with 56" span, .35 eng. Vic Macaluso. FM 1-72. **\$8.00.**

**CF167 MESSERSCHMIDT ME-109.** Near scale 48" span combat C/L design for .35 eng. Vince Micchia. FM 6-69. **\$7.00.**

### C/L COMBAT- 8



**CF598 SC 2.** Top C/L slow combat design for .36 motors. Phil Cartier. FM 5-82. **\$7.00.**

**CF618 MASTER KILLER.** State of the art fast combat C/L model for hot-test .36 size motors. 39-3/4" span. John Jo. FM 12-82. **\$6.00.**



**CF754 TEXAS SLOW.** Slow C/L Combat "Texas Style" as interpreted by a Pennsylvanian. A hot performer with a .36. Phil Cartier. FM 7-87. **\$8.00.**

### C/L PROFILE- 9

**CF78 EXCALIBUR.** C/L stunt, 51" span semi-profile for McCoy .40 or similar. Dick Mathis. FM 5-67. **\$5.00.**



**CF284 SPIRIT OF SAGINAW \$10.50.** Profile stunt C/L 50" span for .35. FM 1-73. **\$6.00.**



**CF291 MONGOOSE.** Slow combat profile C/L 40" span, .35 eng. Fast Richard. FM 3-73. **\$6.00.**



**CF295 CITABRIA.** Profile stunt for .29 to .40 eng. Dick Mathis. FM 4-73. **\$6.00.**

### F/F SOARING- 11



**CF244 GAMBIT.** A/2 Nordic. Benedek 7457 airfoil, fiberglass rod fuselage. Kit Bays. FM 11-71. **\$5.00.**

**CF209 ATHENA.** 80" span Nordic A/2 glass fuselage. Open class winner '66 NATS. Roger Simpson. FM 3-67. **\$5.00.**

### NEW UNSORTED



**CF179 U. S. KID, ZING, FLASH.** Three hand launched 18" gliders by Bay, Mathis, Peadon. Great fun. FM 7-70. **\$7.00.**



**CF-926 SWALLOW.** Build this sporty high-wing ship which features proportionally operated flaps. Spans 56 inches, requires a .28 to .32 eng., and 3 to 4 channel R/C system. Plans on two sheets. By W. Winter and J. Hunton. FM 3-94 **\$14.00**

**CF-929 BINGO 20.** This low-wing, four channel, R/C sport design features interlocking light-ply fuselage construction. Spans 49 inches, and uses .20 to .30 two or four stroke engines. Dr. D.B. Mathews. FM 4-94. **\$8.00**

**CF-930 WEDELL WILLIAMS RACER.** A profile C/L Stunt version of a popular 1930's speedster. Features a 59 3/4-inch wing span, and uses .40 to .51 eng. M. Garmon. FM 4-94. **\$8.00.**

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# Big planes

By Dick Sarpolus



PHOTO: KEVIN LARKE

Carole Lark is happy now and so is her husband Kevin since he solved the ignition interference problem of the Maloney 125 on his *Sledge Hammer*. Text details the fix—soldering a resistor into the ignition cable.

**M**aloney engine tip: there are at least a few other modelers out there in addition to myself who use and enjoy the Maloney engine. I know a lot of guys feel the Maloney is too heavy for its power, but I find that the engine starts easily and runs so steadily that it's worth building a lightweight airframe to get a package that performs well.

I have had some trouble with ignition noise from the Maloney affecting the radio operation. In one case the problem was cured by moving the battery pack away from the receiver; in another case I removed the radio and went to another brand that oper-

ated with no trouble. I have found that after the spark plug gets some running time on it, the radio interference problem comes back. I've tried cleaning the plug, but only a new plug has stopped the interference troubles. And those plugs are expensive.

I received a letter from modeler Kevin Larke, along with some photos of the very, very nice *Sledge Hammer* Kevin built for his Maloney 125 engine. He had so much of an ignition noise problem that he couldn't fly this plane at all. When he ran the engine outside his home, his wife told him about the bad interference it caused on their TV's channel 5. Kevin knew that resistor type

spark plugs helped cut down radio interference in cars, so he tried to find a resistor plug for his Maloney. He couldn't find such a plug, so he checked a resistor plug intended for his truck, and found that it measured about 5000 ohms resistance from the outer terminal tip to the center electrode. He slid back the rubber plug boot on the Maloney's spark plug lead, took off the spring terminal which clips onto the spark plug, and soldered a 4.7K ohm, one watt carbon composition resistor between the plug lead and the spring terminal. The rubber boot slides back in place and covers both the resistor and the spring terminal.

Success! With no change in the performance and operation of the engine, the TV interference was greatly reduced and his radio range improved so much that he now flies with the Maloney engine and has no problem.

Kevin hasn't tried other types of resistors or other resistance values; the first thing he tried works just fine. And he also found that his local Honda dealer sells NGK CM-6 spark plugs, which fit the Maloney, for \$2.35 each! He's pleased with the Maloney in his *Sledge Hammer*; while it doesn't provide scorching performance, the plane lifts off quickly and flies nicely. I appreciate the tip about a resistor spark plug and its effect on radio interference; I'll be trying this one on my Maloney.

Kevin went on to say that the *Sledge Hammer*, built from FLYING MODELS plans, was his first scratch-built aircraft project. While working on it, he bought a scroll saw, table saw, and a belt/disc sander—all to use in the preparation of the balsa and plywood parts for the *Hammer*. That's quite an investment in power tools, but obviously he's now in a position to do plenty of scratch building.

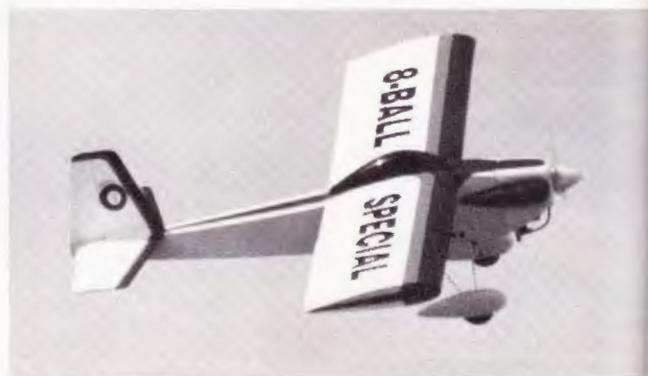
## 8-Ball Special: a new kit

I like this one; a new sport design for the Quadra Q-40/Zenoah G-38 type engines. You can tell at a glance from the aircraft's design layout and numbers (85-inch wingspan,



PHOTOS: REID'S QUALITY MODEL PRODUCTS

Zeroing in on the popularity of the Quadra 40 and Zenoah G-38, Reid's Quality Model Products designed this 85-inch sport plane (above left) called the *8-Ball*



*Special*. Dick says its flying qualities (above right) remind him of the venerable *Senior Falcon*. The wings are foam core, the fuselage light poplar ply.

1360 square inch wing area, 53-inch length) that it's going to be an easy handling, good flier. It kind of reminds me of the old *Senior Falcon*, but in a larger size. With its shoulder wing configuration, constant chord planform, and tail dragger landing gear, it's bound to be a good one. The kit specifications are interesting: foam core wings notched for hardwood spars, full length light plywood fuselage sides, pre-cut parts, aluminum landing gear, fiberglass cowl, etc. Scale aircraft are great, but it can be seen by the continued introduction of sport designs such as this one that there are plenty of Big Plane modelers who like the sport type planes.

For more information on the *8-Ball Special*, you can call or write: Reid's Quality Model Products, 16 Main St., Phelps, NY 14532. 315-548-3779. Get it now at an introductory lower price.

### Zinger Propellers

While in California on a business trip, I found enough time to visit Joe Zingali's Zinger prop manufacturing facility. And I sure enjoyed the visit! I think the thing that impressed me the most was the raw material from which the Zinger props are made; it's all rock hard American maple. To see the stacks and stacks of different sized hard maple blanks which will be machined into props of so many diameters and pitches was impressive. Zinger props are available from stock in diameters from 6 to 24 inches. And for those Big Plane enthusiasts needing even larger props, Zinger now offers, on a custom basis, props up to 36 inches in diameter. For even more strength and rigidity, the larger props are made from laminated maple stock. And Zingers in 3- and 4-bladed configurations are available from 10 to 28 inch diameters. In their 3- and 4-blade props, the prop blades are held in place between two aluminum plates with two bolts each; spare blades are interchangeable and available separately.

The first time I started my DC-3's Quadra Q-40s, by hand, with their 3-bladed Zingers, I was afraid of getting my fingers hit. I wore a heavy glove on my prop flipping hand. No problem; with the usual technique, it was no more difficult to flip the 3-blader than it was with the usual prop. Now, I don't know about those 4-bladers.

Most of the actual wood cutting machinery was custom developed and made in-house; while I couldn't understand from a quick look just how the tools worked, I sure could see them doing their job, and the finished products appear precision made. Zinger makes their props in real quantity; after seeing the size of their inventory stock, I doubt if they'd ever have any trouble filling an order.

Although Zinger props are balanced as a part of their manufacturing process, Zinger realizes that some can require touch-up for perfect balance. Their instructions tell you

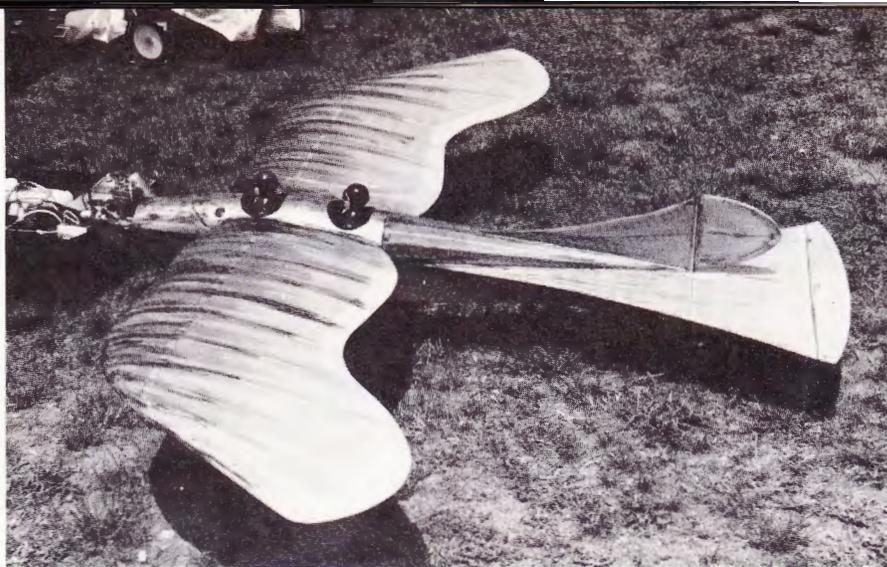


PHOTO: DICK SARPOLUS

WW I aircraft generally mean bipes, but the *Taube* was one exception to the rule. With this large 88-inch Zirolli designed model you're spared the complexity of bipes, but enjoy the flavor of this aviation era.

to remove weight from the heavier blade by scraping on the front of the blade, not the back side, which would affect the pitch of the blade. If you find a Zinger prop that you just can't seem to balance, return it to Zinger and they'll check it out for you.

Zinger's props in the custom larger sizes also come in very high pitches; for example, 18, 20, 22, and even 24 inch pitch. These props are primarily intended for use on the high horsepower engines used in the unlimited Reno type racing. I can understand that; but I have some trouble imagining the size of an R/C aircraft and engine that would utilize a 36-inch diameter propeller. Well, if you need one that big, Zinger will make it for you.

For information on any of their products, which also includes spun aluminum spinners in larger sizes, several types of glow plugs, a variety of glow fuel blends, and their larger sizes of custom propellers, write to: J-Z Products Inc., 25029 S. Vermont Ave., Harbor City, CA 90710.

### Large Taube

World War I aircraft are reasonably well represented at many Big Plane fly-ins, and it's nice to see the vintage types doing their generally slow-and-steady performing as a contrast to the newer warbird and aerobatic aircraft. With the narrow landing gear tread typical on WW I planes, the ground handling can be tricky. Straight-into-the-wind operations are usually the way things have to be done. I saw a large Nieuport model recently, being flown by someone who really knew what he was doing. Consistently, on the takeoff runs, the tail would rise and after a long, straight ground run, the plane would gradually and smoothly lift off. Sure looked realistic to me.

I've stayed away from WW I aircraft mainly because the added work of two wings, with all the rigging wires, etc., just doesn't appeal to my build-em-pretty-quick nature. I'd prefer a Junkers or *Eindecker* monoplane as a WW I project. There's another early monoplane to choose, with a very interesting configuration, the German *Taube*. Nick Zirolli made a small R/C *Taube* —.40 powered I believe—many years ago, that is still being built and flown by the WW I guys. Nick took enough liberties with the scale outlines that the model is very defi-

nately a *Taube*, but the layout is easy to build. No ailerons; but not to worry, the plane responds fine to rudder control. I've seen a number of *Taubes* fly, and their good flying always surprises me; I'd have guessed that the unusual wing and tail surface outlines would not result in a good flying aircraft.

If you're not aware of it, Nick has plans available for an IMAA-size *Taube*. At 88 inches wingspan, 62-inch length, and 1300 square inches of wing area, it's good sized. But the fuselage is slender enough and the plane is light enough that it's not for Quadra-type powerplants. It's recommended engine size range is .60-.90 2-cycle, or .20-1.2 4-cycle. For the engine sound alone, a 4-cycle powerplant would be an ideal choice. I'd bet a scaled-up version, about 1800 square inches or so, would be fun with a Zenoh G-38 or Quadra Q-42. The photo here shows a nicely done *Taube*, with I believe a .90 SuperTigre engine; the thing must go straight up. It looks vintage, with its faded fabric covering. Sorry, I didn't get the builder's name. Consider Nick's large *Taube* for an interesting, easy WW I project.



PHOTO: DICK SARPOLUS

**You need a prop?** Joe Zingali has one, from custom props like the 36-incher he holds, two choices of 2-, 3-, or 4-bladed props up to 28-inch diameters.

# R/C pattern

By Dean Pappas

**W**ell, at the end of last month's drivel, we were talking about how to make your plane last... No! Not last in the contest, I mean *last*—as in durable. The framework into which I shall be force fitting this discussion is the improvement of your flying through extreme familiarity with your equipment.

The maintenance and consistency of the control system and powerplant are of supreme importance, as is a predictable and well-trimmed airframe. The ingredient at hand is keeping that airframe around long enough for you to fully trim it and *then* put five hundred to a thousand flights on it. Yeah! a thousand flights is not unheard of, and by the end of your second season with an airplane, you will have developed a rapport with it. If it is a reasonably good ship to begin with, that communication can be wondrous! Pity those poor souls who believe that airplanes are inanimate objects. They have a life force that increases with the state of trim and with age (measured in flights and seasons). Okay, enough of this nonsense.

We talked about keeping wings from folding (in particular, the plug-in variety) and keeping the landing gear from pulling out of the wing. Saving weight is, after all, next to godliness, but there are some places where it is just not appropriate. To try and encap-

sulate last month: make all the necessary "hard points" in the structure tie together. See! I could have said that last month and pushed myself away from the word processor an hour or two earlier. Onward.

Now that we have devoted a small amount of attention to keeping the plane in one piece, let's look at protecting the investment in time and effort that we make when we struggle to build the airplane straight. What, after all, is the sense of building an airplane straight, if when you fly the airplane under a "G" loading or during gusty conditions, it *moves*.

It happens. For example, I had a *Typo 750* that I had built early in the winter of '83. It was desperately light, built just for the then new Turnaround pattern, with tail-dragging gear, and an inverted engine. All the structure that I would normally have put into a fiberglass fuse was left out in order to get the plane dead light. As result, the fuselage was... well, twisty. The airplane flew great—sometimes. It was light, well powered, and straight, and in calm or smooth air, it was a killer. In particular, the rolling stuff, like the half rolls at the tops of maneuvers, were effortless. This was no doubt due to both the weight and the excellent rolling characteristics of the Dick Hanson design.

In bumpy air, the airplane was transformed in Doctor Jekyll-to-Mr. Hyde man-

ner. I would pull up for a square corner, and sometimes the plane would break left, and sometimes it would break right. In good air, it was perfectly trimmed.

The best wind airplane I ever had just happened to be the stiffest one that I have ever built. The prototype *Maya* (which very few people ever saw) was twisty in the tail cone because of the stab mount. The airplane held a lot of promise, and in the week before the '84 Tangerine I put what must have been more than fifty test flights on the bird, adding some tail braces. As a result, the Mk II, the version people first saw, had a fuselage that was decidedly overbuilt. I had used top and bottom crutches of one-eighth inch fiberglass Magnalite (a marvelous material available from Bob Violett Models) and as a result, that airplane was dead rigid.

It was the same airplane, no matter what the weather. It also sent me on a quest for building techniques that would produce light, stiff fuselages. This was aimed at wood, but since the majority of kit built planes have fiberglass fuselages, we will discuss techniques appropriate to them.

The fuselage can flex in two different directions that can mess up the works. The first is twisting in the tail cone, like my experience with the *Turnarare*. Yeah, that's what I called it! The second problem has cropped up more with plug-in type planes. You've bought a dime-store type glider... or maybe a *Sleek Streak* rubber model, right? How do you make it turn? You put the wing into the slot in the fuselage so that one wing tip is further forward than the other. On a fiberglass fuselage with fillets or bulges in the area of the wing roots, the fuse is naturally stiff because of its shape. If the sides are flat, as they are on many designs, then you will likely have a problem. I ran into this recently, and two solutions presented themselves. Since I couldn't make up my mind, I used both. Let me explain...

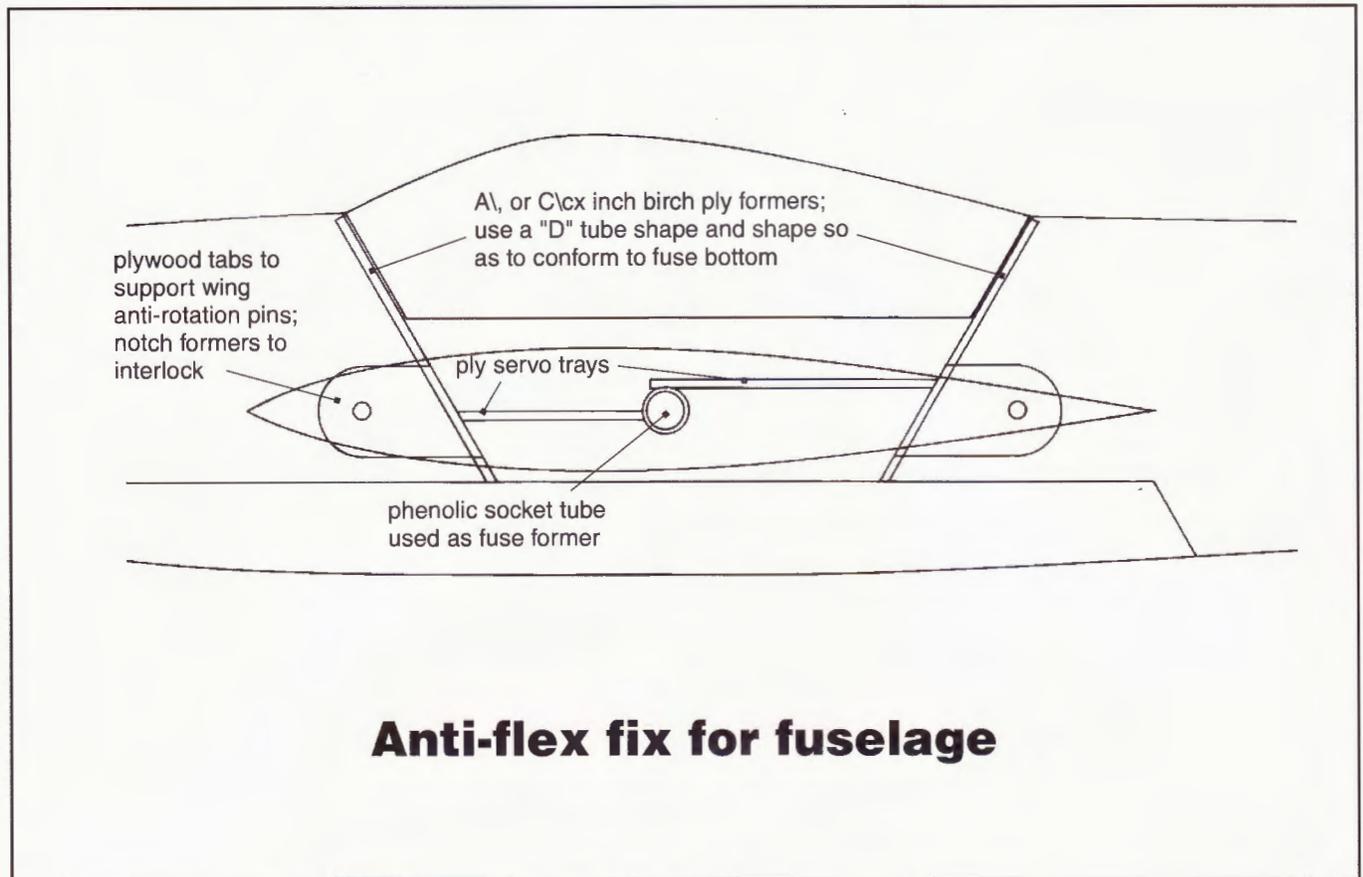
The airplane that I plan to use in this year's Pattern Wars is a *Dr. Jekyll*, the newer 120 powered design. The kit is available from RC City. Anyhow, with the airplane all ready to go, I had taken to hangar flying the thing in the workshop (the alternative was to chip and shovel the inch thick ice off of my driveway... sometimes it's tough to be thankful for having an ideal building season). As I was fiddling about, I found that the fuse would flex so that I could move the wing tips to look like the *Sleek Streak* with the unavoidable turn. I had to push pretty hard to do this, but a wooden airplane would be stiffer, so I attacked the problem.

Before I go on, let me say this loud and clear, this is *not* a criticism of the *Jekyll* design: any flat sided fiberglass fuselage will do the same, and a large top hatch (like the *Jekyll* does not have) would make things worse. You are probably wondering why anyone designs a plane with flat fuse sides if they are a structural stiffness problem. A lot



PHOTO: DEAN PAPPAS

Wayne Ulery designed it. Dean Koger built and flies it—his *Dazzle-U-II* that is. Built like a giant rubber model, it has 1300 squares, a YS .61 long stroke with belt drive, and a prop in the 15–16 range. Weighs 9 pounds.



## Anti-flex fix for fuselage

of people (myself included) think that they fly better. That's a good enough reason! The flexibility issue rears its ugly head even with one piece wing designs, and the solutions are similar.

What was needed was either a former or a shear web to keep the fuse sides from bending in an "S" shape. The shear web is really just a former, but lying flat instead of standing vertical in the fuselage. You might even mistake it for a fuse former, and that's exactly what I used. The servo tray was extended so that it grabbed the phenolic tube where it passes through the fuselage, and extended it to the back so that it grabbed the plywood pads in the fuse sides that are used for the rear wing anti-rotation pins. A plywood former up front, grabbing the front wing pins, distributes that load, and stops the wing wiggle. For those planes with a top hatch, a former at the rear of the hatch is going to be necessary anyway, so why not extend it so that it is a full former rather than just a "D" shape.

The message here is sort of like the one about tying all the hard points together: if you have to put some plywood into the fuse so that you can put canopy mounting pins and screws, then why not get some structure out of the job. Back when most of us thought that weight was not terribly important—do

you remember when the "right" weight for a *Tipo* or *Curare* was nine pounds?—most of us put a solid plywood floor between the firewall and the front wing bolts. While it might have kept the mud kicked off of the nose wheel out of the plane, it also served as an excellent stiffener. As nose wheels find their way to the endangered species list, so did this benefit. Back to the tail cone.

There are a variety of ways of stiffening the tail cone. Probably the neatest is to make a fiberglass composite fuselage, with a thin layer of foam (typically Rohacell) in between two layers of fiberglass. Some manufacturers offer this as an expensive option! Vacuum bagging and similar techniques make this sort of deal terribly labor intensive, although it turns out that life is much simpler if the sandwich area is reduced to a two or three inch tall strip, running from the firewall to the tail post. Since the foam does not need to be formed to any curves, simple hand layup techniques work. Someone really clever will eventually figure out how to use Nomex paper honeycomb for the middle layer, and then we'll really be in business. Forget the exotic stuff! Let's get practical.

The Hansons have been using a very good method in their kits. They lay a single strip of quarter inch square balsa in each side of

the still uncured mold, running from where the servo tray starts to the front of the stab. After the fuse is joined, sticks are laid across the two rails in a "ladder" (may as well make the first rung the servo tray!). The result is a very stiff fuselage, and the ladder-crutch could easily be glued into your new kit.

One simple addition that I never see in kit plans is a half former, joining the leading edge of the stab to the top of the fuselage, just in front of the leading edge of the fin. Here's an experiment to do with your buddy's plane. Twist the stab gently and look for where the distortion of the fuse side is most severe. The "shear buckle" will run from just in front of the stab, through the gap between the stab and fin leading edge, and up the fin on a diagonal. A small one-eighth inch balsa former—that would be trivial to install through the stab holes—kills the problem. Some kits required the builder to glue a sheeted foam fin into the fiberglass fuse, and while this was a tricky step during which many kits have been ruined (they *always* blame the manufacturer for the crooked fuselage) it automatically solved the stiffness problem.

Oops, I have overrun for the month: guess I loose Pattern points... Sorry, it's an inside joke. See you in a month.

# R/C Soaring

By Herk Stokely



PHOTOGRAPHY: HERK STOKELY

Hand launch R/C soaring is booming, but some people's arms are not. Herk has been exercising to get consistent mighty tosses like this one with his Waco 3434 "mosquito" (above left). But then there are some not so mighty heaves, like the one with his *Lil Bird* (above right), a hand launch version of the *Bird of Time*.



Those of you who know Bob Harold are probably aware that he enjoys our sport as much as anyone. I first met him at the '88 Nats. I was impressed with the fun he had, and the fun he made for many others with his little aluminum can flyers. In fact, if you have met Bob, but didn't recognize his name, it is the aluminum can planes that will be your recognition key.

I've flown with Bob some since '88, and last year at the LSF Nats we met again. As much fun as ever, the little aluminum can planes made their appearance again. In fact, there was even one that had a periscope on it, presented to Pete Peterson at the awards banquet. Pete managed to fly his plane into a lake at the hand-launch golf match—so the periscope equipped replacement was very appropriate.

## Fixing the arm

In my conversations with Bob, he asked if I was going to fly in the hand-launch contest. I told him that while I could throw some, I knew I'd get carried away and have a sore shoulder for a long time if I tried to toss my model all day at the contest. He mentioned that he'd been doing a lot of swimming, and had found that some exercises for swimmers had developed a couple of obscure little shoulder muscles that seemed to make the whole joint work better for hand-launch flying as well as for swimming.

I was very interested! I asked him to send me some info on these exercises, and some time after the Nats I received an outprint from a swimming magazine. There were only two specific exercises singled out in the article, which said that the repetitive arm motions of the swimming stroke combined with a "loose shoulder joint" can cause rotator cuff injury, and the associated soreness known as swimmer's shoulder. Bob said that the motions of tossing a hand-launch are so much like the freestyle swimming stroke, that these exercises had really helped him with both.

Since I'd fallen in love with hand-launch,

I decided to try the exercises. They're done in sets; use a weight that tires the muscle in 10 to 15 repetitions, and do each set of exercises three times at each session. I began to do the exercises four or five times a week, and within a month or so, I found that I could throw the model for much longer periods of time without feeling those warning twinges that said it's time to stop. These exercises don't seem to make the throwing muscles stronger. Instead, they seem to strengthen more obscure muscles that hold the shoulder joint in the proper alignment during the throwing movements.



Say, Bob Harold, you don't need a good arm to chuck those little aluminum gliders! Actually, it was Bob who gave Herk some interesting exercises to strengthen and rejuvenate his launching arm.

The first exercise is done while standing. With the arms straight out to the side and raised almost but not quite to the horizontal, move the arms forward about 30 degrees. With the wrist turned so that the thumbs point toward the floor, slowly lower the arms to vertical, and then back up to the starting position (about 80 degrees up - not quite level; and about 30 degrees forward). Start with weights of about 2 pounds and work up to no more than 10 (I'm using 6.6 now), and do three sets of 10 to 15 repetitions at each session.

The second exercise is done while lying on your side on the floor. With the elbow of the upper arm held against your body, allow the forearm to hang vertically to the floor (the elbow is bent 90 degrees and the upper arm is against your side). Then raise the forearm toward the ceiling while keeping the elbow bent 90 degrees and the upper arm against your side. Again, you should work with weights in the range of 2 to 10 pounds and do several sets at each exercise session.

If you'd like to have what Bob sent, send me an SASE, with an extra stamp inside to cover the cost of copying, to 1504 N. Horseshoe Circle, Virginia Beach, VA 23451, and I'll make you a copy. These exercises have not made me into serious competition for Brian Agnew, but they have given my shoulder back to me. I do a careful warm-up of stretching and light throwing before I begin. I also don't throw if the warm-up indicates that the old joint is feeling "delicate". But, on a good day with a proper warm-up, I've been able to toss the model all afternoon with no after-effects at all.

## PC-Soar And MaxSoar

In a previous column I mentioned some of the problems that occur when a computer user, programmer, and system operator are different people, and sometimes are even working toward different objectives. Folks who are avoiding computers, and who may have come to dislike the whole concept of "computer" in that kind of environment are missing an opportunity to benefit from the use of some really excellent soaring software, software that was developed not by programmers, but by other users with interests just like theirs.

A great example of the case where a user develops and then supplies the computer program (for which he also a user) is the PC-Soar and MaxSoar family of products from LJM Associates. Lee Murray is a longtime sailplane flyer and is well known for his work in providing laser cut airfoil templates for model builders. Lee, along with John Hohensee may have been the first to supply sailplane design performance analysis programs to the R/C soaring community.

The programs supplied by Lee and John are unique in that they are available for both the IBM compatible PC and the Macintosh computers. I may be mistaken, but I believe that if you are a MAC user, MaxSoar is your

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PC-SOAR MAIN MENU

- 1 > Add... Sailplanes to the Desktop
- 2 > Create... Sailplane on the Desktop
- 3 > Modify... Sailplane on the Desktop
- 4 > Compute... Sailplane PARAMETERS and PERFORMANCE
- 5 > Compare... Sailplanes on the Desktop
- 6 > Save... a MODEL to DISK
- 7 > Remove... a MODEL from DISK
- 8 > Execute... DOS Command while remaining in program
- 9 > Exit... PC-SOAR Program

To Select: ↑ or ↓ To Run: ←  
or Press Highlighted Number

ENTER YOUR SELECTION

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Version 3.3

PC-SOAR QPOLAR MENU

- 1 > SELECT ... File to View/Edit
- 2 > CREATE ... New File
- 3 > HELP ... General Program Help
- 4 > EXIT ... QPOLARS Program

To Select: ↑ or ↓ To Run: ←  
or Press Highlighted Number

ENTER YOUR SELECTION

The PC-Soar program breaks down to two main subprograms, one for performance, and one for airfoil polars. This (above left) is the main menu for the performance aspect of PC-Soar, while the menu for the polars side of things looks

like this (above right). From the performance side come these comparative analyses of three model versions (below left). The polar displays (below right) use color to identify each model's plot. Tabulated data is also available.

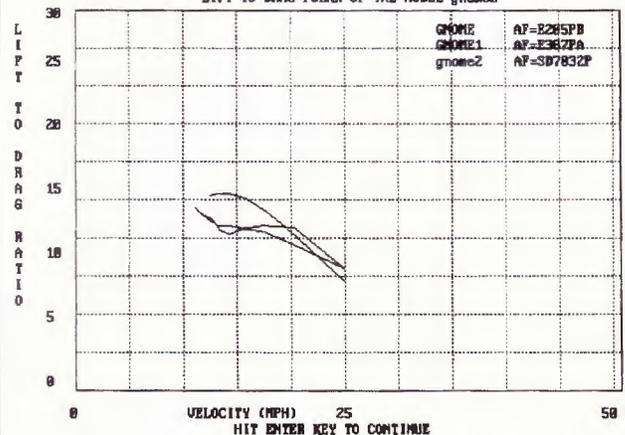
COMPARISON OF 3 MODELS ON THE DESKTOP

MODEL NAME	SOAR	NUMAL	GNOME
AIRFOIL	E285PB	E387PA	SD7832P
WING TYPE	POLYHEDRAL	POLYHEDRAL	POLYHEDRAL
WING POSITION	SHOULDER	SHOULDER	SHOULDER
H.STAB TYPE	LOW	LOW	LOW
MODEL WEIGHT	13.00	13.00	13.00
WING LOADING	5.07	5.07	5.07
WING SPAN	68.00	68.00	68.00
WING AREA	369.18	369.18	369.18
WING A/R	9.33	9.33	9.33
STAB AREA	43.04	43.04	43.04
LONG S.F.	0.31	0.31	0.31
FIN/NUDDER AREA	32.55	32.55	32.55
UTUC	0.026	0.026	0.026

ENTER YOUR SELECTION

1-Sail #1 2-Sail #2 3-Sail #3 4-Sail #4 5-Compare All  
GRAPHIS: 6-Sink Rate 7-Lift to Drag 8-Set Screen Type 9-EXIT TO MENU

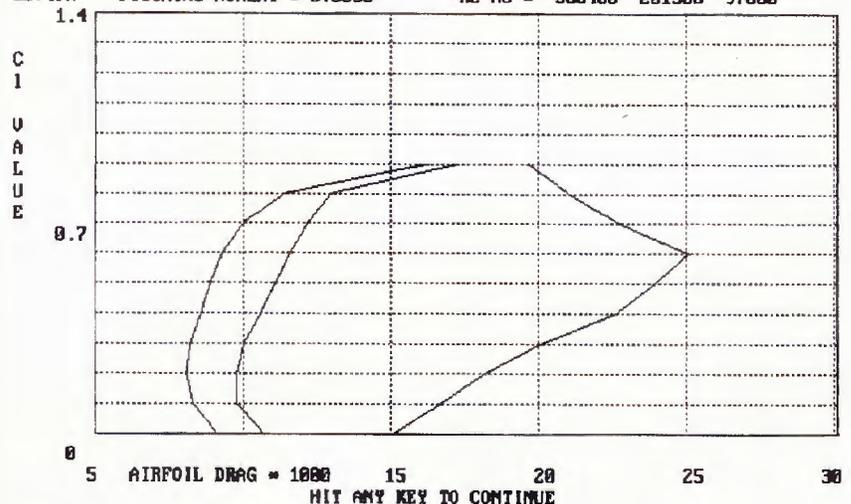
LIFT TO DRAG POLAR OF THE MODEL gnome2



only commercially available option. Of course you can run some PC programs with the PC emulator software available for MACs. The LJM software is somewhat unique in providing a very thorough analysis while remaining easy to navigate and use. There seems to be some kind of perverse rule that computer programs which are powerful will be hard to learn to use, while programs that are relatively easy to use are often very limited in their capabilities. This isn't the case with PC-Soar. Full performance comparison plus stability and control analysis is available in a clear and intuitive format. There is also an extensive library of sailplanes and another of airfoil data available.

The programs cost about \$50 (for MAC) and \$40 (for the PC). These come with data for ten airfoils and five sailplanes pre-entered. If you want to expand that you can get extra disks with dozens of sailplanes and hundreds of airfoils for about \$30 each. To get the latest information and prices, contact Lee Murray at 1300 Bay Ridge Rd., Appleton WI 54915-2854 for PC versions, and John Hohensee at S-22 W-27400 Fenway Dr., Waukesha WI 53188 for the MAC software.

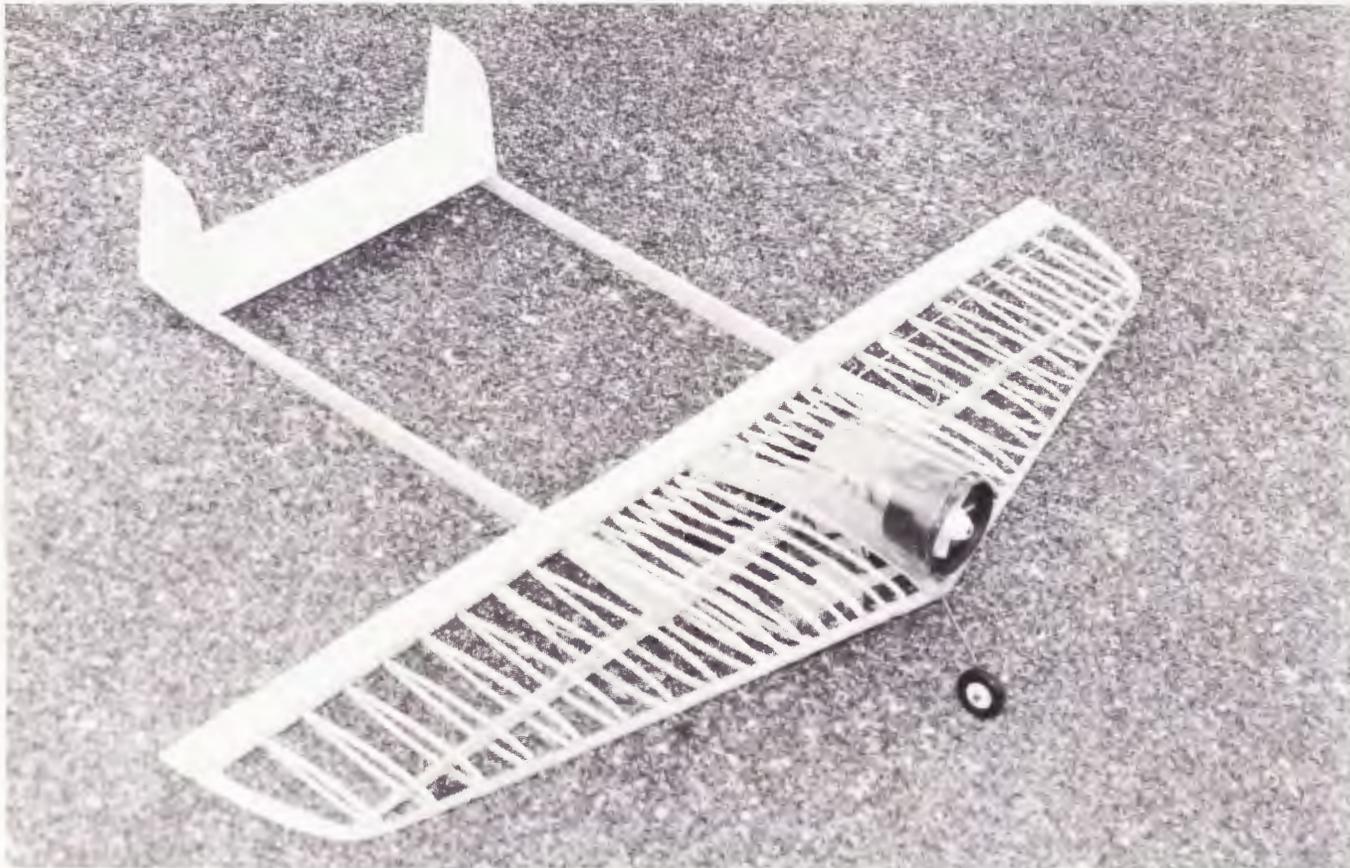
E374PA PITCHING MOMENT = 0.0000 Re No = 300400 201300 97800



The viewing option of the airfoil data reproduces the lift to drag polars at various Reynolds numbers. PC-Soar also has an optional library of dozens of sailplane and hundreds of airfoil data.

# Fan Facts

By Frank Fanelli



PHOTOS THIS PAGE: WOODY BLANCHARD

You won't find the aesthetics of modern jets in Woody Blanchard's electric powered fan plane, but the Morley powered model can perform well.

**E**ven the most ardent ducted fanatic will have to admit that the complexity, noise, and mess of a glow powered fan, with throttle linkage, pipe, pressure, remote needle valve,

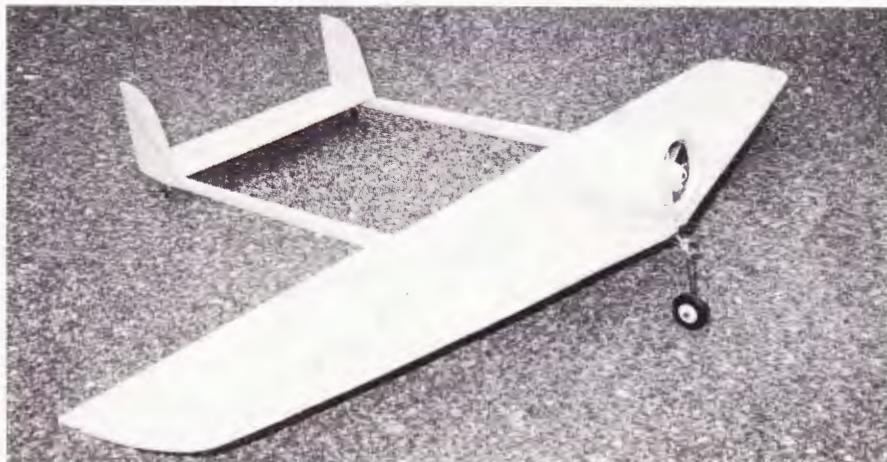
and in-flight adjustable mixture control are not some of his/her favorite things. Deep down in his/her heart he/she wishes they could do without it all.

Perhaps someone could wave a magic

wand and presto! a power source that is easy to install, clean, light, fuel efficient, and powerful. So far nothing like that, in this world run by the compromise of physics, exists. There is a power source that satisfies all of the above criteria, except for one: weight. I'm talking about electric fans.

More than one person has played with the seduction of electric power for fans, turned on the calculator, and toted up the numbers to see if the effort of such a model would be worth it. Take a look at other areas of modeling, right up to fifth scale aircraft. Designers seem to be finding successful methods and airframes to employ this clean, quiet, and fairly powerful method of propulsion. Look at the advantages: no pipe installation, no throttle linkage, fairly quiet, no needle valves, and no protruding carburetors or cylinder heads. Sounds like a fan modelers heaven.

But into every life some rain must fall and in this case it's more like a splash when you come to the subject of weight. It is the Catch 22 of using electric power for a fan. To get the power and the duration needed for a practical, efficient fan model you build an airframe that weighs next to almost nothing or you use batteries. Lots of 'em and big



The fan unit is standard as sold by Kress Jets and works quite well. The landing gear is really a tricycle tail-dragger, with a small tail wheel under each fin. Emphasis is on lightness in this model.

ones. That spells significantly more weight than the heartiest glow fan engine around. Nothing, so far, beats the power to weight advantage that an internal combustion, reciprocating engine provides.

That doesn't mean give up the dream. Some modelers are gradually breaking trails to promised land of an electric fan. Keith Shaw, among his marvelous air force of electric designs of all kinds, created an electric fan powered Hornet Flying Wing. In England, Dave Chinery flies a twin electric fan powered Lockheed S3A Viking that spans 67 inches and weighs 100 ounces.

Closer to home, Woody Blanchard and Jerry Vilendrer have concocted their own solutions to the tempting lure of electric power. For the sake of stoking creative inspiration, listen to what each has done. First one to take the podium is Woody Blanchard.

"In order to achieve an 'acceptable' thrust to weight ratio of 0.5, the structure (*Woody's is still a no-name plane—Ed.*) was kept light as possible. All-up weight is 33 ounces and static thrust has been measured at 16+ ounces. Since the propulsion system weighs 24+ ounces (ten SCR 1000 cells plus Morley Fan unit with Kress supplied motor), this leaves only nine ounces for the airframe plus the receiver and two servos. The receiver case was removed, and no connectors are used in the propulsion system. Performance is respectable, but would be better at a higher thrust to weight ratio. I intend to try an Astro FAI 035 motor, and should be able to improve T/W somewhat."

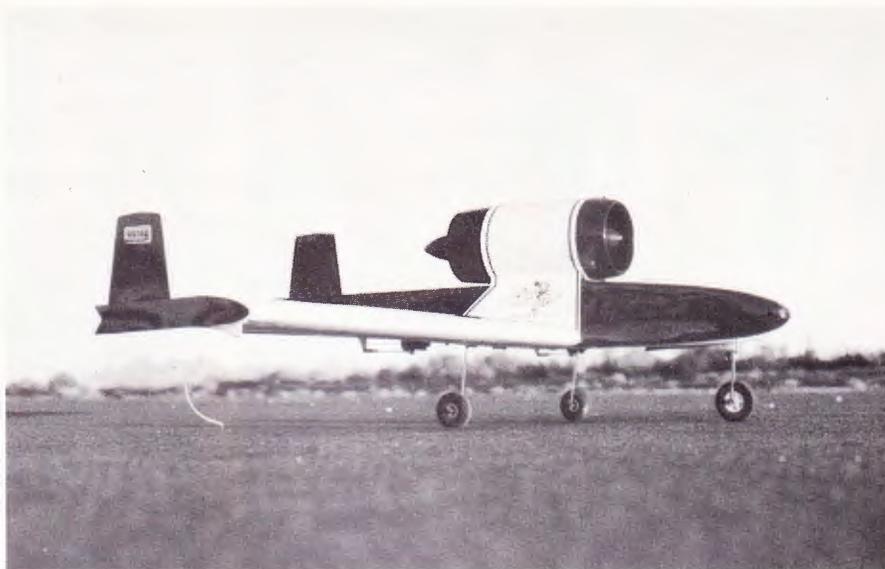
A look at the photos shows that Woody considered every gram that he put into the plane. The ribs are not solid. The covering is a light weight material called Litespan (from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; 615-373-1444). In a recent phone conversation, he mentioned that he did substitute the Astro FAI 035 but it didn't yield the increased performance he expected.

Jerry Vilendrer showed up at this past Arizona Jet Rally with his effort at electric fan power, a converted Midwest *Jetster*, a late 1970s design of Dick Sarpolus that used a Midwest RK-20 Axiflo fan. Here's what Jerry had to say.

"Following our telephone conversations, I reviewed the process of my work on developing an electric ducted fan aircraft. I have tried to detail the specifics in the process and hope that it is helpful to you..."

"My first attempt at building an electric ducted fan aircraft did not work out quite as I had planned. However, it provided me with the information I needed to do it right, the second time.

I tried converting an H.O.B. F-86 (now kitted by Paul's Flying Stuff) for electric operation but could not quite come up with the right combination. Selecting a model with the fan unit outside the fuselage solved



PHOTOS THIS PAGE, JERRY VILENDRER

Jerry Vilendrer's electric *Jetster* is a pretty standard version of the late 70s Midwest kit. The fan is the old reliable Midwest RK-20 that was simply modified to house an Astro 40 cobalt instead of a .25 2-cycle engine.

most of the problems. The Midwest *Jetster* seemed to be a good choice. I wanted to keep the project as simple as possible and use as many 'off the shelf' items as I could. I purchased a *Jetster* that was framed up, but not covered, as a starting point. After checking the catalogues for possible motors, I chose the Astro 40 Cobalt and the RK 20 fan unit, and hoped I could make it work. The motor did fit into the RK 20 with very little modification and has worked extremely well. It took 24 cells to get the rpm to 20,000; the amp draw was a surprising 21 amps. But the thrust was a disappointing two pounds. In order to get the wing loading out of the F-104 category, I would need more wing area. A 60-inch wing span will give me about 540 square inches. This will make the wing loading about 24 to 26 ounces per square foot. This seemed reasonable, but on two pounds of thrust!

"With wings extended, the radio installed and twenty-four 1000 mAh cells, the total weight is six pounds 14 ounces. Wing loading 26.25 ounces per square foot.

"Time to taxi test and see if it will get up enough speed to fly. I belong to the Arizona Model Aviators and we have a long, wide paved runway with good overruns. Acceleration

was surprisingly fast but the nose wheel steering was over-sensitive and very difficult to hold straight on the runway. After passing the transmitter to a friend, it did track straight and we could tell it was ready to fly. After a recharge of the batteries, and with a friend at the controls and me on the camera, it took off and flew much better than I anticipated. Except for the sound, it was no different than a typical *Jetster*.

"That first flight was in November, 1992. At the Arizona Jet Rally that year it won a trophy for technical achievement. At the Great Frontier Jet Shoot Out, in February, 1993, it was clocked at 79 mph and won the bronze plaque in the subsonic class. We did a decibel check and it showed 89 decibels. That seems loud for an electric.

"For those who might want to duplicate what I did, I located the elevator servo aft of the wing trailing edge bulkhead and put an access cover on the bottom of the fuselage. In the nose of the aircraft, I put the nose wheel steering servo (use a micro-servo here). Also in the nose are the receiver, speed control (Astro 205) and 500 mAh battery pack. I used Velcro™ for mounting everything except the servos. For the ailerons, I used a micro-servo in each wing. This leaves the center section open and room for the batteries in the center of the fuselage on the c.g. Make three, eight-cell battery packs of 1000 mAh. Two of these will lay flat, one on top of the other, and the third will stand on edge. It's a tight fit but they will go in.

"All in all, it has surpassed my expectations. It does mild aerobatics with ease. Full power flights last about four and one half minutes. Everyone who has flown it has been both surprised and pleased at how well it flies."

I don't for a millisecond doubt that the absolutely tame by current fan standards will leave many saying that just ain't my cup of tea. It doesn't fly like a jet should look, and they are right. But for now, in the realm of electric power for fans, it's a time of small steps. After all, look how far we've come in this world of Viojets, Dynamaxes, Turbaxes, Ramtecs, and Byrojets from those early, crude, stamped metal, twisted blade impellers and ringed engines.



To help better the wing loading of his *Jetster*, Jerry Vilendrer extended the span to 60 inches which gave a more acceptable 24-26 ounces/square foot.

# Electric Flight

By Don Mott



PHOTOGRAPHY: DON MOTT

The weather that greeted this year's KRC meet was just the kind for Art Thom's magnificent 114-inch Boeing 314 *Yankee Clipper* (above left). Four Astro 05s



power the 14-pound model. Four Pittman motors powered Ken Stinson's KC-130 (above right) through Master Airscrew 3:1 gearboxes. Props are 8-6s.

The weather has been miserable today, just the thing I needed to get my tail moving over to the old keyboard and write up the happenings at the 14th annual Keystone R/C Club Electric Fun Fly so that you folks who weren't lucky enough to be there would know what you missed. Well, what you missed was another great electric flying weekend in the same tradition that has made The Keystone R/C Club the premiere booster for electric flight on the East Coast. Thanks to Bob Lane, John Hickey, Bob Kopski and all of those other hard workers in the Keystone club, 160 registered fliers and many more spectators had a wonderful three days.

Yes, I said *three* days. The festivities began officially on Friday evening, September 17th with open flying for those who arrived early and the First Annual SR Batteries Night Fly starting just before dusk and continuing well into the pitch dark portion of the evening. Black as the IRS man's heart it was, with the eerie glow of the Cynalume sticks outlining the runway and ghost like, almost silent models drifting in the black velvet air. It was a strange experience for sure, with those present speaking in hushed tones as if something supernatural was taking place. It may have had something to do with the idea of a bunch of adults standing in the middle of a grass field on a black moon-less night, doing something insane, releasing their multi-hundred dollar models into the unforgiving night air, always with doubtful hopes of getting them back in one piece.

The skeptical among the group were surprised by the total absence of crashes, however. Of the one hundred to one hundred and twenty people attending (it was a little hard to get a head count in the dark), about three quarters were spectators. There were a total of twenty-three successful flights logged over the two or two and a half hour time span. A few "shaky" flights were made by fliers who really needed a bit more practice

with their particular aircraft or perhaps more stick time in general. The main message here is to be sure you and your airplane are ready for night flying, just as you would if the aircraft were full size and your life were on the line.

One of the best lighting systems noted was Bob "Mr. Electric" Kopski's light pods. These are long pods, strapped chord wise by rubber bands, beneath the wing. With lights to the front and rear of these pods, there is a neat box shape visible from the ground that tells you at all times what attitude the aircraft is in.

Another good setup was used by Steve Anthony; he had lights mounted internally in his *Viking* old timer. The *Viking* is covered with transparent yellow MonoKote and the effect is one of having the whole aircraft glow with light.

Several fliers opted for the last minute fix of strapping Cynalume sticks to the wings and fuselage. This also worked, but personally I had trouble telling what attitude these ships were in at certain times.

Larry SRibnick tells me that there will definitely be another SR Batteries Night Fly on Friday evening of KRC weekend this year and hopes to attract more participants this time around.

KRC will officially be a three day affair for 1994. The Buc-Le Aero Sportsmen field will be open all day Friday for flying by KRC participants, and Larry SRibnick has a surprise for all who can arrive Friday morning. There will be an all-day electric flight symposium held that will interest all who fly electric. Many expert guest speakers are scheduled, and you will be surprised at the popular personalities who will share their knowledge with you. For more detailed information on this interesting symposium be sure to keep an eye on the Electric Flight column in future issues of this magazine.

The weather this time around was slightly on the miserable side with a Friday on and off rain stopping just in time for the SR Night Fly. But then we were beset by driz-

zles all day Saturday, turning the parking lot of the Buc-Le Aerosportsmen field into a quagmire of mud and stuck cars. The parking lot boys, always an unsung lot, did a super job of keeping things sorted out.

The low ceiling on Saturday made flying at altitude impossible and I don't for the life of me know how the all-up, last-down boys managed the times that they did. High time was 59 minutes; this had to be without the help of thermals. Amazing! Even more amazing is the fact that the high time for Sunday was only 30 minutes even though weather that day was much better, so go figure.

The Saturday night banquet was top notch as usual, good food and plenty of it. But the most important event of the night was the donation of over \$500.00 to the AMA National Flying Site fund by the Keystone club. This money was raised through the raffle of an AVEOX brushless motor system. KRC president Bob Lane and David Palumbo, representing AVEOX, presented the check to Bud Klopp District III Associate VP.

In a separate presentation the Keystone boys were recognized by the AMA as a Gold Leader Club for their years of support for model aviation and their community. Joe Beshar, AMA Vice President District II, made the awards, presenting a plaque to Bob Lane and a gold pin to each member of the club.

The weather on Sunday was much improved, with dry skies and a much higher ceiling. The parking lot had a chance to dry out a little and there were no more patches of quick sand to suck down your car. By the way, donations were asked for by KRC to pay for repairs to the parking field and modelers being the generous folks that they are, dug down deep and provided over five hundred and fifty dollars to help keep the peace with the Buc-Le Aerosportsmen. Remember, the Keystone club and their electromodeling friends (that's us) are guests of the Aerosportsmen and should really leave the field as we found it. That objective was obviously accomplished, as KRC is scheduled for



**Built to qualify for IMAA specs,** Walt Bub's Grumman F4F *Wildcat* (above left) is certainly big. It relies on a geared Astro 40, fed by eighteen 1400 mAh cells, to



turn its 15-10 prop. Not so big, but still pretty neat was Don Bousquet's 45-ounce PBY (above right). This Easy-Built kit used two Speed 400 motors.

the same time, same place in 1994.

The most obvious trends this year were the many beautiful, larger motored aircraft present and the increase in the numbers of high speed aerobatic F5B type aircraft flown.

Among the larger aircraft was one that although huge, is still powered only by Astro Cobalt 05 size motors, four of them in fact. It is Art Thoms' Boeing 314 flying boat, *The Yankee Clipper*. Although not flown at KRC, (it didn't rain quite enough) this work of Art, (Get it? Work of Art? I kill me sometimes.) attracted much attention and garnered a third place for Art in the Best Technical Achievement category. I have since seen it float off the water at the Lake Ronkonkoma Float Fly on Long Island and it truly flies spectacularly. It has a 114-inch wing span and weighs 14 pounds; this makes for a 22 ounce per square foot wing loading. The motors turn three blade 10-6 props through gear drives. The battery pack contains 32 cells. Art hales from Berkeley Heights, NJ.

Another flying boat that caught my eye was the PBV of Don Bousquet. The model started out life as an Easy-Built kit and was finally completed after several hundred hours of skillful building at the hands of Don and his co-builder Ray Canton. They have racked up over thirty flights on the "Dumbo" so far and as Don's 12-year old son Nathan demonstrated on the flight line, it flies as good as it looks. Speed 400 motors and eight 800 mAh cells power the 45-ounce model, turning 3-blade 6-3 props. An Airtronics MA-3 speed control and 501 servos round out the equipment.

Walt Bub of Lebanon, CT brought a Grumman F-4-F that flew very realistically. It's light construction and ample power enabled the big model to fly slowly in a scale-like manner to the delight of the crowd. Built to qualify for IMAA, this large scale model is powered by an Astro 40 geared motor turning a 15-10 prop on eighteen 1400 mAh cells.

While we are talking quarter scale I'd like to mention Dave Baron's 1/4 scale Heath *Parasol*. Dave, of Roxbury, CT, powered his *Parasol* with one of the new Mega R5 motors from Czechoslovakia via Hobby Lobby. This is a cobalt type motor and draws its volts and amps from a 16-cell 1700 mAh battery pack through an Astro 207 speed control at a twenty amp rate. Dave drives a 15-10 prop through a modified Astro gear box; the combination pulls the 8-foot span model with authority.

Multi-motored models were the order of

the day all weekend and one of the most impressive was Ken Stinson's KC-130. Ken pulled down a third place Best Scale model on Saturday and a second place CD's Choice on Sunday. Ken powered his model with four Pittman motors and 20 1400 mAh cells. Some of you folks may remember the Pittman boat motors of quite a few years ago; for quite a while Pittman was the only boat motor that you would find in the local hobby shop. Perhaps they will be getting in on the rising interest in electric flight and put out a few aircraft motors. The ones that Ken used drew only 6 Amps at 20 volts while turning four blade 8-6 props through Master Airscrew three-to-one gearboxes. Eight and one half pounds and an 85-inch span, 839 square inch wing gave a wing loading of 23 ounces/square

foot. Oh yeah, Ken is from Telford, PA.

As usual there were quite a number of Old Timer models present and one of the most impressive was a Goldberg *Gas Bird* built by Karl Benson of Wyomissing, PA. Carl's *Gas Bird* is powered by an Astro 15 and twenty-four 1100 mAh SR cells. Yes you read that correctly, that's over 1000 watts. You would really believe it if you could see and hear this rocket ship go. And go it does, howling and climbing at a very steep angle. I'd like to know how he keeps the motor together.

I could keep on going here, telling you about all of the beautiful models that were in attendance at the 14th Annual KRC Electric Fly, but you really must see this mega show with your own eyes. It is an experience that is not to be missed if you can at all help it. See you in Quakertown in '94.



**One facet of modeling** that has benefitted greatly from electric is Old Timer, like the Goldberg *Gas Bird* of Karl Benson (above left), Ralph Jackson's WW I DeHavilland Pusher (above right). Dave Baron's Heath *Parasol* is true 1/4 scale at 8-foot span (below). A Czech Mega R5 motor from Hobby Lobby provides power.



# Whirlywords

By Pete O'Connor

**A**s you might already know, I'm now the "only" Whirlywords columnist. Dale finally decided to take a permanent vacation. However, the door has been left open for a guest appearance anytime he may have the urge. I think once he gets used to all that free time to go flying, he'll be hard to grab for an article. So, here's hoping I can keep this column as interesting as Dale has done.

Last month, I discussed how to create, and the need for, a constant head speed to maximize Stunt mode t/r revo mixing. Continuing with that column, let's go right to Stunt mode t/r mixing for the PCM10 and 10S.

One advantage the PCM10s have over other JR radios is the ability to set the zero point (Pitch) anywhere you like. As I usually do, let me get one thing straight right now! The 10 and 10S have different codes for similar functions. And, by now, you should know how to find them. So with that in mind, when I talk about Stunt mode trim and other modes, I'll refer to them by name only.

Well, let's do it! In order to make sure you find zero pitch—a prime necessity on your radio (while flying)—set up a regular pitch curve in one of the stunt modes and choose where you want zero pitch. Then, readjust the curve so you have zero pitch from that point to full low stick. This way there is no guessing that you are right on zero. As described last month, set up your throttle for a constant head speed.

OK, it's out to the field for hands-on testing. Get that baby started and bring it into a hover. Since you are going to be adjusting the stunt mode revo mix, I will assume (oh, well) that you know to be in stunt mode 1 or 2 to activate the mixing.

At this point, make sure there are no values for +P or -P in your radio. OK, from a hover, add full pitch and ascend to about 75 feet. Keep an eye on the direction the nose goes. If the nose turns left, it needs right rudder stunt trim added. However, if the nose rotates right, it needs left rudder stunt trim. Continue this exercise until the machine ascends without turning. On to step two.

Next, bring up stunt mode revo mix (+P) and enter 18 as your starting point. This is the value that I have found to be an excellent starting percentage. Next, still in stunt mode, put your copter in slow forward flight into the wind with 100 feet of altitude. Now, lower pitch to zero degrees, full bottom stick, and check which direction the nose begins to turn. The nose turning left will indicate stunt mode revo mix (+P) needs to be decreased. The nose rotating to the right shows an increase in (+P) is needed to stop the rotation. Remember, it's important to keep the head speed constant. Once you get the machine to descend without any tendency to rotate either direction, you're ready to set up (-P).

To set up (-P), enter the number you found for (+P) as your starting point for (-P). Remember, it doesn't matter whether you run one degree of negative or ten degrees of negative, you are taking a linear percentage of pitch to offset your rudder. Now it's time to decide on the amount of negative pitch you want to run and change your pitch curve accordingly. Let me make a suggestion. Begin with the pitch curve you already have and make low pitch minus 2 degrees.

To repeat myself, don't try too much at one time. You'll have plenty of time to run minus 10 degrees and do hovering flips. Also, from last month's column, readjust your throttle curve to yield a constant head speed. So, as long as you keep your head speed constant, I guarantee that you'll be right in the ballpark.

Since every copter is different, fine tuning (-P) is as follows. Using your choice, enter inverted flight with about 100 feet of altitude. Make sure you are headed away from yourself when you get inverted. If you are comfortable with upright nose-in, a very good way to get inverted is fly toward yourself and enter a loop, letting it stay inverted as it flies away from you. Use care and don't fly too close to yourself. Once inverted going away from yourself, go to full negative pitch and quickly (if you're not into inverted pirouettes) observe if the nose has any turning tendency. If the nose wants to turn right, increase (-P) to correct. If the nose wants to turn left, decrease (-P).

Let me add a helpful hint that will keep your copter from doing the "I wanna be a lawnmower syndrome". Enter the inverted position with a fair amount of speed to prevent the machine from any possibility of pirouetting. This will, however, mask which direction the nose wants to rotate. So, get your flying buddy or bribe your wife (with a season's pass to Roy Roger's), to watch the tail of your machine as you fly. You're right, I did say tail!

By now, Ray Hostetler's (RCM's chopper columnist) ears must be burnin'. Ray always told me to reference the nose when talking about rotation. Well, when your bird is inverted for only a few seconds, tail movement is much easier to detect than nose movement. And, if your wife or girlfriend is helping, I know she will tell you, "Gee honey, I couldn't see which way the nose moved, but the back end (the tail) went to the right." By the laughing, I can tell some of you have already been through this. Alright. It is true though, movement can be picked up faster by watching the tail. This is because, for any given rotation, the tail moves more than twice the distance the nose does. For any given rotation, movement can be picked up faster by watching the tail. Anyway, just keep trimming until the machine tracks straight inverted. A final hint for fine tuning that t/r mix is to go back and check your machine's zero pitch mixing, at full speed in the upright position. I say this because at

the faster speed (compared to slow forward flight), the vertical rudder has more effect. Also, more air moving over the tail rotor disc will change the tail rotor's efficiency.

Time for my sermon of the week. After an hour's talk with John Adams of Horizon Hobby Distributors, I thought it was necessary to give you my opinion about t/r mixing and stunt modes. For easy reading, I'm going group t/r revo mix and stunt modes under one heading: Mixing. OK, from all the input I've seen and heard about Mixing, I feel it should be treated as a type of flying maneuver. First, like any maneuver, you should have some idea how to do it. Next, you should not try Mixing that you don't have the skill for. Also, you need to break the Mixing down into sections, practice each one, and then add them together to perform the whole maneuver. And last, you need to decide what type of flying you'll be doing and then decide which type of Mixing will work the best. I'll explain what I mean.

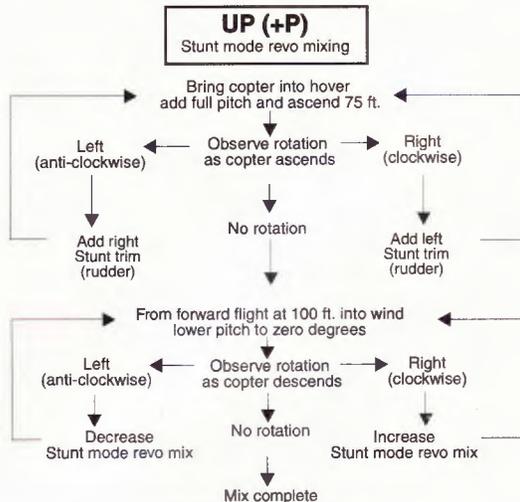
I'm going to go out on a limb (and hopefully not saw it off) to group flyers by the type of mixing they should be using. Remember, these groupings should act only as guidelines for beginner and intermediate flyers to follow. Because there are so many categories of flyers to include, I will generalize and hope to get most flyers grouped correctly. Let's give it a try.

To start, normal mode in your radio can be a lot of things to different flyers. A contest flyer uses this mode for most all his hovering maneuvers. It has many inflight adjustable trims that can be accessed. However, once the contest flyer goes into forward flight, he switches to another mixing mode to make his bird fly as straight as an arrow with no stick inputs. For him, mixing involves t/r compensation plus aileron, elevator and rudder stunt trim adjustments. The contest flyer is also at a level of flying where he knows exactly what he wants and how to get it from the radio. In my opinion, this would include mainly class 3 and higher flyers. Also, any pilot who can loop, roll at 15 feet and is very comfortable in any upright attitude would also fall into this category.

Beginners are next. Beginners, as I group them, include flyers that have just bought their machine through flyers who have limited forward flight experience. This can include the flyer who has just done his first loop, if he has very little knowledge of his radio. From my experience, this group of pilots will benefit most by staying in the normal mode of their radio. I know: tell me to take a hike! Remember, I'm not saying these guys can't use stunt modes. I'm stating that they'll learn faster if they stay in flight mode normal till they improve their abilities. Many times I've witnessed guys that are ready to loop or roll and end up blowing the maneuver because they set up their stunt mode wrong. Or, they spend a month or two trying to get the stunt mode right and end

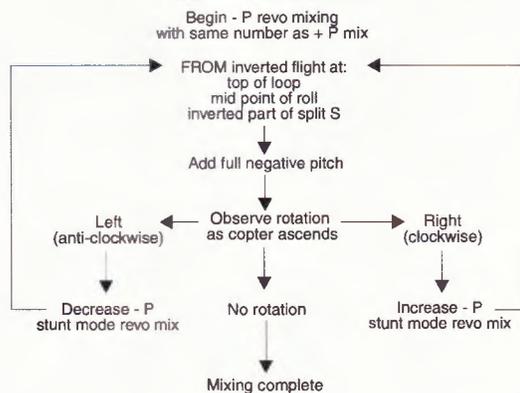
# Trimming Flow Chart

## JR PCM 10, 10S

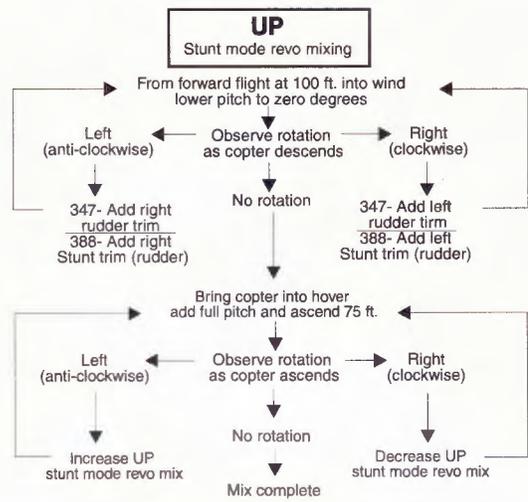


## DOWN (-P)

Stunt mode revo mixing

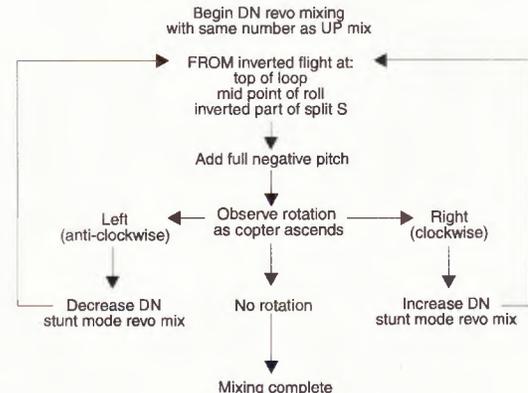


## JR 347,388



## DOWN

Stunt mode revo mixing



ARTWORK: PETE O'CONNOR

up never trying the loop. Honestly, there is a lot that can be done in the normal flight mode. You should have no trouble performing loops rolls, split S's, all your stall turns and more, in just the normal mode. And, once you've got those things down in the normal mode, you "are" ready to learn how to use stunt t/r mixing and stunt trims.

There are, however, two types of flyers that don't fit any mold. First, there's the pilot who has so much raw talent that he can fly almost any maneuver he sees another pilot do but, has no idea how to use his radio. Then, there's the flyer who knows how to use all the program mixing he can get his hands on, but can't seem to get a handle on nose-in hovering. I guess if both of these pilots realized their shortcomings and got together, they would end up two great flyers.

Finally, we come to my type of flying. Weekend Hot Dogger would be a pretty good name for me. I just try to get the most

out of flying and still bring my machine home in one piece. I am not concerned with contest flying, since I usually have only one afternoon a week to fly. I feel much more practice would be necessary to fly on a contest level. However, I have set many goals for myself and proudly accomplished them all. I also have begun to realize limits, because I'm reaching them, as to how far you can progress with small amounts of practice.

Anyhow, back to the subject, Mixing. I find staying in one flight mode easiest to work with. When using just one mode (stunt mode 2), I'm never in the wrong place at the wrong time. Yes, I'll clarify that. It means that I don't need to hit the invert switch, since I fly switchless. And, I don't worry if the tail will track straight in a loop, because I don't use stunt trims (I hold left rudder all the time in forward flight and fly the whole loop). You know, in the old days, that was the

way we always flew. What is nice about using stunt mode revo mixing without stunt trims, is you can go from forward flight right to hovering aerobatics and blast off full throttle without any trim setting problems. Of course, this is just me talking. But, I'm sure you've heard plenty of stories about pilots hitting the invert switch at the wrong time. Or, you've seen guys come into a hover from forward flight and have their motor rev to twenty thousand because they were in the wrong flight mode.

The real bottom line is, do what feels comfortable for you. Don't let anyone tell what you "must" run. And if something doesn't feel right, maybe it isn't! But, just like flying above your skill level, don't try stunt trims or mixing programs that you do not understand. You will only slow your progress. As always, if you need help, write me and if I don't have the answer, I'll find it. Oh yeah, here's those flow charts I promised you. ☺

# Old Timer Topics

By Jim Alaback



PHOTO: JIM NOONAN

Ray Arden shows off his pre-1910 homebuilt engine at the 1946 Nationals (above left). The engine eventually powered a six-foot biplane. The Brown Junior

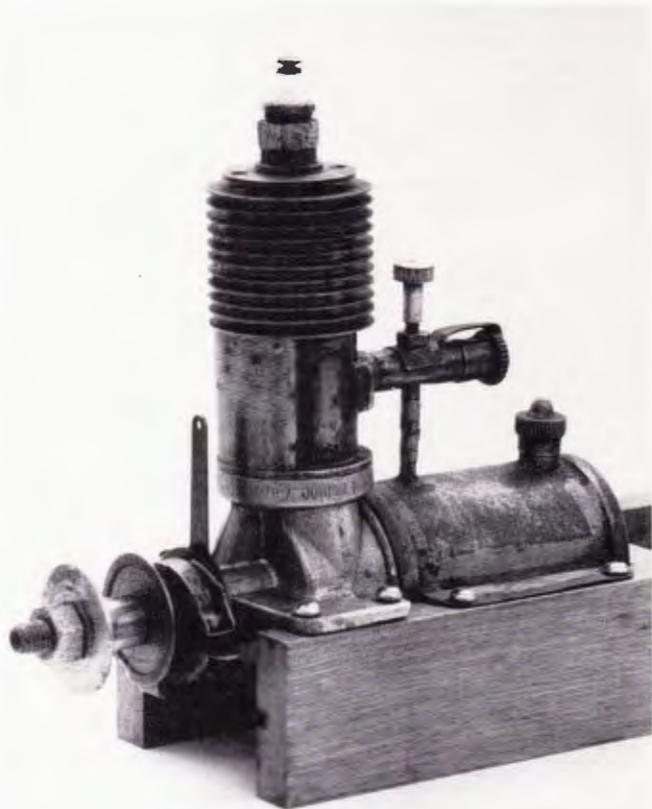


PHOTO: JIM ALABACK

Model B (above right) launched the gas model age throughout the world. Displacement of the engine was .60 cubic inch. This one is serial #B250 from 1934.

**M**ost of today's model airplane flying is done with internal combustion engine-powered models. Although "gas model" engines did not become widely popular until the 1930s, their use dates from 1901.

## Langley was first

It is ironic that Samuel Pierpont Langley should be remembered for his failure to invent a man-carrying airplane, but he is unrecognized, even among modelers, for creating the first successful "gas model" airplane.

Langley built many models from 1887 onward in his effort to test ideas for manned flight. Power was always a problem. Gasoline engines were just being developed in the 1890s, but they did offer hope for the highest output, relative to weight, of any power source. Late in 1899 he set out to develop a suitable gasoline engine with his assistant, Charles M. Manley, and a consulting engineer, Stephen M. Balzer. They decided to go with two engines concurrently, one full size and one quarter-size. The engines were 4-stroke-cycle, 5-cylinder radials. The model engine was air-cooled and the larger one water-cooled. Concurrently, Manley was developing and building a model airplane for the smaller engine.

The first flights of the quarter-size gas model were made on June 18, 1901. The engine did not develop enough power to climb, so a flight of about 300 feet was the day's best.

Manley later increased the model engine's output from the original 1½–2 horsepower to 3.2 hp at 1,800 rpm. The model was flown again in August of 1903 at which time it climbed and flew about 1,000 feet despite fluctuating power from the engine. The model had a wingspan of 12 feet and weighed 42 pounds including 10 pounds for the engine, complete with its carburetor, ignition system, and battery. The wing area was 61 square feet, the wing loading was 11 ounces per square foot, and the average speed in flight was 25 mph.

## After Langley, before Brown

Model gas engines started to be built by individuals for their own use from the earliest days of model airplane flying. In England, D. Stanger built a four-cylinder, 5½ pound engine in 1908. It developed just over one horsepower at 1,300 rpm. Ray Arden, in the United States, built a single-cylinder, air-cooled engine which was flying a six-foot biplane in New York City by 1910. Others in England, the U.S., France, Germany and other countries are known to

have built home-made model engines over the years.

Probably the first model gas engine offered for sale to the public was a seven-pound, single-cylinder engine sold by A.W. Gamage of London in 1909. In this country, the first engine sold commercially was the "Baby", in 1911. It was manufactured by the Baby Engine Co., of Stamford, Connecticut. This engine weighed just under four pounds, and developed ½ hp at 2,300 rpm turning an 18-inch diameter, 13-inch pitch propeller. The price was \$35. (At that time the average manufacturing wage in America was \$11 a week.)

In 1913, the Baby Engine Company sponsored the first American gas model contest at Mineola, N.Y. The contestants were members of the New York Model Aero Club.

The "Baby" engine remained in production until 1914. During the following 20 years various other engines were on the U.S. market, including the Midget, the Gil, the Wall and the Knight. Typically these later engines weighed about two pounds, had a bore and stroke of about 1½ inches, and turned props of 16 to 20 inches in diameter—when and if they ran! But none of these early engines launched the popular gas model hobby. That was left for the Brown Junior to achieve.

## The Brown Junior

William Lykens Brown, IV, of Philadelphia started developing a model gas engine in 1930, while still a high school student. By the time he graduated in February, 1932, he had built a half-dozen experimental engines.

During this time, Maxwell Bassett had been building models to use the experimental engines built by Bill Brown. The 1932 Nationals at Atlantic City won worldwide publicity when Bassett's Brown-powered model placed fourth in the Wakefield event. In 1933 Bassett's models, powered with the .60 cubic inch Brown Junior engine, made a clean sweep of the outdoor events by winning the Mulvihill, Stout, and Moffett trophies.

After the 1933 Nationals, the NAA (forerunner of the AMA) set up a separate event for gas models. Thus, Brown's engine began a whole new phase of model aviation, including the control line and radio control flying to follow.

In response to modelers' requests for engines during 1932 and 1933, Brown, with the help of machine shop owner Walter Hurleman, produced and sold about 50 similar engines on an individual, custom-built basis. These were called the Brown Junior "Model A" and carried serial numbers of A1 to about A50.

In the latter part of 1933 the Junior Motors Corporation was established. It tooled up to meet the demand for engines on a volume basis. These production-built engines were the .60 cubic inch Brown Junior "Model B". The 1934 production was 1,000 engines, serial numbers B1 to B1000. The introductory price of \$15 was raised in a few months to \$21.50, where it remained until 1941.

## Brown's early competition

Late in 1935, Brown's first significant competitor, the Baby Cyclone, arrived on the market. This engine was about the same weight and exterior size as the Brown, but had less displacement: .36 cubic inches, vs. .60 for the Brown. It also had a novel fuel induction system, a front rotary intake valve. The engine sold for \$15.75. This lower price helped it to attract business. So did its low fuel consumption in the usual limited-fuel contests of the time.

Although second in popularity only to the Brown, not many Baby Cyclones have survived to the present day. Their crankcases were die-cast with a zinc alloy which was easily damaged in crackups and tended to self-destruct with age.

In the Summer of 1936, the first advertising for the Bunch Gwin Aero and Mighty Midget appeared. At \$17.50, the price fell between the Brown and Baby Cyclone, as did the displacement of .42 cubic inches. Like the Brown, it was a sideport engine and used a similar brazed-steel cylinder assembly screwed into a cast aluminum crankcase. The Bunch engines underwent



PHOTOS: JIM ALABACK

**The Baby Cyclone, introduced in late 1935 (above left),** was the second model gas engine to be mass-produced in America. In mid-1936 the Bunch Mighty Midget **(above right),** the third of the "Big Four" of early gas model engines, was introduced. This one is the 1937 version with a displacement of .49 cubic inches.



continual revisions, including displacement changes to .49 for 1937, and then to the familiar .45 for 1939 onward. The last pre-war development was the Tiger Aero, a very high-output version of the basic Bunch design that made a popular combination with the Comet Zipper in Class C events.

The last of the "big four" of early engines to be introduced was the Ohlsson, at the end of 1936. This engine had a displacement of .56 cubic inches. Its most novel feature was the radial engine mounting. All other engines were beam-mounted at the time.

Irwin Ohlsson's greatest achievement, however, was to come in 1938 with the introduction of the Ohlsson 23. Prior to this, no manufacturer's "small bore" engine (later to be called Classes A and B) had developed much sales volume. This easy-starting, sweet-running, sturdy little Ohl-

son 23 was reliable and powerful for its day and probably the best engine of any size available at the time. It became the most popular spark ignition engine ever built. It made smaller models practical, and that greatly broadened the appeal of gas models in general.

## Spark ignition today

It is now entirely possible to exactly recreate the pre-1939 days of gas modeling, which is defined as the "Antique" era by the Society of Antique Modelers. The same engines, accessories, model plans and kits, and covering and finishing materials are available to you. In next month's column I'll review the sources and give recommendations for everything needed.

To get started, if you don't have a usable spark ignition engine, you should join the Model Engine Collectors Association because that's where original and reproduction engines, parts, and accessories will be found. Membership is \$20 a year, payable to MECA, and mailed to Bob McClelland, 3007 Travis, West Lake, LA 70669. Include your street address, not just a P.O. box.

## Obechi wood

Last month I said I had ordered some obechi wood for use in making laminated parts, such as wing tips and empennage outlines. SIG didn't have obechi, but I found a source in Dave's Wood Products, 12306 Bergstrasse, Leavenworth, WA 98826; 509-548-5201. This knowledgeable and helpful gentleman has obechi in large sheets for use in veneering foam R/C sailplane wings. It is \$7 for a sheet 10 inches wide and 8 feet long. When I told him what I wanted obechi for he fixed me up with about five sheets, (about 1/32 inch thick, 4 or 5 inches wide and 6 or 8 feet long), at \$4. To ship these long pieces, they are coiled up in a big box and sent UPS, so an additional \$6 shipping charge is required per order. Dave will make you the same deal, \$10 including shipping, for a few lifetimes' worth of obechi for laminated outlines.

Thanks to all who are sending letters, pictures, and club newsletters. Everything is read and appreciated and contributes to this column. Jim Alaback, 12366 Nacido Drive, San Diego, CA 92128.



PHOTO: JIM ALABACK

**The first Ohlsson engine, which had a displacement of .56 cubic inch,** was introduced at the end of 1936, but Ohlsson's real claim to engine fame is this 1938 Ohlsson 23, the most popular spark ignition engine of all time. It made smaller models practical.

By Larry Kruse

**T**he adage, "God is in the details," holds especially true for the scale models we build and fly. A plain-Jane rendition of the ubiquitous Piper Cub J-3 takes on a life of its own with the inclusion of a few simple details such as cowl lines, an instrument panel, plug wires, shock absorbers, door lines, and a profile pilot inside. Creating just the right set of details is a time-consuming and tedious process, though. As Walt Mooney observed, the last 10% of the airplane will take 90% of your time.

To ease that burden a bit, Bill Pillen, a

prolific Peanut scale builder from Oklahoma City, has been kind enough to provide this month's "freebie." Bill has put together a single sheet of paper absolutely filled with dummy radial engines in two sizes, instrument panels (both civilian and military), mesh radiator screens, wheel covers, profile pilot heads, and other good stuff to help give your creation the illusion of being a full-sized rendition of its namesake.

The detail sheet is yours for the asking by sending a business sized, self-addressed, stamped envelope to my address at the end of this column. The deadline for getting your

request in the mail is April 15, 1994. Somehow, that deadline seems vaguely familiar.

## Laminating sliced ribs

The technique of using sliced ribs to save weight (and wood!) has caught on all over and is widely accepted in F/F circles. However, the problem is that sliced ribs with any degree of camber are cut across the grain at some point in the chord, and as a consequence, can be quite weak. To overcome the problem, some modelers have opted for the "cracked-rib" method, whereby a single square strip of balsa is bent over the main spar until it cracks, is cemented in place, and then is filled in with scrap balsa at the front to effect a rounded contour at the leading edge.

Tony Peters, an accomplished F/F'er from downtown New York City, likes sliced ribs and has developed a technique to make them strong through a process of laminating. Tony makes several sets of ribs at a time with the form block shown in **Fig. A**. The block is built from solid balsa with spacers cemented to the end as noted. This single form will handle a wide range of chord widths. Tony uses two layers of 1/32-inch sheet balsa soaked in hot water until they're quite pliable, spreads thinned white glue between them, and then tapes them over the form with waxed paper underneath. The grain runs chordwise, of course. The high point mark shown helps in centering smaller ribs. It's quite easy to simply slice off uniformly shaped and uniformly strong ribs from the blanks. Tony, thanks for sharing a neat idea.

## Tips on finishing

Responding to my comments on finishing techniques from a couple of columns ago, Claude Powell, an outstanding member of the equally outstanding D.C. Maxcutters club, wrote to offer even better ways of treating tissue covering. Claude recommends using thinned white glue applied with a small brush for sealing those areas where one layer of tissue overlaps another. That makes a great deal of sense. The method I use, running a thin bead of dope between the two layers many times results in the tissue popping up as it dries. Claude's technique would ensure that the fibers of the tissue are pliable enough to lay down. Any white glue oozing out could be removed by capillary action with the corner of a facial tissue.

Claude also says he's found an easier and warp-free way of putting a light moisture-resistant finish on tissue. Immediately after spraying a covered framework with alcohol, pin it down to dry. After 24 hours, lightly mist on clear auto lacquer from auto paint aerosol cans obtained at K-Mart. It will take two or three layers of mist to start to see it on the covering; however, you only have to wait from four to six minutes between coats because it dries so fast. Add misted coats

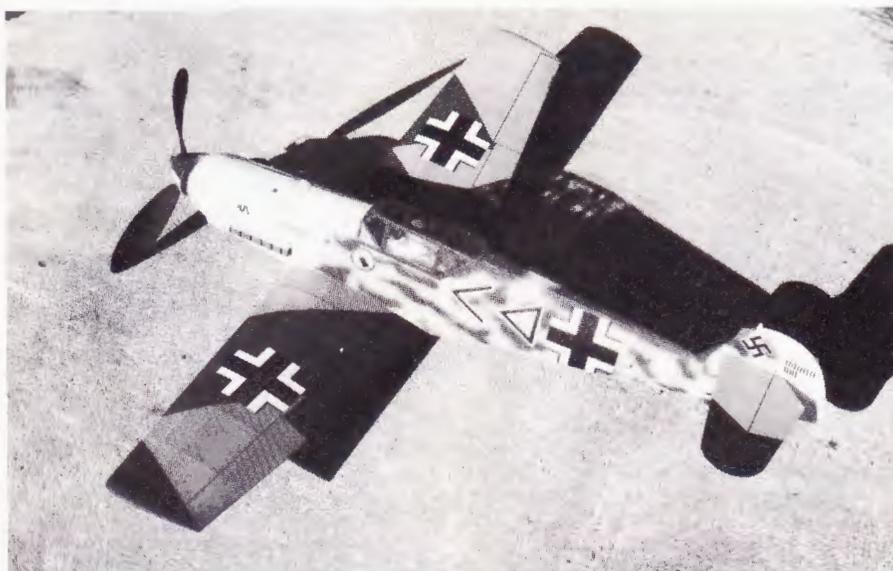


PHOTO: BOB ISAACKS

**This one is going to be** a winner for Bob Isaacks. His Bf-109E.4 (**above**) spans 39 inches and has a 13-inch 3-bladed prop. He built the model from Mike Midkiff drawings and employed a color copier and stick-on mylar sheet to reproduce the insignia shown (**below**). Look out FAC Jumbo Scale!





PHOTOS: DR. GENE SMITH

**Dr. Gene Smith likes** Peanut Scale. His strikingly decorated Fokker D-VII (above left) has its front half covered with natural red tissue, while the rear is air-

brushed white. He also created this original Peanut Skandanavisk KZ.III Laerke (above right). All-up white, with ballast, is seven grams. Trim is airbrushed.

until you're satisfied and leave everything pinned down another 24 hours. The bottom of the surfaces can now be treated the same way, but there's no need to pin them down. Claude says the first lacquer application to the top surfaces seems to "lock-in" or "set" the framework so it won't warp.

Do make sure the room your working in has adequate ventilation and always wear a respirator mask when spraying lacquer based products. Claude, I'm going to try your lacquer spray tip on my Bostonian currently under construction.

### Pre-construction notes

In this high-tech world of modeling with its instant glues, plastic coverings, and pre-fabricated kits, we sometimes overlook time-honored techniques which could still serve us well. One of these is the practice of pre-gluing parts in order to increase strength, but not add weight. Primarily, I'm addressing those of us who still use cellulose based glues such as Ambroid or Sig-ment as major building tools. If you're totally into CyA glues such as Zap, Jet or Hot Stuff, this is not for you. But for those of us who like to walk into our shops and smell the glue drying, brushing on a thinned coat of Ambroid has several benefits.

Essentially, all one needs to do is thin the cellulose-based glue 50 to 60% with dope thinner and brush the mixture on both surfaces to be joined. Such an application causes the glue to soak deep into the wood fibers and dry there. The next application of glue—either thinned or straight out of the tube—will bond with the dried glue, resulting in a strong, yet flexible joint that's more than just surface deep. While I've not done empirical torsional or shear strength tests on such joints, perceptually they seem significantly stronger than one-application joints.

Another practice we sometime forget is the benefit of pre-shrinking tissue to avoid subsequent warps. A method that has worked well for me is to tape the tissue to a Grumbacher art frame (which has the benefit of being collapsible for storage) and then spray both sides of the tissue with water. This practice is repeated two more times after the tissue appears to be dry, and then it is set aside for a full 24 hours. When that time period is elapsed, the tissue is removed from the frame and ironed at a moderately high heat to remove both residual moisture and any creases or wrinkles on the outer edges. I try to have two or three sheets of several colors prepared in this fashion and

ready to use when needed. Since I've begun preparing tissue in this fashion, I've quit worrying about warps, even in very lightly constructed surfaces.

### High tech scales

For those whose modeling has progressed to the point of being concerned about tenths of a gram, George Schroedter of Champion Model Products has added a new line of electronic digital scales to his already fine line of kits and strip rubber. George now handles the full line of Acculab Electronic Digital Scales consisting of seven models. These seven models cover the gamut of all free flight needs, indoors or outdoors. For example, if outdoor F/F is your thing, Model 1200 can handle up to 1200 grams (over 40 ounces) in 0.1 gram or 0.01 ounce increments. If indoor is your bag, Model 121 can handle up to 120 grams in 0.01 gram or 0.001 ounce increments.

If you want to ratchet your modeling skills up to another level, contact Champion Model Products at 800 Carmen Court, LaVerne, CA 91750 and ask for a descriptive price list. I'm sure George would appreciate a business-sized, self-addressed, stamped envelope.

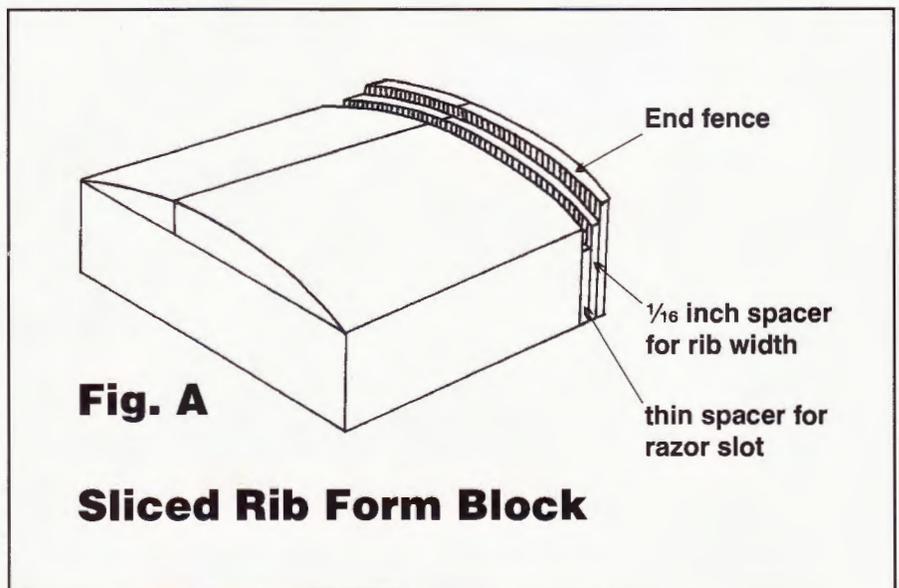
### Four color stick-ons and canopies to go

Texas modeler, Bob Isaacks, sent along photos this month of his Jumbo Scale Bf-

109E.4 which is a beautiful rendition of the WW II bird from Mike Midkiff drawings. Aside from it being such an outstanding example of craftsmanship, the insignia details on the model were produced in 4-color on a copier! With his photos of the Messerschmitt, Bob included a sample of an adhesive-backed reproduction film manufactured by the Rayven Co. which can be run through a copier or a laser printer. The sample he sent had some very tiny and precise Japanese script and German phrases reproduced in two colors. It is terrific! Bob did not give a purchase location for the material, but I would suspect that an office supply company would be the place to start looking.

For those who don't know yet, Bob has also gone into the business of producing custom canopies. As an example, the one on his Bf-109E.4 is over 7 inches long and 2¼ inches deep. The canopies are one-piece vacuum-formed units, priced according to individual requirements. Thus far Bob has produced canopies for modelers in seven states and Canada. Send a self-addressed, stamped envelope to Bob at 4335 Field Meadow Drive, Katy, TX 77449 for a spec sheet and price list.

That will wrap things up for this month. Thanks to all who continue to send photos of their work and tips on ways of doing things better. My address for correspondence is 1204 S. Mansfield, Stillwater, OK 74074. ☐



# CA combat

By Phil Cartier



PHOTOGRAPHY: PHIL CARTIER

**Louis Lopez**, flying the trailing plane, turns away after a kill in Slow Combat. Flying off for first and second with flying partner Roy Glenn, the match went the distance, with Lopez winning by a cut.

**M**ore on trimming: here are a few more ideas to add to Larry Driskill's tips last month. It seems that a new plane always flies great until it gets into a match. Opponents have a nasty habit of making you fly where you ordinarily wouldn't and force you to use more control than comfortable. To nail the warps, we have to really push the plane

during a trim flight. Here are a couple of maneuvers that can help pinpoint problems.

**Overhead eights:** these are especially helpful in a good breeze. Start the eight with the wind in your face. Pull up vertically into a wing over and do some overhead eights, starting with the inside loop. Try and make the first few kind of large. If that goes ok, pull them tighter. The plane should stay



"Who needs a motor, I can beat 'em with my bare wing" says Chuck Cline after winning a match in Slow at the Fall Cleveland contest. Looking on is flying buddy Mark Czarnecki who has probably heard this one before.

straight on the lines when turning either direction. If it snap rolls at you during an inside loop it has a left-rolling warp. Bend the left trailing edge down to correct. If it snaps during the outside loop it has a right-rolling warp. Bend the left trailing edge up. Then repeat the process, but start the eights with the wind at your back. This reverses the wind direction with regard to the loops and makes sure all the warps rear their ugly heads. A perfectly trimmed plane should be able to do consecutive overhead eights in a stiff breeze, in either direction with no problems. Once you have it, enjoy!

Another good trimming maneuver I call walking loops. Start fairly high with one and a half inside loops, then one and a half outsides, then insides, etc. Fly the plane all the way around the circle clockwise. Then try the same thing, but start with outsides and fly around counterclockwise. If all is well up high, move them down and tighten up the loops. Once again, going out of control on an inside means a left-rolling warp. Losing it on an outside means a right-rolling warp. A straight plane, and a sober pilot, will be able to walk the plane all the way around the circle in head-high, full control loops.

Trimming line tension is another matter. The actual tension is pretty much fixed by the plane weight and airspeed. What we are after is keeping the plane out square on the end of the lines and not having it turn in and fly down the lines at us. Trimming for warps takes care of most of that. Moving the leadout position and adding engine offset takes care of the rest. After years and years of fiddling with leadout position, I think I've gone back to where Matt Kania, the designer of the *Ringmaster* ended up 50 years ago. Three or four degrees of leadout sweep and three or four degrees of engine offset work well on just about everything.

Moving the leadouts back can add lots of line pull in level flight. Too much sweep makes the plane really snaky when switching direction. The lines curve back from the wing tip and the bow in the lines whips the wing tip around. Putting the leadouts too far back just adds leverage for the lines to whip the plane around. The point halfway between the two leadout holes should fall one to two inches behind the balance point. Small, slow, light planes need more leadout sweep. Fast, heavy, large planes can use less.

Engine offset works wonders for line tension during maneuvers. Putting washers under the front of the mounting lugs or carving the motor mounts both work. Don't add thick angled wedges. The thickness pretty much cancels out any benefit from the angle. Bob Morse, one of the engine experts from the Michigan area, even showed me how he mills a two degree angle into the engine lugs. That works like a charm. Ideally, the thrust line should run about a quarter to half an inch to the left of the balance point. Like anything else, engine offset can hav

some disadvantages. Mostly, motors cocked at large angles, eight to ten degrees, tend to break the mounting lugs when the plane hits.

### Spring Cleaning

I'm writing this in January, and the East Coast has been hit with the coldest, snowiest winter in years. So I have been cleaning up all the wrecks and motors I threw in the corner last fall. Don't you wish you had cleaned them all up then, instead of frantically trying to sort things out before the first contest? To help you through those frantic moments, here is a little checklist of things to clean and check.

Clean up the motors. Take them off the planes. Flush and scrape all the dirt and grime off the outside. Remove the glow plug and back plate. Wash out the innards with plenty of hot, soapy water. Rinse thoroughly and swish the motor around in a cup of fuel. Then wipe it dry and use a blow dryer to warm it up and evaporate any traces of moisture. Load it up with some after-run oil and button up the backplate and glow plug. If you are really concerned about clean, disassemble the motor completely for cleaning. The dirt can really go through a motor and get caught in nooks and crannies all over inside. I tend to cause more damage with a screwdriver than the dirt though and make do with just flushing things thoroughly.

Wash up the planes. A bucket of soapy water and a brush in the bath tub works well. Just remember: clean the tub when you're done! Lightly scrub the planes all over and dry with paper towels. Make a note on each one with a marking pen if you find any problems. The pen marks can be removed with a dab of solvent on a rag when the repairs are made.

Empty out the flight box and wash it out. Sift out all the grass and twigs from the tools and put stuff back neatly. Also, make a list of supplies to replenish—glow plugs, fuel line, line clips, bladders, tie wraps for tanks, needle valves, mounting bolts, etc. Charge up the starting battery, or buy a new dry cell if you still use one. Very thoroughly and carefully check the glow plug clip and wires. The wires have a nasty habit of cracking and shorting out or breaking the circuit. Inventory the tools and make sure the right ones are there. While you are at it, put a name and AMA number on them so when you drop something at a contest whoever finds will have a chance to return it.

One final note: make sure to renew your MACA (Miniature Aircraft Combat Association) membership. MACA and MACA members do or run just about everything in Combat. The newsletter always has early news of the latest contests, new products, lists of suppliers, and can put you in touch with more flyers in your area. Dues are \$15. Send 'em to the newsletter editor, Chuck Cline, 11900 Clarke Rd., College Station, OH 44028.

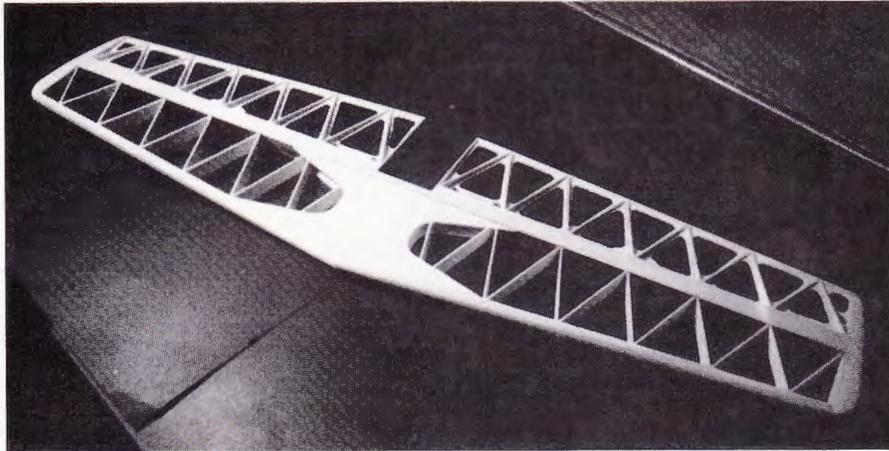


With the assistance of Chuck Cline and Bob Morse, MACA Treasurer Ross Leighliter preps his arrowshaft Slow for a Super Slow match at Cleveland (**above**). Steve Kott and Paul Baluch get Paul's *Warrior* ready for some Fast action at the '93 Nats (**below**). The plane is a modified—for strength—version of the *Arrowplane*.



# CA stunt

By Bob Hunt



PHOTOGRAPHY: BOB HUNT

Carbon fiber strips face the forward edge of this stab trailing edge. The .007 strip is doubled halfway out, so that, with the addition of the center section sheeting, you have an assembly with extreme torsional rigidity.

Last month we talked a bit about balsa wood: how to order it, and how to get the very lightest stock available. Balsa remains the number one building material for a competitive stunter, but lately some new materials have become available which, if used properly, can increase the strength and longevity of the average ship, and actually reduce the weight in the bargain. I'm referring of course to the space-age composite materials such as carbon fiber, and Kevlar. These high-tech building materials have actually been with us for several years. Some have incorporated these materials sparingly into their Stunt models in the past, but only recently have we begun to see widespread use of them. The average Stunt builder is a creature of habit, and is not prone to try too many new things if he's already getting good results from the old methods. I was that way—until recently.

A couple of years back, Randy Smith of Aero Products, raised some eyebrows by expounding the virtues of 1/8-inch balsa doublers laminated to the 1/8-inch fuselage sides with a layer of thin carbon fiber matt between. Many thought that this treatment would be too weak for the pounding .60 powered ships. Randy's success proved them wrong; the front ends constructed in this manner turned out to be extremely rigid and long lasting. Randy used Aerospace Composite Products' 0.5 ounce (per square yard) carbon fiber matt. This material looks almost exactly like silkspan that has been dyed black. It is porous, allowing slow-cure laminating resin to soak through and achieve a strong bond between both fuselage sides and the matt. Randy further suggested that the fuselage sides be cut from clean and straight "A" grain balsa, while the doublers should be cut from "B" or "C" grain stock.

I've used a similar method on my latest *Saturn*, only I substituted thin Kevlar matt

for the carbon fiber, and laminated the fuse sides to 1/32 plywood, instead of the balsa doublers (Remember those creatures of habit? I'm one of them!). Dean Pappas had a big roll of the Kevlar around, and it seemed like a good experiment. It works every bit as well as the carbon fiber matt in this application, but it is much more difficult to cut. I'll opt for the carbon matt in the future. Until you try this method, you just can't imagine how rigid the nose of your ship can be.

Randy also suggested laminating the thin carbon fiber matt between two pieces of 1/16 balsa, and then cutting a "D" Tube wing spar from the finished piece. That's one I'm definitely going to try!

Bill Werwage showed me his method of building an extremely stiff tail assembly, using thin, uni-directional, carbon fiber laminate glued to the front of the stabilizer trailing edge. He glues .007 thick carbon fiber laminate to a piece of medium weight 1/4 x 3-inch balsa using Slow ZAP CA. The carbon fiber laminate must be scuffed with #220 grit sandpaper to remove the glaze from the shiny side before gluing. As soon as the carbon fiber laminate is positioned on the balsa sheet, the sandwich is inverted onto a piece of waxed paper on a flat surface, and weights are applied to ensure that the carbon will be pressed tightly against the balsa along its entire length. Once the glue has dried (allow several minutes to insure this), another strip of carbon fiber laminate is glued to the first. This piece runs from the center out five to six inches on either side. The weighting process is repeated. Several trailing edge strips can be cut from this laminated strip. We are using 3/16 thick stabilizers on our new ships, and so we cut strips just a bit wider than that and sanded them to exact size.

The 3/16 strip is pinned over the stabilizer plan, which is protected with a piece of waxed paper. Two 3/16 by 3/32 leading edge strips are cut from somewhat softer stock

than that which was used for the stab's trailing edge, and these are also pinned over the plan. Now 1/16 rib stock is cut into 3/16 wide strips. The ribs are cut from this stock and glued in place. Note: the ribs are glued with Gap Filling ZAP right to the carbon fiber at the stabilizer's trailing edge. I thought this type of balsa-to-carbon end gluing might not be strong enough, but it proved to be excellent. Once all the ribs are glued in place, the center section sheeting is laid out, cut, and installed. It's a good idea to compute how deep the center section ribs have to be in advance, and size them accordingly before installation. The remainder of the tail assembly can be constructed in your usual manner. Bill has worked out a "Warren Truss" type of ribbing scheme for the wings and tails, and it yields very torsionally rigid components.

Carbon fiber laminate and carbon fiber matt can be used in many places during construction, and you should be encouraged to try almost anything that seems logical. Bob Gieseke came up with a great use for the carbon fiber matt last year when he doped it to the outside of his *Gieseke Nobler* in all high stress areas, and on surfaces where he wanted additional stiffness, such as the flaps. He liked the results so much that this year's ship is totally covered with the carbon fiber matt, except where there are open bay areas. Bob used the 0.5 ounce/square yard carbon fiber matt. He laid it directly over the bare wood of the airframe and brushed two coats of thinned nitrate dope through the weave to adhere it. He said that if too much dope is applied, or if the dope is too thick in consistency, the result would be a very hard-to-sand surface. The doped carbon fiber matt gets sanded with #320 grit sandpaper, being very careful not to take off too much of the carbon material. Another coat of thinned nitrate is applied and sanded, and the ship is ready for final finish! Sounds almost like cheating, Bob! Seriously, I've seen the results, and I'm going to try this system on my new ship.

Bob wanted me to warn anyone who is considering trying this method that this material can be very difficult to sand. If you are not accustomed to doing a lot of detail sanding you may want to wait until you have a few standard type contest finishes under your belt. Bob also told me that he doesn't use any fillercoat on his finishes. The carbon evens out that well with clear nitrate dope and careful sanding alone!

The carbon fiber matt is also available in 0.2 ounce/square yard sheets. I told Bob about these, and he thought they would work as well as the 0.5 ounce material, and be even lighter. He added a strong caution to not sand too much. We'll try this material very soon and report the results in this column. This is exciting.

If you are interested in trying some of these techniques, or perhaps coming up with some of your own, drop a line to Aerospace



Randy Smith's original *Dreadnought* stunter (above left) was fitted out at the 1993 Nats with an OPS .40 and a Smith/Werwage Resonator pipe. Jim Young

updated his very beautiful *Roadrunner* (above right) with a piped OPS .40. The ship features a 650 square inch wing and a dope finish.

Composite Products, 14210 Doolittle Dr., San Leandro, CA 94577, or call: 510-352-2022. Ask for George or Barbara Sparr, and tell them we sent you.

### Inside Loop

I would bet a pretty substantial amount of money that the Inside Loop was the first aerobatic maneuver attempted. Next to the simple Wing Over (not the Reverse Wing Over), the Inside Loop is the easiest maneuver to perform with a Control Line model.

The maneuver begins at a point directly down wind (wind at your back). The AMA rule book calls for this maneuver to be started and ended at four- to six-foot altitude. For the purposes of learning, we'll start at a somewhat higher altitude, say ten feet. Face directly downwind with your legs spread comfortably apart. Apply up or "top" control (back stick) and watch as the model begins a steep climb with a radius. You will have to adjust the size of the loop by either applying more or less control at the handle. The model will continue to climb to the top of the loop where it will be in an inverted position. You may have to reduce the amount of control at this point to prevent the radius from tightening as the model starts its dive towards the bottom of the loop.

As the speed of the model increases in this dive the controls become more effective. Speed creates lift, and unless you slightly reduce the amount of control being held, the loop will tighten up. As the model approaches the bottom of the loop the controls should be smoothly neutralized to allow the model to recover into level flight. First attempts will probably end up with the exit at a higher altitude than the entrance. That's fine, and far more desirable than the other way around—if you get my drift. You will get the knack of giving the proper amount of control to achieve the desired constant radius as you practice. The idea, of course, is to fly a shape that is perfectly round. Your arm should be straight out, but not locked at the elbow. The idea is to apply a bit of control and trace the shape of the loop with your arm. Think of your arm as a scribe.

If you are new at this aerobatic game, you should try only one loop at a time, with a lap or two of level flight in between attempts to allow you to regain your composure. Don't force yourself to try doing consecutive loops too soon. Most aerobatic students will have a tendency to make the second loop somewhat smaller than the first, with the result being a loss of airspeed. When this happens, the model will stall and "mush" through the

bottom of the maneuver... if you're lucky! Many times the result is disaster, so don't rush to perform this maneuver as per the rule book the first time out. As you gain proficiency, you will find it natural to "pilot" the model through the maneuver, allowing it the proper amount of room, maintaining the proper amount of airspeed, and timing the pullout to exit smoothly back into level flight. Do only five practice inside loops during a flight to prevent a loss of control from the friction created by too many wraps in the lines. Be sure to unwind these wraps before each flight.

Performed as per the rule book, the loop is a fairly small maneuver. It starts at five foot altitude and at its zenith it is 45 degrees high. That means that the angle of the lines, if viewed from the side, is 45 degrees when the model is inverted at the top of the loop. That sounds like a lot of room, but most competition fliers have a hard time keeping their maneuvers within these parameters.

Flying on longer lines allows more air-space and hence more linear feet from the level flight position to the 45 degree altitude. Your model must be built light and powered well to allow the use of the long lines, but the result will be that you will be able to achieve the 45 degree top more easily and consistently. Learners should disregard the 45 degree portion of the maneuver until they have learned how to perform it smoothly and without a loss of airspeed. Get the shape first, then get to a point where you can perform three consecutive loops which are all in the same track, and then work on

size. When you are confident and relaxed with the maneuver, you can perform it at the proper entry and exit altitudes without anxiety.

You will probably see some fliers bias their loops into the wind on extremely windy days. This is being done to allow the wind to slow the model at the bottom of the maneuver. Most models will tend to increase in speed during consecutive loops if they are being performed directly down wind. Proper engine and prop setups will minimize this effect a great deal, but some speed-up will always occur at this point. Light models with a somewhat aft center of gravity location will handle this situation better than a heavy model which has too much nose weight. Flatter pitch props turned at fairly high r.p.m.'s will also help.

In competition you should never bias the loops into the wind. The judges look for this and will take points off unless you perform the maneuver directly across the circle from them. If the maneuver is biased to one side or the other, then the judge will get a distorted view of the shape, and will, justifiably, reduce the point award for that particular maneuver. The message is clear: practice in wind as well as calm, and be ready to compensate at the handle when the model gets pushed around by the wind. Hey, if it were easy, anybody could do it!

The rule book says that the loops are to be exited into Inverted Flight. That will be the topic for next month's column, so practice those loops until they are second nature.

Till next time, Fly Stunt!

CC



Gid Adkisson puts his very scale-like *Laser 200* through one of the best patterns seen at the 1990 Nats. The ship features an ST .60 for power. Semi-scale stunters are making a big comeback.

# R/C scale Boats

By Andy Paris



PHOTOGRAPHY: ANDY PARIS



Museums are a great place to find inspiration for your next project, or simply to research it. In the Pacific Northwest the Columbia River Maritime Museum has

grown to now include the lightship Columbia (above left and right) which used to serve as the primary navigation device for the mouth of the Columbia River.

Living in the Pacific Northwest has many options for people who love boats. Since I do not own one yet, the next best thing is to go to the museums. Last summer we took a few vacation days and drove from Seattle to Cannon Beach in Oregon. On the way we stopped in the City of Astoria, Oregon and I had the opportunity to spend a few enjoyable hours in the Columbia River Maritime Museum. As with all museums, this one was rich in history of the area and contained some unusual exhibits.

As with all of the cities in the Northwest, Astoria has a colorful maritime history. Astoria sits on the South shore of the great Columbia River, which was first entered in 1792 by Captain Robert Gray. He thought he had finally found the Northwest Passage that explorers had been searching for. Then in 1805 Lewis and Clark built Fort Clatsop, and a few years later John Astor built Fort

Astoria. It was not long before the fur, fishing, and lumber industries were well established. All of these industries needed ships to haul away the abundant natural resources. Today, nearly two hundred years later, ships still carry lumber and now, wheat resources all over the world.

The Columbia River Maritime Museum was built on the banks of the Columbia River. Commander Rolf Klep (1904-1981) was the driving force behind building the Museum. In May of 1962, a hundred and seventy years after the Columbia River was discovered, the Columbia River Maritime Museum was founded. Many groups and private individuals as well as the U.S. Navy and U.S. Coast Guard gave their support to the project. The current building was begun in 1975 and finished in 1982. It was a pay-as-you-go project and now the Museum is totally self supporting. Entrance fee is \$5.00 and is discounted for seniors and children. The Muse-

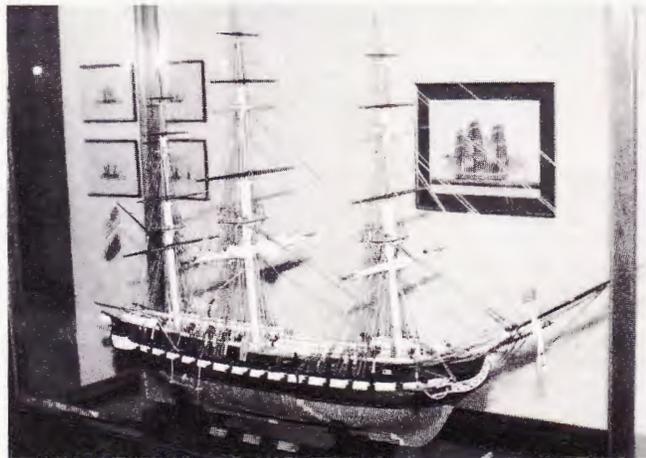
um is open every day except Thanksgiving and Christmas from 9:30 a.m. to 5:00 p.m. and is located at 1792 Marine Drive.

The first exhibits the Museum displayed were from Commander Klep's private collection, and since then it has really grown. The U.S. Navy donated the bridge of the destroyer *U.S.S. Knapp* when she was scrapped in 1973. It is an unusual experience to watch children play where naval officers fought World War II and the Korean conflict years ago. To compliment the bridge of a destroyer, the Museum has part of the conning tower and periscopes of the submarine *U.S.S. Rasher*. You can take aim through the periscope. The U.S. Navy's other donations include a full size World War II torpedo, 20mm anti-aircraft gun, numerous posters and models.

The U.S. Coast Guard's biggest contribution to the Museum is the lightship *Columbia* (WLV-604). This vessel was commis-



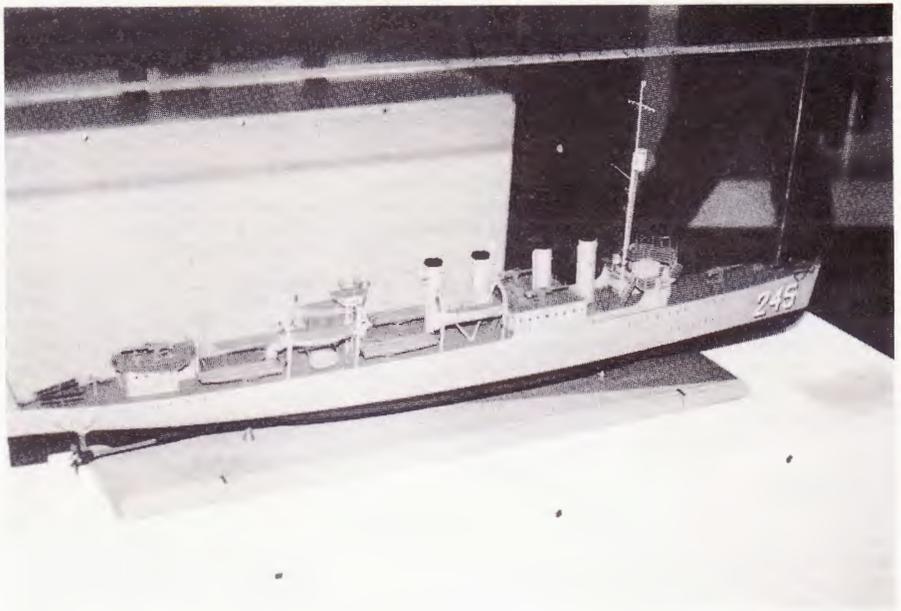
Many large static display models depict American maritime history. The *Inca* (above left) carried lumber from the time of her commission and was superbly



built by Eric Swanson. The frigate *Constitution* (above right) remains the oldest commissioned ship in the U.S. Navy. Fred Rice built this 56-inch model.

sioned in 1951 and served as a navigation lightship for the numerous ships entering the Columbia River until 1979. At that time the *Columbia* was replaced with an unmanned, forty-foot navigation buoy with a strobe light visible for 10 miles. The lightship *Columbia's* (WLV-604) length is 128 feet, with a beam of 30 feet, and displaced 617 tons. She was powered by a 550 hp Atlas Diesel engine. Her beacon was situated on top of the forward mast and could be seen for 13 miles. Her diaphone fog horn could be heard for five miles. She carried fifteen enlisted men with a warrant officer in command. Today she is maintained in operating condition by the Museum.

No collection would be complete without models of sailing ships. After all, the sailing ships opened the Northwest to the rest of the world. The Columbia River Maritime Museum has its share. The model of the five masted schooner *Inca* was built by one of her own sailors. Since I enjoy building large models myself I really liked the nine-foot



The first American naval casualty of WW II, the *Reuben James* (DD 245) was a *Clemson* class destroyer modeled for the museum by Dr. Niclaus Marineau. She went down in October 1941, escorting a convoy.

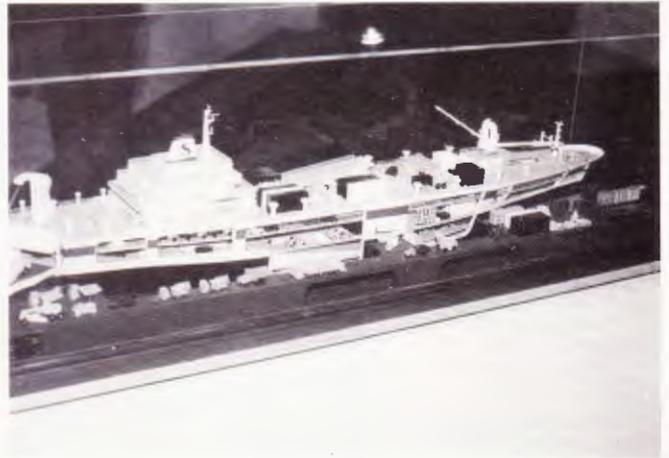
model of the *Ocean Pride*. And, of course, a model of the *U.S.S. Constitution* is displayed here.

If you are traveling to the Northwest, just remember that Astoria is a two hour drive

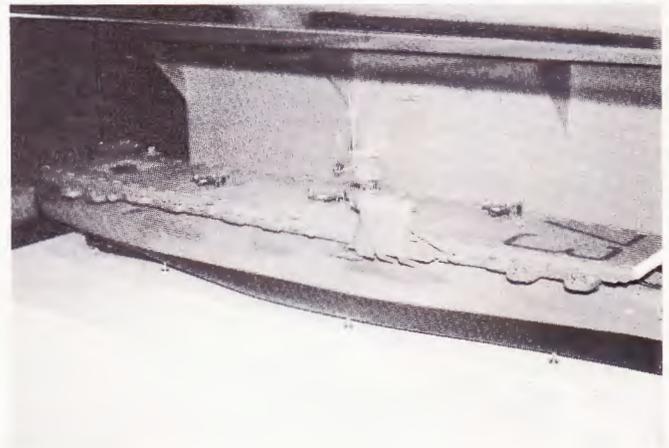
(100 miles) from Portland, Oregon. The two lane road meanders through a forest and is a very pleasant drive. The round trip can easily be done in an afternoon and the Museum is well worth your time.



Launched in 1893, the *USS Oregon* (above left) saw action in three wars. Dr. Niclaus Marineau built this 1/8 scale model. Called a "Ro-Ro" (roll-on, roll-off), the *SS Maine* (above right) was built expressly to carry rolling stock, i.e cars, trucks,



etc. The supertanker *Torrey Canyon* (below left) gained infamy when it spilled 36,000,000 gallons of oil in a shipwreck. Launched in 1943, the *USS Gambier Bay* (below right) was sunk at Leyte Gulf in 1944. The model is 1/8 scale.



# FLYING MODELS BACK ISSUES

Described below are some of the featured articles in each issue.  
Supplies are low on many issues and cannot be replaced, so please order now!

## September 74

FM rides the Blimp  
Ducted fans and Delta data  
MRC masters Mark VIII  
Build the EZ-VEE

## February 75

Sport "Pro" soarer  
Auro 511 "Arrowscout"  
Lightweight interiors for stunters  
Schuco-Hegi submarine

## March 75

Midwest "Strikemaster"  
\$10,000 "Tournament of  
Champions"  
"Scorpio" stunter  
Drive systems

## April 75

Ace digital commander  
Goldbergs handi-tote  
"Draft Dodger"  
EAA "Headwind"

## July 75

1929 American Eagle  
Focke Wulf 190D-9  
Toledo's big year for boats  
Best in Wram Show

## August 75

Stand-off "YAK-9"  
Peck-Polymers "Pletenpol"  
"Ochroma Pyramidale"  
Props

## September 75

U.S. Free Flight Championships  
1975 Royal Sport series  
A bird named "Flicon"  
The "Parafal"

## October 75

Stunt flying made easy  
Grumman "Skyrocket"  
"98.6" soarer  
High performance throttles

## November 75

"Sundance" stunter  
Heathkit Pack 17  
1975 Namba National's  
"Shadow" 50/800 yacht

## December 75

Pattern championships at  
Bern, Switzerland  
Rhinebeck's "Sopwith Pup"  
Sky-Glas "Miss Cosmic Wind"  
IMPBA 1975 Internats

## April 76

Build a vacuum former  
Twin electric powered "DH-10"  
Bristol "Bullet"  
A&L "Hustler Outrigger"

## May 76

1975 King Orange  
Boulton-Paul "Defiant"  
FM visits G&M models  
Souping up Taipan .21

## June 76

The big "Gere"  
R/C vs. CB  
Wram Show 76  
R/C model boating in Finland

## July 76

Toledo 1976  
Tiny "Cannonball"  
"Hobie Hawk"  
Race at Stone Mountain

## September 76

1910 Fabre Hydravion  
The longest flight  
Ins & outs of sail control  
Hartford Gold Cup Classic

## October 76

FM visits Sterling Models  
Midwest's Mini Star  
1976 Namba Internationals  
Jasco Scout G-22

## November 76

The Hightailer  
'76 World Scale Championships  
The Golden Nats  
Indy Unlimited

## December 76

About your F.C.C. license  
Pulsar  
French Dewoitine D-520  
1976 IMPBA Internats

## April 77

Rubber scale Jungster II  
R/C kit's Tigercat  
Astro flite mini-starter  
Golden Gate outboard Regatta

## May 77

Reiss' Rooster  
Ace R/C's Super Pacer  
Glowplug driver  
Sailboats: radio & sail servo

## June 77

1977 Wram Show  
MRC 775 R/C system  
Boats at WRAMS  
'76 Powerboat Championships

## July 77

Half-sized Scram  
Maximun sailplane speed  
Boats at Toledo  
R/C Fokker T-2

## August 77

Genesis 46  
Midwest's Attacker  
Kraft systems KP-4A  
Marker bouys for yacht racing

## September 77

ASL Valkyrie See Bee  
3-channel system kit  
Southern's Alley Cat  
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## October 77

10th F.A.I. Championships  
A Douglas Skyraider  
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## November 77

1977 FAI Free-Flight  
World Championships  
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## December 77

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Build 2-channel transmitter  
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1977 Namba Nationals Reno

## January 78

Twin-Boomed Challenger  
Build a scrappy gas job  
RA system's RD-RFM  
Build a waterproof radio box

## February 78

R/C power sources  
Sig's Smith miniplane  
Rambler gasoliner  
Porterfield CP-65

## March 78

Judging the judging  
Miss Cosmic Wind  
R&S Skyglas Zero  
Thoughts on aerial photos

## April 78

Ryson ST-100 Cloudster  
Flying Aces Moth  
Signature Transmitter  
MRC's Webra .20 Marine

## May 78

The Red Zipper  
Introduction to R/C Sailing  
P-61 Black Widow  
The Silver

## June 78

1978 WRAM Show  
Stall-proof Gassie  
Handrail jig for scale boats  
Hobby Lobby's Jr.  
Beginners outfit

## July 78

1979 Toledo R/C Exposition  
Heron gas buggy  
Royal's Omega transmitter  
R/C model boating at Toledo

## September 78

MRC's series 774  
Magnum 80  
How to paint solid canopies  
Atlanta Miniature Offshore  
Classic

## October 78

Rhinebeck Classics  
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Champion's Anderson Kingfisher  
Isolated needle valves

## December 78

1978 AMA Nationals  
Intro to towline soaring  
MRC's Cobra Jet  
1938 Porterfield Zephyr

## March 79

The Sky Bird  
Ace's Bantam Midget Servo  
'78 Endurance Championships  
Tournament of Champions

## April 79

R/C SOS miles M-20/2  
Seafang  
1913 Rumpler Taube 3F Seaplane  
The U-505

## May 79

Aberle's new angle  
Goldberg's Skylark 56 MK II  
The Pretender  
An easy antenna hook-up

## June 79

1979 WRAM Show  
Beginners Q&A  
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## July 79

Intro to electric flying  
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## August 79

Lockheed's Little Dipper  
1/2 A engine throttling  
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HB's .61 PDP marine engine

## September 79

1979 Indy Unlimited  
Mitsubishi "Claude"  
The Car Corner  
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## October 79

Cessna Agwagon  
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MRC's Trainer Hawk Contest  
Hughey's .20 Rigger

## November 79

Roger Dodger  
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## September 81

Heathkit multimeter  
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MRC's Grand Prix radio systems

## December 81

1981 AMA Nats  
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Mark's Model Scorpion

## January 82

Dual stick vs. single stick  
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Aviafiber 2 FL  
"Hot Stuff"

## February 82

Long Islander 2-meter  
Airtronics' Warlock 40  
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Ducted Fan Pioneer

## May 82

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Airtronic's frequency scanner  
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## July 82

Piper Pawnee Brave  
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## August 82

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McRae Super Dart  
Joining wing skins with  
Hot Stuff  
Off Road World Championships

## December 82

Polish Fighter  
Airtronics Championship Series  
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1982 Roar Nats

## May 83

Casburn's Lucky Fly II  
Monocoupe  
Tower Hobbies System 500  
Miss Dara

## July 83

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## September 83

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Zirroll's Morane Saunier

## March 85

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## June 85

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"Piggy back starter pack"  
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## July 85

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## September 85

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## October 85

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1985 AMA Nats  
The McDaniels Line  
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## February 86

Waco SRE  
PCM 9 single stick  
Greater Southwest Ducted  
Fan Fly-In  
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## March 86

Trainer cables  
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Prather's Piranha

## April 86

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Gambler MK II  
Eastern Freeflight Championships  
Kraft Systems' KP2KWB

## May 86

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Glow plug igniter  
Two Bilsky how-to's  
Bellanca Scout

## June 86

Dornier Do .335  
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PAC Model Supply's Cessna 150

## July 86

Cox Hobbies' Gallop  
1986 WRAM Show  
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R/C Boating at WRAM

## August 86

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Scale Boat Cradles  
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## September 86

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## October 86

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Wiley Post Biplane  
Racing sail boats  
Custom muffler extensions

## December 86

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Kyosho's Electric Zero  
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## January 87

L&L's Technician  
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Saab AJ-37 Viggen  
Building a power boat

**February 87**

MRC's Piper Cherokee  
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ACOM's R/C Sytem  
Galaxy's Mystic

**March 87**

Chicago Model & Hobby Show  
Cressline Canard Stick  
Tower's Mafrec Battery  
A German Canard fly-in

**April 87**

SR-50 Battery Pack  
Goldberg's J-3 Cub  
Scale detailing a boat model  
P-26A Peashooter

**May 87**

San Diego Flaggship  
Beginners C/L pattern  
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**June 87**

R/C Frequencies  
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**July 87**

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**August 87**

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**September 87**

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**November 87**

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**December 87**

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Ducted Fans International  
Altech's Soprano 40  
Picking props propitiously Pt.1  
Norcal's Accu-Charger

**February 88**

Bristol Scout "D"  
Zimpro's Extra 230  
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**May 88**

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**June 88**

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Top Flite's Kitti Wake

**July 88**

Little Wire  
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Project Controline: The basics  
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**September 88**

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FLYING MODELS

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**November 88**

Project C/L, simple maneuvers  
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Foxcat  
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**January 89**

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Les Nering special

**February 89**

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**March 89**

Ducted Fans International  
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**April 89**

Frequency control board  
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Big Foot

**May 89**

The Delta Difference  
Cox's Typhoon ARF  
New England Air Museum  
Super Cruiser

**June 89**

Aerocraft's Aero Sport  
National Soaring Museum  
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MRP's Miss Budweiser

**July 89**

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Classic off shore Deep Vee  
F-82 Twin Mustang

**August 89**

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Classic off shore Deep Vee

**September 89**

Rubber Scale Part II  
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Yak-50

**October 89**

Belleville '89  
A template how-to  
Cradle of Aviation Museum  
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**November 89**

Robbe's Arcus  
Airtronics vision system  
A Plug-In LG how-to  
Make a carved name board

**December 89**

Ace R/C's Tricklers  
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**January 90**

Sorrell Heath EXP-II  
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**February 90**

1/2 A Texaco Rambler  
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**April 90**

P-51D Mustang  
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**May 90**

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Infant Sportster  
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**June 90**

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Sopwith Camel  
Seducer Boats' Seducer

**July 90**

Graupner Super Laser  
Futaba's Conquest R/C Systems  
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R/C scale boats

**August 90**

Leisure Electronics' Playboy  
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Ninja Retriever - Part II  
R/C scale & sport boats

**September 90**

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**October 90**

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**November 90**

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**December 90**

Control Line fuel tanks - Part II  
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Bob Violett's F-86F Sabre  
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**March 91**

C/L F-40 Corsair  
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Clipper "Sidewinder" Hydroplane

**April 91**

PBY Catalina  
Speedo 40  
Futaba's Professor 40  
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**May 91**

Twin Mustang conversion  
MRC's Delta Quick Charger  
Ace R/C's 4-120 Bipe  
R/C Scale boats

**June 91**

Lightning Bug  
Futaba's Super 7 R/C system  
C/L RD-1  
Hobby Dynamics' Hustler

**July 91**

Futaba's Acrostar 60  
Idealair's Komic Elf  
Sky Champ  
Futaba's FP-2D & FP-3D

**August 91**

RCD's AM & FM receivers  
Mini-electric stick system  
C/L Gemini II  
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**September 91**

P-51B Mustang conversion  
Ace R/C's AT-2000  
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ACOMS boat/car R/C system

**October 91**

Kalt Enforcer  
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MRC's Top Gun R/C systems

**November 91**

Banner Aircraft Design's Sukhoi  
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**December 91**

Cable Controls  
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**January 92**

Eagle Mountain Fans  
Digipace II  
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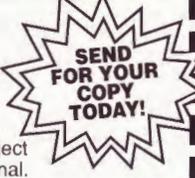
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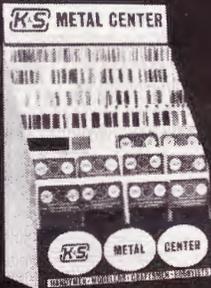
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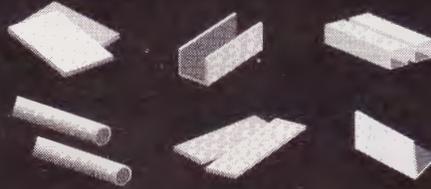
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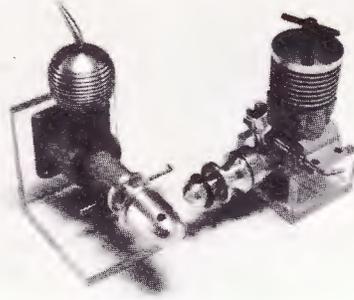
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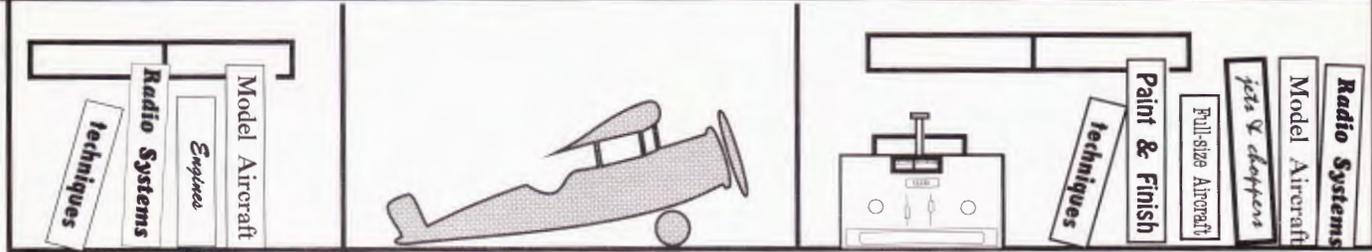


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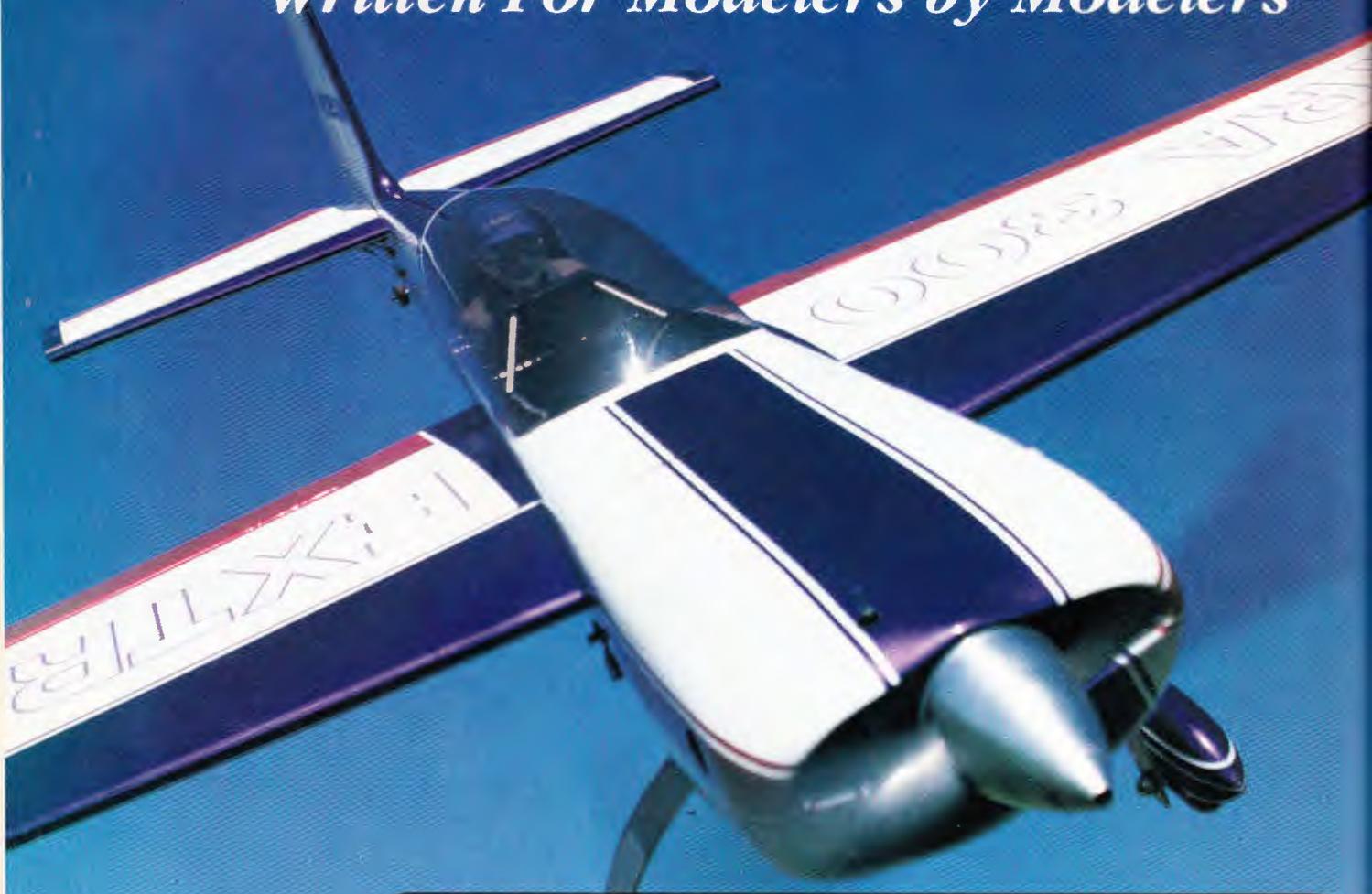
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This is the 40th annual Weak Signals Expo and we will be featuring something special for everyone including 2 new classes of competition: "Sport Jet" and "Scale Jet".

Our Swap Shop features 180 tables and the Saturday night auction is worth attending in itself.

TICKETS can be purchased in ADVANCE by sending a self-addressed, STAMPED business size (4 x 9) envelope to: TICKETS, 15387 Forrister Rd, Clayton, MI 49235

ADVANCE tickets are \$5.50 per day or tickets may be purchased at the door for \$5.00. Tickets for children 12 and under are \$1.00 per day. All orders over 10 tickets must include adequate return postage.

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Deadline for ticket orders is **March 18, 1994** and all sales are final.

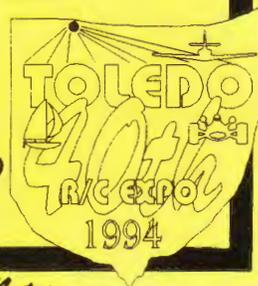
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**NOTE: Show hours are 9AM to 6PM, Fri & Sat-9AM to 4PM, Sun  
The Saturday night auction is at 7:30 PM**

Bring your latest COMPLETELY FINISHED model to display and enter competition for exciting awards. R/C radios will be awarded to the first, second and third place finishers in the following classes:

R/C SAILPLANE (no engines, non-scale models only)  
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 MILITARY SCALE BOAT  
 PLEASURE POWER BOAT  
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\* Judging by AMA scale rules



### Competitors Notes:

1. All models except R/C Sailplane must have engines installed and all scale models must have radios installed.
2. Entries are limited to one model per person, per class. (Also one per show team)
3. Former 1st place models are not eligible.
4. Models must remain on display until show closing on Sunday.
5. Deadline for entering models is 12: Noon on Saturday, April 9.

All models will be judged for "Best Finish", "Best Monokote", the "Directors Award for Achievement" and "Best of Show".

# April 8, 9 & 10

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