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*Issue*



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## CONTENTS

DECEMBER 1994 • VOLUME 24 • NUMBER 3

### COLUMNS

- 14 MODEL DESIGN & TECHNICAL STUFF**  
Francis Reynolds
- 16 HANNAN'S HANGAR**  
Bill Hannan
- 32 PLUG SPARKS**  
John Pond
- 52 FREE FLIGHT**  
Bob Stalick
- 74 ELECTRONICS CORNER**  
Eloy Marez

### CONSTRUCTION

- 41 PEANUT SCALE: THE WRIGHT FLYER NO. 3**  
Thomas Wielecki
- 60 BUILDING THE EEE-Z-FLI RC ULTIMATE BIPLANE**  
Al Wheeler
- 64 THE ULTIMATE BIPE FOR FF RUBBER SCALE**  
Patrick Trittle



### ON THE COVER

An appropriate subject for the cover of our "Ultimate" issue, don't you agree? The lovely Susan Mashiba is pictured with Bert Moriguchi's big Ultimate 10 Dash 300, built from the Ohio R/C Models kit. Finished in MonoKote and K&B Super Poxypaint, Bert's Ultimate is powered by an O.S. 280 (a 240 with two of the cylinders replaced with 80s) turning a Zinger 18x8-14 and fitted with a Tru-Turn 4-inch aluminum spinner. Graphics were done by fellow modeler Paul Yuan. Photo was taken by Jim Miura at Kewalo Basin Park in Honolulu, Hawaii.

### PRODUCTS IN USE

- 48 HOBIBCO'S ASAP ULTIMATE BIPLANE**  
Art Steinberg
- 56 COMPETITION ELECTRONICS' TURBOMATCHER**  
Andrew P. Gump

### HELICOPTER WORLD

- 36 THE NINJA PRO HELI FROM CENTURY HELICOPTER PRODUCTS**  
James Wang

### DEPARTMENTS

- 6 PLANE TALK**  
Reader Photos
- 12 OVER THE COUNTER**  
New Product Announcements
- 20 BIG BIRDS, SPORT & SCALE**  
Bruce Edwards
- 24 RC SOARING**  
Bill Forrey
- 28 CONTROL LINE**  
John Thompson

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Japanese reader Jiro Sugimoto, a frequent contributor to Bill Hannan's column and whose rubber-powered ducted fan MIG-15 appeared in the March '94 "Plane Talk," sent these before-and-after covering photos of his latest Peanut Scale effort, an Art Chester "Goon." Flawless workmanship! Since Jiro already has a *Model Builder* shirt, we'll give him a six-month subscription extension instead. *Jiro Sugimoto, 2-38 Kitahata-Cho, Nakamura-Ku, Nagoya, 453, Japan.*

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Phoenix modeler Reuben Schneider took a break from "normal" projects to make this Grumman F3F Pedal Plane for his grandson, Bennett Karas, as a third birthday present. He used plans and a partial kit from Aviation Products, Inc., of Cedar Rapids, Iowa. "The instruments are 1/3 scale J-Tec," he reports. "A joystick controls the tailwheel steering. I'm not sure if the controls meet FAA safety standards." Reuben Schneider, 2248 E. Camelback Rd., Phoenix, AZ 85016-1149.

This Peanut Scale 1938 Gee Bee Model Y was designed by Pres Bruning and built by Stan Fink, whose D.H. 29 appeared as a construction project in the October '94 Model Builder. "Although not as fast as other Gee Bees, it placed a respectable 4th at 201 mph in the 1931 Thompson Trophy Race," Stan relates. "The model weighs 7.5 grams without rubber and features a foam noseblock, cylinders, wheels and wheel pants. It's easier to trim than the short-coupled Gee Bee R and Z models." Stan Fink, 1810 Pine Street #2R, Philadelphia, PA 19103-6682.



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Torque @4.8v	130"/Ounces	70"/Ounces	42"/Ounces	35"/Ounces	35"/Ounces
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L x W x H	2.3" x 1.1" x 2"	1.6" x .79" x 1.6"	1.6" x .79" x 1.4"	1.4" x .7" x 1.25"	1.1" x .53 x 1.1"
Weight	3.5 Ounces	1.8 Ounces	1.7 Ounces	1.1 Ounces	0.67 Ounces
Ret/Pick-a-Pack	\$39 <sup>**</sup> / \$29 <sup>**</sup>	\$34 <sup>**</sup> / \$25 <sup>**</sup>	\$19 <sup>**</sup> / \$12 <sup>**</sup>	\$29 <sup>**</sup> / \$19 <sup>**</sup>	\$36 <sup>**</sup> / \$26 <sup>**</sup>

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Wingspan: 47 in Wing Area: 524 sq in Weight: 5.5-6 lb Wing Loading: 24-26 oz/sq ft  
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"Paraso Locust" is the name Johnny Gonzalez gave to his latest creation, made of white pine and birch plywood. Wingspan is 103 inches, it weighs 15 pounds and is powered by an ASP 91 Redhead. "The contraption is covered with MonoKote and flies slow and very stable throughout the speed envelope. A Futaba radio controls rudder, elevator and throttle," reports Johnny, a member of the Rag Tag R/C Association of Westleco, Texas. Johnny Gonzalez, 2200 Jackson Ave., McAllen, TX 78501.



Charles Valentino spent six months on this 1/6-scale Douglas Skyraider, scratch built from Nick Zirolli plans. The color scheme and hand-painted markings are from a Vietnam-era aircraft assigned to the USS Intrepid (which is now a floating museum in New York). Span is 102 inches, and the engine is a Zenoah. Finish is Krylon paint over Super Coverite. Charles has turned out several other equally magnificent Zirolli projects: stay tuned for an upcoming MB photo story on them by ace photographer Frank Gudaitis. Charles Valentino, 83 Foster Rd., Lake Ronkonkoma, NY 11779-4308.

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# over the counter

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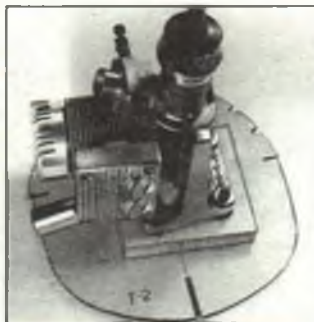


## GRAUPNER'S ELECTRIC AEROBAT

It seems that most kit manufacturers have at least one Sukhoi in their line-up these days. Now Hobby Lobby has jumped on the Sukhoi bandwagon by importing Graupner's 57-inch span all-balsa Su-26M kit, designed for either .40-.46 glow power or Graupner's inexpensive 14-cell electric setup, the Speed 700 Turbo motor mated to the Power Gear 2:1 belt drive. All-up weight with the electric system aboard is about 95 ounces, for a wing loading of 18.5 ounces per square foot. You can find out more about this and many other neat and interesting modeling goodies by requesting the 124-page Catalog 24, free from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.

## SCALE AT-6 MUFFLER

As any scale buff knows, the engine exhaust on a full-size AT-6 exits the right side of the aircraft; why then do most of the 1/6-scale Texan kits on the market show the exhaust coming out the bottom?



That's what J'Tec's John Tatone wanted to know also, and that's why he designed a special muffler that places the exhaust in the correct location. The muffler is cast aluminum, bolts directly to the engine and comes with mounting bolts and an exhaust extension. Suitable engines are the O.S. Max 1.08, Super Tigre 2500 and 3000,

Webra 1.20 and Moki 1.5 and 1.8. The mufflers are priced at \$34.95, at your dealer or direct from J'Tec, 164 School St., Daly City, CA 94014; (415) 756-3400.

## SOMETHING COMPLETELY DIFFERENT

Here's a flying machine that's sure to appeal to RC'ers whose tastes run toward the bizarre. Kyosho's AutoKite 10, distributed in the U.S. by Great Planes Model Distributors, is best described as a pod-and-boom fuselage with engine, landing gear and conventional tailfeathers, suspended below a brightly colored polyester Rogallo-type flexible wing. Controls are simply rudder, elevator and throttle. According to the Great Planes folks, the AutoKite 10 won't stall or spin, and in fact is so stable and positive in pitch that you cannot drive it into the ground. The whole thing screws together—no glue or painting required—and comes complete with everything but the .10 size engine and radio. Suggested



retail is \$169.99. From Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630.

## LIGHT THOSE GLOW PLUGS

The folks at Du-Bro predict that their new Kwik Start Glo-Plug Ignitor will become the No. 1 best-selling unit of its type on the market. It comes with a Sanyo 1300-1450 mAh NiCd battery, lock-on glow plug clip and Du-Bro's new Kwik-Mount



Storage Klip (which is also being marketed separately) for mounting on the side of your field box, all priced at a very reasonable \$16.95. An AC wall charger is also available. Check out the new Kwik Start Glo-Plug Ignitor at your local hobby shop. It's produced by Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084; (708) 526-2136.

## SPORT SCALE RAVEN

Now being produced under the Global Quality Kits label is a sport



scale replica of the Raven, Wayne Handley's famous one-of-a-kind airshow performer. Global's kit features an all-wood structure with some molded plastic parts, and includes spinner, bent wire landing gear and a set of special Raven decals. Specs: 62 inches span, 50-1/2 inches overall length, 638 square inches, .60-.65 two-stroke or .90 four-stroke. Properly powered, you'll wind up with a model fully capable of duplicating the incredible airshow maneuvers of the

full-size aircraft. Distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728-8610; (714) 963-0133.

## A MUST-HAVE FIELD KIT TOOL

The model PDS-12 Pocket Drill Set from Davis Model Products belongs in every modeler's field box. The PDS-12 is a cleverly designed pin vise with a hollow aluminum body that contains 12 high speed steel twist drills, ranging in size from a #74 (.014 inch) to a #52 (.062). At the business end, the drills are held by a four-jaw steel collet. Considering that the drills are included, the \$9.95 postpaid asking price is exceptionally reasonable. See your dealer or order direct from Davis Model Products, P.O. Box

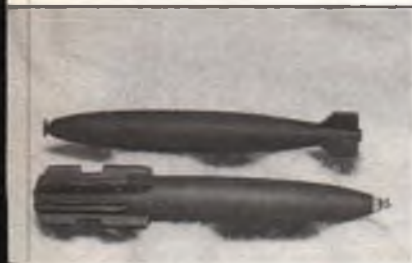




141, Dept. MB, Milford, CT 06460; (203) 877-1670.

## BOMBS AWAY!

Eagle Miniatures is producing two versions of the Mk 82 500-pound bomb used on modern military aircraft. Shown at the top of the photo is the low-drag, general purpose Mk 82 500-pounder, offered in 1/10 and 1/7 scales; both sizes include four bombs per kit. The other is the Mk 82 Snakeye, the real-life counterpart of which has pop-out folding fins to slow the bomb's descent. The Snakeye kit is



offered in 1/10 scale only, one pair per kit. Both feature pre-scored bodies and exceptionally lightweight construction. Full details can be yours for \$2 and an SASE sent to Eagle Miniatures, P.O. Box 468, Streamwood, IL 60107.

## JET PERFORMANCE ON A BUDGET

The second in Hangar 1 Aviation's series of semi-scale jet

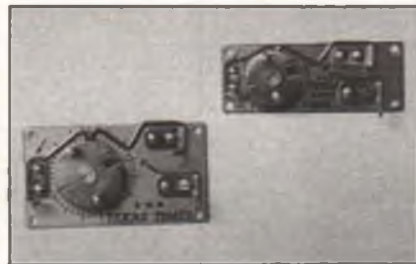


When contacting the manufacturers/distributors mentioned in Over the Counter, please tell them you read about their products in *Model Builder* magazine!

models is an F-105 Thunderchief, a rakish, mean-looking aircraft designed for a standard nose-mounted engine (.35-.46 two-stroke) turning a standard tractor prop. It's claimed to be a virtual screamer with a .46 aboard, and we don't doubt it. The model features a foam core wing and an all-wood fuselage, spans 33 inches and is priced at \$109.95. From Hangar 1 Aviation, 2705 Airport Rd., Suite 111, Dalton, GA 30721; (706) 278-1585.

## NEW & IMPROVED TIMERS

For you free flight types, Hank Nystrom is offering updated versions of his high-quality two-function clockwork Texas Timers, the Texas ABC and Texas Mini. Most notable improvements are the addition of knobs to the timing wheel, a redesigned faceplate with more visible timing marks, and the "Texas Stoplock," a specially bent trigger wire that latches in place and prevents false starts from engine vibration. The Texas Mini is actually a redesign of the former Texas 1/2A timer; the name was changed because many fliers prefer it even for their bigger models. An



SASE will bring full particulars on all Texas Timer products and services. Write to Hank Nystrom, 3317 Pine Timbers Dr., Johnson City, TN 37604, or call (615) 282-6423.

## FOR SEAPLANE FLIERS ONLY

New from Ernst Manufacturing are two sizes of very nicely engineered retractable water rudders for RC seaplanes. Made of glass-filled nylon and equipped with stainless steel screws, Part #155 is



for .40-.60 models and is priced at \$6.98; #156 is for .90 to 1/4-scale and sells for a buck more. What sets these apart from similar products is that they can be retracted by radio, if you care to set them up that way. And even if you don't, they'll still automatically kick up when beaching or running over floating objects. Steering can be via pull-pull cables or a push-pull pushrod. Consider installing one of these rudders on your next seaplane project. They're made by Ernst Mfg. Co., 37570 Ruben Lane, Suite B, Sandy, OR 97055; (503) 668-5597.

## THE FINISHING TOUCH

Aeroloft Designs makes of some of the very best precision scale dry transfers available. The ink used to make those markings is now being packaged in liquid form, to be loaded into a technical pen and used to make panel lines on scale and scale-like models. Aeroloft's Panel Line Ink is said to dry instantly and will not smudge, and comes in a rainbow of colors. A starter kit, priced at \$15.50 and enough to easily do 20

models, includes instructions, a 2-ounce bottle of ink (your choice of color), and a 4-ounce bottle of developer. Pens are also available for \$15 each. For more information and a product catalog, send \$3 to Aeroloft Designs, 2940 W. Gregg Dr., Chandler, AZ 85224, or call (602) 838-0447.



## .40-SIZE FUN

The folks at Air Flair are now producing their classic Sundancer in a new smaller .40-size version, a 63-1/2 inch span, 702 square inch high-wing aerobatic ship said to be capable of knife-edge loops, cross-controlled slips, slides, skids, one-wheel

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Sundancer 40 is \$104.95, but it's being offered factory direct at a special introductory price of \$69.95 plus \$5 S&H. Order yours from Air Flair, 1750 Lundgren Rd., New Carlisle, OH 45344.



## A THIRD HAND

Remember PanaVise? Yep, they're still around, and they've now come out with a new smaller version, the PanaVise Jr. A versatile tool, the vise head on the Jr. can rotate a full 360 degrees and pivot

up and down a total of 210 degrees; a single knob locks the head in position. The base is die-cast zinc, the jaws are fiber reinforced plastic and can open up to 2-7/8 inches. Retail price is only \$19.95. From PanaVise, 1485 Southern Way, Sparks, NV 89431; (702) 353-2900. **MB**



# MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS REYNOLDS

## • Scale Speed • V-Tails Revisited • Roadable Aircraft

This is one of those months when we need to speak of cabbages and kings, and coversome letters from our good readers.

### SCALE SPEED

If we were to ask modelers in general to define "scale speed," we would get a lot of different answers. The words "scale speed" alone are insufficient to avoid confusion and controversy. I prefer the terms "visual scale speed" and "dynamic scale speed." These are *not* the same thing.

Visual scale speed, which is what most modelers seem to mean when they talk about scale speed, is simply the speed of the full-size aircraft divided by the scale factor. In other words, a quarter-scale model

should fly one-fourth as fast as the full-size airplane.

To make a scale model look the same in flight as the real thing, visual scale speed is what we want. Assume the real airplane is flying 1,000 feet away, and its quarter-scale model is flying 250 feet away; each will now subtend the same angle in the eyes of the observer, and will appear the same size. Angles don't change with scale.

Further, assume that the airplane is flying at 100 mph; it will require a certain sweep rate of the eyeballs or head in order to follow it. If the quarter-scale model flies at 25 mph at its "scale distance," the visual sweep rate required to follow the model will be the same as the sweep rate required to fol-

low the real airplane at its distance and speed. This is what advocates of "scale speed" seem to be asking for.

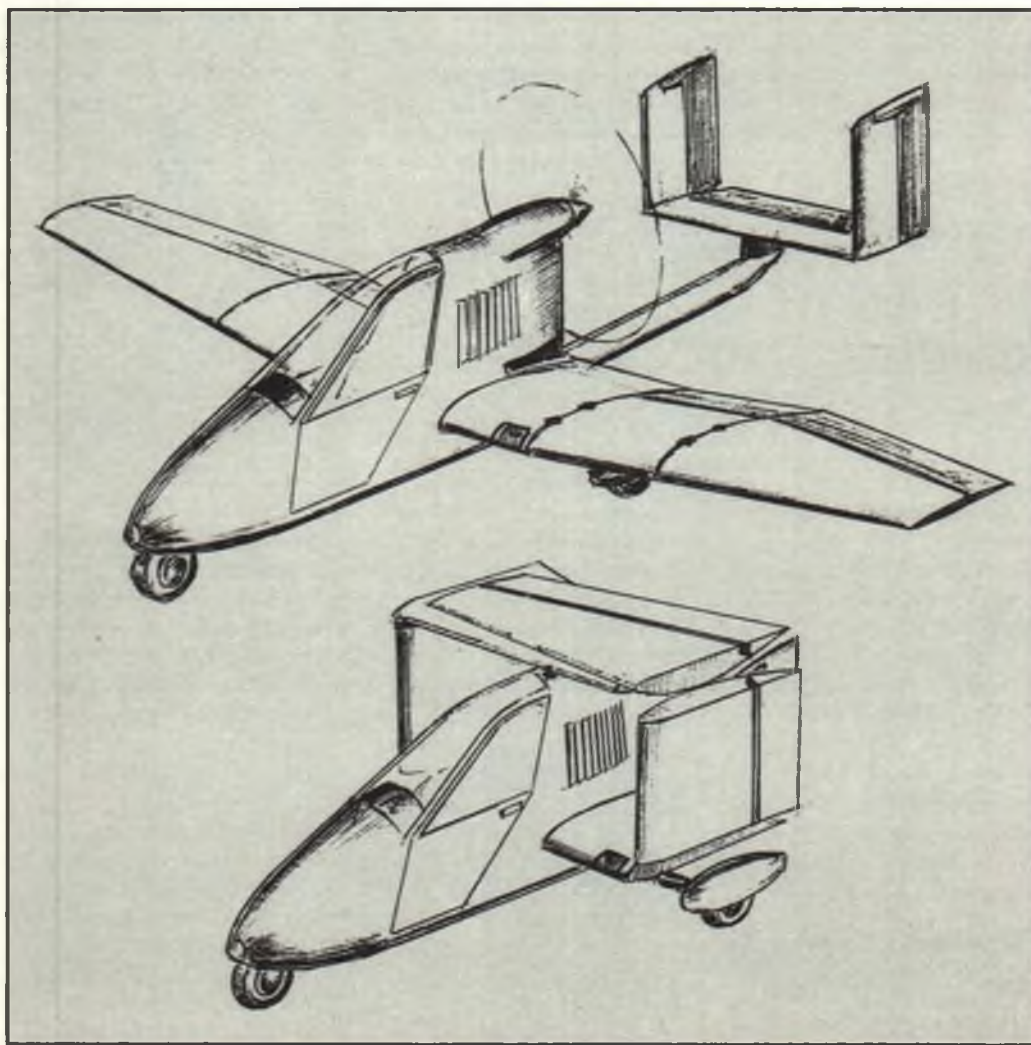
But there are problems when we try to fly scale models at visual scale speed, especially replicas of some of the old low-powered lightplanes. Of these, even the most lightly loaded model is usually too heavy to fly at true visual scale speed. If they can fly at all at true visual scale speed, they fly at a nose-high attitude, are apt to stall or snap roll, and their aerobatic maneuvers are far from scale in appearance. On the other hand, visual-scale speed for a model of a supersonic jet may be quite achievable, because of the high speed of the prototype.

"Dynamic scale speed," a term suggested to me by my favorite technical consultant, Will Kuhnle, is equal to the speed of the prototype divided by the square root of the scale factor. You will find this relationship in many textbooks on aerodynamics. Taking our previous example, if the full-size aircraft flies at 100 mph, its quarter-scale model's dynamic scale speed will be 100 divided by the square root of 4, or  $100/2 = 50$  mph. We can probably get our RC scale models to do this with little trouble.

Last year I had extensive correspondence with Ralph Grose, of Riverside, California. Ralph is an RC scale competitor, a technically savvy individual, and he has been concerned over the flying speed issue in judging RC scale contests.

Ralph, using arguments similar to mine above, has submitted a rule change proposal to the AMA, to delete the requirement for "scalelike speed." I support him. I hate to see our hobby

*continued on page 46*



Ready to take on a real challenge? Try your hand at designing a truly practical full-size roadable aircraft. A small core of enthusiasts are working toward that goal here in the U.S., one of whom is Bill Schugt, whose sketch of his "Mini-Aircar II" is reproduced here. Francis touches on the subject of roadable aircraft in this month's column and also tells how you can subscribe to *Roadable Aircraft* magazine.



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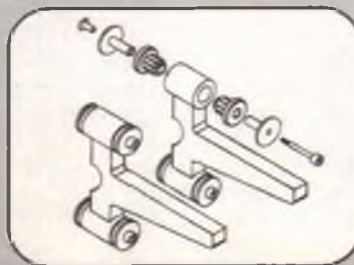
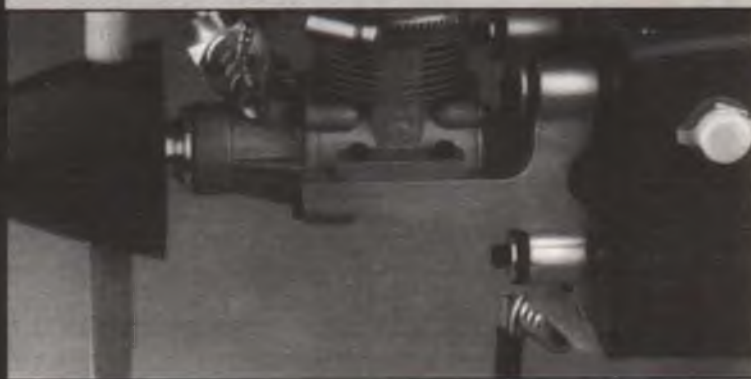
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# HANNAN'S HANGAR

BY BILL HANNAN

**'You are never too old to enjoy a happy childhood!'**

Our lead-in quotation, by Dorothy Pierson, is from *The Best Is Yet To Be* newsletter. Dorothy explained that while children seem oblivious of time when it comes to the joy to be found in surroundings, adults often feel too busy to "really see things and feel a sense of appreciation and enjoyment and wonder." She suggests tuning in to our inner child-selves to "indulge the soul in the interests a child might enjoy."

Might there be a message here for modelers? Perhaps we tend to become so involved in the pursuit of perfection that we turn our hobby into a second job. Why not try a change of pace now and then, with easier, more child-like, short-

dividual expression and creativity. Furthermore, they can be spirited performers with a minimum of effort.

## MARIN AERO CLUB

Located in the San Francisco bay area, the Marin Aero Club emphasizes relaxed, pressure-free model flying and informal competition, both indoors and out. A wide range of scale and non-scale events for rubber, CO<sub>2</sub> and electric FF models are held. Prizes, generally kits or supplies, are donated by the contestants themselves, and since club rules permit only one award per entrant, all who participate take home a prize.

The four Marin Aero Club

tical Administration, and has worked at the Ames Research wind-tunnel facility. George Benson returned to modeling only a few years ago, following a 50-year gap since building models in England during WWII. All of these people share similar fly-for-fun priorities, in a club which has no dues, no meetings, and no officers; just a group of folks who like to get together to fly model airplanes.

## SCALE OLD TIMERS SOCIETY

A similar attitude also prevails in the SOTS model club, as evidenced by these extracts from one of their brochures: "There are few hobbies today that can equal the pleasure a



■ LEFT: Shades of 1934! Don Campbell's Buck Rogers rocket departs planet X (actually a crinkled black trash bag) in a cloud of poly-fil fiber "smoke."

■ RIGHT: George Benson's slick "Silver Schtick" Bostonian decorated with fictitious-but-fun markings. This John Oldenkamp design was featured with full-size plans in the November 1992 *Model Builder*.

term projects? Simple can be satisfying and facile can be fun!

## BLAST-OFF

Take a look at Don Campbell's Buck Rogers rocketship, for example. This old-fashioned solid model radiates nostalgic charm, yet it was made from common, low-cost materials, just for personal satisfaction. But isn't it a great conversation piece?

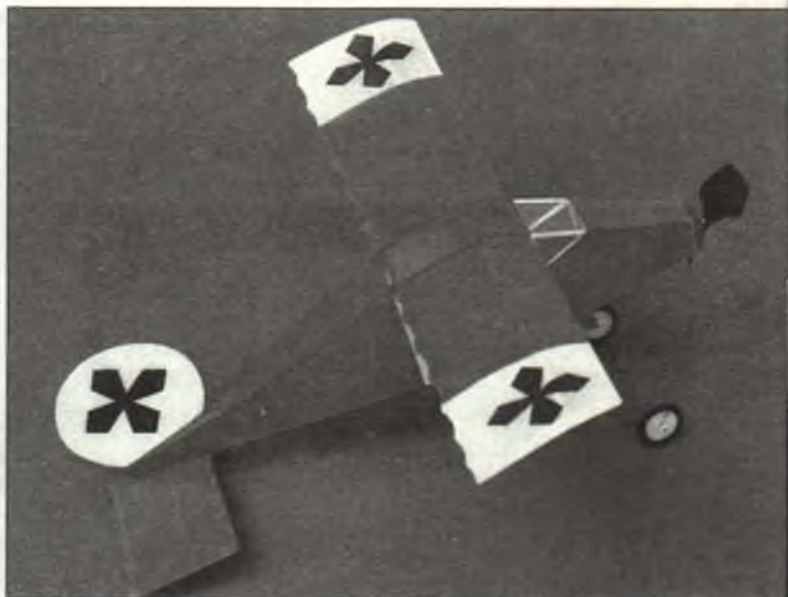
And how about those Bostonian models? Sure, they're easy to build, but they also offer marvelous opportunities for in-

members in our photo have fun with their Silver Schtick Bostonians, each colorfully finished and decorated in quasi-national markings. These 14-gram models, built from John Oldenkamp's full-size plans in the November '92 *Model Builder*, fly very well, with a top time of 57 seconds indoors under a 28-foot ceiling, and as much as 3 minutes outdoors.

Club fliers Bill Hurley and Walter Palmer, friends for 60 years, have been modelers since 1935. Bill's daughter Barbara holds a B.S. degree in Aeronau-

person may enjoy through building and flying indoor and outdoor free flight models. Those long, graceful flights by your own airplane are so rewarding! There is no large investment needed to begin flying, and necessary tools and materials are easily found at local hobby shops.

"Free flight has an infectious charm and is the perfect way to introduce technical science and mathematics to young and old alike. Learning about aerodynamics and physics is subtle and painless. A real sense of





accomplishment comes with every successful flight."

For more information about the Scale Old Timers Society, contact Tom Sanders, 9 Kern Dr., Perkasie, PA 18944. Please include return postage.

## MEANWHILE, IN FLORIDA

The Miami Indoor Model Aircraft Association (MIAMA) is another organization famed for its low-pressure competitions. Millard Wells and friends recently held the 7th annual seaplane contest, with a relaxed ambiance. Scale judging was simplified by not evaluating models until after they had demonstrated the ability to take off unassisted. Achieving this is

contact Dr. John Martin, 2180 Tigertail, Miami, FL 33133.

## GONE WEST

More friends have left us recently. Among them was teacher Roland Hoot, who was a proficient builder of model aircraft, trains and dollhouses.

Vito Garofalo, a former designer with Comet and founder of the model kit company Tern Aero, was reportedly killed in an airplane crash, along with his son. No other details were available at the time of writing.

Longtime Los Angeles area model enthusiast George Honda also passed away, apparently quickly and peacefully.

Lou Proctor, of San Diego, California, won his first national

lies and friends of all these departed modelers.

## PUBLICATIONS

### •The Windy Sock

Dozens of newsletters pass across our desk each month, and all are appreciated. Among the most educational of them is *The Windy Sock*, edited by Joe Joseph. Most issues feature comprehensive how-to articles concerning such subjects as making your own spoked wheels, flight trimming, and Fritz Mueller's remarkable series on CO<sub>2</sub> systems. Twelve-issue subscriptions cost \$10, from Joe Joseph, The Alamo Escadill Model Flyers, 8311 Babe Ruth, San Antonio, TX 78240.

planes organization, entitled *Aerodrome Update*, is a beautifully produced magazine devoted strictly to WWI aircraft. A unique feature is that there are two outer covers; thus one may be removed for framing, if desired, leaving the magazine itself intact.

Articles include the history of the organization, its museum and fly-ins, a tribute to the late Cole Palen, and more. Of special interest is the philosophy of founder Frank Ryder, who feels that model aircraft deserve as much appreciation as their full-size cousins. In fact, he prefers to refer to models, regardless of size, as simply "unmanned aircraft," which are expected to be featured in the magazine



■ LEFT: Tom Sanders' "Hollywood Hawler" Bostonian won two prizes at a recent Reading, Pennsylvania airport indoor contest. Those clever trophies, created by Tom Hallman, feature artwork from vintage *Flying Aces* magazine covers. ■ RIGHT: The "Silver Schtick Staffel" of the Marin Aero Club, from left: Walter Palmer, George Benson, Barbara Hurley and her father Bill Hurley. Their distinctively decorated Bostonians provide plenty of pleasure.

more difficult than it may appear, and in fact, no one in the past seven years has been able to accomplish R.O.W. with a Peanut!

Be that as it may, the MIAMA meet was a rousing success, with a wonderful buffet breakfast and the winning flier receiving an original Millard Wells watercolor painting. The 1995 event is already planned. In case you may wish to attend this or any other Florida frolics,

scale model contest in 1929, and was rewarded with a trip to Europe and lunch with Louis Bleriot, among other honors. Aviation, both full-size and model, remained vital factors in Lou's life. Proctor Enterprises, his highly regarded RC model kit company, now under different ownership, carries on Lou's superb manufacturing standards, and will help perpetuate his name.

Our condolences to the fami-

### •Best of Hangar Pilot

Speaking of newsletters, Dave Linstrum has announced Volumes 4 and 5 in the *Best of Hangar Pilot* compilations, featuring plans for Pistachios, Peanuts and sport models from editor Doc Martin's archives. The Volume 4 and 5 set is available for \$14 postpaid from Dave Linstrum, 1109 36th Ave. W., Bradenton, FL 34205-6109.

### •Aerodrome Update

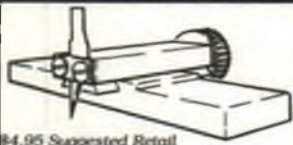
The journal of The First War-

regularly.

Membership in The First Warplanes is open to anyone interested in WWI flying machines, and includes a subscription to *Aerodrome Update*, discounts at participating airshows, a club decal and the opportunity of taking part in the construction of a full-size Gotha! The fee is \$30 from The First Warplanes, P.O. Box 366, Guntersville, AL 35976; (205) 582-4309.



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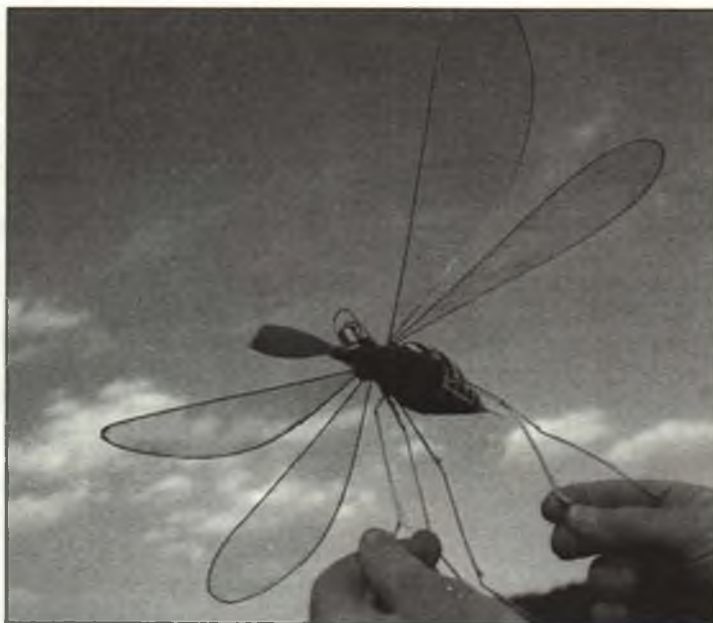
Wayne Kester, who is responsible for the highly detailed printing on the shirts and caps being marketed by Vern Clements, now offers his services to individuals or groups interested in custom printing for garments, labels, Mylar decals and plaques. Wayne specializes in one-of-a-kind and short-run productions, with no screen or setup costs involved. Logos or designs may be of any size and may be reproduced in a wide range of colors. We have several of his shirts and caps here at the Hangar, and are especially pleased with the quality of the printing and the garments. For a free bro-

chure and price list, call Kester Marketing Services at (800) 437-9146.

When contacting any of the aforementioned people, please tell 'em *Model Builder* sent you. Thanks!

### SIGN-OFF

In keeping with our theme this month, we close with this comment from Earl VanGorder, who attended the highly successful Flying Aces Nationals: "A Flying Aces Club meet is not your typical model contest with tension, stress, etc. No . . . it's more like a family reunion with a bunch of guys and gals who are having FUN!" **MB**



■ LEFT: Fun-scale "Wasp" by Rainer Gaggler, of Austria, is CO<sub>2</sub> powered. Photo by W. Hach, via Fritz Mueller, was taken during the Openscale '94 meet in the Czech Republic. ■ BELOW: These MIAMA indoor fliers in Florida also find fun outside with their rise-off-ocean models. Standing, from left: Dr. John Martin, Carl Hadley, Jürgen Kortenbach (holding his winning Pilatus), Don Brimmer, and Millard Wells. Kneeling are George Nunez and George Nunez Jr.





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HLBW002 PS Flyer 99" ..... \$79.00  
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THE 1994 IMAA

# Festival Of C

For Big Bird lovers, the place to be on July 15-17 was Arlington, Washington, for one of the biggest and best annual Giant Scale meets in the country.



Here's one we'd like to see modeled more often. Harold Leminger turned out this 42 percent size replica of Jim Miller's Pussycat racer and plans to compete at Madera. Wingspan is 80 inches, and the engine is a 75cc 3W. One fast airplane!

## BIG BIRDS, SPORT & SCALE BY BRUCE EDWARDS

Ultimate Sport's latest replica of the latest Sukhoi, the two-place Su-29, as flown at the Festival by Duane Sims. The 1/3-scale plane is powered by a 3W 120 twin-cylinder engine.





# giants



Leo Oskowski has just fired up the two Super Tiger 2500s that power his Douglas A-26. The 48-pound plane has a 10-foot wingspan and Phil Girard retracts. Brakes and flaps work, too.



Beautiful and rarely modeled Boeing 247 is the work of Doug Dugan. The 45-pound, 127-inch span plane is powered by two O.S. 320 four-strokes and features retractable gear. Doug and his pilot, Don Modan, traveled from Salina, Kansas to fly at the 1994 Festival of Giants.



One of several multi-engine models at this year's Festival of Giants was the beautifully finished Northrop P-61 Black Widow entered by the father-and-son team of Bob and Don Carpenter. Flew well with two O.S. BGX 3500s.



**T**he 1994 IMAA Festival of Giants is over and the dust is settling at Arlington Airport in Washington. The Boeing Hawks RC Club and the Lesser Seattle Giant Aircraft Squadron (LSGAS), IMAA Chapter 163, along with a multitude of Northwest Big Bird enthusiasts, can look back with some pride at one of the most efficiently run and pleasant Festivals ever.

I've been unable to attend a Big Bird Festival since 1984, so I was pleased that this year's meet was so close to home. I talked with well over a hundred Big Bird modelers from all parts of the country and they were very pleased with this year's site and its facilities.

The registration booth was well manned and the entrants were warmly greeted and eased through what to me is normally a tedious process, one that could certainly be simplified by the bean counters of the various governing organizations. The Hawks and LSGAS members tried to make it as painless as possible. The transmitter impound was a very smooth operation that kept the transmitters in a nice, cool, easily accessible location. Not a single plane was shot down due to inadvertent transmitter use. Frequencies were closely monitored by the Boeing Hawks' scanner.

A generous pit area made it possible to start your engine(s) comfortably, and flightline attendants directed you out of the pit area when it was your turn to fly. The four flying stations were generally busy, but the wait to fly was reasonably short. Announcer Al Watson did a great job of letting the spectators know who and what was in the air.

There were at least 350 planes and 151 registered pilots, which made this event the largest Big Bird Festival ever held in the Pacific Northwest. Many planes were kept out of the display area and next to the participants' motor homes or travel trailers,



Canadian flier Bill Smallwood drove down from Vancouver to attend the Festival and fly his highly detailed Bellanca Air Cruiser. Powered by a Quadra 50, it spans 130 inches and has working oleo struts.

# Festival Of Giants



John Cobb's pretty Starduster Too is a Darío Brisighella design, is powered by a Zenoah G-62, spans 79 inches and weighs 26 pounds.



■ LEFT: Larry Wheat was so busy with the nuts and bolts of running the Festival that he never got a chance to fly his Lancelot ES. Larry's Lancelot flies very well with a Moki 1.8, weighs 24 pounds and has a 118-inch wingspan. ■ CENTER: Don Thorson's Ford Trimotor doesn't have much detail, but he flew as many flights and had as much fun as anyone at the Festival. Three K&B .61s power the 22-pound, 112-inch wingspan model, which Don built from scaled-up Cleveland plans. ■ RIGHT: A Saito 300 twin powers Larry Roberts' gorgeous Gee Bee Model Y Senior Sportster, built from the Ikon N'west kit but with many mods along the way. A beautiful classic plane!



making it easy for me to interview the builders and pilots.

This was definitely the year of the multi-engine model. Lou Oskowski flew his 48-pound Douglas A-26. Don Moden flew Doug Dugan's Boeing 247. The father-and-son team of Bob and Don Carpenter flew their P-61 Black Widow. Don Tronson was flying a 112-inch Ford Trimotor built from Cleveland plans. There was also a 8-17 flown, but I could never find the pilot or get the plane in a good position for pictures. The sight of the large multi-engined plane in flight had the spectators on their feet applauding. One of the beautiful things about the IMAA's Festival of Giants is that you are in effect in a time machine, looking at wonderful planes from past eras, flying again in only a somewhat smaller version.

Congratulations to Larry Wheat, the Boeing Hawks, IMAA Chapter 163 and all the Big Bird modelers from around the country who made this a great event. My thanks also to Kathy and Walt Wyrick for the loan of a camera when mine quit a few weeks prior to the event. **MB**

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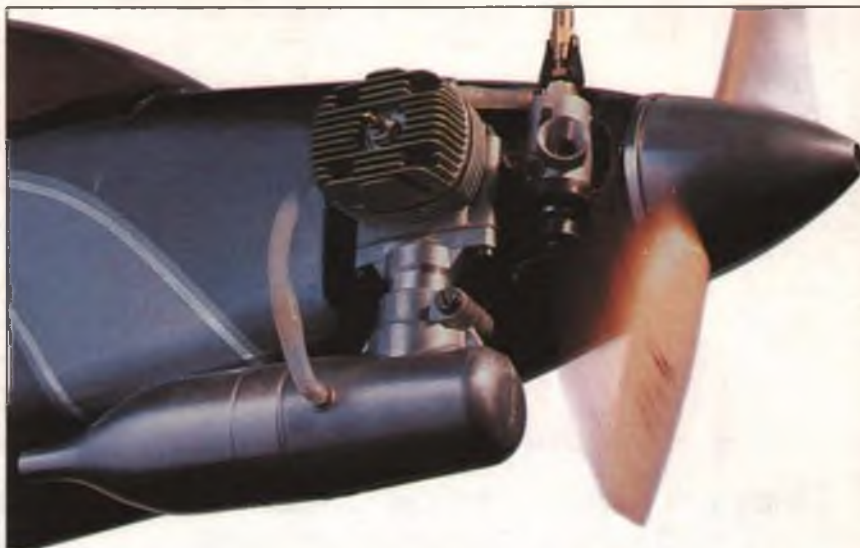
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# WHAT'S NEW FROM SAILPLANE KIT MANUFACTURERS?

There are several new designs out there, every one of them capable of putting you at the top of the heap at that next big contest.



Top Team at this year's Pasadena Spring Soaring Festival was the Harbor Soaring Society. Fred Weaver shot this photo of the top team, from left: Tom Vincent, 19th; Mike Aguirre, 9th; Roger Lackey, 5th; and Ben Clerx, 10th... all flying Ben's Mako design! Note that two are the new V-tail version of the Mako.

It's toy store time again, all ye who love to soar and who like to window shop via magazine. This month's column will focus on some of the wonderful new creations that can be obtained from those who work in model factories great and small.

## CLERX AERONAUTICS

Although the Clerx Mako isn't really new, there's a new version of it available if you prefer a V-tail competition ship. The Mako, for those who are not familiar with it, is designed for aggressive competition flying.

Walt Volhard is rightfully proud of his new V-gilliant from Dodgson Designs. This hot new 180-inch V-tail is likely to make a lot of friends on the AMA contest circuit in the years to come.

yet it also exhibits the kind of docile handling that makes it appropriate for a first aileron thermal competition ship. Some say it's even easier to fly than a poly ship.

Anyway, the Mako features the popular triple taper planform and equally popular SD7037 airfoil. The wings are foam cores with obechi sheeting and a strong CF spar; it's available both as a basic kit or with pre-sheeted wings. Specifications: 114 inches wingspan, 948 square inches wing area, 13.7:1 aspect ratio, 74 ounces flying weight, and 11.2 ounces per square foot wing loading.

For availability and pricing info, contact Ben Clerx at 39 Seabrook Cove, Newport Beach, CA 92660.

## AVE-SLOVAKIA/DYNAMIC MODELLING

At the recent two-day Pasadena Spring Soaring Festival I ran into my longtime friend and fellow modeling columnist, Don Edberg. He was there with a friend from Slovakia (formerly a part of Czechoslovakia) who brought a truly gorgeous, beautifully detailed all-molded competition sailplane which he manufactures. It's called the Diamant, and Don at Dynamic is the U.S. agent.

The Diamant comes ready to fly, requir-







■ ABOVE: Dodgson Designs' new 2-meter Wee-gilante is a truly versatile sailplane. Buy it and a set of 100-inch V-gilante wings and you will have a great all-around AMA Nationals plane with a minimum of expense, travel space requirements and setup hassle. ■ BELOW: Ian Douglas models the Tom Finch designed, Sailplane Systems Vigilante sailplane. Featuring molded composite wings, stabs and fuselage, this ship is truly high-tech. Unique features detailed in the text make it an interesting high-performance contest ship.



ing radio installation only. The basic specs are: 96 inches wingspan, 691 square inches wing area, Eppler 193 airfoil, 57 ounces flying weight with five servos, 12 ounces per square foot wing loading, and hollow-core molded GFK-CFK-Rohacell sandwich construction of the wings and (I think) stabs.

The fuselage is molded fiberglass and features a blade-type steel wing joiner for the wings. The bellcrank is reversed from most competition designs in that when the pushrod pulls, you get up elevator. This can be a lifesaver in a hard zoom launch or extended vertical dive, where any flex in the system can minimize or even neutralize elevator effectiveness.

There are three versions of the Diamant: F3J (thermal), F3F (slope), and F5B (electric). I believe the F3J version is what Don has in stock right now. If you like the looks of the model and are impressed by flawless

*Here are some of the wonderful new creations that can be obtained from those who work in model factories great and small.*

quality (trust me on that one), give Don a call at (714) 552-1812, or write to Dynamic Modelling at 4922 Rochelle Ave., Irvine, CA 92714-2941.

#### DODGSON DESIGNS

Talk about a prolific model designer, that's Bob Dodgson. I phoned Bob recently to find out how he was doing and to touch base with him on what was new in his product line. Boy, did I get an answer! He included info and photos on his entire line, including the new models! Even though I've never owned one myself, I've always liked the way Dodgson planes looked and flew.

Bob's two newest designs look better than ever. New for this year are the 100-inch span V-gilante (obviously a V-tail ship) and a smaller 2-meter version, the Wee-gilante. Both share the same fuselage and tail, so that you can in effect fly two classes with the same model merely by swapping wings. The fuselage for these models is Dodgson's unique MonoSeam rolled fiberglass piece that comes pre-joined along the turtledeck, but requires the builder to install the pre-molded fiberglass nose top-deck—and you can even get this "nose job" done for you at the factory for an extra 10 bucks. The SD7037 wings are foam core with carbon fiber reinforced spars and obechi sheeting. The stabs are built-up balsa for light weight.

Specifications for the V-gilante: Span 100 inches, wing area 750 square inches, flying weight 42 ounces, wing loading 8 ounces per square foot. The Wee-gilante has a 78-inch span, 585 square inches, 37 ounces





The Diamant is a diamond in any language, and this ship of the same name is as perfect as one, too! Molded wings, stabs and fuselage are flawless and worth every penny of their price. Don Edberg of Dynamic Modelling is the U.S. agent for this Slovakian-made glider.

flying weight, and a 9 ounce per square foot wing loading. The V-gilante kit sells for \$175 complete or \$185 with the factory "nose job." Respective prices for the Wee-gilante kit are \$165 and \$175.

One great thing about Dodgson models

is spare parts availability. You can buy wing kits, fuselages, stab kits, parts, etc., to keep your sailplane going for years!

There's much more to tell you about Dodgson Designs, but space doesn't allow me to tell it all. My recommendation is that

you get the Dodgson 10-page 1994 catalog and read all about it! Write to Dodgson Designs, 21230 Damson Rd., Bothell, WA 98021; (206) 776-8067. Tell Bob you read about his new kits in *Model Builder*!

## SAILPLANE SYSTEMS

You may not have heard about this new company. It hasn't been around long, but watch for good things to come. Proprietor Tom Finch is a longtime friend of mine whose passion is flying full-size and model sailplanes. What Tom is offering is a "a new (and better) open class sailplane" called the Vigilante.

The Vigilante is an all-hollow-molded composite ship. The wing is a three-piece affair with Kevlar/glass/balsa wing skins and carbon fiber spar caps and reinforcing. The stabs are all-moving and hollow-molded using Rohacell and glass/CF. The fuselage is Kevlar/glass and features a slip-on nose cone.

In the way of unique features, the Vigilante's flap and aileron hinges are actually one of the Kevlar wing skin laminations. They can't pull out, they can't rip or tear, they make a perfect seal, and best of all, they require no work on your part. The wings and stabs can be ordered with white top surfaces and your choice of color on the bottom for best visibility. Also unique are the flap servo mounting plates that bolt on and give easy access. The aileron servos mount directly to the inside of the lower wing skin and are easy to access when the

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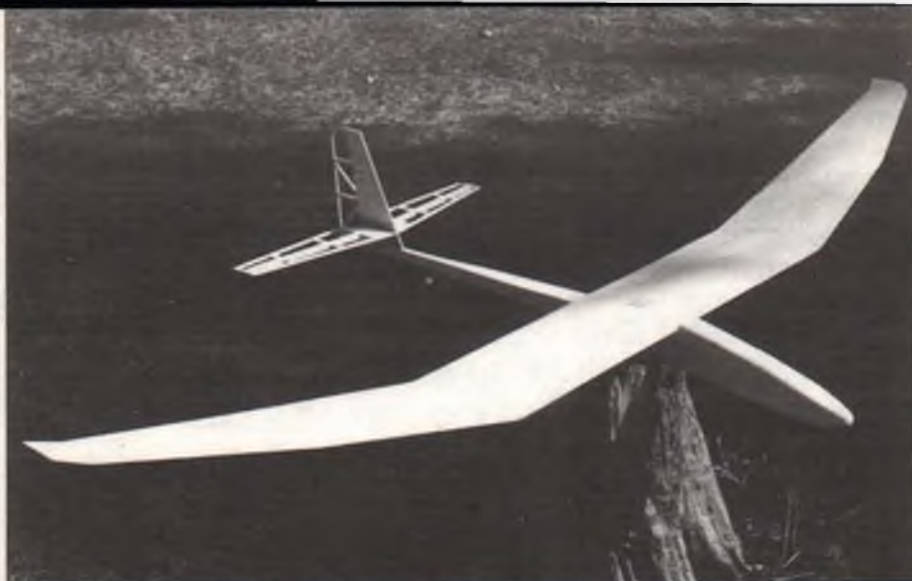


SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE
5.5 X 2	1.59	8.5 X 7.5	5.39	11 X 6	2.49	12.5 X 12.5	7.95	14.4 X 12	12.95	20 X 10	25.00	24 X 10	55.00
5.7 X 3	1.59	8.75 X 7.0	5.39	11 X 7	2.49	12.5 X 13	7.95	14.4 X 13	12.95	20 X 12	25.00	24 X 12	55.00
6 X 2	1.59	8.75 X 7.5	5.39	11 X 8	2.49	13 X 6	4.25	14.5 X 14N	10.12	20 X 14	25.00	24 X 14	55.00
6.3 X 4	2.39	8.75 X 8.0	5.39	11 X 9	2.49	13 X 7	4.25	14.5 X 14.5N	10.12	20 X 16	25.00	24 X 16	55.00
6.5 X 2.9	2.39	8.75 X 8.5	5.39	12 X 6	2.89	13 X 8	4.25	15 X 8	10.12	21 X 12	25.00	3 Blade Hub 17 - 19"	54.00
6.5 X 3.7	2.39	9 X 4	1.99	12 X 7	2.89	13 X 9	7.95	15 X 10	10.12	22 X 8	31.00	3 Blade Hub 20 - 21"	66.00
6.5 X 5.0	3.95	9 X 5	1.99	12 X 8	2.89	13 X 10	7.95	15 X 11	10.12	22 X 10	31.00	3 Blade Hub 22"	78.00
6.5 X 5.5	3.95	9 X 6	1.99	11 X 10	7.95	13 X 11	7.95	15 X 12	10.12	22 X 12	31.00	3 Blade Hub 24"	108.00
6.5 X 6.0	3.95	9 X 7	1.99	11 X 11	7.95	13 X 12	7.95	15 X 13N	10.12	22 X 14	31.00		
6.5 X 6.5	3.95	9 X 8	1.99	11 X 12	7.95	13 X 13N	9.95	15 X 14N	10.12	22 X 16	31.00		
7 X 3	1.59	9 X 9	1.99	11 X 12W	7.95	13 X 13.5N	9.95	15.5 X 13N	10.12	24 X 10	38.00		
7 X 4	1.59	9 X 10	1.99	11 X 13	7.95	13.5 X 9	7.95	16 X 8	12.95	24 X 12	38.00		
7 X 5	1.59	9.5 X 6.5N	5.39	11 X 14	7.95	13.5 X 10	7.95	16 X 10	12.95	24 X 14	38.00		
7 X 6	1.59	9.5 X 7.0N	5.39	11.5 X 4	8.29	13.5 X 11.5N	7.95	16 X 12	12.95	24 X 16	38.00		
7 X 7	1.59	9.5 X 7.5N	5.39	12.25 X 3.75	8.39	13.5 X 12.5	10.12	16 X 13N	10.12	2 Blade Hub 18 - 19"	30.00		
7 X 8	1.59	9.5 X 8.0N	5.39	12 X 9	7.95	13.5 X 13.3	10.12	16 X 14	12.95	2 Blade Hub 20 - 21"	35.00		
7 X 9	1.59	9.5 X 8.5N	5.39	12 X 9W	7.95	13.5 X 13.5	10.12	16 X 16	12.95	2 Blade Hub 22"	40.00		
7 X 10	1.59	9.5 X 9	5.39	12 X 10	7.95	13.5 X 14	10.12	9 X 6P	Pusher 3.95	2 Blade Hub 24"	60.00		
7.8 X 4	14.39	9.5 X 9.5	5.39	12 X 10W	7.95	13.5 X 14W	10.12	10X 6P	Pusher 3.95				
7.8 X 6	6.39	9.5 X 10	5.39	12 X 11	7.95	14 X 5N	12.95	10 X 7P	Pusher 3.95				
7.8 X 7	6.39	9.5 X 10.5	5.39	12 X 11N	7.95	14 X 6	12.95	10 X 8P	Pusher 3.95				
8 X 7.3	5.39	10 X 3	2.29	12 X 11.5	7.95	14 X 8	12.95	11 X 6P	Pusher 3.95				
8 X 4	14.39	10 X 4	2.29	12 X 12	7.95	14 X 10	12.95	11 X 7P	Pusher 3.95				
8 X 5	4.39	10 X 5	2.29	12 X 12.5	7.95	14 X 11	12.95	14 X 6P	Pusher 12.95				
8 X 6	4.39	10 X 6	2.29	12 X 12N	7.95	14 X 12	12.95						
8 X 7	4.39	10 X 7	2.29	12 X 13	7.95	14 X 12N	10.12						
8 X 8	4.39	10 X 8	2.29	12 X 13N	7.95	14 X 13	10.12						
8 X 9	4.39	10 X 9	2.29	12 X 14	7.95	14 X 13N	10.12						
8 X 10	4.39	10 X 10	2.29	12.5 X 9	7.95	14 X 13.5	10.12						
8.5 X 5	4.39	10.5 X 4.5	11.39	12.5 X 10	7.95	14 X 13.5N	10.12						
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8.5 X 6.5	5.39	11 X 4	2.49	12.5 X 11.5	7.95	14 X 14N	10.12						
8.5 X 7.0	5.39	11 X 5	2.49	12.5 X 12	7.95	14.4 X 10.5	10.12						

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15	15 Free Flight
16	29 Free Flight

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Sky Bench Aerotech offers this new HLG for the contestant or fun-flier who demands high performance. It's the Joustier, a reduced version of the Harley Michaelis open class design. Wingtip design and fuselage nose droop are said to greatly minimize drag.

tip panels are removed—no access hatches or other cutouts required.

Specifications for the Vigilante are: 118 inches wingspan, 1017 square inches wing area, double taper "elliptical" wing planform, SD7037 airfoil, 78-82 ounces flying weight, and 11-11.6 ounces per square foot wing loading.

The basic kit (out of the mold) is said to take about 20-30 hours to complete and goes for an introductory price of \$450. The Vigilante RTF is ready for servos and sells for about \$800. Contact Tom Finch at (909) 391-2838, or write to Sailplane Systems at 1222 So. Cypress, Unit G, Ontario, CA 91762.

#### SKY BENCH AEROTECH

First there was the Lil Bird RCHLG, which resembles a scaled-down Bird of Time. Now Ray Hayes of Sky Bench Aerotech sends word of his latest kit offering, which also happens to be a hand-launch glider. The new model is the Joustier, a miniature version of Harley Michaelis' unlimited class

competition sailplane.

The main features of the Joustier HLG are its bolt-on foam-core wings with full 1/32 balsa sheeting, the excellent SD7032 airfoil, vortex reducing wingtips, built-up full-flying stab, and built-up balsa/1/64 ply fuselage. Wing area is 360 square inches; at a claimed flying weight of 12 ounces, the wing loading comes to 4.8 ounces per square foot. Like the Lil Bird, the Joustier comes in kit (\$49.95) and ARF (\$139.95) versions. As an extra-cost option, Sky Bench offers a package of Japanese tissue in your choice of colors for applying a super-lightweight tissue-and-dope finish to your Joustier.

More big news from Ray Hayes is that he's now an authorized dealer for Ace R/C Inc. and Cannon R/C Systems. Cannon's new sub-micro airborne packages are especially well suited to HLGs; as an example, a two-channel Cannon Micro-Elite AM receiver, two CE-9D servos and a 50-mAH battery pack weighs under 2 ounces! A Cannon R/C Systems catalog is available

from Sky Bench for a large SASE.

A complete catalog of Sky Bench Aerotech's constantly growing line of kits, accessories, building materials, tools, hardware and other modeling paraphernalia can be yours for \$2 (refundable with purchase). Call (810) 781-7018, or write to 58030 Cyrenus Lane, Washington, MI 48094. Be sure to tell Ray that *Model Builder* sent you!

\*\*\*

In the coming months I may be able to showcase more models from these and other companies as space, time and opportunity arise. Till then, green air and blue sky! Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530; (909) 245-1702. I actually prefer phone calls to letter writing. Talk at you soon, I hope! **MB**

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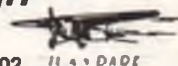
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# 

**There's no better place to start in Control Line Precision Aerobatics than with a good flap-equipped profile ship. This month, John talks about setting up such models and presents a list of some of the available kits, including where to get them.**

Impact. Trivial Pursuit. Cardinal. Magnum. Genesis. Stiletto.

Precision aerobatics planes have great names and great looks that send a chill up the spine of any true CL model aviation enthusiast. They represent the type of airplane that those interested in stunt would like to show off on the flying field and on the

expert class scoreboard.

But nobody starts in any kind of competition in the expert class, and no stunt flier begins with an Impact or a Patternmaster. And that's the source of one of the most common questions received by this column: Where do I start?

That was the question from Floyd Town

of Ketchum, Idaho recently. Floyd has been flying RC pattern for the past 15 years and, faced with the loss of a flying site, wanted to know what would be a good starting point for CL precision aerobatics. Specifically, he was looking for a kit of a profile model on which he could train.

Fortunately for novices, many excellent profile stunters are available. Most of the modern flapped profiles are capable of flying the full AMA pattern at a high level, even when built stock.

In this category we're talking about planes that are a step up from the most basic beginner CL airplane. We're looking at planes which are larger, are equipped with flaps and are designed for more precise flying. The flaps assist the plane in turning more true corners, and the model's larger size provides a lighter wing loading for better lift. They're not much more difficult to build than the simplest profiles, except for the added steps involved in hinging the flaps and linking up a more complex control system.

Profile stunters generally have room for a large tank that can carry the fuel load necessary for the full pattern, and they often are suitable for an engine larger than the standard profile .35—most often a .40.

Construction of profile stunters usually can follow the kit instructions exactly. Spend special care on:

- Alignment: Flying surfaces must be true with one another. The wing and stabilizer/elevator should be exactly parallel and perpendicular with the fuselage and vertical stabilizer.
- Wing: Must be straight, no warps.
- Flaps: Must be straight and aligned with one another.
- Control system: Must be free and provide the proper flap/hinge ratio. Flaps and elevator should both be level at the same time and deflect the same proportional amount.
- Nose area: Must be stiff enough to prevent vibration. Sometimes reinforcement with glass cloth or a cheek cowl is advisable.

Sig's classic Banshee design has started many aspiring novice fliers on their way to a precision aerobatics career. Josh Scripsick displayed his nice-looking version at the 1994 Sig control line contest. Photo by Bob Farr.





- Balance:** Position the engine so that the plane balances as shown on the plans. Some designs may require adding weight to the nose or tail during flight trimming.

- Adjustable features:** Even if the kit doesn't call for it, adjustable leadouts and a tip weight compartment are advisable.

- Weight:** Though profiles don't tend to come out as heavy as full-fuselage planes, they usually have smaller engines, so take care not to use excessive glue or paint. Examine the wood in the kit and substitute lighter wood for any unnecessarily heavy pieces.

- Engine/tank:** Be sure to select an engine set up for CL stunt and of the proper size for the plane. A too-small engine can make the plane struggle through the pattern; one that's too big can cause problems of balance, speed and precision. The tank must be the proper size for the engine and the mounting should be adjustable for alignment of the fuel pickup and the venturi. The tank should be a uniflow design for a steady run.

is from fairly recent sources.

- Banshee:** 49-inch span, 510 square inches, built-up balsa wing. Very popular in the late '70s and early '80s, may require some adjustment of balance for good flying. Made by Sig Manufacturing Co., 401-7 S. Front St., Montezuma, Iowa 50171, available from Sig and good hobby shops.

- Forerunner:** 54-3/4 inch span, 550 squares, foam wing. One of the largest profiles available, designed for engines up to .46. Made by Custom Models, available from Brodak's Distributing Co., 100 Park Ave., Carmichaels, PA 15320.

- George Aldrich Special Profile Stunt:** 50-inch span, 550 square inches, foam wing. Made by Custom Models, available from Brodak's.

- Koyote:** 54-inch span, 510 square inches, foam wing. This is a larger profile designed for up to .46 engines. Made by Custom Models, available from Brodak's.

- Magician:** 48-inch span, built-up balsa wing. A classic design resurrected by Golden

- Twister:** 48-inch span, 490 square inches, built-up balsa wing. One of the most popular flapped profile stunters. Made by Sig Manufacturing Co., available from Sig and good hobby shops.

Most modern CL profile stunters come with excellent hardware packages and instructions. Build the plane per the instructions, add an engine and tank and a lot of practice, and you'll move up from the beginner class through intermediate to advanced and be working on your first full-fuselage stunter before you know it.

While in the process of researching the available precision aerobatics profiles, we came across quite a number of currently available non-flapped profiles suitable for novices and sport flying. Since we're talking about profiles, why not list some of those, too? As mentioned above, we'll update the list if we're reminded of any we missed.

The following planes are full-size, non-flapped profiles suitable for novice build-



■ LEFT: One of the earliest profile stunt planes was Midwest's Magician—and it's still available in kit form (see text for details). This Fox .35 powered model by Wade Pearson was photographed by Bob Furr at the Omaha Orbiting Eagles 1994 Frozen Finger Flying Festival. ■ RIGHT: The Prowler is one of the more modern precision aerobatics profiles, and uses a foam wing. This one was flown by Gary Harris at an all-profile contest in Portland in 1993. Photo by Jim Cameron.

- Design:** If you're a beginner in aerobatics, resist the temptation to modify the kit. The design is no accident; don't tinker until you really know what you're doing.

Based on a look through recent catalogs and newsletters, I've compiled a list of some of the currently available CL profile precision aerobatics kits. This list is undoubtedly incomplete; our readers will remind us of any we've left out and we'll update it in a future issue.

The list is in alphabetical order and includes a basic description of the plane and at least one mail order source for it. (As always, try your local hobby shop first.) The availability of products can fluctuate, so not all products listed may be available at all times; however, the information below

State Models, using C-tube and capstrip construction. Available from Golden State Models, 2368 Ave. 396, Kingsburg, CA 93631.

- Prowler:** 48-inch span, 490 square inches, foam wing. A highly successful modern profile stunter by former world champion Bob Hunt. Manufactured by Aerosmith Model Aviation, available from Brodak's.

- Scimitar:** 48-inch span, 515 squares, foam wing. A unique-looking profile. Made by Custom Models, available from Brodak's.

- Tutor:** 45-inch span, 410 square inches, built-up balsa wing. A popular profile stunter based on the classic Nobler. Made by Top Flite, available from Brodak's and good hobby shops.

ers, beginning stunt fliers, or sport flying. The list is confined to those with a conventional layout—wing, fuselage, empennage—and does not include combat flying wings or other specialized planes.

- Buster:** 40-inch span, 408 square inches. A reproduction of the kit long produced by Carl Goldberg Models. Made by Control Line Classics, available from Brodak's.

- Flite Streak:** 42-inch span, built-up balsa wing. One of the best flying flapless profiles, can be built very light. Made by Top Flite, available from Brodak's and good hobby shops.

- Galaxy:** 45-inch span, 400 square inches. Jet-styled profile. Made by Control Line Classics, available from Brodak's.

- Hellcat F6F:** 42-inch span, built-up balsa



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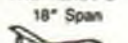
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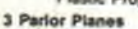
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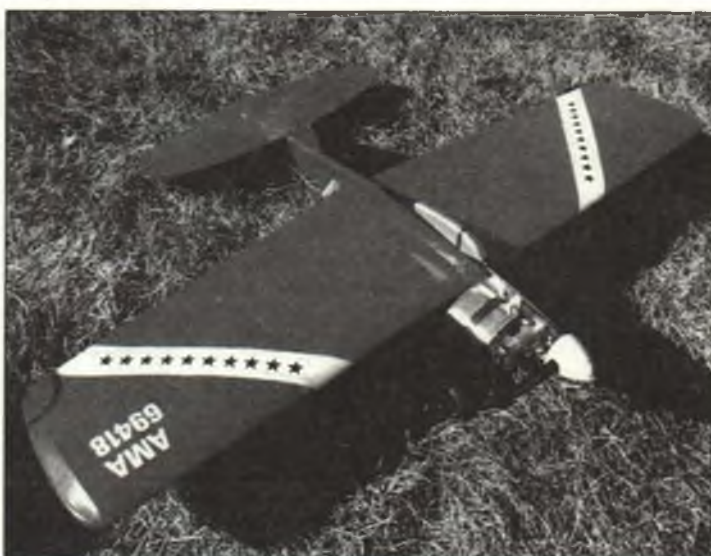
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If you're not quite ready for a flapped profile, the classic Sterling Ringmaster is still a popular choice for novice fliers—and you can use it in Old-Time Stunt! This Fox .35 powered classic was flown by Gary Hetrick at the 1994 Frozen Finger Festival. Bob Ferr photo.

wing. Can also be modified for Navy Carrier. Made by Sterling, available from Brodak's and good hobby shops.

•P-51D Mustang: 38-inch span, built-up balsa wing. Semi-scale model. Made by Sterling, available from Brodak's or good hobby shops.

•Ringmaster: 42-inch span, built-up balsa wing. Available in old or new construction styles (appearance is approximately the same). Original version is legal for Old-Time Stunt. Probably the all-time most popular profile, though not necessarily the best flier for those with precision aerobatics in mind. Available from Brodak's or good hobby shops.

•Shoestring Stunter: 42-inch span, built-up balsa wing. Made by Carl Goldberg Models, available from Brodak's or good hobby shops.

•Skyray 35: 44-inch span, 296 square inches, built-up balsa wing. One of the

larger non-flapped profiles, designed for a .35. Excellent kit, significant strengthening in the nose area recommended—a cheek cowl and glass cloth is a must to dampen vibration. Made by Sig, available from Sig and good hobby shops.

•38 Special: 38-inch span biplane, built-up balsa wings. Designed for aerobatics and .35 to .46 engines. Made and sold by Tom Dixon, P.O. Box 671166, Marietta, GA 30066.

•Tomahawk: 40-inch span, 338 square inches. A reproduction of the classic Veco kit. Made by Control Line Classics, available from Brodak's.

•Yak 9: 38-inch span, built-up balsa wing. Semi-scale model. Made by Sterling, available from Brodak's or good hobby shops.

### VIDEOS NOT TO BE MISSED

For those cold winter evenings, there's nothing like a good model airplane video to keep up your interest in flying.

For the serious stunt flier, Windy Urtnowski's series of shop videos is like going to college. See them all (the list is growing!) and you'll have your Master's degree in precision aerobatics. For a complete list and Windy's Pro-Stunt Products catalog, send \$2 to Pro-Stunt Products, 9 Union Ave., Little Ferry, NJ 07643.

One of the most recently announced videos was noted in *Hi-Low Landings*, the Navy Carrier Society's newsletter. It's a detailed documentary on the 1992 National Model Airplane Championships, covering all types of model airplane activity. It's available for \$25 plus \$4 shipping and handling from Alan Abriss, 94-20 66th Ave., Forest Hills, NY 11374.

Questions, club news, contest information and reports, photographs, technical tips, and other information of interest to CL fliers is welcomed. Write John Thompson, 295 W. 38th Ave., Eugene, OR 97405. E-mail at 73473.1407@compuserve.com. MB

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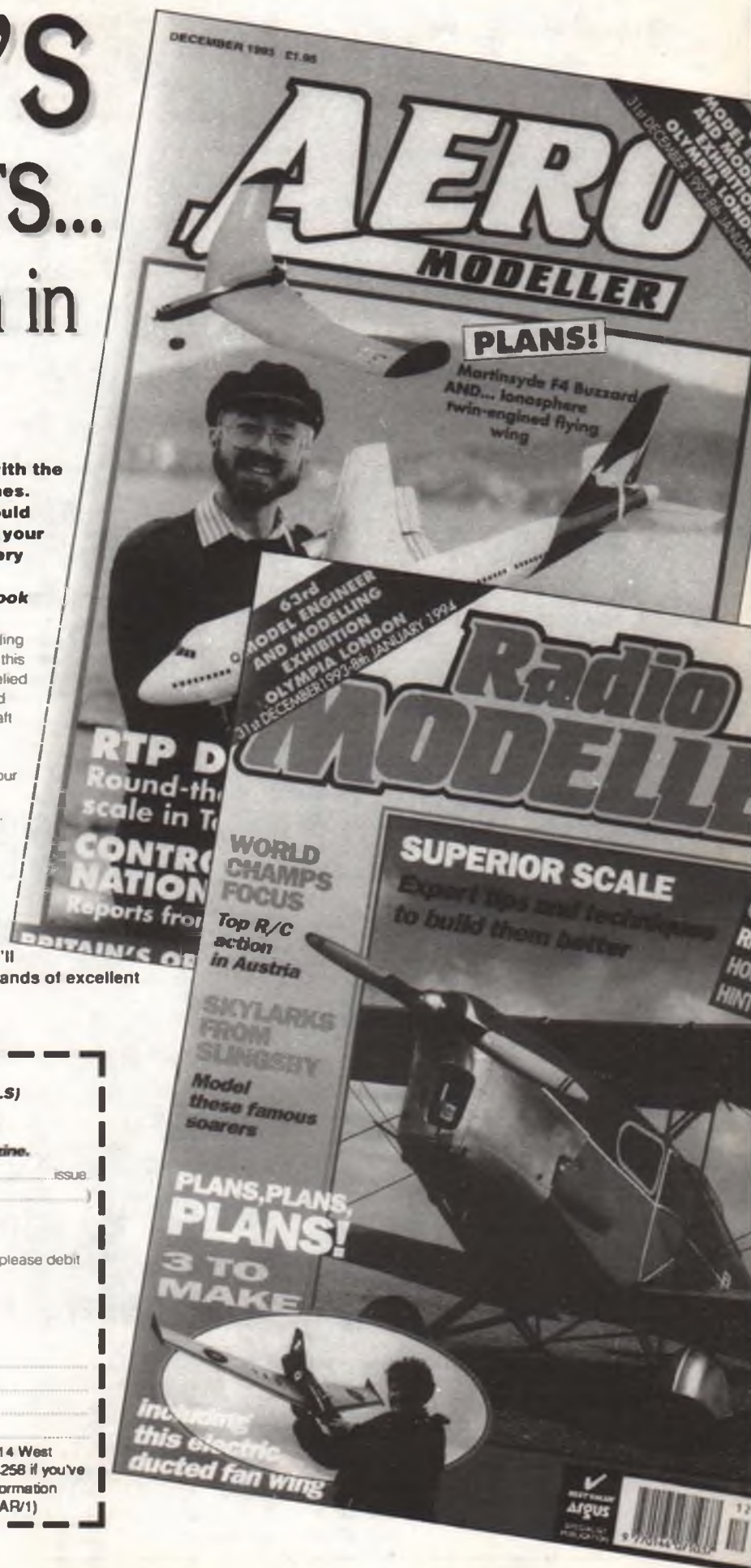
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# PLUG SPARKS

BY JOHN POND

## • Topper Revisited • Deezil Repro • Pinch Hitter O.T.

One of the most surprising things to this writer is the interest shown in nostalgia-type articles such as the one on Gordon (Scotty) Murray and his multi-faceted activities, which appeared in the September 1994 *Model Builder*. The photo of the Topper used to illustrate this subject model was later identified by Dick Johnson of Dallas, Texas as his own model, flown at the 1977 SAM Champs.

Dick writes to add a bit more nostalgia about his Topper and at the same time recall another famous name—Johnny Clemens. For the benefit of those who don't recall, Clemens ran a very successful hobby shop in Dallas until some malcontent set fire to it. Unfortunately, Johnny's hobby shop fell more into the



Photo No. 2. A real nostalgia snapshot of three members of the Jayhawk Sundusters Model Airplane Club of Lawrence, Kansas, from left: Jack Jella with a Jabberwock, Dick Johnson with a Mk. I Clipper and his Topper, and "Buffalo Roy" Edwards with his Megow Ranger. Those shirts are replicas of the ones they had in the late '40s and were re-created by hand by Roy's daughter Pam. Photo via Guy Johnson.



Photo No. 1. Dick Johnson (left), who authored the .019 Strato Streak article in last month's *Model Builder*, presents his lovely Bay Ridge Topper to Johnny Clemens for display in his shop, June 6, 1987.

category of a museum with its historical models and antique engines, plus a tremendous amount of unique merchandise.

A group of old-timers, including Dick, decided to help reconstruct the new hobby shop Johnny was preparing a

few doors from the old location. It was then that Dick decided to part with his precious Topper, seen in Photo No. 1. Later on, several photos were taken of the model hanging from the ceiling in true Old Timer style.

Dick also enclosed a photo

taken at the Jean Nevada SAM Champs, showing the remnants of the old Jayhawk Sundusters club out of Lawrence, Kansas. The chief members dating from 1940 form the nucleus of the reunion of the Jayhawks.

Seen in Photo No. 2 are Jack Jella, holding a Midwest Jabberwock; Dick Johnson with a Mk. I Comet Clipper and the Ohlsson .19 powered Topper; and Roy Edwards with a Ranger. Years ago, Roy climbed into a buffalo pen at a meet in central California to retrieve a model. Roy soon found himself cornered by the buffalo, but as it charged him, he had the presence of mind to punch the animal in the nose and scramble out of the pen before it could recover. Such a remarkable feat! Roy was affectionately known as "Buffalo Roy" from then on.

Shortly after the Topper article appeared, up popped Photo No. 3, taken in 1963 at the first Stockton GMA Old Timer contest at Waegell Field, in Sacramento, California. As can be seen, Bob Bowen did a crackerjack job on his Topper, which netted him 1st place in the Beauty event that day. If this writer remembers correctly, the



model is still in good condition and is hanging in his ranch home.

### "DEEZIL" O.M.T.

Seems like Gordon Burford, noted Australian engine manufacturer, started something with his series of old-time diesel engines, as now another copy of his impeccable Deezil has again been reproduced for the O.T. modeler.

Received an interesting announcement from engine collecting buddy Don Belote, who announced the introduction of the 1948 Deezil. Don, operating under the name Classic Old Time Engines, 15731 Five Point Rd., Perrysburg, OH 43551, is now offering this version at \$95 plus \$4 postage.

Don sends Photo No. 4 which displays what a beauty of a diesel can be made from the original "crudie" marketed by Gotham Hobby Shop of New York City. Those interested in acquiring a replica Deezil should either write Don or call him at (419) 878-8144.

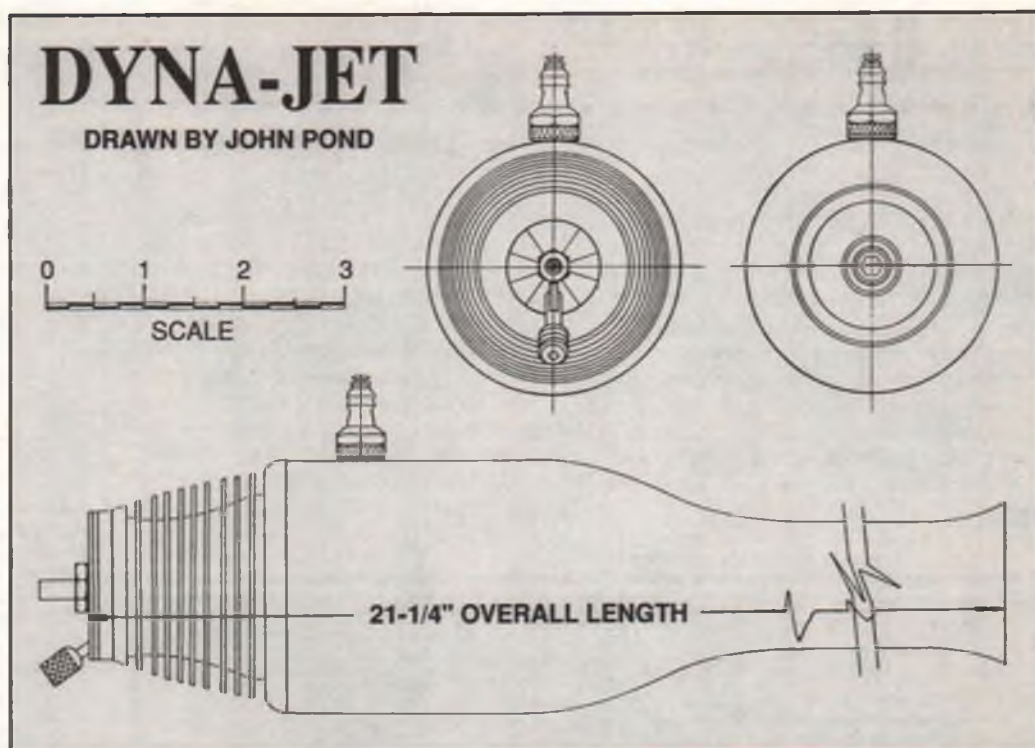
### MODEL OF THE MONTH

This month's subject, the "Pinch Hitter," is a result of WWII restrictions on critical materials needed for defense production. Aluminum, steel and other metals were expected to be scarce, but the surprise was balsa wood. Turned out the U.S. Navy needed liferafts. Mostly 12x15 footers, these were turned out by the thousands. (Matter of fact, after the war, this writer acquired several of these liferafts and promptly cut them up. At this late date, at least a half-dozen six-foot blocks are still in this columnist's inventory for future cutting.)

Naturally, the crush was on to develop a model employing hardwoods. Such a model was the Pinch Hitter, which was cooked up by Paul Plecan and Gil Shurman and was featured in the November 1942 *Air Trails*. The design can be traced to a mixture of Plecan's

## DYNA-JET

DRAWN BY JOHN POND



ENGINE OF THE MONTH

Simplex and Shurman's Rambler. Probably the most surprising thing was the total weight, which came out under the required rules. Considering the power of the smaller ignition engines, this model would do quite well in Class A or small Class B O.T. free flight competition.

### ENGINE OF THE MONTH

Surprise! This month's engine is a most unusual subject—a pulse jet. Many of the purists will object, saying it is not a true spark ignition engine, but the truth is that the Dyna-Jet is started using a standard

3/8-24 spark plug and an old Ford Model T spark coil.

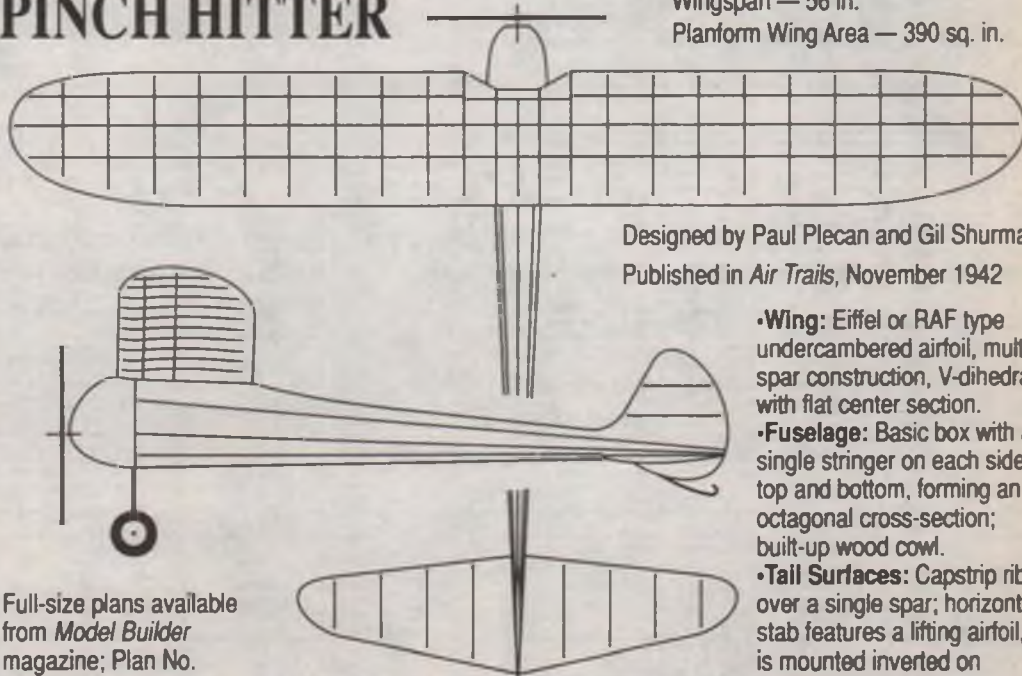
One neat thing about the Dyna-Jet is that it runs on straight gasoline, preferably white, but leaded fuels don't seem to bother the spring steel flutter valve, which operates at 260-280 times per second.

This writer had the first Dyna-

### MODEL OF THE MONTH

## PINCH HITTER

Wingspan — 56 in.  
Planform Wing Area — 390 sq. in.



Designed by Paul Plecan and Gil Shurman  
Published in *Air Trails*, November 1942

Full-size plans available  
from *Model Builder*  
magazine; Plan No.  
1089-O.T., \$12.00

- Wing:** Eiffel or RAF type undercambered airfoil, multi-spar construction, V-dihedral with flat center section.
- Fuselage:** Basic box with a single stringer on each side, top and bottom, forming an octagonal cross-section; built-up wood cowl.
- Tail Surfaces:** Capstrip ribs over a single spar; horizontal stab features a lifting airfoil, is mounted inverted on bottom of fuselage.



## PLUG SPARKS

jet in his area and promptly mounted it in an early type Berkeley "Squirt," a control line jet speedster. The model was promptly entered in the San Jose M.A.C. control line annual. Starting was a bit of a problem until it was found that using long strokes on the tire pump (used to fuel the chamber) kept the spring steel flutter valve open too long. Short, quick strokes did the trick and the engine soon broke into an ear-splitting roar with flame extending about a foot beyond the tube.

After the initial shock, there was nothing to do but take an official flight. By now, we were "experts" and no problem was encountered in starting. Much to my surprise, the jet model flew very smoothly with very little pull on the lines. In retrospect, one had to realize there was no torque as in the case of the reciprocating engines. Alas, the 7-ounce gas tank was not enough for the prodigious appetite of the Dyna-Jet and it ran out of fuel on the last lap, landing short of the finish line.

*continued on page 68*



Photo No. 3. Gene Pond photographed Bob Bowen with his well-built Topper at the first Stockton (California) O.T. meet in 1963.

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Photo No. 4. Replicas of the 1948 Deezil are now available through Don Belote of Classic Old Time Engines—details in text.

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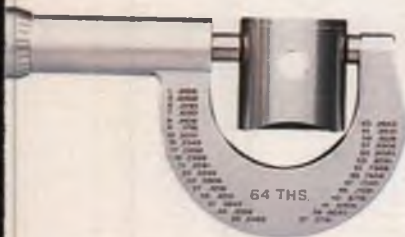
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## The Ninja Pro from Century Helicopter Products

**Three years under development, this American-made helicopter has several noteworthy features that set it apart from most other .30-.40 size models on the market.**

**BY JAMES WANG**

**T**his month we'll take a look at the new Ninja Pro helicopter from Century Helicopter Products in Milpitas, California. The Ninja Pro is available in .30 and .40 size versions; both are nearly identical, the main difference being that the engine mount, cooling fan and fan shroud on the 40 are bigger.

The Ninja Pro is different from other .30-.40 size helicopters in that it's the first medium-size helicopter kit to feature G-10 composite sideframes, an all-metal main rotor head, a metal swashplate, and a metal washout assembly. The G-10 material is similar to that used for electronic circuit boards and is surprisingly strong. In several months of flying I've inadvertently



James' Ninja 40, powered by an O.S. 50 FSR-H fitted with a Century .60-size Black Torpedo muffler. Bottom canopy cutout is for access to the glow plug.



# helicopter world

crashed my two Ninjas a few times, and haven't yet cracked the G-10 sideframes and servo tray. The main frame assembly is strong! Typically, only the tail boom, main shaft and landing struts had to be replaced. The landing skids were never damaged.

The Ninja can take a lot of abuse, and it's easy to repair. Replacing the tail boom takes only a few minutes, because the Ninja has a belt drive tail rotor system. Replacing the main shaft is easy, too; just remove the 3mm bolt on the autorotation clutch.

The Ninja Pro includes a 1-1/2 hour video on how to assemble and set up the model, step by step. It took me about 15 hours to

**TABLE 1—THROTTLE OPENING AND BLADE PITCH FOR THE NINJA PRO**

	Collective Pitch			Throttle Opening		
	Low	Middle	High	Low	Middle	High
Normal	-3.5	5.0	14.5	20%	60%	100%
Idle-Up 1	-5.5	4.7	14.0	80%	65%	100%
Throttle Hold	-7.0	5.0	16.0			



O.S. .50 FSR-H in the 40. For beginners, I suggest the Ninja 30 in conjunction with the O.S. .32SX. For more advanced pilots, I suggest the 40 with an O.S. .46SF-H. The flying weight of the Ninja 30 is around 6-3/4 pounds; the 40 is around 7 pounds.

The metal rotor head on the Ninja is excellent. The two large O-rings inside the head give no deadband or slop in blade flapping; the blades teeter very smoothly. This may be part of the reason for the smooth hover. Use a medium-fast rotor speed during hover—1,500-1,600 rpm. A slower rpm causes the helicopter to oscillate fore/aft slightly. Use 1,600-1,750 rpm in forward flight. The gear ratio (engine to main rotor) is 9.6:1, which lets the engine run at peak power when the rotor speed is 1,600-1,700 rpm.

The Century forward mounted muffler system looks neat inside the sleek canopy. The muffler is cooled by the airscoop underneath. I'm using Century's forward-mounted tuned exhaust system (CN3035

The Ninja Pro kit contents. The parts are packaged in numbered bags. Not shown but also included in the kit is a 90-minute instructional videotape detailing the assembly.

assemble the mechanics, and another 15 hours to install the radio and engine and set up the linkages. The Ninja has push-pull on the collective and cyclic control system; it takes some time to set them up properly. The first 20 flights were devoted to fine-tuning the engine, adjusting the mechanical linkages and dialing in the radio programs. I use an Airtronics Infinity 660 radio in one of my Ninjas and a JR XF622 in the other. To help readers get started, I've enclosed the programs and the three-point pitch curves for my XF622. These curves can be used for any programmable heli radio. A nice feature about the XF622 is that when idle-up is turned on, it automatically changes the gyro gain and triggers the cyclic dual rates from low to high rate.

I highly recommend using a high quality double ball bearing servo for the elevator control (either Futaba 9201, JR 4131 or Airtronics 94735), because it experiences high loads. With a good servo, you can feel the improvement in the preciseness of fore/aft cyclic. Good servos also last longer. I suggest you also use servos with at least one ball bearing for the collective and roll cyclic controls (try a Futaba 3002 or JR 517).

Properly set up, the Ninja Pro is stable and easy to hover. Slow forward flight characteristics are excellent. To obtain good forward flight performance, a healthy engine should be used. I use an O.S. .32SX pull starter engine in my Ninja 30, and an older

**TABLE 2—JR XF622 PROGRAMS FOR THE NINJA PRO**

Aileron dual rate .....	85%
Elevator dual rate .....	85%
Travel Adjust:	
Aileron .....	90% left, 90% right
Elevator .....	75% fwd, 75% aft
Rudder .....	110% left, 90% right
Throttle .....	100% up, 100% down
Pitch .....	65% up, 65% down
Throttle Hold .....	0%
3-Point Pitch Curves	
PLN, P2N, PHN .....	20, 60, 98
PLS, P2S, PHS .....	0, 55, 98 (Beginners don't use)
PLH, P2H, PHH .....	5, 60, 100 (Beginners don't use)
3-Point Throttle Curves	
TLN, T2N, THN .....	0, 60, 100
TLS, T2S, THS .....	100, 85, 100 (Beginners don't use)
Revo-Mix .....	-40% up, 0% down
Rud Offset in Hold .....	+38%



# helicopter world

Figure 1 — Ninja Pro Throttle Curves

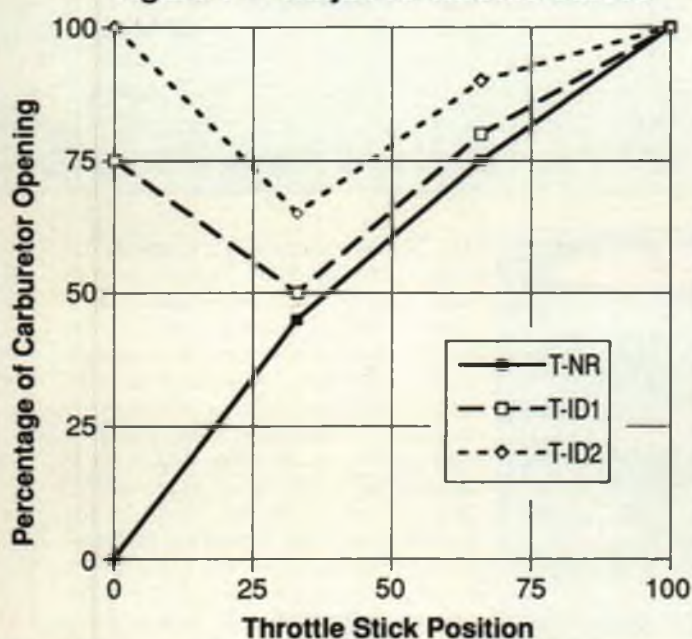
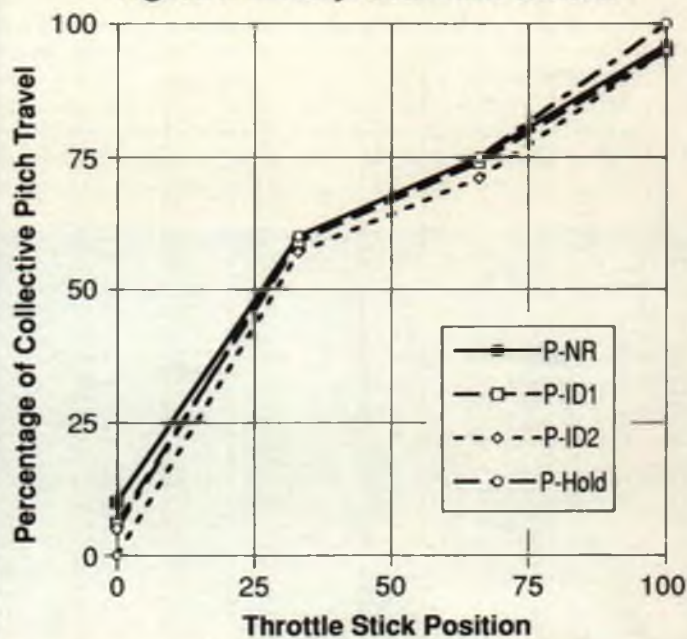


Figure 2 — Ninja Pro Pitch Curves



for the 30 and CN3036 for the 40). As an experiment, I removed the tube that comes out the bottom of the muffler can and cut away the portion with the holes. I then epoxied it back using a metal epoxy (JB Weld or Duraweld). This reduces the back pressure and boosts the engine power by another 5-10 percent. Of course, the engine is also noisier.

I've also tried a couple of side-mounted mufflers on my Ninja. Century's .30-size side muffler is extremely quiet. The new KSJ .30-size muffler is also excellent. For the Ninja 40, I like Century's .60-size side-mounted Torpedo muffler rather than the .40-size side-mounted muffler. The .60-size muffler gives less back pressure.

The stock wood blades give an excellent hover. They weigh 86 to 89 grams each. After I broke the wood blades, I replaced them with Century's Kevlar Shogun fiberglass blades, which weigh around 100 grams each. With the Shogun blades, the Ninja is even more stable in hover and penetrates better in forward flight.

The best improvement, however, is in autorotation. The heavier Shogun blades allow you to flare and hover the helicopter for half a second before touching down.

I haven't crashed either of my Ninjas lately because I've got them perfectly dialed in. I know them inside and out now. I know what to check after each flight and how to maintain them regularly. Basically, I make sure the steel balls on the mixing arm arms are not loose, the mixing arms are not sloppy, the tail pulley is not slipping, the tail control bellcrank and pin are not loose, the blades are undamaged, and there is no binding in the controls at the extremes. It took me a dozen flights to dial in my Ninjas so they perform the way I want. Compared to other .30-size helicopters, it may take longer to set up the Ninja, but it will fly very nicely.

It's important to know the performance envelope of any helicopter. The only thing that limits the Ninja's 3-D

*continued on page 40*



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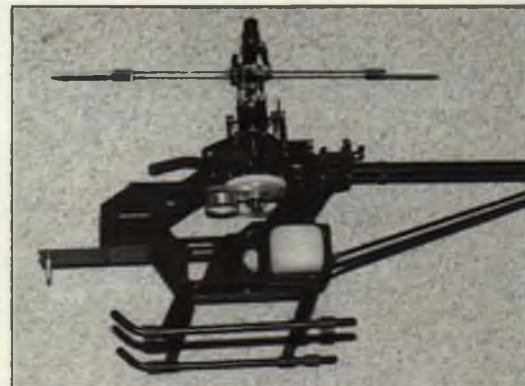
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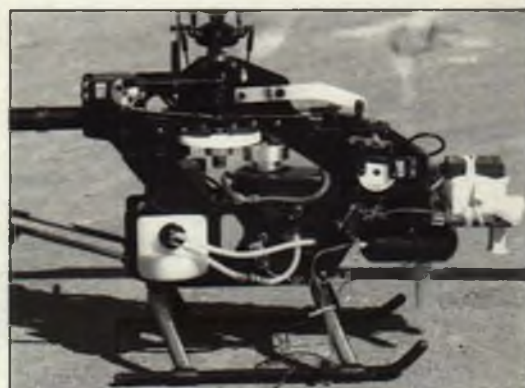
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hotdogging capability is its control throw. At full positive or full negative pitch and full cyclic command, the control system can bind slightly. I almost crashed my Ninja once while flying inverted, when the control system locked up momentarily. This is probably my fault, as I'm pushing my model to do more than it was designed for. The Ninja was designed as a beginner and sport flying machine, yet



The assembled Ninja mechanics. Not difficult to build, but it does take some time to set it up and fine-tune the linkages. Sideframes are made of a material known as G-10, an extremely tough composite that can take a phenomenal amount of abuse—just the ticket for beginners.



The Ninja Pro uses a belt start system; an optional cone start setup is also available. Also shown here are Century's front-mounted tuned pipe and a Model Products Corp. No. 021 glow plug extension lead.

I'm tumbling it all over the sky.

The kit includes a pair of flybar weights. Move them all the way out against the paddles to get maximum stability. By now, Century should have an optional CG-corrected FAI paddle. These molded paddles have a hole near the leading edge for adding lead weights. They should make the Ninja even more stable.

I didn't like the Ninja's belt starting system at first, but have since gotten used to it. Just make sure the belt is well secured before taking off. When the belt is new, it doesn't like to stay inside the metal retainer clips. Use needlenose pliers to curl inward the four corners of the metal belt retainer bracket; the four corners will act like teeth to help prevent the

*continued on page 69*



# THE WRIGHT FLYER NO. 3

Ready for a *real* challenge? Tackle this Peanut replica of the Wrights' 1905 flying machine. Structure is actually quite simple, but requires a delicate touch in both building and flight trimming.

BY THOMAS WIELECKI

On December 17, 1903, world history was made when the Wright brothers' Flyer took to the air for a brief and erratic 12 seconds. Away from the prying eyes of the press and mobs of onlookers, the first controlled

powered flight was made over the sands of Kitty Hawk, North Carolina.

Although only four brief flights were made that day, it was enough for the Wrights to conclude that they could im-

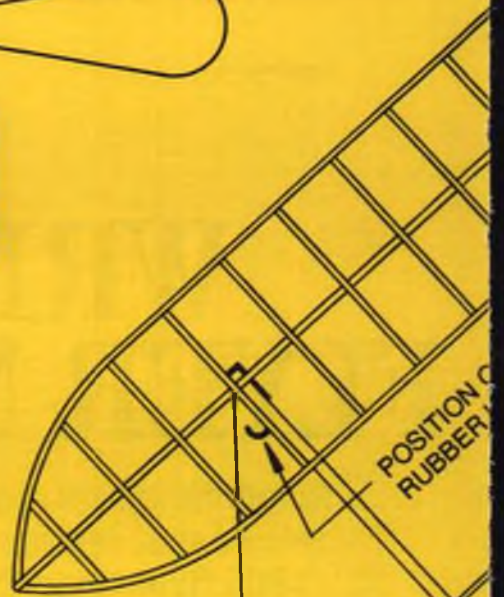






**TRUE PROP  
BLADE SHAPE**

1/32 SHEET BALSA SANDED DOWN  
TO "ALMOST NOTHING," FORMED  
OVER A BEVERAGE CAN AT 30°  
OFF VERTICAL; 4 REQUIRED,  
2 LEFT-HAND, 2 RIGHT-HAND  
ROTATION

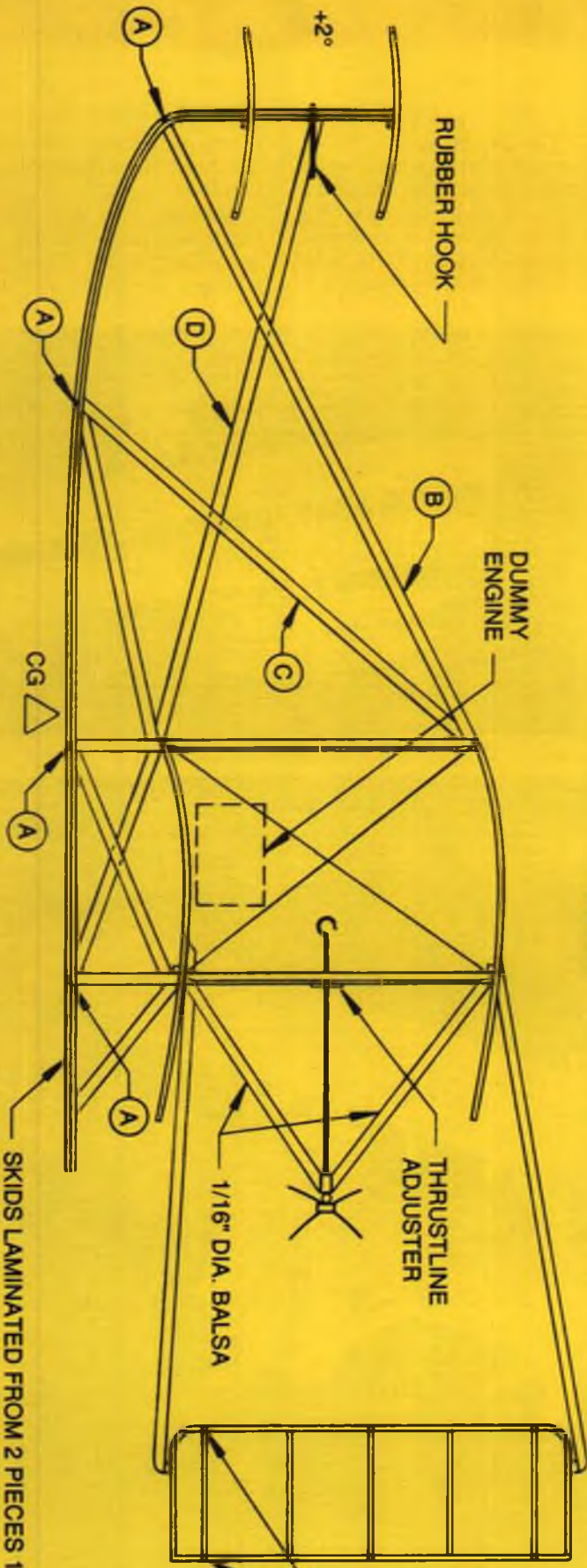


POSITION OF  
RUBBER HOOK



CA PARTS  
TOGETHER  
AT 90°

**THRUSTLINE  
ADJUSTER  
DETAIL**

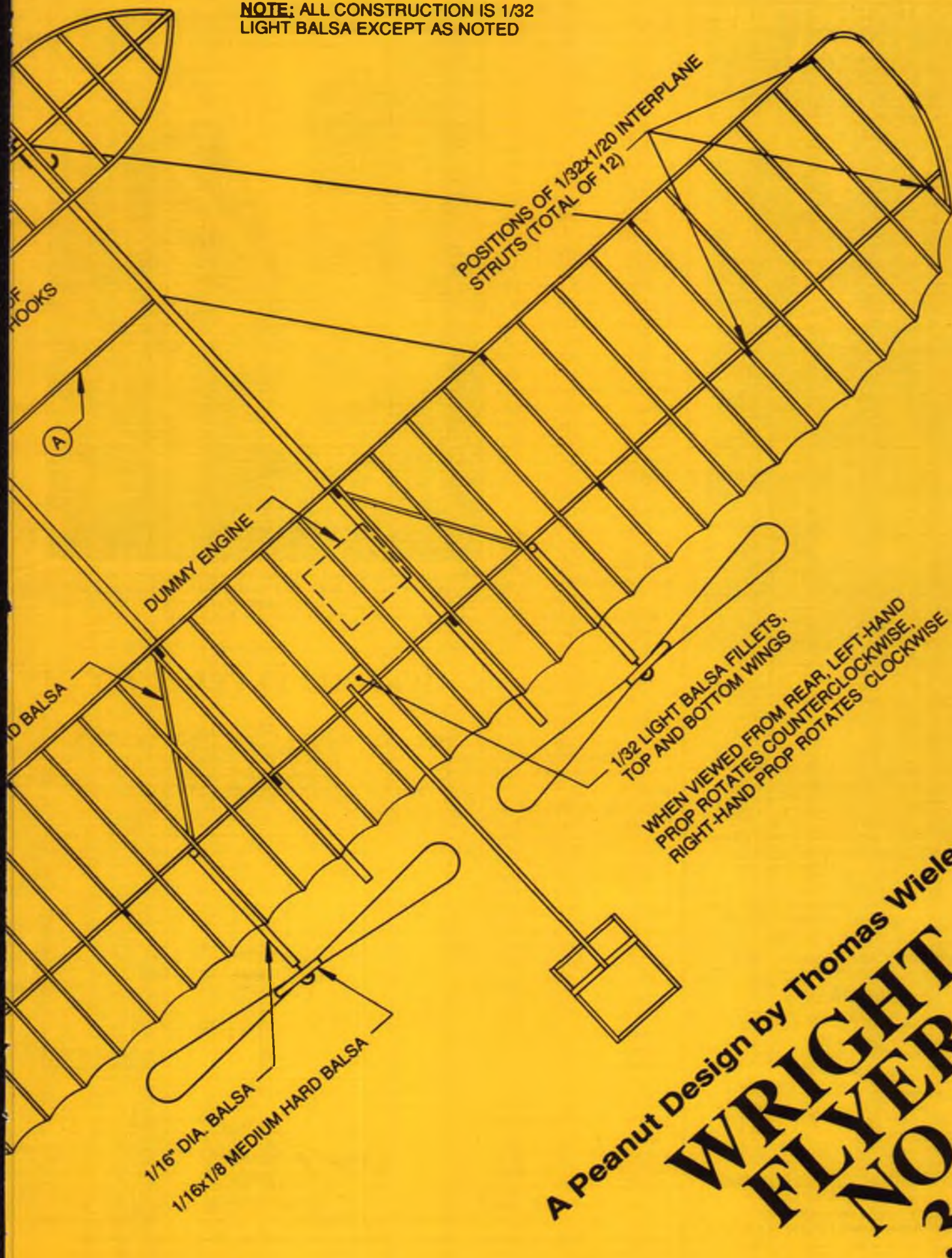


POSITIONS OF 1/32 SQ. CROSS-MEMBERS  
(TOTAL OF 6)

CROSS-PIECES (A) ARE 1/32 SQUARE; DIAGONALS (B), (C) AND (D) ARE 1/32x1/16

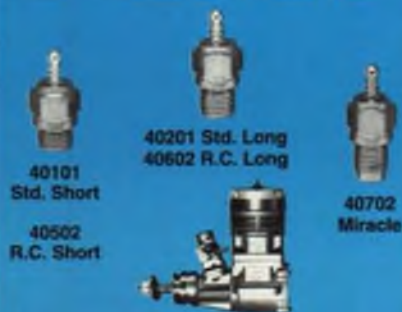


**NOTE:** ALL CONSTRUCTION IS 1/32  
LIGHT BALSA EXCEPT AS NOTED





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prove on their design. Flyer No. 2 featured a more powerful engine and slightly longer moments to improve stability.

Still showing a tendency to stall when turned sharply, there was room for improvement. Thus was born Flyer No. 3. With more efficient propellers, a more powerful engine (17 horsepower instead of the original 12) and lengthened moments, it is generally regarded as the world's first completely practical airplane. This aircraft achieved a record flight time of 38 minutes 3 seconds before being retired to make room for the further improved Flyer Model A, which was a stepping stone into the world of popular aviation.

I've always been fascinated by the Wright Flyer, and discovered that a flying model was possible only when I actually began construction. Of all the Flyers, I chose No. 3 because of its long moments and also its historic significance.

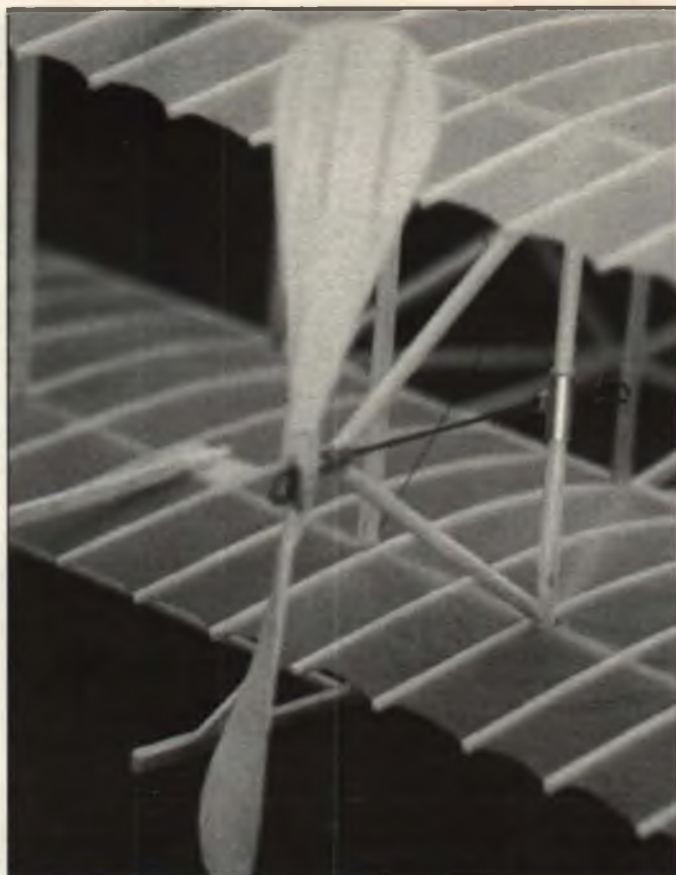
## CONSTRUCTION

I always begin by cutting out the wing ribs. It's simply a case of getting over the monotonous stuff first, and into the fun bit second.

Luckily enough, all of the 68 (!) ribs are just sliced out of light 1/32 balsa, using a plywood template. With the pile of ribs on hand, take two lengths of 1/32 square for the leading edge and main spar and tape them down over the plans at either end. With both strips held in position, glue on the ribs. The wingtips can either be laminated or the rounded corners cut from 1/32 sheet.

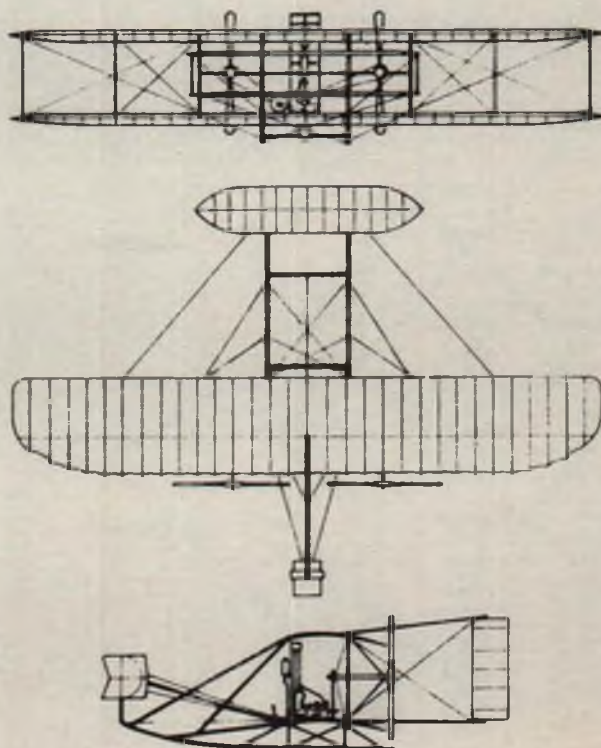
Now that you've got your wings, set them aside and use the same procedure for the stabilizers. With the rounded tips, simply trim the two outer ribs to length and bend

*continued on page 79*



Thrustline adjuster details. Each prop shaft is supported both at the prop and at the vertical member of the prop shaft A-frame, the latter by means of a right-angle bracket made of aluminum tubing. This bracket is a snug fit on the round balsa strut and can be moved up and down to fine-tune the thrust angle. Neat idea, eh?

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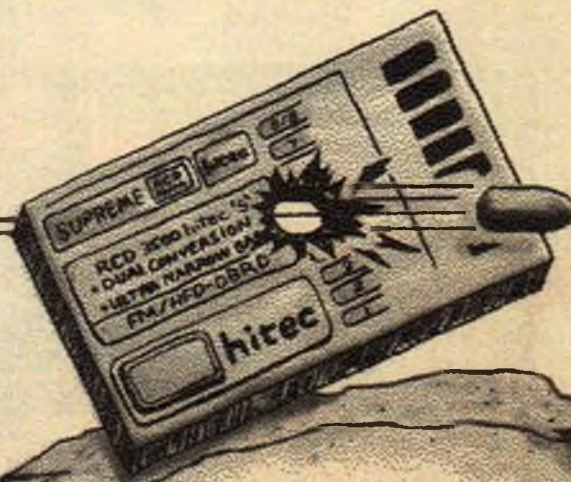


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	Servo Type	# of Servos	Size in Inches H x W x L	Wt. Oz.	Stall Torque	Speed 60 DEG@ (4.8V)
SPORT PACK	HS-300	4	1.4 x 0.8 x 1.6	1.57	42 oz."	0.19 Sec
PRO-PACK	HS-422	4	1.4 x 0.8 x 1.6	1.60	43 oz."	0.20 Sec
ELECTRO-GLIDE	HS-101	3	1.2 x 0.5 x 1.3	0.93	24 oz."	0.20 Sec
GIANT PACK	HS-700	3	2.0 x 1.1 x 2.3	3.60	133 oz."	0.22 Sec
(w/1 std. servo)	HS-422	1	1.4 x 0.8 x 1.6	1.60	43 oz."	0.20 Sec
SUB-MICRO PACK	HS-80	3	1.1 x .05 x 1.1	0.62	31 oz."	0.15 Sec
SUPER PACK	HS-605	3	1.5 x .08 x 1.6	1.73	77 oz."	0.16 Sec



## TECH STUFF cont. from page 14

cluttered with unscientific rules which hurt the event more than they help, and which were originally written and incorporated with good intention but which show a lack of understanding of the physics involved.

Ralph tells me that his proposal for this rule change will be published in the December 1994 issue of the AMA magazine. If you have any feelings on the matter, write to your AMA District Contest Board Member—or better yet, write to all of them.

### V-TAILS

In the June '94 issue we talked about V-

tails; mostly I talked against them, which prompted several letters on the subject. W.C. (Bill) Williams, of Louisville, Colorado, had some good practical arguments for using V-tails. He points out that on gliders flown from rough fields, V-tails can be more serviceable than either conventional or T-tails. Bill says that in more than 100 hours of flying V-tails on rough ground and slopes he has never had a tail breakage problem. He extends the tailcone aft a bit so that if the plane cartwheels or groundloops on landing, the tailcone protects the tail surfaces.

Bill wrote, "People tried to steer me away from adopting the V-tail configuration, but every time I broke a conventional stab on

what would have otherwise been an acceptable landing, I thought about V-tails." He has now used V-tails on five gliders, both slope and thermal, and is very happy with them. He uses the typical 110-degree angle between the surfaces, and likes to put the servos directly in the roots of the V surfaces. Bill's letter had a lot of other good stuff, but this column will only hold a certain amount of "stuff." Thank you, Bill Williams.

### DIHEDRAL

In the June 1994 issue I said that if a V-tail is operating under a slight download, as it will on conventionally balanced airplanes, its marked dihedral will act as anhedral and slightly destabilize the airplane in roll. Not so, wrote Mickey Nowell of Longwood, Florida. So—back to how dihedral works.

There are two oft-quoted explanations of dihedral action. In some aerodynamic books you'll find both explanations; others mention only the most important one. The least important one is the easiest to understand, and is the one I happened to be thinking of when I said V-tails are slightly destabilizing.

The simple explanation says that if a wing with dihedral is rolled slightly, the projected area of the lower wing on a horizontal plane will be more than the projected area of the higher wing. This greater effective area will give the lower wing more lift, and it will rise back up to the level of the other one. There are other forces involved, and the picture isn't quite that simple, but the effect is there in a minor way.

The other stabilizing effect of dihedral is admittedly the important one, but a little harder to visualize. Take a piece of paper, put a bend in the middle of it, and call it a wing with dihedral. Line up the centerline chord of your "wing" with your line of sight and then yaw the wing about 30 degrees. You will now see the lower surface of the wing half turned toward you, and the upper surface of the wing half turned away from you. If your line of sight were also the line of flight, you are looking at different angles of attack on the two wing panels. For this reason, in yawed flight a wing with dihedral will tend to roll into the turn (as in rudder-controlled models). Likewise, in a sideslip the higher effective angle of attack on the lower wing will tend to restore the level attitude of the airplane.

Mickey is right. When we consider the sideslip angle-of-attack effects on a V-tail the direction of the lift clearly makes no difference. Mickey Nowell and I exchanged three letters in each direction. He's a tiger in an argument—watch yourself if you ever tangle with him. Thanks for the further education, Mickey.

### ROADABLE AIRCRAFT

Since the early days of the airplane, certain creative designers have tried to suc-

*continued on page 81*



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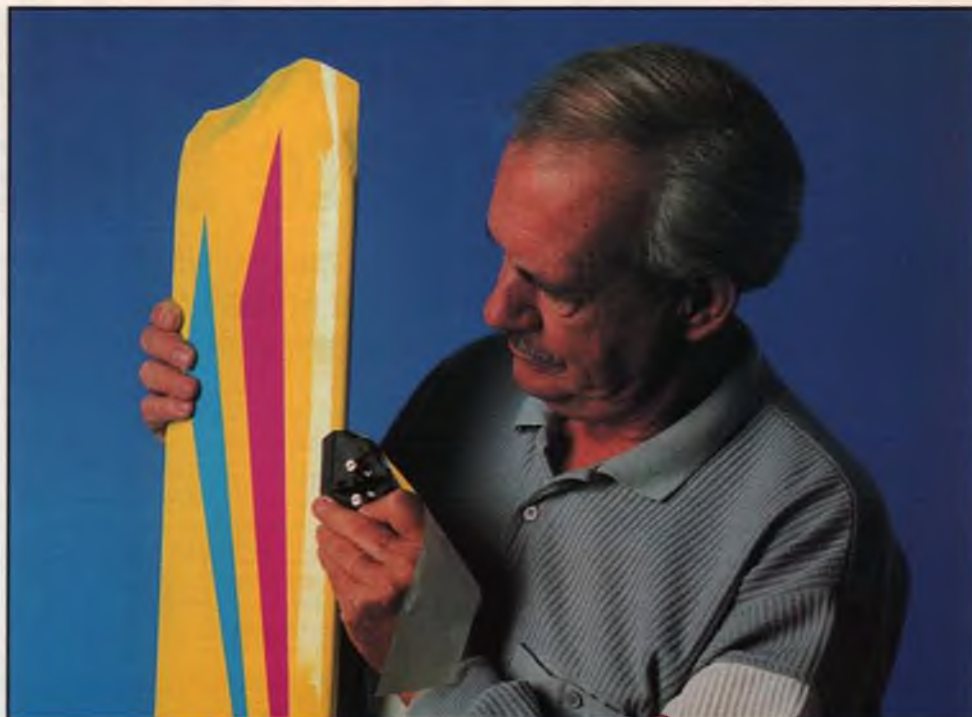
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Patent pending



BY ART STEINBERG

# Hobbico's ASAP Ultimate Biplane

**With its spectacular performance and no-nonsense lines, the Ultimate biplane has become a favorite of modelers around the world. Hobbico's ASAP Ultimate has to rank as one of the most attractive ARFs ever designed.**

**L**ike most red-blooded American aviation enthusiasts, I've long had a love affair with bipes, but I usually limited myself to watching other people fly them. I always found biplanes to be a headache to build and align, and they're a real pain in the neck to assemble and break down at the field. But if you can get past these problems,

beautifully, alignment was automatic, and there was very little grumbling on my part.

This model is one of Hobbico's ASAP series of ARFs and consists of a wood framework covered with a type of foamboard and finished in a fuelproof, multi-color Mylar type covering. Though a bit tough to repair, this type of construction is quite strong and extremely attractive.

your local builder's supply store and buy a roll of adhesive-backed fiberglass drywall tape. This material is made of a coarse mesh screen and is sticky on one side. Cutting it into appropriate strips, plaster it all over the inside of the cowl and wheelpants, and it will stay nicely in place. To finish the job, mix up a batch of slow-drying epoxy and rub it all over the tape, using only enough



there's nothing that looks better, or flies more gracefully, or exudes more nostalgic charm, than an eye-catching biplane.

As for me, all of my objections were overcome the moment I completed my Hobbico Ultimate, gleaming in its red, blue, silver, and black color scheme. Though it didn't go together overnight, I enjoyed every minute of assembling it. The parts fit

The cowl and wheelpants are molded ABS plastic. Many builders are unhappy with wheelpants and cowls made of plastic, as these components are subject to a lot of stress and are easily damaged. A method I use to greatly strengthen these parts is to first rough up the insides with 150-grit sandpaper. Spot-glue the components together, using a minimum of CA. Now go to

to penetrate the weave of the material and bond the tape to the plastic. Set aside to cure overnight, and the next day you'll have components about as strong as any made of fiberglass.

The fuselage goes together with very little work. I painted the interior of the cockpit flat black as suggested in the instructions—this really dresses up the appearance. The



canopy was attached with RC 56 glue instead of CA as called for in the instructions, as I've seen too many canopy installations botched up and clouded by CA fumes.

All four ailerons and the two elevators are pre-hinged, but the rudder must be hinged by the builder after the vertical stab and the tailwheel assembly are mounted. All hinges are of the heavy-duty brass type. The hinges have to be secured with epoxy, and are therefore susceptible to being clogged with glue. The factory installed hinges on my Ultimate Biplane were stiff from too much glue, so I worked them back and forth by hand until they loosened up to my satisfaction.

Hobbico specifies a .46 two-stroke or a .61-.91 four-stroke for this airplane. I decided on what seemed to be the perfect choice: the O.S. .70 Surpass, one of the shining stars of the O.S. four-stroke line. This was bolted into the kit's universal motor mount in the rearmost position. The engine fit quite comfortably inside the cowl, but it was necessary to provide a hole for the cylinder head to peek through. The cowl has two sizable vent holes in front and there is plenty of flow-through space, so engine cooling has been fully satisfactory.

Hobbico's Ultimate biplane is definitely in the category of serious airplanes, so I felt it



Cowling has generous air intake openings which allow for plenty of cooling for the O.S. .70 four-stroke. That nicely chromed plastic spinner is included in the kit.

I've always felt that higher powered models should use dual aileron servos, especially when you've got four ailerons to move around. Had I installed a .46 two-stroke, a single servo would not have been a great cause for concern, but the O.S. .70 Surpass is a comparatively powerful engine, and I would have felt more comfort-

mate were definitely on the light side. However, I faithfully adhered to the instructions and used a single aileron servo. The upper and lower ailerons are connected with slave pushrods, but I didn't use the ones supplied. They are made of a pliable type of wire and I feared they might not be stiff enough, so I substituted 1/16-inch diameter



■ LEFT: Art brings the Ultimate by for a low, fast pass. Ship really moves out with an O.S. .70 Surpass providing the pull, but a .91 Surpass would make for even better vertical performance. ■ RIGHT: Feeling his high-performance biplane deserved a high-class radio, Art chose to install his Airtronics Infinity 660 and four ball bearing 94732 servos; a fifth was added later when he chose to go with a dual aileron servo setup.

deserved the best radio I own—namely, my Airtronics Infinity 660 with four 94732 ball bearing servos. As the model utilizes a pull-pull cable control system on the rudder, it's advisable to install a ball bearing servo at least for rudder control.

able with dual aileron servos. Furthermore, the factory-installed aileron torque rods measure only .075-inch in diameter. Standard torque rods on .40 size airplanes usually measure at least .094 (3/32) or even .125 (1/8), so the torque rods on the Ulti-

music wire. Still not satisfied, I further beefed them up by slipping a brass tube over them.

A beautiful chrome spinner is included with the kit. I was fooled into thinking it was made of metal, however, close examination proved it to be plastic, and I





■ LEFT: The canopy is an exceptionally nice fit on the fuselage. Note the stick-on instrument panel decal and the flat black painted cockpit. No pilot figure is supplied. ■ RIGHT: The interplane struts are sturdy ABS plastic. Note that the author has stiffened the aileron slave pushrods with a brass tubing sleeve. The interplane struts were secured with 2-56 screws and nylon insert lock nuts after the kit-supplied nuts vibrated loose.

hesitated to scuff it up with an electric starter. To date, however, my starter has had no effect on the spinner's bright finish even after dozens of starts.

Ready to fly, the Ultimate weighed in at exactly 7 pounds. Had I used a lighter engine and a smaller battery pack and not beefed up the cowl and wheelpans, the plane might have come in as low as 6-1/4 pounds. Anyway, the wing area amounts to 660 square

inches, so the wing loading came to 24.5 ounces per square foot—high, but not outrageous. I made a mental note to follow the manufacturer's recommendation and keep the airspeed up on the landings.

Before taking a new model to the field, I like to run a couple tanks of fuel through the engine while tethering the tail to a picket fence in my back yard. The Ultimate has lots of nuts and bolts in it, and I wanted to

know if any of them would loosen from vibration, especially those in the wing strut and cabane assemblies. As it turned out, every one of the eight sets of 2mm nuts and bolts which connect the interplane struts to the wings worked their way out and blew away in the prop blast! I replaced them with 2-56 screws and nylon insert lock nuts.

## FLYING

Most of the first flight was flown at half throttle, as this was plenty of power for comfortable flying. No violent maneuvers were attempted, as this was to be a trim flight only. I found that high rate was too much on the ailerons, and low rate was too slow. Response turned out to be best when the control surface throws were later set right at factory specs.

All went well until I put the Ultimate in a shallow dive and heard the ominous sound of aileron flutter. Throttle was immediately chopped and the airplane was brought in for an uneventful landing. That ended the testing for the day.

Back in the workshop, I dismantled the ship and thoroughly examined it for damage, but could find none. This is a testimonial to the strong construction of this model,

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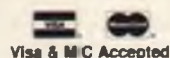
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—Jeff Troy, RC Scale Editor  
Model Aviation Magazine, June, 1994

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and to the ruggedness and dependability of Airtronics radio equipment. I cured the problem simply by applying clear tape over the aileron hingelines on both wings; the flutter problem has since disappeared. For extra insurance, it might be advisable to replace the torque rods with heavier wire.

In the air, Hobbico's Ultimate proved it can do almost anything asked of it, maneuvers being limited only by the skill of the pilot. Landing approaches do need a little power until touchdown—exactly according to the manufacturer's instructions. Though the vertical performance is excellent, it would be even better with a .90 four-stroke. However, it goes without saying that only advanced pilots should consider installing that much power.

When the test flying was completed, I followed my personal preference and in-



The heart of any biplane is its wing support system; this birdcage is all metal and plenty strong.

stalled a servo in each side of the lower wing to ensure solid aileron response in the more demanding aerobatic maneuvers. These were flat mounted and do the job perfectly.

One of the nicest things about this air-



The elevators are actuated by a spill pushrod system, while the rudder is controlled by pull-pull cables.

plane is its portability. Fully assembled, it easily fits into the trunk of my Buick, a remarkable feat for a performance biplane, and that fact alone gives it a perfect 10 in my book! **MB**

## The O.S. .70 Surpass

My engine was run-in on a test stand exactly per the instructions, using Powermaster 15 percent nitro fuel. O.S. isn't finicky about advising what fuel you should use, as long as it's standard commercially available fuel with 5 to 15 percent nitro. The oil may be castor, synthetic or a blend of both. I've long since given up using "special" four-stroke fuels in my four-strokes, with excellent results.

O.S. advises that two tanks of fuel be run through the engine at full throttle, alternating speed from high to low by successively richening and leaning the fuel mixture. Final break-in is completed in the air by running a rich mixture for the first few flights.

For break-in I used the smallest, lowest pitch prop on the recommended list—an 11x8 APC—and found this to be ideal for flying the Ultimate. The .70 turns it easily at 11,500 rpm. Idle was thoroughly reliable right out of the box, and for those macho souls who disdain electric starters, one-flip hand starts are the rule.

There are some four-strokes which should never have been marketed. They run rough, are overweight, lack power, and are cranky in their ways. There are other four-strokes which perform acceptably well, and once in a while a manufacturer manages to produce a real sweetheart of an engine. The O.S. .70 Surpass is just such a jewel. Nothing in its displacement class even comes close. I've seen this engine used by many RC fliers and have heard nothing but praise from each of them. If you've been considering buying an engine in the .70 four-stroke class, get yourself an O.S. You'll love it just as much as I do! **MB**

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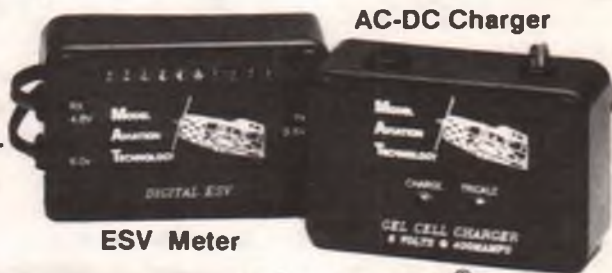
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# FREE FLIGHT

BY BOB STALICK  
PHOTOS BY MARY SMOTHERS

## • For Pee Wee 30: Don Boyer's Look-Up • Specialty Free Flight Publications

Although this column deals mostly with outdoor free flight, I also enjoy flying some indoor events. In my part of the country, the indoor site is scheduled five or six weekends per year—mostly in the winter. Our best flying, however, is usually in the spring. Our site is the South Albany High School gymnasium, where the ceiling height is just slightly under 42 feet in the large gym and just under 25 feet in the practice gym. The nice part about this site is that other than two solid beams that run the length of the ceiling, it is free of obstructions. We fly both category I and category II events during the same contest dates.

The pictures accompanying this month's column were taken



No doubt about it, the most fantastic configurations to be found in all of modeling are found in indoor FF competition. Here Dave Hagan is about to launch his elegant biplane Pennyplane.

in the South Albany H.S. gym by Mary Smothers. Mary's husband, Leo, is a regular contestant at our meets even though they have to travel nearly 500 miles round trip to compete. Mary is employed at the Oregon Institute of Technology as a photographer. Her photos were taken a year ago and give a nice flavor of the indoor scene.

Intrigued? The best thing you



Andrew Tagliafico, a top-rated indoor flier whose "Plum Easy" EZB was recently voted one of the ten Models of the Year by the NFFS, prepares his Pro-20 design for a flight. Pro-20 is a specialty event intended to fill the gap between EZB and F1D.

can do to get started in indoor is to order Lew Gitlow's new book, *Indoor Flying Models*. The cost is \$25 postpaid from Indoor Model Supply, Box 5311, Salem, OR 97304, and while you're at it, you might just join the National Indoor Model Airplane Society. Contact them via their newsletter, *Indoor News and Views*, at 1025 Cedar St., Catawissa, MO 63015. Indoor flying is a lot of fun. Don't miss out!

### DECEMBER THREE-VIEW: DON BOYER'S LOOK-UP

This month's model was featured in the pages of the *CIA Informer*, the newsletter of the Central Indiana Aeromodelers. A Pee Wee 30 ship, its triangular fuselage cross-section distinguishes it from more familiar designs. Full-size plans of this model are available from Don Boyer, 34 Tuxworth Rd.,



Leo Smothers launches his original design rubber-powered indoor helicopter. All of this month's photos were taken by Mary Smothers. Leo's wife and a professional photographer, at one of the Willamette Modelers Club's indoor contests last year.



Centerville, IN 45458. Cost in the U.S. is \$7 postpaid.

For those of you who may be unfamiliar with the Pee Wee 30 rules, these ships have maximum dimensions of 30 inches and a minimum weight of 100 grams. A two-wheel landing gear is required with a minimum 1-inch wheel diameter. No engine timer is allowed, and scoring is done using a formula with 2-minute maxes the target.

This model may be a bit unusual in appearance, but as with all Pee Wee 30 designs, it should be enjoyable to build and fly. In addition, these little ships are very inexpensive, as used Pee Wee engines can usually be found for a couple of bucks, and even a new one at \$20 is not expensive by today's standards.

## DECEMBER MYSTERY MODEL

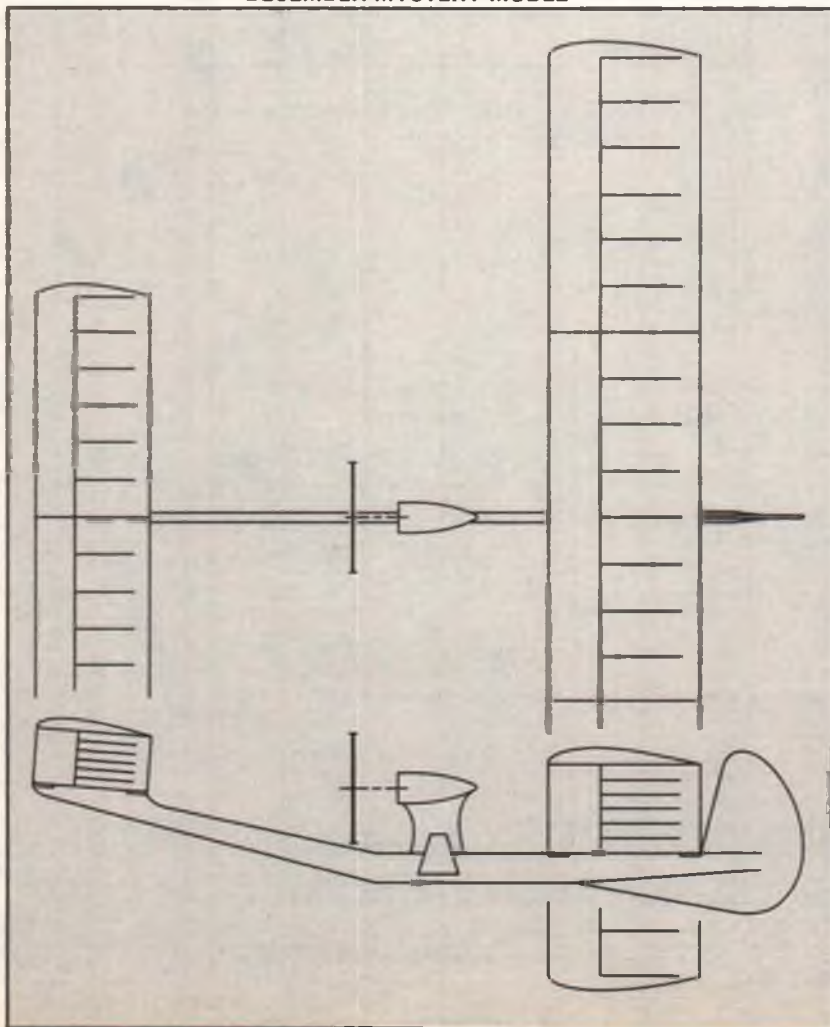
From an old issue of *Aeromodeller* comes this month's stumper. It's an .010 powered canard by one of the more prolific British free flight designers of the early 1960s. This ship actually came in two different sizes; the larger of the two was powered by two Cox .010s mounted back-to-back on a single pylon, but this one is the single engine version.

If you know the name of the model, send it on a postcard or letter to *Model Builder* magazine. In a couple of months the winner will be drawn at random from among the correct entries, and will get a free one year MB subscription. Nothing to it—just do it!



Concentration is intense as our columnist's son, Tom Stalick, makes a last-minute adjustment before launching his EZB.

## DECEMBER MYSTERY MODEL



## SEPTEMBER MYSTERY MODEL WINNER

According to the mail we received, several readers had personal experience with "Woody's Wagon," a Woody Blanchard design from M.A.N., January 1950. Little more than a weekend project, WW was a rather short-coupled, 32-inch span pylon job powered by the then-new K&B .035 Torp Jr. The name that popped up as the winner of the free MB sub was that of perennial Mystery Model entrant Frank Beatty, of Granite City, Illinois.

### JIM CLEM

I received the following letter from Bil Salnikov:

"I wish to inform you that one of our more prominent designers, builders and fliers passed away today (July 15, 1994).

His name was Jim Clem, of Witch Doctor, Witch Hawk, Country Boy and ABC Scrambler fame. He had other designs that really never saw the light of day which he designed to fill the parameters of rule changes as the years went by. He attended regional and national contests and always seemed to end up in the upper echelon of the results. He was inducted into the NFFS Hall of Fame during the past year.

"Also, he was a very knowledgeable purveyor and accumulator of ignition engines, as attested in the classifieds of the model magazines through the years.

"I am happy to say that Jim became interested in RC 1/2A Texaco during the past three years after resisting my efforts to induce him into RC for the previous ten years or so. I had never seen a wider grin on an adult than when Jim was returning from the flight line after completing his initial solo flight. The following year he garnered 2nd place in this event at the SAM Champs at Lawrenceville."

So long, Jim. I only met you



# FREE FLIGHT

a time or two, but we did write now and then. Thanks for all of your contributions to our hobby and for your friendship. We will miss you.

## SPECIALTY FF PUBLICATIONS

### •Rules for Special Events—1994

If you're intrigued by the Pee Wee 30 event or wonder just what on earth an ROG, USIC Federation model is, read on.

Various parts of the country have their own unusual rules or events. For example, our club always schedules P-24 at our indoor events. Many of you probably have

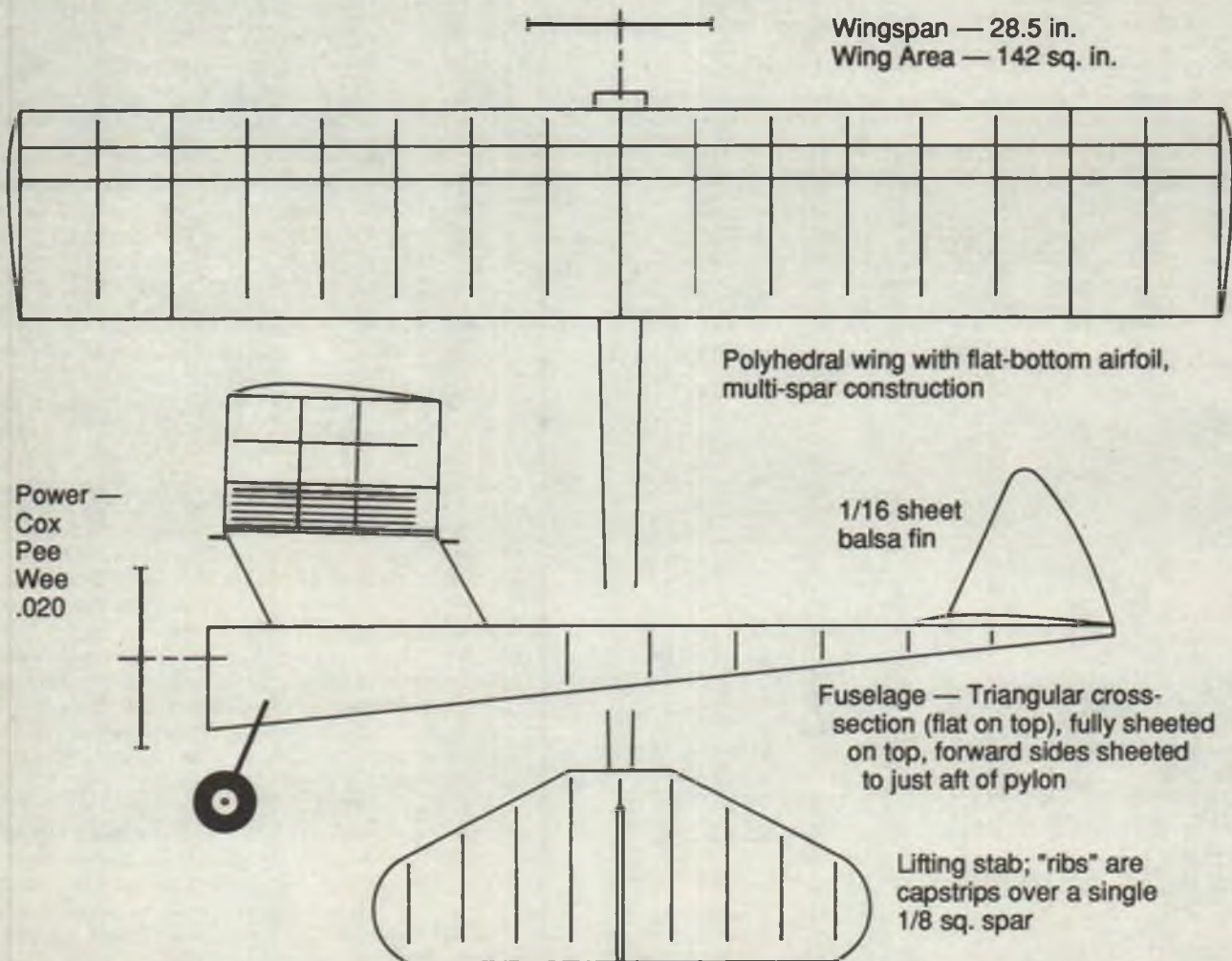
never heard of P-24. Well, this event and Pee Wee 30, along with 12 other specialty indoor and 22 specialty outdoor events, are now detailed in a new NFFS publication entitled *Rules for Special Events—1994*. This 12-page booklet, produced by Walt Rozelle, will give you all of the information you need to be knowledgeable about these unusual events, and in some cases, Walt gives you sources so you can seek out even more information. The booklet is available from Walt Rozelle, 926 Argonne Ave. N.E., Atlanta, GA 30309, for a mere \$2 postpaid.

### •The Best of Hangar Pilot

Dave Linstrum, who has made more

moves in his lifetime than Michael Jordan, has produced three compendiums from the MIAMA newsletter, *The Hangar Pilot*. These are highlight publications with the best of the best included. Volume 1 covers plans, three-views, pix and how-to articles from 1971 through 1978. Volume 2 covers from 1979 through 1986, and Volume 3 from 1987 through 1994. Dave sells them for \$7 each postpaid or all three for \$20.

For more details you can contact Dave at his new, new address: 1109 36th Ave. W., Bradenton, FL 34205-6109. Let's hope he sells enough of these publications so he can stay put for at least a year or two!

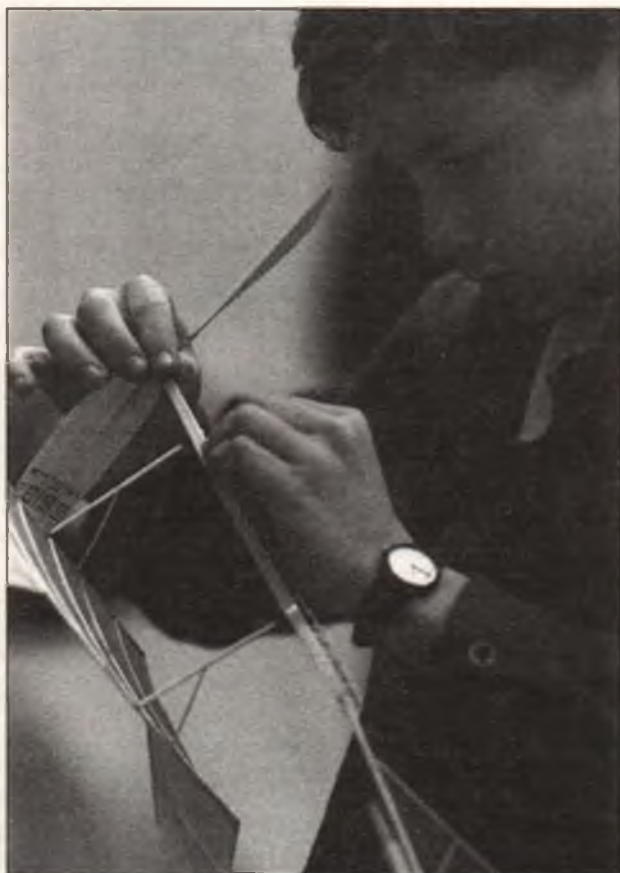


## LOOK-UP

### A Pee Wee 30 Design by Don Boyer

Full-size plans available from Don Boyer, 34 Tuxworth Rd., Centerville, IN 45458; \$7.00 postpaid





#### •'94 NFFS Symposium

If you haven't seen it yet, don't wait any longer. The new NFFS Sympo is ready for your purchase. It contains 132 jam-packed pages of free flight development. I'm particularly pleased to note that two Oregon fliers, Andrew Tagliafico and Ralph Cooney, have received Model of the Year honors. This is a premier issue and deserves to be in your collection. This year's editor is the old maestro himself, Bob Meuser.

To order your copy, send a check for \$22.50 (\$20 for the publication and \$2.50 for postage) to Fred Terzian, 4858 Moorpark Ave., San Jose, CA 95129. If you're not an NFFS member, the fee is \$4 higher. A good reason to join NFFS, I think. Order now, and treat yourself to a great Christmas present! **MB**

**Jake Palmer, an up-and-coming Junior flier, seen attaching the wound motor to the prop on his Pennyplane.**

Gil Coughlin (right) and Ed Barry pictured in a simultaneous launch of their indoor ornithopters.



## FLIGHT INSTRUCTORS NEEDED



The AirCore 40 Family Trainer

Dear Fellow Modeler:

If you are an experienced modeler, no doubt you remember your first days in the hobby. Chances are, some nice modeler reached out and lent you a hand, offering advice, guidance and a little moral support. Isn't it time you returned the favor?

**GIVE THE GIFT OF FLIGHT** - This year, why not bring someone new into the hobby, or be that special friend. Many people want to learn our hobby, but they need a little encouragement and someone like you to answer questions and get them started. If you invest a little time, and give back to the hobby some of what it has given to you, you will be rewarded many times over for your effort.



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Our mission at U.S. AirCore is to help people learn to fly, and supply them with rugged planes that survive their learning experience. (We even offer a crash-guarantee\* on the AirCore 40 Family Trainer.) Regardless of your airplane preference, we hope you share our belief that there are few hobbies offering the friendship, enjoyment or education that modeling has to offer.

*George Barker* *Lawrence Ragan*  
George Barker Lawrence Ragan

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BY ANDREW P. GUMP

# The Turbomatcher from Competition Electronics

**Competition and sport fliers alike can benefit from the extra performance that a "matched" battery pack offers. The Turbomatcher has become the industry standard and can be a valuable asset to clubs and hobby shops.**

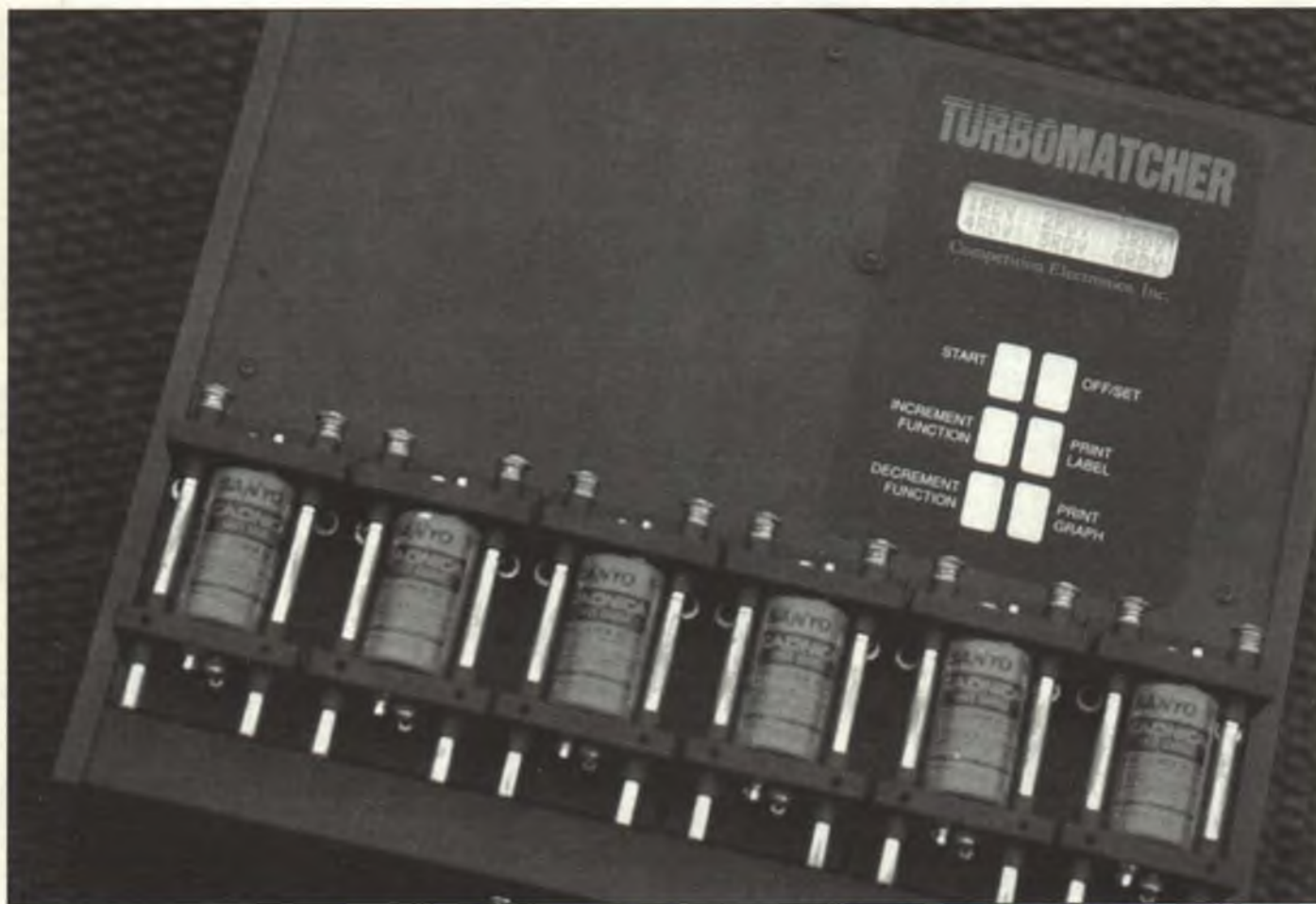
**S**ooner or later, everyone involved in electric flight becomes interested in getting more performance out of their NiCd packs—performance meaning both run time and power. It's a common lament: "We both have identical airplanes, motors and props, we're both using six-cell 1400-mAH SCR packs. So how come you get a longer run and a faster climb than I do?" Truly a baffling question—until it dawned on someone that one bad apple does indeed spoil the whole bunch.

A pack of cells is only as good as its worst one. It's possible to spot a blown or leaky cell by physical inspection, but there's no pair of eyes on earth that can spy a low-capacity cell. Enter the timed-discharge method of rating cells.

The idea is simple: measure the amount of time it takes for a cell to go from its max charge down to its lowest useful point. A cell's maximum charge is reached at its peak (reached by a charging cell when its voltage actually begins

to drop—usually 0.03 volt for a single cell); its lowest useful point, or cutoff voltage, is determined by the tester—usually 0.80 or 0.90 volt per cell.

The first rated cells were done with a stopwatch, a voltmeter and a bank of resistors or maybe even a lightbulb or two. The cells would be peak charged, then immediately discharged. The watch started when the discharge began and the voltmeter was monitored for the approaching 0.90 volt—end of discharge.





Not very complicated, but it's quite primitive and very tedious to do.

Ron Bailey is the man behind Competition Electronics, a company that primarily serves the RC car market. Being a racer himself, Ron decided there had to be an easier, more accurate way to measure the discharge rates of cells. The result is the Turbomatcher, which has since become the industry standard in battery-matching systems. With regard to cost, convenience, reliability, accuracy and user-friendliness, the Turbomatcher has no peer.

### TURBO TALK

The Turbomatcher is designed to rate single cells for the express purpose of grouping together cells of equal rating, in order to achieve the Zen state of electric RC—the matched pack.

The unit takes up to six individual cells and rates them at a simulated motor draw current of either 20 or 30 amps max, depending on which model of Turbomatcher you have. It also provides information such as discharge time, discharge average voltage, charge time and charge peak voltage. Believe it or not, if you have the proper type of printer, the Turbomatcher can provide you with a graph of your cell's discharge performance and a printout label of each cell's individual performance! All of this is executed via a six-button keypad.

Operation of the Turbomatcher is pretty

rate, discharge end voltage (cutoff), discharge end time and cell count; the cycle begins with the touch of the Start button. The LCD display shows an individual cell's status—ready, off, charging, re-peak, discharging and done.

To ensure absolute accuracy, the Turbomatcher employs two contacts on each end of each cell. The large contacts carry the current, while the smaller contacts are used to measure the voltage. Voltages measured in this manner are always accurate.

Two of the TM's most awesome features are Labels and Graphs. All you need is a Centronics parallel, compatible type printer (which covers most printers out there). The labels contain such useful information as discharge time, discharge average volts, charge amps, discharge amps, charge time, charge peak voltage, discharge cutoff volts and serial number—all necessary tidbits of data required for the perfect match.

The Graphs function will display a discharge curve of any of the six cells and will print a cell's voltage versus the discharge time in seconds. A lot can be learned by seeing the actual graph of how your cells discharge over time.

The Turbomatcher can even be ordered with the ability to show the internal resistance of your cells, and/or you can have your labels customized to print out a name of your choice.

of unmatched or out-of-match batteries. The motor will run for the rest of the discharge, but only at half power or maybe less. What a drag! When one or more of your cells discharges more quickly than the others or discharges at a very low average voltage, the other cells of that pack come down to that low level also. By contrast, in a matched pack, all of the cells have approximately the same discharge times and average voltages.

Once a matched pack, always a matched pack? Nope! Cells change their charge and discharge characteristics throughout their (hopefully) long lives. That means re-rating cells every now and then in order to keep your packs in the best possible working order.

### THE TRUE TEST

With access to a Turbomatcher, I had the opportunity to run a little test. Granted, this was no M.I.T. experiment, but it did give me some valuable information.

I enlisted the help of MaxCell, the battery folks, who loaned me three of their 1400-mAH, matched SCR packs. I ran them twice a week for about nine months. Each pack was charged on a Linear Turbocharger (another Competition Electronics product) at 6.5 amps and peaked twice before running.

After each run, all were discharged down to 0.00 volt on the Turbocharger. Pack #1 was then left out to cool, Pack #2 was

# TURBOMATCHER

SUPPLY VOLT 14.0  
CHARGE AMPS 0.0

Competition Electronics, Inc.

START

OFF/SET

INCREMENT  
FUNCTION

PRINT  
LABEL

DECREMENT  
FUNCTION

PRINT  
GRAPH



■ LEFT: Programming the Turbomatcher is done via a six-button keypad; the information is shown on the LCD screen above. Charge rate, discharge rate, cutoff voltage, discharge end time and number of cells are all variable. ■ RIGHT: Each end of each cell station is fitted with two contacts: one for current, one for measuring the voltage.

simple. The Increment and Decrement buttons take you where you want to be, and the Off/Set button allows you to change the actual operation values themselves. You set the charge rate, discharge

### USING THE FORCE

How many times have you been flying your electric model and suddenly the power drops dramatically? That's the typical result

placed on a single discharge resistor (30 ohms, 10 watts); Pack #3 was placed on a discharge rack which effectively places a single resistor across each cell, allowing each cell to come down independently.



# "Rust. A screw-locking compound out of control...until now!"

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"Underneath the zinc plating is **hardened steel**...for the strength and dependability you need from the hardware that holds

*Don Anderson*  
Don Anderson  
President and Founder  
Great Planes Model Manufacturing



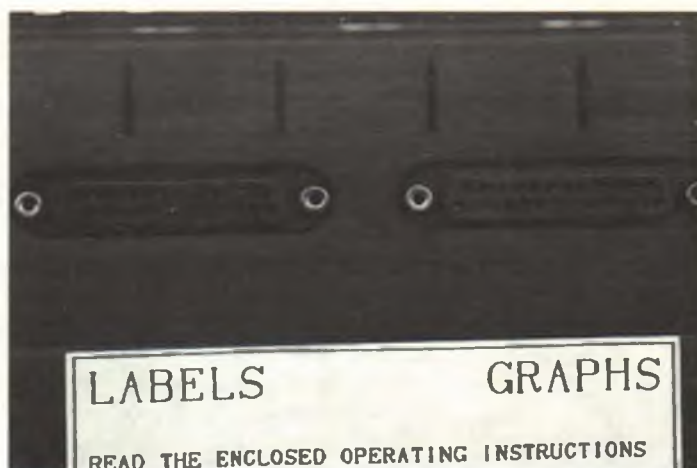
For a free brochure and the location of the dealer nearest you, please call 1-800-682-8948, ext. 033X.



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**Retailer Instructions:** To redeem, send this original coupon (no photocopies accepted) along with any regular Great Planes invoice payment within 30 days after the expiration date shown. Deduct the coupon value from your net invoice payment. Proof of adequate purchase may be required.



The Turbomatcher features Label and Graph functions. Connected to the proper type of printer (see text), you can print out individual cell labels that contain all the pertinent information for very close cell matching. You can also have it print a graph of each cell's voltage vs. discharge time—another useful matching tool.

The packs on resistors were removed approximately 48 hours later. After nine months of this, the packs were disassembled and the individual cells were tested as they originally were on the Turbomatcher, using MaxCell's matching parameters.

The results were surprising. The discharge time of each pack had gone from a fantastic 300 seconds to 260-270. It's true that we're only talking 30 seconds at a discharge rate of 20 amps, but still!

I then put all of the cells through several cycles at a 20-amp discharge, 5-amp charge and .8-volt cutoff. Each cycle was completed by simply removing the cells and allowing them to cool. Time between cycles was 48 hours.

Each cycle showed more and more improvement, until 90-95 percent of the original capacity was regained! After more than 72 hot and heavy run cycles, the cells were practically as good as new.

Encouraged, I then started cycling several of my oldest cells. None could be restored to their original high numbers, but almost all could be restored to at least 90 percent of their original capacity. I also found at least three truly bad cells lurking in their midst. Packs that I thought were shot only had bad cells in them!

So what happened to the last 10 percent? It's gone for good, usually as a result of overheating, which causes a portion of the substances within the cell to escape through the vent holes in the cell cap. Also, a small

amount of the substances themselves just plain get used up with use.

To complete the program, once the individual cells have been fully cycled several times, cells of like discharge times are grouped as packs. At the same time, you'd want to consider the cells' average discharge voltage, which is a parameter of power.

## THE FINAL ANALYSIS

You're probably asking yourself, "Who is this guy trying to kid? How can I afford to have one of these things in my shop?" Whoa! I'm not saying that any one person should own one of these units, but let's look at the bigger picture—or should I say, the more numerous one!

Because high tech has become more affordable in recent years, equipment like the Turbomatcher is no longer limited to the large battery-matching concerns. All around my area, clubs and hobby shops are pooling their members' resources. The result is that many people reap the benefits of the Turbomatcher for a fraction of the cost of a matching service. Think of the benefits of having a cycling/rating system at your beck and call! Consider also the possibility of saving cells instead of tossing them. Sounds pretty good, eh?

For full details on the Turbomatcher, write Ron Bailey at Competition Electronics, 3469 Precision Dr., Rockford, IL 61109; (815) 874-8001. FAX: (815) 874-8181. **MB**



To operate the Turbomatcher, you'll need a power supply that can put out at least 30 amps at 13.8 to 15 volts DC. The author highly recommends the Power Source PC-30, available from Rivergate Hobby Center Inc., 707-E Two Mile Parkway, Goodlettsville, TN 37072; (615) 859-3455.



# Congratulations, Gentlemen. Again.

U.S. NATIONALS, 1994		
EVENT	WINNER	RADIO
FAI Pattern	Chip Hyde	JR PCM-10S
FAI Helicopter	Curtis Youngblood	JR PCM-10SX
Unlimited Sailplane	Fred Sage	JR X-388S
Quickie 500	Chip Hyde	JR X-388S

And this year, the number of flyers  
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# BUILD AN ULTIMATE, EEE-Z-FLI STYLE!

**One of the world's premier competition aerobatic aircraft, the Ultimate has become by far the most-modeled biplane of the past few years. Here's an affordable .40 size sport version in the author's unique EEE-Z-FLI style of construction.**

BY AL WHEELER

Considering the Ultimate Biplane's numerous achievements in the TOC and other aerobatic competitions, the fact that it has become a popular modeling subject is understandable. Most of the current model offerings, however, are big airplanes—so big that the initial cost is high, the engines required run into megabucks, and transportation to and from the flying site requires assembly before you can fly and disassembly before you can go home.

For those who prefer a smaller Ultimate, the EEE-Z-FLI .40 size model is ideal. Cost is low, the engine is affordable, and transportation is simple (fully assembled, it will fit easily into most compacts, even in the trunk!). Also, little is lost in performance; the .40 powered EEE-Z Ultimate, with its 660 square inches of wing and an all-up weight of 5.25 pounds, gives

an excellent account of itself when flown next to .60 and .80 powered kit models.

In keeping with the EEE-Z-FLI tradition, construction is basic, the parts count is low, no exotic materials are used, and the flight performance and ground handling are outstanding. Initial flights indicated straight tracking on takeoff, the tail coming up by itself with neutral elevator trim and the aircraft lifting off as it attained sufficient speed. It was found early on that the ailerons are *quick*, a characteristic that your writer likes, however, one that may be changed to suit your taste.

Rudder also has considerable authority—great for knife-edge flight. The aircraft has neutral stability and will stay in the attitude you leave it in. Loop and roll combinations are lots of fun, as are all aerobatic ma-

The prototype EEE-Z-FLI Ultimate on the tarmac at the author's home field in Hawaii. An exceptionally good looking ship, we think. Engine is an O.S. .40 FP swinging a 10x6 Master Airscrew and fitted with a Tatone Pitts type muffler, cowling is from a Sig Skybell, the wheel pants are from a Goldberg Ultimate (a bigger model, which is why the pants look a little big here), and the radio is a four-channel Futaba.







The canopy (in this case, "borrowed" from an EZ Christen Eagle) is secured simply with a couple of small screws. Overall covering is MonoKote, Al's favorite for all of his EEE-Z-FLI projects. Cowling and other small parts are sprayed with Pactra's Formula-U polyurethane.

neuers. The glide is normal and the aircraft is hard to slow down for a biplane—must be a clean machine! Once slowed down, flare and landing, either

three-point or on the mains, is straightforward with an easily controlled rollout (that big rudder again). To sum up, the flight characteristics are most pleas-

ing and the EEE-Z Ultimate will do anything you ask of it.

### CONSTRUCTION

Work the instructions and the

plans as a unit; an item that may be unclear in one may be more understandable in the other. If all else fails, get in touch with "Ol' Al" at 525 Kumulani Dr., Kihei, HI 96753; (808) 879-3086.

### EMPENNAGE

The tail surfaces are all sheet balsa. Note the 1/16 plywood doublers on both sides of the rudder. Slot the stabilizer, elevators, fin and rudder for hinges, and install hinges in the stab and fin only. Round all edges and you're done.

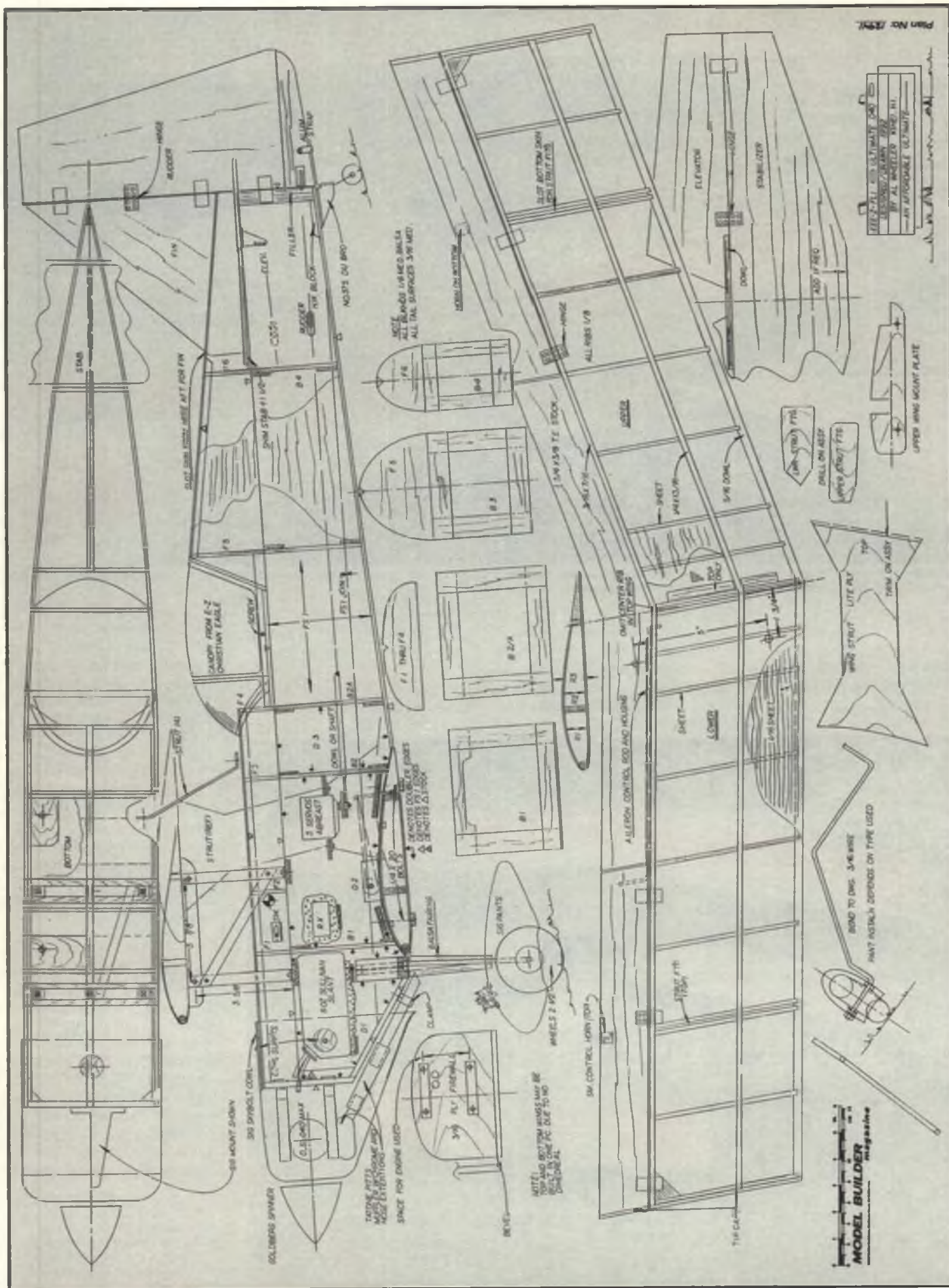
### FUSELAGE

Doublers D-1, D-2 and D-3 are glued to the FS-1 fuselage sides with spaces in between for the firewall and bulkheads. Install bulkheads B-1 and B-2 on one FS-1, then place the remaining FS-1 on the building board (doublers up) and cement the bulkheads into the slots. Make sure everything is square and in proper alignment. Epoxy the plywood firewall

With those four barn-door ailerons and correspondingly large elevator and rudder, the Ultimate is one responsive bird! There's a lot of fun in store for those who build one of these agile models.











Ready for covering and paint, this view shows off the Ultimate's straight lines and simple construction. Note also the experimental short landing gear, which probably improves the ground handling a bit but doesn't look as good as the longer gear.

and cabane strut mounts in place; add triangle stock (not shown on the plans) between the bottom surface of the strut mounts and the inside of the fuselage. Add top formers F-1 through F-4.

Install the three hardwood landing gear support blocks with epoxy. (The horizontal piece is slotted for the landing gear wires; don't drill the vertical blocks yet.) Add the 3/16 balsa bottom section aft of the firewall. Add the triangle stock gussets at each side of the firewall.

Install the front and rear wing support blocks and triangular blocks. (Use epoxy for all wing attach-

ment structure.) The rear ends of the fuselage may now be pulled together and B-3 and B-4 installed. Be sure the rear fuselage joint is vertical; this is where bananas are born and bananas we don't need! Fit and install the filler block at the rear joint and install the cockpit floor.

Add F-5, F-6 and an extended F-5 from the front face of the vertical F-5 at an angle down to the cockpit floor; this becomes the

rear support for the canopy. Install the 1/4 square top stringer. Plank the bottom from B-2 aft to the rear end with soft 1/8 balsa (cross grain); the section forward of B-2 will be fitted following wing installation.

Form the four cabane struts from brass or aluminum; the prototype used K&S brass strips from the local hobby shop. Align them carefully, and

when satisfied, drill the plywood supports and install 4-40 blind nuts on the bottom of the supports. Minor rebending can be done as required.

Being sure to maintain the 3-5/8 inch dimension shown on the plan, install the diagonal braces with #3 self-tapping screws. Recheck the strut attachment hardware for tightness—this is your last chance, so get it right!

Install the forward 1/4 square top stringer. The top 1/16 skin is now added in pieces, working from the top edge of FS-1 to the center of the top stringer. Plan a joint at a point about midway between the struts and work to that point from the front and rear. Slot the skin for strut clearance as required.

Sheet the turtledeck, going all the way back to the tail post. Slot the sides and top for the stab and fin. Install the cowl supports and the engine mount. With the engine installed, cut the required cowl openings and fit the cowl. A Tatone Pitts type muffler adapts well to the area below the fuselage section inside the cowl. The chrome extensions are neat and give a more mellow sound.

## WINGS

The upper and lower wings are identical with the following exceptions:

1. The lower wing incorporates the aileron torque rods and the aileron servo.

*continued on page 67*

## "What makes our spinners so easy to install?"

"First, if you need to enlarge the engine shaft hole from the predrilled 1/4" size, our spinner backplate's stepped guides help you stay perfectly centered.

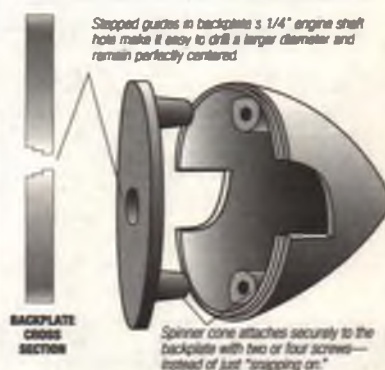
"Second, our spinner cone locks onto the backplate with screws—a much more secure method than the 'snap together' style of other manufacturers.

"Great Planes Nylon Spinners come in white, black or red, in seven sizes from 1-1/2" to 3". They require no special adapters, very little time or effort...and they look great!"

*Don Anderson*

Don Anderson  
President and Founder  
Great Planes Model Manufacturing

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## THE ULTIMATE BIPLANE FOR FF RUBBER SCALE

**With all the RC Ultimate bipes being flown throughout the country, it's about time the free flighters had one too. This modern design has all the right moments for a good flying rubber scale model. Might make a good CO<sub>2</sub> job as well.**

**BY PATRICK TRITLE**

When the first RC Ultimate biplane kits burst upon the scene a few years back they took the market by storm. My kit was the second to leave the local hobby shop and the first to return framed. I hung it in the shop for display and to maybe help sell a couple more kits. The first thing that happened was that someone offered me more than I could turn down, so I sold it. Later on, I had the opportunity to fly one, and was duly impressed by the stable, steady feel of the airplane, and immediately began to regret selling mine.

In the meantime, my modeling pendulum had swung back to the early roots of my modeling career—rubber power. At the same time, the direction of my interest was again migrating back to scale, which it always does, and I again began thinking about the Ultimate. There are lots of RC kits and plans out there, a couple of CL plans are available, but nothing for FF rubber. It seemed like the time was right.

Rather than get too carried

away with a hard-core scale project, I decided to keep construction as simple and light as possible in hopes of producing a durable sport scale model for the weekend flier.

The basic airframe design is a simple stick-and-tissue format. Wing construction utilizes main and sub spars and sliced ribs to keep the weight down, as well as built-up I-struts for further weight savings. The overall outline is not intended to be true to scale, and the horizontal stab has been enlarged for added stability. Though not totally accurate in outline, it's definitely an Ultimate.

### CONSTRUCTION

Start by building up the vertical and horizontal stabilizers. When the glue has dried thoroughly, remove the frames from the plan, sand all the edges round and set them aside.

The wings go together next. Pin the leading and trailing edges to the plan, followed by the 1/16 square rib bottoms. Add the main and rear spars,







The outlines have been changed a bit to make a better flying model, but it's definitely an Ultimate. A scale canopy would have to be vacuum formed; the author chose instead to make his from two pieces of flat acetate. Multi-colored tissue paper trim is easy to do and adds much to the model's sporty appearance.

and glue everything in place.

Both wings are of equal and constant chord, so only one rib template is required (I made mine from .040 styrene). Cut all the sliced rib tops from contest grade balsa and glue them to the wings, followed by the 1/32 balsa end caps. When dry, take the wing panels from the plan

and shape the leading and trailing edges. Block up the tips and join the panels to the center sections at the proper dihedral angle. The 3 degrees of dihedral may not look like enough, but coupled with the effective 2 degrees obtained by the 10 degrees of wing sweep, it's adequate.

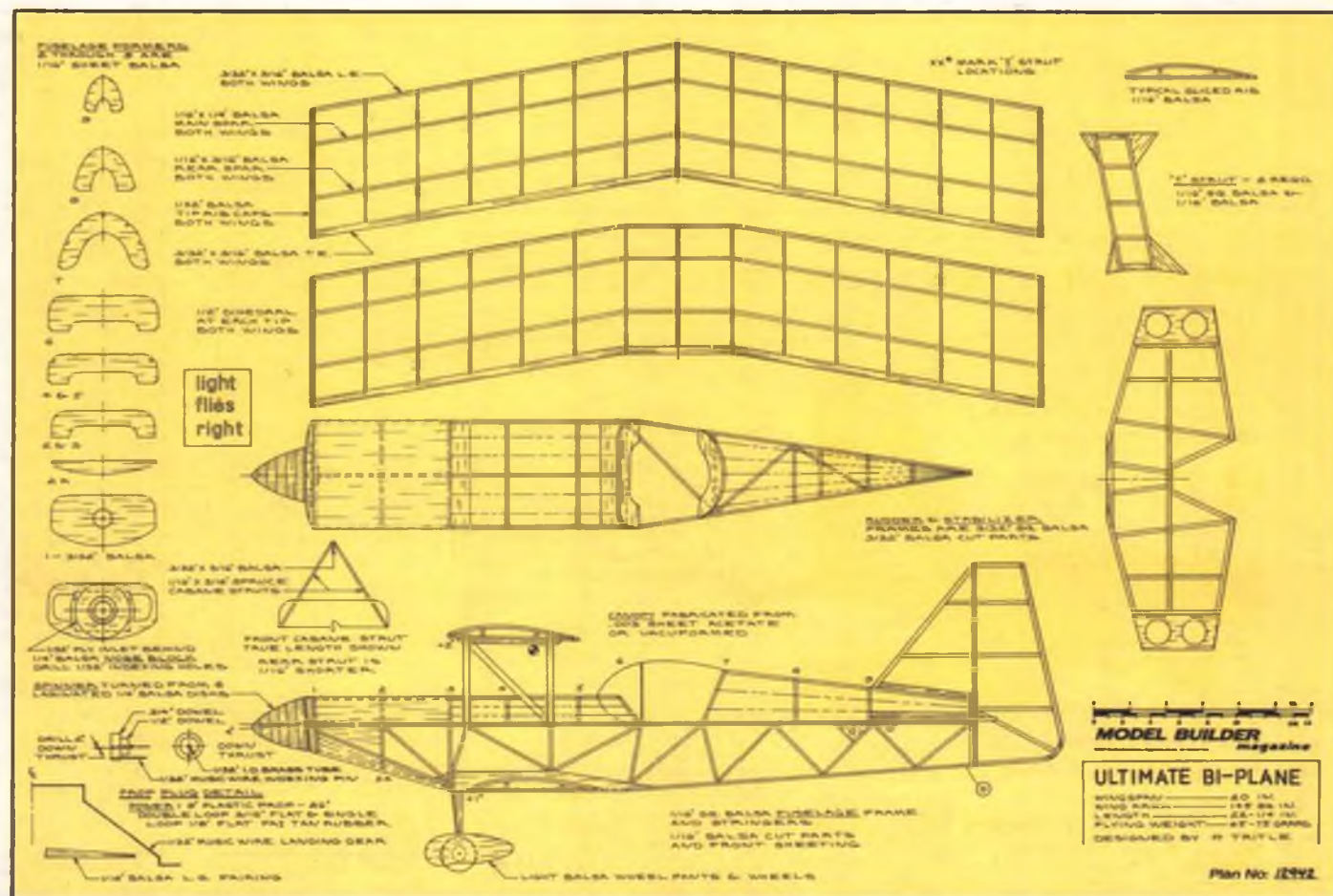
The fuselage is the basic stick side frame type, joined at the top by the formers and cross sticks on the bottom. Note that former 1 is installed to provide at least 4-1/2 to 5 degrees of downthrust. Next add the upper and lower cowl sheeting. Glue the 1/4-inch balsa noseblock to the fuselage and sand it to shape to complete the basic structure.

Using the front view of the cabane struts as a guide, build up the strut system directly on the fuselage. Cut the rear strut 1/16-inch shorter to obtain the top wing incidence, being careful to maintain the saddle alignment true to the fuselage centerline. This setup goes together easier than it sounds, but care is needed to ensure good alignment. The landing gear is bent from .032 music wire and installed using triangles for reinforcement. The pants are layered from 1/4 and 3/32-inch soft balsa, carved and sanded to shape.

Covering is Japanese tissue and Sig Lite-Coat dope. The color scheme is up to the builder. Don't go overboard with the dope, as the fuselage



The author about to send the Ultimate skyward from a field near his home in Albuquerque, New Mexico.







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Bare bones shot reveals the model's light framework—even the I-struts are built up. For best flight performance, the model should weigh no more than about 75 grams.

longerons tend to bow in if the tissue is pulled too tight. Three coats of thinned dope provide an adequate finish at minimum weight.

Final assembly begins by gluing the vertical and horizontal stabs to the fuselage. It won't hurt to offset the rudder 1 degree to the right in the initial setup; you'll need it in flight. The bottom wing incidence takes care of itself if the leading and trailing edges are fitted flush with the fuselage bottom. Check the wings for warps and straighten any you may find, then add 1 degree of washout to the lower right wing. Glue the top wing to the center saddle and add the left I-strut first, then the right I-strut, being careful to maintain the 1 degree washout.

The wheel pants and landing gear fairings can go on next, followed by the canopy. Adventurous types can vacuum form one, or simply do as I did and make a forward canopy bow and form the canopy from two flat pieces of .003 sheet acetate. While you have the acetate handy, cover both sides of the cabane struts, which will help stabilize the glide significantly.

The noseblock on this airplane is my own design and has proven to work quite well. Start by cutting a 1/4-inch long piece each of 1/2- and 3/4-inch diameter dowel and glue them together, maintaining proper centering. Then drill a 1/16-inch diameter hole in the block at an angle of 2-1/2 to 3 degrees and mark the block at the bottom-most angle; that will be the location for the 1/32-inch music wire indexing pin. Using the hole as a guide, fit the block into the nose and drill six equally spaced holes from the 180 to the 270 degrees point. Glue the 1-inch long wire index pin into the noseblock. Bend the rubber hook from .032 music wire, turn the spinner from laminated 1/4-inch balsa discs, and assemble the 9-inch prop to the hub. This airplane likes a lot of down and a fair amount of right thrust to fly, and this adjustable block allows several combinations of both for trimming.

Power is a 26-inch double loop of 3/16-inch flat and a single loop of 1/8-inch flat FAI tan rubber. With the rubber in the model, add noseweight to arrive at the CG shown on the plan. Add or remove weight to achieve proper glide. Start at low winds and make trim adjustments as needed for a fairly tight left-hand climb, followed by a right-hand glide. My airplane is a little

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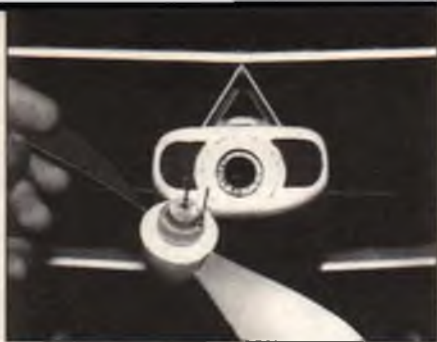


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finicky about the launch and likes to start at about 5 degrees nose up with only a gentle push to get started. With a good launch, the climb is gradual and nose high. Transition to glide is gentle and predictable.

I hope your Ultimate brings you as much enjoyment as mine has. In the RC market, Ultimates are everywhere. Let's hope the rubber market catches on as well. Hmmm . . . how about a Peanut Ultimate. . . or Pistachio? **MB**

## ULTIMATE RC continued from page 63

2. The lower wing has three ribs at the centerline; the upper wing omits the center rib to allow for the plywood mounting plate.

3. Upper and lower wings are shown in the same plan; the right side depicts the lower wing and the left side the upper.

4. Both wings are flat (no dihedral) and may be assembled in one piece.

Edge-join the bottom sheets; note that they extend full chord and from the root to the tip. Pin the bottom sheet on the plan and mark the locations of the spars and all ribs.

Install the spars on one side. Slide a sheet of waxed paper under the centerline and pin down the opposite bottom wing skin. Be sure the centerline joint of the bottom sheets is true and at the correct angle. Once satisfied with the joint, apply cement and weight it down until dry. When dry, install the spars on the other side. With the bottom skin held down firmly, use a strip of aileron or T.E. stock to raise the bottom skin at the leading edge to match the curve of the R-1 ribs and install them, along with the R-2 and R-3 ribs.

Using a rattail file or other suitable tool, make the cutouts for the leading edge in the ribs; a file may be worked through several ribs at once, giving a straight line. The slots must allow the dowel to seat against the bottom skin. Once fitted, carefully cut the dowel to length with the proper bevel on each end. Install the leading edge, assuring a good glue joint against the bottom skins and at each rib. Sand the rib/leading edge joint and ribs back to the

*continued on page 73*

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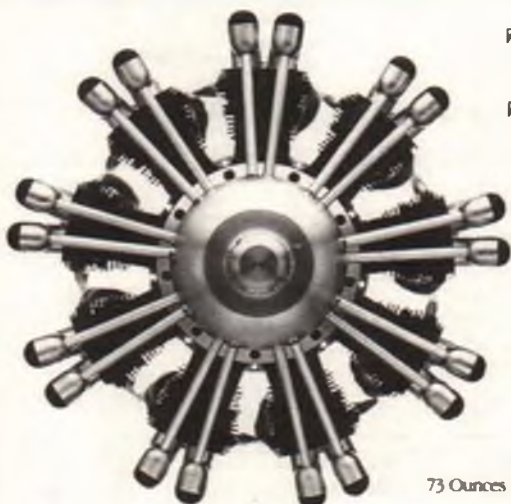
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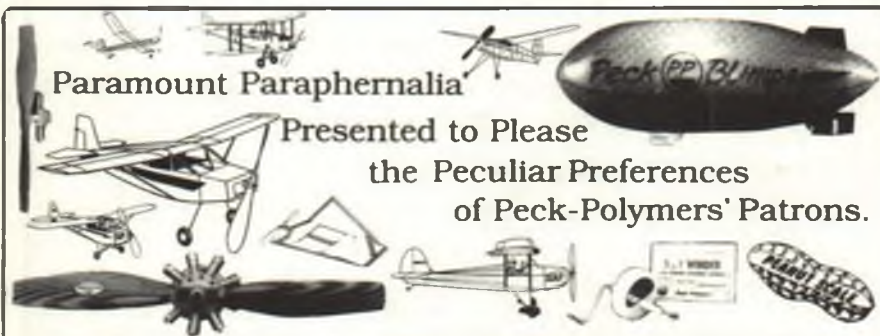


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## PLUG SPARKS continued from page 34

This engine, manufactured by Aero-Marine Co. of Vandalia, Ohio, was first written up in 1948 *Air Trails Pictorial* under the column, "Inside Stuff." Advertised in June 1948, the opening price was set at \$35. While this seemed high at the time, sales of the jet engine was only 2,000 for the first year. In all, only 10,000 were manufactured. From this, other uses were found; i.e., the Dyna-Fog Jet Insecticide Fog Generator. This and other ideas, including military applications, set the trend in the jet pulse field. Since then, jet model flying has become a very specialized event.



Photo No. 5. A super nice building job on this Lancer 72 by Vincent Burton of New Orleans. The three-channel RC model is powered by a geared Astro 15 running on 12 cells.

## MEMBERSHIP PLUG

Jack Alten, who was one of the spark plugs of SAM 21 until he moved up to Oregon, is finding Old Timer flying action a little hard to come by in his area. Jack has asked for help in getting members for a SAM club in Portland. If you have been missing Old Timer action in the Great Northwest, now is the time to join the new SAM group. Contact Jack Alten, 3880 S.E. Pine St., Hillsboro, OR 97023; (503) 640-0197.

## LANCER 72

Vincent R. Burton, 4619 Bundy Rd., New Orleans, LA 70127, sent in a photo of his electric powered Lancer 72. This gorgeous model, seen in Photo No. 5, is covered with green silk, doped with clear nitrate, and is trimmed with Sig Supercoat gold dope and yellow and black pinstriping.

Vince says the geared Astro 15 will run for 4 minutes on its 12-cell, 1700-mAH battery pack. Should be quite competitive in the Class B O.T. Electric event being promoted by some California SAM clubs. This is the kind of model this columnist likes to see!

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The latest gimmick to come along is not a new idea, but "Sky Shine" is an easy way to put highly visible reflective material on your model. Manufactured by PEP Aviation, 111 E. Geneva Dr., Tempe, AZ 85282-3638, this highly reflective self-adhesive trim film is just the thing to make your high-flying model more visible. Like Phil Pearce (PEP owner) says, this should reduce the number of models lost O.O.S. Try it! **MB**



## NINJA PRO continued from page 40

belt from slipping out of the clip. Century has an optional cone start system (\$89) that includes a special clutch and clutch bell.

For the Ninja 40, a file or a Dremel Moto-Tool is needed to grind away some of the sideframe to make the muffler fit. I find Dremel's cylindrical milling bit to be the best choice. My fuel tank is secured with double-sided foam tape. I recently added a 2-ounce feeder tank to increase flight time and to give more consistent engine run during aerobatics.

The canopy is securely held by three posts. It won't fall off by itself, even during high-G aerobatics. The easiest way to get a great looking canopy is to spray the inside with Pactra fluorescent car spray paint, then spray a base coat of Pactra Sprint White. The fins are painted

in a reverse technique—Sprint White first, then the fluorescent colors. After adding decals to the fins, spray them with an enamel clear coat.

In summary, the Ninja Pro is a stable helicopter for beginners to learn on. (I personally prefer the Ninja 40 for its better power margin and better aerobatics.) Any standard inexpensive heli radio can

Close-up of the Ninja's belt-drive tail rotor. Two bearings are used inside each blade grip.

James added a 2-ounce feeder tank to his model to increase flight time and give more consistent engine runs for aerobatics.

be used. The only upgrade accessory that I suggest is the 18-piece ball bearing set for the control system. The Ninja 30 and 40 are distributed by Century Helicopter Products, 521 Sinclair Frontage Rd., Milpitas, CA 95035-5413; (408) 942-9525. FAX: (408) 942-9524. **MB**

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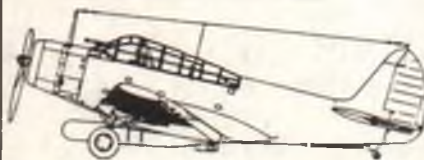
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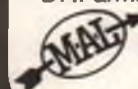
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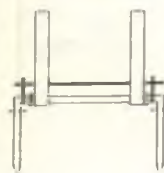


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## ULTIMATE RC continued from page 67

spar to the same contour.

Install the skin supports between the R-2 ribs at the rear spar. Fit and cement the trailing edge stock to the rear face of the rear spar and to the bottom skin. Cut out the bottom skin at the aileron and cement it to another piece of trailing edge stock to form the ailerons. Bevel the front edges and make the hinge slots in the ailerons and the rear spar. Install hinges in the rear spar only.

Sand all ribs to the same contour using a long sanding block. Sheet the center section with 1/16 balsa to the outboard R-2 ribs. Start at the face of the rear spar and cover forward to the mid-point of the front spar. Cut 1/16 sheet to cover the entire leading edge from the center to each tip. Notch it at the center so it will come to the rear edge of the main spar and extend just past the leading edge dowel. If necessary, wet the top surface for easier bending. Assure good glue joints at all points of contact. Use tape to hold the leading edge down.

Trim both the bottom skin and the top sheeting as required and sand to blend smoothly with the leading edge dowel. Glue on the tip caps and sand to blend with the wing contour. Do the same for the ailerons.

The lower wing construction is the same as the upper with the following exceptions:

1. The center section uses three ribs at the centerline.

2. The inboard trailing edge bottom skin is cut loose at the rear spar, the trailing edge and bottom skin are cemented together and notched to accept the aileron torque rod/tube assembly. Assure that the tube is flush at the front face of the trailing edge and cement the assembly to the rear face of the rear spar. Do not get glue on the rod! Drill the lower ailerons to accept the control rod.

## ASSEMBLY

Cement the vertical fin squarely to the top of the stabilizer and insert this assembly into the slots in the fuselage. Trim the slots for as close a fit as possible and assure that the assembly is centered fore and aft and level with the leading edge elevated approximately 1/16 inch; this will provide the +1-1/2 degrees positive incidence.

In the upper wing, epoxy the plywood mounting plate between the two center ribs. A firm joint is important here as it will tend to keep the upper wing with the rest of the airplane during frisky flight sessions. Install the interplane strut mounts in the same manner.

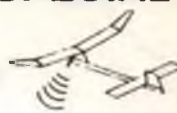
Measure and mark the bolt hole positions on the bottom of the lower wing, position the wing squarely in its saddle and drill the four holes with a #7 bit. Tap the holes in the mounting blocks to 1/4-20 and open the holes in the wing to 1/4 inch.

Install the upper wing with 4-40 bolts and

continued on page 78

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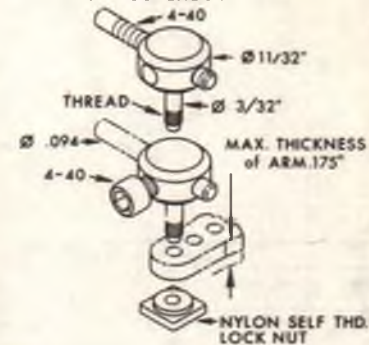


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NiCd batteries seem to be a requirement for inclusion in almost every edition of EC. While I don't use anything but solder tab equipped and soldered cells in my RC equipment, I do use single cells in test sets and other non-flying applications. To charge and capacity test them, I've been using the plastic four-cell holders that are supplied with non-NiCd equipped RC equipment. The results have never been satisfactory, especially during capacity tests, always displaying less mAH than when the same batteries are soldered together. Obviously, it has to do with the lack of proper contacts. Well, I finally found the answer, and I want to share it with you.

The answer is Keystone, but not like in Kops! It is a brand of battery holders—actually not a new brand, as I remember the

name from the early days of RC. Keystone battery holders are all aluminum, and are available for all sizes of cells and in many configurations. They are made without cell-to-cell connections, so that you can wire them in series or parallel, or most any combination you can think of. Best of all, contact is not dependent on a weak coil spring, but on the spring action of the aluminum case itself, and the proper choice of contact shapes and materials.

Keystone battery holders are available at some of the better electronic supply houses or by mail from Digi-Key Corp., P.O. Box 677, Thief River Falls, MN 56701; (800) 344-4539, and Mouser Electronics, with four U.S. locations; (800) 346-6873. Both furnish free catalogs; representative price for the four AA cell holder shown is \$2.50.



The two-channel Flight Command RC system by Cox Products, which uses a video game type of actuator, is seen here with a stick added, as preferred by experienced fliers.

ing has never been high on my list of priorities, I know it's important in other applications; the rest of the features of this system are interesting and worthy of consideration.



Though not generally recommended for use in RC equipment, unsoldered NiCd cells are acceptable in some related uses. Charging and discharging require a good battery holder, as seen here. More in text.

### NICDS AGAIN!

Some interesting material on the subject came in from James L. Craft, of Holiday, Florida. Many RCers seem to think these batteries were created just for our use, but such is not the case. I heard some months ago that less than 5 percent of those produced are used within our hobby, and that includes RC cars, whose enthusiasts go through NiCds like beginning fliers go through propellers!

Jim's material deals with a "battery management" system—circuitry intended to discharge, fast charge, and trickle charge them. While fast charg-



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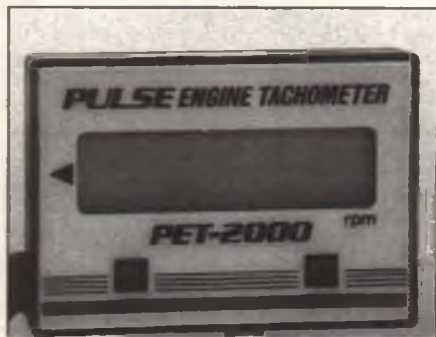


The heart of such circuitry is one of several ICs that have appeared recently, designed primarily for care of both nickel-cadmium (NiCd) and nickel-metal-hydride (NiMH) batteries. The one used in this case is the bq2003, a product of Benchmark Microelectronics. Others that I am familiar with are the Enstore ECSII; the Maxim Integrated Products MAX712 and MAX713; Sanyo Energy Corporation's SI-101 and AS211, and from TelCom Semiconductor Inc., the TC-675, 676, 677 and 678.

While differing in some ways, all of these ICs have some common features. They require few external components, can be tailored as to charging rate, and can be set to terminate the fast charge either by voltage peak or temperature sensing. As an absolute safety feature, a maximum charge time can be set, after which charging will terminate, should the other method selected malfunction for any reason. Similarly, the trickle charge rate can be set as desired, with automatic return to fast charge in case of any serious self-discharge.

Interestingly enough, different parameters are recommended for charging NiMH cells. Bear in mind that these ICs are intended for use in sophisticated, expensive chargers for commercial and military applications—far ahead of the transformer/diode charger common in RC. Their setting different requirements for each type of cell raises serious doubts, at least to me, about the NiMH batteries we are beginning to see advertised in our publications, whose suppliers claim they can be charged with a normal system charger. Charged, yes—of that there is little doubt. Charged correctly and fully? That's another question!

Jim Craft's material includes a circuit diagram incorporating the bq2003, which bears out my concerns. It is captioned as "... specifically handles NiCds, but could handle other kinds of batteries with minor changes." Copies of this circuit alone are



Another Condor RC product, the PET-2000 tachometer reads the rpm of spark ignition engines, without any mechanical or optical hookups; also displays engine running time. Details in text.

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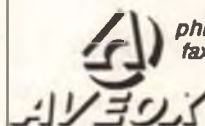
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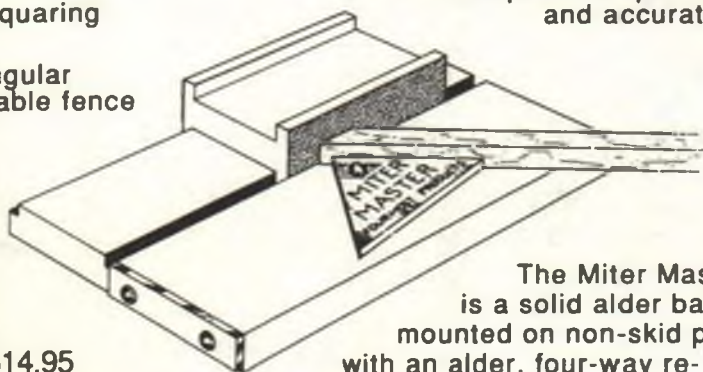
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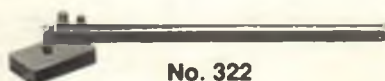
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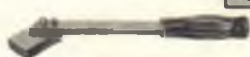
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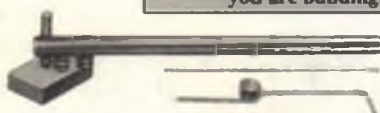
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•Telcom Semiconductor Inc., 1300 Terra Bella Ave., Mountain View, CA 94039-7267; (415) 968-9241.

Such manufacturers can generally also provide retail sources; they don't deal in onesies and twosies! To start you off, the Benchmarq chip is available from Pure Unobtainium, 13109 Old Creedmoor Rd., Raleigh, NC 27613; (919) 676-4525, and Maxim products from Digi-Key as listed above.

## FAILSAFE ON A STICK

Cox Products has made a lot of RCers happy by continuing to supply its small one- and two-channel Failsafe equipment. After a year and a half, I still get mail on my conversion of the one-channel Failsafe to full proportional. The photo shows a possible change to the two-channel transmitter, which, while it doesn't change its basic on-off operation, does configure the control assembly to that which experienced fliers are used to. It would also be a good training aid for anyone who has mastered this system and is ready to move on to a more common control method.

The stick shown was salvaged and trimmed down from an old gimbal assembly, but any round piece of metal or plastic would do. The knurled tip looks professional, but is not really necessary. It is held on with a 4-40 screw threaded into it through a hole drilled in the center of the plastic control actuator.

Step-by-step instructions are hardly necessary, the procedure becoming perfectly clear as the case and then the four-way lever assembly is disassembled. There is plenty of material on the centerpiece for the hole required, the plastic itself is substantial, there is plenty of clearance inside for the screw head, and you have only to be sure to get all the pieces back in their proper place.

## SOAPBOX

RC today is divided into many special interest groups, including everything that creeps, crawls, swims and flies. In my mind, though, we all share the same basic interest, and all certainly benefit from the large market that we've created for the manufacturer.

In spite of different basic interests, I like to think of us as a sort of family, or a fraternity at least. As such, I hate to read the potshots that many of those who write



about electric power seem to delight in taking at what they call us "wet" fliers, i.e. we who use internal combustion engines using liquid fuel.

I would welcome an explanation—and would print—from one of these gentlemen as to why this has to be. I have some quite firm opinions about the advantages of "wet" flying—as I do about Mode One—but I realize that they are opinions only. There is one indisputable fact, though: we were here first, by many years, and if it wasn't for us, the chances are that you wouldn't be here at all!

## SUPER SERVOS

Seen in the photo is but one of several interesting products available from Condor R/C Specialties, 1733-G Monrovia Ave., Costa Mesa, CA 92627-4421; (714) 642-8020. Pictured with a normal Airtronics 102 servo cuddling up to it is Condor's PS-050—just the thing for that really big project you've been dreaming of!

The PS-050 is controlled by the standard 1.0 to 2.0 millisecond RC system control pulse, but requires external 4.8 to 12.0 volts operating voltage. It's capable of torques as high as 907 ounce-inches at 6.0 volts; 1271 ounce-inches at 8.4 volts; speeds being 0.29 and 0.21 second for 60 degrees at those respective voltages. It weighs 10 ounces. Overall length, width and height are 3.94, 1.73 and 3.66 inches respectively. Mechanically, the PS-050 can only be described as rugged: die-cast aluminum case, with composite gears and dual ball bearings on the output shaft.

Electronically, the PS-050 differs little from a more conventional servo, except that since size constraints are not as critical, the amplifier uses larger, more rugged components. It drives four large transistors, which in turn control a heavy-duty 28mm five-pole motor.

Another interesting Condor product is the PET-2000 digital tachometer, specifically designed for spark ignition engines. While I don't generally care for digital tachometers, this one has two interesting features: 1) It's small enough to be permanently installed in most airplanes, being only 1.73x2.40x.43 inches and weighing 1.09 ounces; and 2) It doesn't require any electrical or optical coupling to the engine. It does its thing by reaction to the electrical pulses radiated each time the plug fires, the same pulse that can mess up your radio if you don't follow the recommended rules.

The PET-2000 reads the rpm of single- and multi-cylinder engines, as high as 19,000. It also stores the accumulative running time, either total or temporary, and will display it on command. The readily visible LCD display is 25/64-inch high, and the unit will operate indefinitely on an internal battery, turning itself off when no input pulses are received. Contact Condor RC for the latest prices, or better yet, ask for a catalog describing these and other interesting and unusual RC items—an SASE with a couple of stamps if probably a good idea! **MB**

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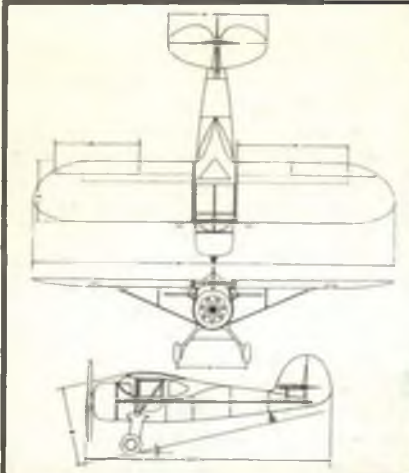


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## ULTIMATE RC *cont. from page 73*

nuts. Looking down on the model, the leading and trailing edges should be parallel. The addition of washers between the plate and the inside of the strut on one side will shift the alignment. Now install the interplane struts outboard of the attachment fittings, trimming the top end as necessary.

### RIGGING

Install the landing gear. Level the aircraft with the top of the horizontal stab at +1-1/2 degrees. The lower wing should be at +1 degree (correctable by cutting or shimming the seat). The upper wing should be at +2 degrees (correctable by elongating the front hole in the plywood mounting plate as required).

With both the upper and lower wings set properly, check for washin/washout. If there is none, position the interplane struts for the best fit. If there is a slight twist, attach the strut at the bottom wing with #3 self-tapping screws and, by rocking the strut fore and aft at the top end, the correct incidence can be established. Clamp the strut in place and attach it at the top end. Once "locked in," you'll find this rigging to be pretty solid. Take the aircraft apart and give all components a final sanding.

### FINISHING

All that remains now is covering, final assembly and installation of the radio and engine systems. The prototype model was covered and trimmed with Super MonoKote, as are all EEE-Z-FLI efforts. The fuselage is more easily covered if the stabilizer and fin are done first, then the sides of the fuselage, then the top and bottom. Added effort will be required between the center section struts. This difficult area on the prototype was done in MonoKote trim sheet, as attempts at ironing on MonoKote, even with a trim iron, were difficult.

### FLYING

Initial control travels should be as follows: Rudder, 1 inch right and left; Elevators, 1/2 inch up and down; Ailerons, 3/16 inch up and down. Make sure the model balances as shown. Push the model on the ground and check the tailwheel for straight tracking with the rudder centered.

Taxi around enough to become comfortable with the ground handling, line up, ease the throttle on and go. You can expect good tracking and positive rudder control. The tail should come up by itself and the bird will lift off as soon as it has enough air wrapped around the wings. Expect the ailerons to be pretty quick and the aircraft to be stable in both pitch and yaw. With the throttle pulled back, expect the approach to be a little nose down. Once slowed, flare and landing are routine and the rudder has ample bite to control the rollout. Happy flying with your affordable Ultimate, by EEE-Z-FLI! **MB**



## WRIGHT FLYER cont. from page 44

the leading and trailing edges to join the spar in the middle. Done!

Rudders are made of 1/32 square strips straight over the plans. The top and bottom leading edge corners are done using the same technique as for the wingtips.

Fashion the two skids of the fuselage by cutting out a 1/16 ply or thin cardboard template around the inner curve of the skid and laminating both skids from two lengths of 1/32x1/16 balsa.

With the flying surfaces finished and ready to cover, pre-shrink the required area of condenser tissue. The stabs and wings are covered on the top surfaces only, and the rudders on the outside surface. The tissue should be stuck to all of the ribs on the wings and stabs. The wing's scalloped trailing edge is achieved by cutting around a 1-inch diameter template with a new X-acto blade with the wing lying upside down.

With all of the main components ready, it's time for final assembly. It looks complicated but it isn't—trust me.

All in all, there are 16 interplane struts. The four central struts are 1/32x1/16 medium balsa and are longer than the remaining 12, as they go straight through the bottom wing and connect to the skids. The 12 outer struts are 1/32x1/20, tapered at the ends to 1/32 square. Take the top wing, flip it on its back and stick the 12 outer struts in their required positions. Try to make them perpendicular to the wing but don't be too fussy. With the struts hanging off the bottom of the top wing, stick them to the top of the bottom wing in pairs from the outside in. Use white glue for this, as it gives you time to reposition in case of mistakes.

With the basic box of the two interconnected wings, cut tiny slots in the tissue of the bottom wing for the four central struts. Slide them through and carefully glue them in position.

With the four central struts sticking out of the bottom of the lower wing, it's time to glue the skids in place. Note that the skids are 1/16 square and the struts are 1/32x1/16. Position the struts on the skids so that the outside is flush. The four crosspieces (marked A on the plans) come next; all are 1/32 square.

The two 1/32x1/16 diagonals (B and C) are now glued in position. Again, the diagonal/skid connection is flush on the outside.

Before diagonal (D) is glued in place (on the inside), the bottom stab is installed. With all diagonals (B, C and D) in place and the bottom stab installed, add the rubber hooks as marked on the plans. The top stab is next. At this point the stabs should be just tack-glued in place to allow for minor adjustments when flight trimming.

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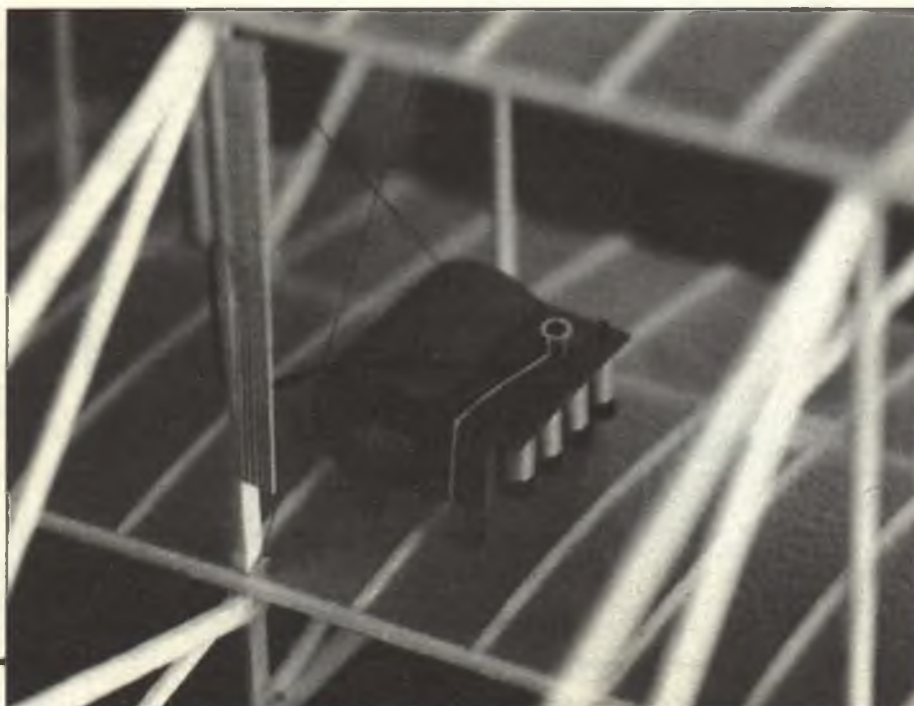
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1/16 diameter medium balsa. First make the thrust adjusters out of a 1/4-inch length of 1/16 I.D. aluminum tubing and a 1/16-inch long piece of 1/16 O.D. tubing, CA'd together as per plans. This is then slid onto the vertical section of the A-frame and the two diagonals are glued in place with a 1/8-inch length of 1/16 O.D. tubing glued at the apex.

Props are made in the usual fashion. Blades should be "paper thin" (i.e. 1/32 sheet sanded down to almost nothing) and formed over a beverage can at 30 degrees off vertical. Although I made my props contrarotating, I don't see why they couldn't rotate in the same direction in order to facilitate winding. It's up to you.

With the prop shaft/A-frame/propeller units finished, glue them firmly in place. They should be resting in the spar/rib joints

The dummy 17-horsepower Wright engine as installed in the author's model. The dummy engine alone upped the model's overall flying weight by 50 percent, so if you decide to add it, make it just as light as possible!





# ADVERTISER INDEX

This Advertiser's Index is provided as a service to readers. Due to last-minute changes, we cannot guarantee correct page numbers or listing of all advertisers.

Acme	78	Great Planes (Spinners)	63	Ohio RC Models	69
Aero Modeller Magazine	31	Great Planes (Zinc)	58	O.S. Engines	35
Aerospace Composites	67	Gyro Kite	66	Pacer Technology (Zap)	Cover 2
Airdrome	79	Hangar Design	79	P.A.W. Diesels	72
Alzart	78	Herr Engineering	34	Peck-Polymers	68
A.M.A.	40	High Sky	75	Philtac	69
Ambrosia	30	HiLine Products	71	Pierce Aero	69
Applied Design	70	Historic Aviation	3	Pop's	71
Astrodata	70	Hitec/RCD	45	Precision Aero	72
Astro Flight	23	Hobby Lobby International	19	R&R (Model Aviation Technology)	51
Aveox	75	Hobby Shack	5	Radar Sales	72
Bob Hooper	15	Hobby Wholesale Club	72	Rahm	82
B&P Associates	77	Horizon Hobby Distributors	59	Riteco	68
Carlson Engine Imports	70	IMS Pasadena	40	Robart (Snake Oil)	46
Century Helicopter Products	38	Indoor Model Supply	30	Rocket City	73
Challenge Engineering	70	Jim Walston Retrieval Systems	73	Ross Models	79
Champion Models	75	John Pond O.T. Plan Service	79	RC Skydivers	72
Chuck Anderson	70	J'Tec	73	Scande Research	72
Clancy Aviation	70	K&B	71	Scientext	69
Combat Models	70	K&S	75	Sequel	78
CPI	71	Kustom Krafters	71	Skunk Works	72
CS Flight Systems	70	Landing Products	26	Sig Manufacturing Co., Inc.	11, 31
D.A.D.	6, 8, 10	Lanier RC	66	Strand Products	72
D&B Import/Export	23	Launcher	66	Super Tigre	23
Dare Designs	27	Major Decals	69	Team, Inc.	67
Dave's Wood Products	71	Micro Fasteners	78	Technopower	67
Diel's Engineering	71	Micro-X	75	Top Flight	47
Du-Bro	15, Cover 3	Miniature Aircraft	39	Unique Model Products	50
Eastern Tool & Supply	71	Millicott Corporation	68	United Pacific	82
Edger	76	Minimax	74	U. S. AirCore	55
Endless Horizons	77	Model Marketplace	70-73	Vantac	72
Fiberlay	63	Model Aircraft Labs	71	Victor Eng.	23
Fourmost Products	76	Model Covering Co.	71	Vintage RC Plans	72
Fox Manufacturing	44	Model Electronics	71	VL Products	73
Futaba	Cover 4	Model Research Labs	72	Windsor Props	18
Great Planes (Pro CA)	7	M&M Glider Tech	78	Woody Bartell	71
Great Planes (Patriot)	9	Northeast Aerodynamics	72		

on both wings. Diagonal stiffeners (E) are 1/32 hard balsa on the underside of both wings. Without these, the wings will warp when rubber tension is applied.

The vertical surfaces (rudders) are made into a box using 1/32 light balsa cross-pieces. The whole assembly is then attached to the plane using 1/32x1/20 medium hard balsa.

Any warps in the wings can now be eliminated with the rigging "wires." Using the thinnest monofilament you can get your hands on, cross-wire between struts, working your way from the inside out. The wings on the original model are flat—no washin or washout.

The dummy engine is an option. If you decide to make it, make it light! My model weighed 4 grams without it, and 6 with.

## FLYING

OK, off to Kitty Hawk. With the stabs at the required angles and the CG as per plans, the Flyer should glide slowly in a straight line. To adjust the model for turns, simply deflect the rudders.

For the first powered flights use 8-inch loops of 1/32 rubber, making sure the CG remains in the same position. Put in about 200 turns on each prop, and with the thrustlines set at zero degrees, launch gently for a powered glide. Increase power as you get more confident with the Flyer's airworthiness. Any tendencies to dive, stall

or spiral can be trimmed out using the fine-tuning thrust adjusters.

Just think, in a contest the Flyer will get a lot of extra static points, as it's a biplane, a canard, a pusher and a twin all at the same time! Many thanks to the Wright brothers for such a delightful design. **MB**

## TECH STUFF

cont. from page 46

cessfully combine the airplane and the automobile. Many such hybrids have been designed, built, driven and flown—some quite well. But the dream of having such vehicles mass produced and in the hands of people driving and flying to work every day is still the dream of a few.

The technical problems involved in coming up with a good car/plane compromise are difficult; and so are the social, traffic and economic problems associated with such a goal. There's a nice little magazine I've been reading lately, called *Roadable Aircraft*. It is privately published by Ron Borovec, P.E., every other month, and contains authoritative reports and drawings on current and past efforts in the field. The subscription rate in the U.S. is \$15 per year. Order from Ron, c/o *Roadable Aircraft Magazine*, P.O. Box 38, Edmonds, WA 98020-0038;

(206) 778-0423.

For those who might like to make scale models of roadable airplanes, *Roadable Aircraft* magazine is the place to start. But my object in discussing roadables in this column is a bit more technical. It's a well-known fact (well known by entirely too few people) that RC models are an excellent tool for use in developing full-scale aircraft.

This writer wrote to *Roadable Aircraft* to suggest that in the initial stages, the process of optimizing the configuration of an airplane for a specific purpose can be done much faster, cheaper, safer and with much less bureaucratic interference with radio controlled models and the pilot on the ground, rather than with a full-scale bird and a breakable pilot on board.

But now I am writing to modelers. My thought to you is, you don't have to be one of the "big boys" to develop new types of airplanes. I've used RC models in developing several of my patented inventions. Get it designed, built and working well in model form, then decide what, if anything, you want to try to do with it in full-scale. Meanwhile, you haven't spent as much time, you still have money in the bank, and you're still here and in one piece.

My friend Paul Weston designed a beautiful and excellent flying amphibian several



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A great flying 20-inch span rubber scale model of the famous aerobatic biplane, designed by Patrick Trite. Simple, straightforward stick-and-tissue construction, builds light and is easy to trim.

## No. 11941 TRAYS VITE \$12.00

Don't be deceived by its rather conventional appearance; this unique little model, from the mind of innovative designer Roy Clough, is made almost entirely of foam deli trays! Can be powered with a Cox .020 or HiLine Imp electric motor for FF or rudder-only RC, or with an .049 for two-channel RC. Three sheets of computer-drawn plans and Roy's full-length construction text.

## No. 8941 EX-29 \$12.00

Proof positive that you don't have to spend big bucks to get real performance out of an electric-powered sport RC model. Al Clark designed this 40-inch span, 274 square inch low-winger for Kyosho's inexpensive AP-29 motor and five- or six-cell battery packs. Prototype features rudder/elevator controls and a simple electronic on-off switch for the motor.

## No. 7941 FARMAN F-190F-192 \$10.00

Master free flight scale modeler Hurst Bowers turned out this nicely proportioned and great flying replica of a classic French high-wing cabin monoplane from the 1920s. Designed for the HiLine Mini 6 electric power system, the model spans 28-7/8 inches and is 21 inches long. Two different color schemes are detailed on the plan.

## No. 7942 FARMAN F-190F-192 \$12.50

A 139 percent enlargement of Hurst Bowers' attractive electric powered FF Scale model (Plan No. 7941), intended for 1/2A RC Texaco Scale competition or just a fun two-channel "schoolyard scale" ship. Should fly quite well with a Cox Texaco .049. Span is 40-1/8 inches, full wing area is 318 square inches. Builders will have to determine wood sizes, beef up the structure in places and plan the radio installation.

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years ago. He worked out all the bugs and the structural problems on a series of RC models. (Boy, does that plane perform!) Now he has the full-scale airplane half built, and it's just as beautiful as the model.

Ron Borovec, the editor and publisher of *Roadable Aircraft*, told me that talented modelers are needed to build models of

several interesting roadable airplanes under development.

The two illustrations are of the same roadable aircraft, as designed by Bill Schugt. In road vehicle configuration the wings are neatly folded up over the fuselage, the tail boom telescopes into the fuselage, and the tail is hidden by the

folded wings. The nose wheel powers the "automobile" by means of a hydraulic motor inside the hub. The hydraulic power comes from a pump driven by the flight engine. The prop is declutched and is horizontal between the tail fins.

## PARTING WORDS

This column keeps a guy busy. Today I mailed letters to Utah; Richardson, Texas; San Antonio, Texas; Bellevue, Washington; Edmonds, Washington; Minnesota; Florida; New York; Ohio; Toronto, Canada; Sweden; and Kanagawa, Japan.

Yesterday I received letters from Murray Sayle, a reader in Japan; and Ray Martlew, a reader in Western Australia. Ray enclosed a copy of an item written by Susan Watts and published in *The Independent*, in London. Ray thought it would interest you. I quote:

"Imagine a solid that weighs less than air. SEAgel (Safe Emulsion Agar gel) is a material so light it would float away if it were not for the weight of the minute air pockets it contains. SEAgel's characteristics can be varied for different uses: it can be made 10 percent lighter than air, softer than cotton wool, or as hard as wood. Its inventors, scientists at the Lawrence Livermore National Laboratory in America, believe it could soon replace foam-based packaging and insulation materials like polystyrene."

Several thoughts come to mind: 1. We are using the wrong foam for wing cores; 2. It is not April first; 3. Scientists are sure doing some great things over here in America; 4. Some women writers compete with some men in making technical boos. 5. Where are the editors?

Francis Reynolds, 3802 127th Ave. N.E., Bellevue, WA 98005-1346. SASE please. (206) 885-2647. **MB**

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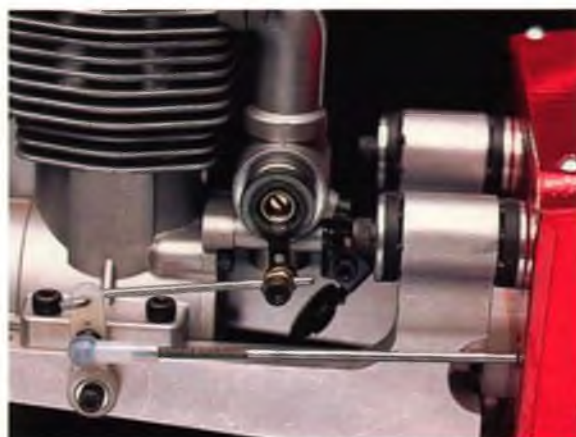
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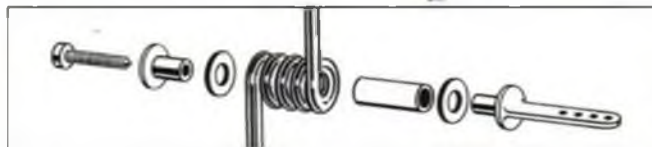
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