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ON THE COVER: Power Scale Slope Flying has become an immensely popular facet of RC soaring, and California slope fanatic Dave Sanders is one of several who offer kits and plans for such models. One of Dave's six diminutive (36 inches and under) WWII fighter kits is the Japanese Kawasaki Ki-61 Hien pictured here: it's a real heavyweight at 22 ounces, having been glassed and painted with Testors enamel sprayed over a K&B Super Pox base. Montana modeler Dennis Tyson's review of Dave's Ki-61 kit appears on page 24.

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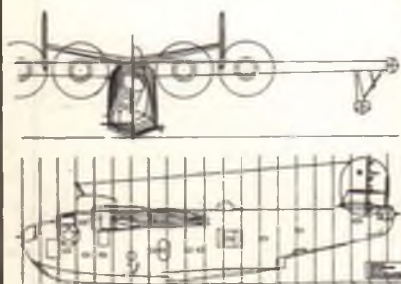
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Gallant Models, Inc.,
P.O. Box 2459, Capistrano Beach, CA
92624-0459 714/496-5411

PUBLISHER

Jack Lewis

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MODEL BUILDER (ISSN 0731-4795) is published monthly by Gallant Models, Inc., 34249 Camino Capistrano, Capistrano Beach, CA 92624-0459. Phone (714) 496-5411. Subscriptions \$27.50 for one year, \$52.00 for two years in U.S. Outside U.S. (except APO and FPO): Canada \$38.50 one year, \$72.50 two years; other foreign, \$36.50 one year, \$69.50 two years. All payments must be in U.S. funds. Copyright 1996 by Gallant Models, Inc. All rights reserved. Reproduction without permission prohibited. Change of address notices must be received six weeks before date of issue that new address takes effect. Send old addresses with new (old label preferred). Duplicate issues cannot be sent. Postmaster: send address changes to Model Builder, P.O. Box 2459, Capistrano Beach, CA 92624-0459. Second class postage paid at Dana Point, California, and additional offices. Editorial contributions are welcomed by Model Builder, but cannot be considered for publication unless guaranteed exclusive. Model Builder assumes no responsibility for loss of or damage to editorial contributions received, including but not limited to text in any form, photographs, drawings and art work. Editorial material must be accompanied by return postage, unless return is not desired. Any material accepted for publication is subject to possible revision as may be considered necessary, at publisher's discretion, to meet requirements of its magazine. Publisher assumes no responsibility for accuracy of content, and opinions stated in published materials are those of the contributing author, and do not necessarily reflect those of the publisher. Upon occasion, payment will be made at our current rate, which covers all author's rights, title to, and interest in, the editorial contributions as described above. Unless prior arrangement is made in writing to Model Builder, submission of editorial material to Model Builder expresses a warranty by the author that such material is in no way an infringement upon the rights of others. Made in U.S.A.

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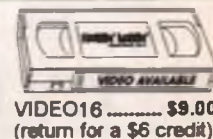
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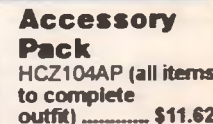
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When flaps are lowered, does the airplane pitch up or down?

S. Cole, of Jackson, Wyoming, a technical contributor to this column, wrote in response to MD&TS in the February 1995 issue. He noted that the sketch I showed in that column indicated that a diving moment was generated when the flaps are depressed; yet he tells me that his sailplane pitches up when he lowers the flaps. How come?

For years I've known that the application of flaps usually requires a little elevator correction; but when the flaps are lowered some airplanes pitch up and others pitch down. I was never curious enough about this anomaly to think it through—until Mr. Cole asked "How come?"

First, let me note that the sketch in the February '95 issue refers to the wing only. Cambered airfoils and lowered flaps impose a negative or diving moment on the wing, and that sketch made it easy to understand why in visual terms. If Cole's sailplane had been a flying wing and he lowered the wing "flaps" (which we would have called elevons or elevator in that case), the plane would definitely nose down. Applying "down elevator" is the way we command a dive.

Some airplanes pitch up and others pitch down when the flaps are lowered, because the proportions of the airplane design determines which has the stronger influence on the overall airplane pitching moment, the wing or the tail.

Among the factors which influence the airplane pitching moment are the area of the horizontal stabilizer and the tail moment arm (the distance from the aerodynamic center of the stab to the aerodynamic center of the wing). When we multiply these two quantities together and divide that product by the product of the wing area times the wing chord, we get something called *tail volume coefficient*. The bigger the stab and the farther back it is, the higher the TVC and the

greater the longitudinal stability of the airplane. With a higher TVC we can fly safely over a greater range of center of gravity. A TVC of 0.5 or less is considered low. High TVCs may be 0.7 or more.

An airplane with a high tail volume coefficient is more apt to pitch up than down when the flaps are lowered, because that big and/or far-aft tail is more able to overpower the basic diving moment which the depressed flap imposes on the wing.

As I see it, depressed flaps increase the lift coefficient, and the center of lift is roughly over the CG, so the wing goes up because the new lift exceeds the airplane weight. (The velocity hasn't had time to change yet). The tail, however, is acting like the feathers on an arrow, and tends to stay put. The wing goes up, but the tail doesn't, therefore the airplane pitches up . . . initially.

I love to write this column every month. I'm sure I learn more from the exercise than most of our readers; and in many cases some of you end up being the teachers and I being one of the students.

As Cole reminded me, we also need to consider the downwash. If the wing is developing lift, the flow behind it will be angling downward. In many designs that downward flow strikes the top of the stab and tends to give it a negative angle of attack, which will produce negative (or more negative) lift on the stab, tending to cause the airplane to pitch up. (A high or T-tail stab will be less influenced by this than one which is farther down into the wing downwash).

Quoting David Thurston, from page 108 of his book *Design for Flying*: "Because of flap-induced airflow changes over the horizontal tail, some aircraft, the Piper Aztec and Beech Baron for example, tend to trim nose-up when flaps are lowered. So the type and

amount of pitch change with flap deflection may vary from one airplane to another."

Thurston doesn't go into any more detail, so I will theorize on what he means by "flap-induced airflow changes." The flaps normally cover only the inboard part of the trailing edge, the outboard trailing edges being reserved for the ailerons. When the flaps are lowered the downwash angle behind them becomes greater. The lift coefficient of the outer part of the wing will be less than that of the flapped area, so its downwash angle will be less than that of the inboard area. Since the stabilizer span is small compared to the wing, the stabilizer sees the increased downwash behind the flaps rather than the lesser downwash outboard. The greater downflow angle onto the stab increases its negative angle of attack, and the increased downward tail "lift"

pitches the airplane up, until it is brought back to level flight by an elevator command or elevator trim adjustment by the pilot.

On the other hand, if the tail is small and/or close to the wing, or if the flaps being used have a very large diving moment when lowered, the tail may not be able to completely overcome the diving moment of the wing when the flaps are lowered (until the stab is trimmed or some up-elevator is applied). We would then have an airplane that pitches down when the flaps are deployed.

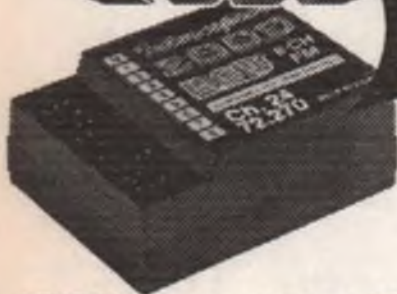
How large is the wing diving moment with flaps down? It depends on the area of the flaps in percentage of the total wing area, the width of the flaps, what percentage of the span they occupy, the type of

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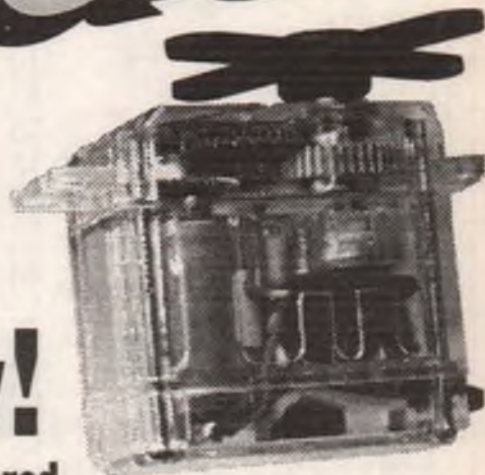
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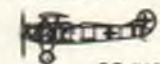
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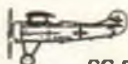
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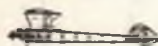
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flaps used, and how many degrees they are lowered. For example, according to NACA TN459, TN422 and TR534, the basic Clark-Y airfoil has a pitching moment coefficient about the aerodynamic center of $-.085$. On the same airfoil, when a split trailing edge flap with a width of 30 percent of the chord is lowered to 45 degrees, the moment coefficient goes to $-.250$, roughly three times as much. If we use a Fowler (area-extending) flap with a width of 40 percent of wing chord and deflect it 40 degrees, the moment coefficient goes to $-.860$; over ten times as much diving moment as for the basic airfoil.

So which is best, an airplane that pitches up or pitches down when the flaps are lowered? It usually isn't all that important. From the standpoint of ease of piloting, an airplane that didn't pitch at all when the flaps were lowered would be ideal. I'm sure there are a lot of airplanes that are nearly balanced in this respect, but I doubt if much design effort was spent to achieve this. The sizing of the various parameters that affect pitch up or down when flaps are deployed is based on other more important goals in the design.

Thanks for your help, Cole; my own curiosity is now satisfied, and we have probably helped a few other readers with a mystery which really isn't all that mysterious. Mysteries never are, once we solve them (or read the last page of the book).

YOUNGER MODELERS AND MODEL YOUNGSTERS

Yes, we modelers should train interested youngsters to build and fly model airplanes; but we can do more than that. Those of us who are fortunate enough to be able to use our heads usually have a desire to pass on our knowledge and thinking skills to youngsters who show similar interests and promise along cerebral lines. (I won't use the word "teenagers" here; the term has too many negative connotations).

I've always greatly enjoyed working with bright kids and adults—those who want to learn things that I'm able to teach. I've taught model airplane classes in many places, and have taught my share of youngsters to fly CL and RC. I was once a "Big Brother" to a fatherless kid; and I'm still a counselor for the Boy Scouts, working with Scouts trying for the various technical and mechanical merit badges.

When my own children were in the 8- to 12-year-old range I originated and led an "Inventor's Club" for the neighborhood kids. I also put on a lot of science shows for school assemblies. All of these activities may have helped a number of youths, including my son Greg who is an engineer, and my daughter Barbara who first became a teacher and then a computer systems engineer.

In my senior years I still find much satisfaction in teaching. For instance, I love to write this column every month. I'm sure I learn more from the exercise than most of

our readers; and in many cases some of you end up being the teachers and I being one of the students. For the past 15 years I have also been teaching a course on inventing through the University of Washington. That too is very rewarding.

Another related activity is the meat of this whole discourse, however. I am a mentor to a very bright youngster. Let me introduce you to Yu-Chang ("Steve") Kuan. Steve is in the tenth grade, is a 4.0 student, has a burning curiosity about all things mechanical and technical, and loves model airplanes. Steve Kuan and his family came to the U.S. from Taiwan five or six years ago. He and I sometimes still have a slight communication problem, but his English is far better now than it was in November 1993 when we first met.

By the way, I didn't find Steve, he found me. Let me quote Steve's first letter to me when he was 14:

"Mr. Reynolds: I'm so interested in your RC crane [which he saw in the July 1987 *Model Builder* while reading old issues at the local library]. I'm very curious and interested to know how you build such a big crane? What kind of materials did you use? Where did you get them? And how much time did you spend to build it? I hope these questions doesn't take you a long time answer it and I'll be more than happy to hear from you."

I wrote to Steve and invited him to come to my workshop for a visit (he lives only 5 miles away). We've been meeting every other Saturday morning since—usually at my place, but sometimes at the model field, at The Museum of Flight, at The Northwest Model Exposition, at an engineering event at the University of Washington, or at the home of a friend who has an interesting project going.

Steve frequently starts asking questions the minute he gets in the door. This morning it was, "Do engines run better on hot days or cold days? Why?" Other times it has been questions such as "How do you do welding? What is capacitance? What is an alloy? I don't understand how airfoils make lift." We go back and forth between the office and the shop, first learning what we can on the selected subject from my textbooks or the Britannica, then we step into the shop and experiment with what we have been talking about—we weld, machine a part, blow glass, run an engine, hook up a simple circuit and test it, conduct a chemical experiment, run a torsional stiffness test on a wing, look at microballoons under a microscope, or any one of dozens of other things.

And the flow of knowledge isn't always from senior to junior. Steve is usually the one who ends up solving my computer problems.

This kid is a gem; we are both fortunate that we found each other. Steve hasn't decided yet what his future career will be, but I know it will be a worthy one. He

continued on page 86



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over the counter

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SAITO'S THREE-LUNG MONSTER

The largest Saito engine yet produced, the new 450 three-cylinder four-stroke radial is a



4.5 cubic inch beast that weighs in at 6.5 pounds and is said to put out 40 pounds of static thrust, turning a Bolly 22x10 at 8,000 rpm on 15 percent PowerMaster two-stroke fuel. The engine breathes through a single 9.4mm carburetor mounted on the rear of the crankcase. An integral firewall mount is included, and the engine is said to be so smooth running that no soft mounts are required. If Big Birds are your thing, check out this brute at your local hobby shop. Saito engines are distributed exclusively by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

HITEC RCD NEWS

Hitec's brand new Prism 7X



computer RC system incorporates such features as a straight-forward two-loop menu which allows quick and easy access

to all computer functions for aileron/rudder, elevator/flap, aileron differential and flaperon/landing switch. Additional features include a trainer setup and FM shift selection, which allows you to fly most any other brand of FM receiver with the 7X transmitter. The system can be ordered with Hitec's Spectra 50-channel synthesized module in FM or PCM, which gives you total channel control on the field. Suggested retail ranges from \$384.95 to \$569.95. From Hitec RCD Inc., 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940.

MEGA ELECTRIC MOTORS

Hobby Lobby's new Catalog 27 lists a greatly expanded line of the Czech-made Mega



neodymium-magnet electric motors, including two in the "Mini" series. On 8.4 volts the Mini 6 is catalog rated at 209 watts at 49 amps; the Mini 7 on 9.6 volts is listed at 226 watts at 52 amps. Both weigh 8.1 ounces and feature anodized aluminum cases, hardened 5mm steel shafts, internal RF suppression, ball bearings, adjustable timing and more. These and the other Mega motors are described in Catalog 27, which is available to new Hobby Lobby customers for \$2 and includes a \$5 discount voucher for your first purchase. Get your copy from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.

RUSSIAN 1cc SCREAMER

Read Bob Stalick's "Free Flight" column this month and you'll see how impressed he is with the AME .049 engines

imported by Northern Velocity. Now Norvel has introduced an AME .061 Mk. II, which should



be just the ticket for F1J or any other event that specifies a 1cc max engine displacement. Price is ridiculously low at just \$33 each plus S&H. The engine features a high-performance glow plug, hand-fitted piston/cylinder, and a sand-cast crankcase. For more information or to order, write or call Norvel, 3656 State Rd., Cuyahoga Falls, OH 44223; (800) 665-9575, fax (216) 923-4349.

SUPER CDI IGNITION SYSTEM

In addition to the Russian MDS engines we told you about last month,

Estes Industries is also handling the British-made Weston "Runtronic" capacitive discharge spark ignition system



that can be installed on just about any single-cylinder glow engine. What makes this system unique is the ignition retard and advance; there's no spark from 0-60 rpm (i.e. no kick-back), then from 60-4,000 rpm there's a series of three sparks per revolution to ensure capture. Over 4,000 rpm it converts to one spark per revolution. For a brochure on the Runtronic CDI system and

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

other Weston RC model products, send an SASE to Estes Industries, P.O. Box 227, Penrose, CO 81240.

ONE MORE ACE CHARGER

No one produces a wider variety of battery chargers than



Ace R/C. Ace's DDVC (Digital Dual Vari-Charger) is a constant-current, microprocessor-based unit that can handle NiCds, NiMH, lead-acid, and gel-cells, and can charge one or two packs simultaneously. Each of the two outputs is variable up to 500 mA in 5 mA increments—you can charge a single 100-mAH cell or a 10-cell 5000-mAH pack, plus everything in between. Hookup to the batteries is via separately available adapter cables. From Ace R/C, 116 W. 19th St., Higginsville, MO 64037-0472; (800) 322-7121.

FOR ELECTRIC FLIERS ONLY

Electric buffs interested in high performance should check out the new Kyosho 05-size cobalt-magnet motors being distributed by Great Planes. Available in standard and FAI versions, these motors feature epoxy-impregnated windings, adjustable timing, ball bearings, lightweight aluminum front and rear endbells with large openings



for maximum cooling, and low-profile brush holders. The Kyosho motors carry a suggested retail of \$109.99 for the standard version, \$129.99 for the FAI. More info is available from Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300.

RUBBER SCALE BIRD DOG

Tom Herr continues to crank out new kits as fast as we can write 'em up. His tenth and latest in the series is a 30-inch span Cessna L-19 Bird Dog, which features over 70 precision laser-cut parts, top grade materials, tissue, all hardware, decals, full-size computer-drawn plans, and a seven-page instruction manual, priced at \$34.95. Kits are available at your local hobby dealer or direct from the factory (add \$4.50



• S&H if ordering direct). From Herr Engineering, 1431 Chaffee Dr., Suite 3, Titusville, FL 32780; (407) 264-2488.

FOR RCHLG FANS

The latest sailplane kit from



K&A Models is called the "Request," a V-tail aileron ship designed for hand-launch thermal flying but which would also serve well as a light-lift sloop. Span is 60 inches, wing area 370 squares, wing airfoil is the SD7037 and the flying weight is quoted at 11-12 ounces. The kit

comes with your choice of either a wood or glass fuselage, Feather Cut foam wing cores, all parts and materials, full-size plans and instructions, and is priced at \$39.95 (wood fuselage) or \$69.95 (glass). Request kits are available in hobby shops or direct from K&A; add \$4.99 S&H if ordering direct. K&A Models, 9300 Yvonne Marie Dr. N.W., Albuquerque, NM 87114; (505) 890-7549.

PRAZI'S SD300 LATHE

Big brother to the German-made Prazi MD200 lathe we



talked about last month is the Prazi Mastertum SD300, a beefy 5x12-inch metalworking machine that incorporates power longitudinal carriage feed for chasing threads, either inch or metric

(change gears are included for both). Also included is a three-jaw chuck, four-way tool post, centers, and a standard 1/3-hp 110-volt AC motor, which drives the spindle at 300, 600, 1200 or 2400 rpm. Many optional tools and accessories are also available. Prazi machines come with a one-year parts and service warranty and are sold and serviced by International Sales & Marketing Group, 5151 Oceanus Dr., Suite 109, Huntington Beach, CA 92649; (714) 379-1380.

CLASSIC OLD TIME ENGINE

For you antique engine collector types, Don Belote of Classic Old Time Engines is offering reproductions of the 1938 Chunn "Chum" spark ignition engine being made in Sweden by Arne Hende. Robert Chunn's .163 cubic inch Chum was one of several small-displacement spark ignition engines that were produced



and sold in the late 1930s. Being a home-shop operation, not many original Chums were made, making them all the more valuable to today's collectors. The Swedish-made replicas are supplied complete as pictured except for spark plugs; new replica 3/8-24 plugs are available separately. Full details on these engines, including price and ordering information, is available from Classic Old Time Engines, 15731 Five Point Rd., Perrysburg, OH

43551; (419) 878-8144.

ULTIMATE SPOKE WHEELS

For builders of Proctor's Sopwith Camel, Nieuport 17, Curtiss Jenny or just about any other 1/6, 1/5 or 1/4-scale



vintage model, a company called Oldtimers Wire Wheels is offering wire spoke wheels featuring CNC-machined aluminum rims, realistic-looking nickel-plated steel spokes and pressure-formed rubber tires. Diameter is 4.60 inches, width is .750 inch, and the going price is \$149 per pair plus \$7.50 S&H. From Oldtimers Wire Wheels, 11500-A N.E. 76th St., Suite 219-B, Vancouver, WA 98662; (360) 891-2957.

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THE SAGA OF "MISS MADONNA"

This month, Roger turns over the helm to Steve Manganelli, who recounts how a seven-man team from the Silent Electric Flyers of San Diego designed and developed the twin-motor ship that won the 7-Cell Cargo event at the '95 Astro Champs.

This column marks the beginning of my fourth year writing *Model Builder's* electric column. Time flies when you're having fun! Thanks for all your support—I appreciate it!

This month I have a special story about how a team of electric modelers joined forces to design, build and fly a one-of-a-kind cargo lifting model for the Astro Champs last September. The plane, affectionately known as "Miss Madonna," successfully carried 15 pounds, 11 ounces to come home with the victory. The story is told by Chief Engineer Steve Manganelli, past president and current newsletter editor for the Silent Electric Flyers of San Diego. So, without further ado, I give you to Steve:

The Team

The object of our affliction is a 15-pound, 11-ounce chunk of steel and lead kept in the air for 60 seconds. The weight lifting effort topped the field in the 7-Cell Cargo competition at the 1995 Astro Champs and culminated a six-month

design and building effort by our crack team of aeronautical engineers. I served as the Chief Engineer, SEFSD club president Wayne Walker assumed the role of Load Master, Steve Neu was our Chief Pilot and Fabricator, Aaron Bourdage was the Undercarriage Specialist, Rick Cutler and Steve Belknap did the fabrication, and Chuck Grim provided the finishing touches.

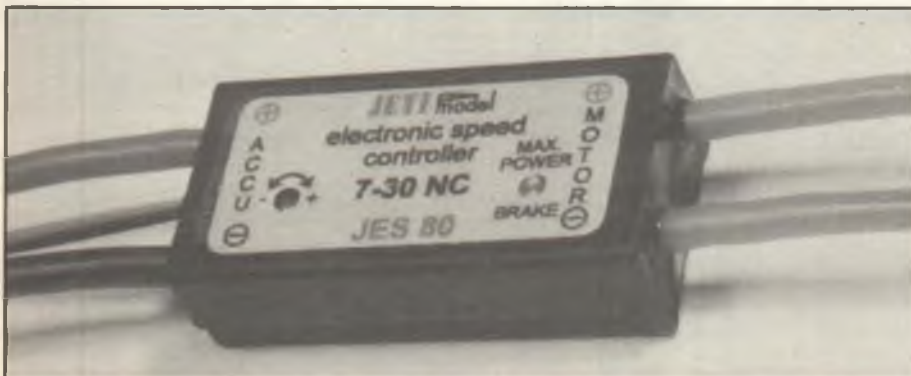
Rules and Design Ideas

There were three contest rules that shaped our design criteria: 1) Any Astro Flight motor(s) was allowed, powered by a maximum of seven 1700 mAh cells; 2) The cargo area must be one minimum contiguous 30 cubic inch space; and 3) The takeoff roll could not exceed 150 feet, and the model must stay in the air at least one minute. There was no restriction on size of the airplane.

The design work began with an idea I've had for some time—to design the plane so that its strength increases as cargo is added. The benefit is that the "unballasted" configuration would not have to suffer from

the weight of the additional structure necessary to accommodate the fully ballasted configuration. Some designers felt that allowing the cargo to reinforce the structure amounted to the exploitation of a loophole and that the cargo should be dead weight. My feeling was that since the model had successfully been flown without the added weight, it was indeed cargo.

Competition glider fliers often implement this type of design by using different wing joiners in their models. A short, light carbon fiber rod is used when the model is devoid of ballast and lightly loaded; a short steel rod when the model is to fly moderately ballasted; and a longer steel rod when the model is to fly fully ballasted at a high wing loading. The implementation of this idea on the Lifter was to use a thinwall carbon fiber tube as the primary wing joiner and a telescoping steel square tube—"The Bar"—inside the carbon tube for the first increment of ballast. The remaining ballast would be chunks of lead placed inside the steel tube. The carbon fiber tube would be designed to only be strong enough (thus as light as possible) to support the



One of the new additions to Hobby Lobby's new Catalog 27 is the Czech-made Jeti JES80 electronic speed control (above), a small, light unit that can take up to 80 amps for short periods and which features a brake, temperature overload protection, optical coupling, and adjustable motor start point, peak power and brake ON point. Hobby Lobby also now offers a total of three different electric ducted fan units (right), sized for Speed 400, Speed RX5408BVZ and Ultra 930 cobraR motors. All are described in more detail in Catalog 27, available to new Hobby Lobby customers for \$2—and that includes a \$5 discount voucher for your first purchase. Order your copy from Hobby Lobby, 5814 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.





Incredibly, no one on the SEFSD team stopped to take a good photo of their "Miss Madonna" entry that won the Cargo LMR event at the '95 Astro Champs, so the best we can do is show you the 2nd place winner, the "High Plains Lifter," as designed, built and flown by Jon Balbach of Leisure Electronics. Put in an official flight at a gross weight of 18 pounds.

empty airplane; once the steel tube was added, there would be no question of the structural integrity!

We decided that the steel bar should also reinforce the landing gear. If the landing gear and the bar were tied together, the rest of the airplane would just go along for the ride in the event of a less-than-perfect landing. In retrospect, this turned out to be very important as there were a couple of landings that bent the gear, which probably would have ripped out of the wing had it not been tied to the bar.

Of course, there's no sense in letting other people's good ideas go to waste. My favorite aircraft from the 1994 event was John Raley's almost-winning entry. John's Lifter used a low-wing configuration with ailerons; other designers used high wings and polyhedral/rudder for lateral control. John's plane had sensible ground handling due its short, conventional, torsion bar landing gear and good lateral control with ailerons, using the rudder just for ground steering. I also benefited from some good ideas and advice from fellow engineer and SEFSD member Don Westergren, who discussed landing gear design and provided a computer program for designing the wing spar.

How big? How much power? What airfoil? What configuration?

The seven-cell constraint indicated the use of one or more Astro 05s for power. Past dynamometer tests of Astro 05s indicated that reasonable efficiency occurs at a current of about 30 amps. Two motors operating efficiently would pull a conservative 60 to 65 amps, allowing ample motor run time for a 1 minute flight with 1700 SCRC batteries. We hooked

up one geared 05 to a static thrust measurement stand, fitted one of Steve Neu's F5B 13x7 folding props and obtained a baseline of 2.3 pounds of static thrust at about 30 amps—just the current we wanted! Implicitly then, we had settled on two motors and two props rather than two motors geared to one prop.

The fuselage design was a bit easier. We made two pods from an old F5B fuselage mold and put a motor in each one. The two pods were tied together with the wing and the horizontal stab, sort of like an F-82 Twin Mustang. This idea was a winner—just a little glass, some epoxy and some carbon fiber for good measure!

Technical Stuff

Next came the wing design, which began with a simple spreadsheet computer program that calculated wing area and

wing loading for a hypothetical wing section. The revelation came after thumbing through an old engineering fluid mechanics text and coming upon an example that predicted takeoff distance from static thrust and lift/drag parameters of the wing.

Calculating the lift and drag of the wing required the coefficient of drag (Cd), coefficient of lift (Cl), Reynolds number (Re), aspect ratio, and wing area. Looking at some airfoil data I selected the Eppler 216 because it had the highest Cl of any airfoil in my data book—and it looked like a high-lift airfoil. (To our chagrin, we came upon the probably superior Selig S1223 airfoil just two days after we had already cut the foam for our Eppler 216!)

But I still had too many unknown variables. The Re depends on the wing chord and flying speed, the wing chord depends

THE SEFSD GROUP'S "MISS MADONNA" CARGO LIFTER

Specifications

Wingspan	128.75 in.	Predicted Cargo Weight	16.94 lbs.
Wing Area	1950 sq. in.	Wing Loading	28.1 oz./sq. ft.
Root Chord	16 in.	Reynolds Number (Re)	273,877.
Tip Chord	13.76 in.	Coefficient of Lift (Cl)	1.37.
Stab Area	220 sq. in.	Coefficient of Drag (Cd)	0.13.
Empty Weight (predicted)	6.81 lbs.	Stall Speed	22.48 mph.
Gross Weight (predicted)	23.76 lbs.	Takeoff Speed	24.28 mph.
Empty Weight (actual)	8.375 lbs.	Takeoff distance	145 feet.
Gross Weight (actual)	24.06 lbs.		

Construction

Wing:	Fiberglass/foam vacuum bagged, carbon spar cap, Rohacell shear web.
Fuselages:	Carbon-reinforced fiberglass (old F5B mold).
Stab:	1/32 balsa over blue foam.
Wing Joiner:	1.06x2.06x28.125x.030-inch wall epoxy/carbon composite.
Cargo:	1x2x.125-inch wall steel tubing (lead/foam filled).
Landing Gear:	7/32-inch formed piano wire torsion bar passing through steel tubing.
Wheels:	3-inch diameter O-ring tire, fiberglass circuit board laminated wheel, instrument ball bearings.
Motors:	Two geared Astro FAI 05s.
Prop:	Two 13x7 carbon folding props.
Battery:	Seven Sanyo 1700-mAH SCRC cells.
Speed Control:	Two Steve Neu "Micro" ESCs.

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on the wing area and A/R. The C_l and C_d are for a theoretical infinite span section and are respectively reduced or increased for a given planform, depending on the aspect ratio and chord of the wing. The distance at which takeoff is achieved depends on gross weight and stall speed, which also depends on wing area. The weight of the airplane is related to the size of the airplane and so on, ad infinitum. There were enough "what ifs" to drive one crazy.

Alter some empiricism (i.e., what looks right) I simplified the wing planform calculation by setting the aspect ratio at 8.5; the wing would be three equal-span sections with a constant-chord center and tips tapered to 85 percent of the root. Using these parameters, I could enter a wing area and then calculate the rest of the wing dimensions. These included the average chord which, when combined with a guess for takeoff speed, generated the Re. The Re and other dimensions gave me the corrections for the C_l and C_d for this particular wing. Since I already knew the static thrust, I could calculate the takeoff speed and take-off distance for a given gross weight.

Oops, still one too many variables—I didn't know the gross weight. This was easy enough to overcome by just entering larger and larger hypothetical weights until the takeoff distance grew to 145 feet (wasn't that nice of me to give the pilot 5 feet to spare?). The predicted cargo for that wing was the difference between the estimated weight of the model and the maximum predicted gross weight for a 145-foot takeoff.

First Flights

Our first flight was on September 14, just ten days before the contest. With just the carbon joiner the model jumped off the ground in about 3 feet but it was horribly tail heavy. Only Steve Neu's piloting skills brought it down in one piece.

"Where's the CG supposed to be?" asks Steve.

"Somewhat forward of where it is now, obviously," I said, the master of understatement.

"What do we have for nose weight?"

Lugnuts! Out come the lugnuts and a roll of tape. We affixed about 4 ounces worth to each fuselage and tried her again. This time it flew much better, so we landed, added the 5-pound bar and tried again.

Success—we have cargo! Wait a minute—something fell off the model. It was still under control so it couldn't be too important. Oh no, the lug nuts! By the time we landed, another had fallen off, this time near the pits. A non-modeling spectator who happened on the scene observed the flight; when she asked what fell from the plane, we said, "Two of the lugnuts." If some poor soul should ask you about the lugnuts on your model airplane, don't be too hard on her, OK? It's our fault.

The Big Day

For the contest, the object was to first qualify at 10 pounds and then "name that tune," in minimum 4-ounce increments,

over the previous best lift. Joe Ballasch had already upped his qualifying lift to 11 pounds, 9 ounces, and thus stood as the King of the Hill. The SEFSD team and two others did their 10 pounds plus to qualify. Someone else pushed to over 12 pounds, forcing Joe to go to 13-plus. Our next lift was supposed to be better than Joe's, but upon the actual weighing was found to be less! And the model really flew lousy too, barely making it off the ground and around the pattern. We thought we were cooked!

Setting the mark at 13 pounds plus ended the contest for the other two pilots. The SEFSD Team went for broke—14 pounds, 7 ounces. A little wind came up and the model seemed to fly better. We made it! Euphoria all around, we were on the throne now. But wait—Joe is going to try 15 pounds.

Compared to our plane, Joe's was beautiful, but his was rudder/elevator/polyhedral. The fuselage was a pod-and-boom with the pod shaped like a shoebox on end to provide clearance for a huge geared prop. The model ground-looped like the dickens and it took a couple of tries, but Joe finally got it going straight, took off with a good 15 feet to spare, and made it around the pattern. Good show, Joe, but now we have to fly again! Wayne "Loadmaster" Walker decided not to fluster our pilot by telling him how much the beast weighed (15 pounds, 11 ounces). And the rest, as they say, is history.

Epilogue

We want to thank the members of the Southern California Electric Flyers for coming out and putting on a fine meet. The contest was very well run with good spectator control, transmitter impound, etc. The plaques awarded to the 1st place finishers were truly works of art. I want to personally thank John Raley for rearranging the schedule to allow us San Diegans to do all our flying on Sunday instead of both Saturday and Sunday, and for coming down to our meeting to pitch the event. We're already looking forward to next year!

• • •
And my thanks to Steve Manganelli for his narrative. I hope you will come away with some ideas on designing your own plane, whether it be for a specific purpose like Miss Madonna, or simply for general-purpose flying. My intent was to illustrate the thinking that goes into the design process. Granted, Steve is one of the best airplane designers I know, but the fundamental principles of design remain unchanged whether you've been designing planes for two months or 20 years.

Please drop me a line if you have any questions, comments or suggestions — I love to get your mail! Roger Jaffe, 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 (between 8 and 5 Pacific time), or via e-mail at 74164.3237@compuserve.com. Here's to the next four years! MB

Finally—a video that demonstrates proven techniques for covering with MonoKote film!



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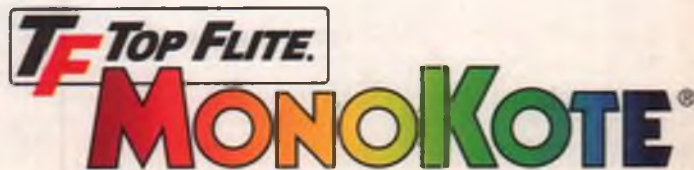
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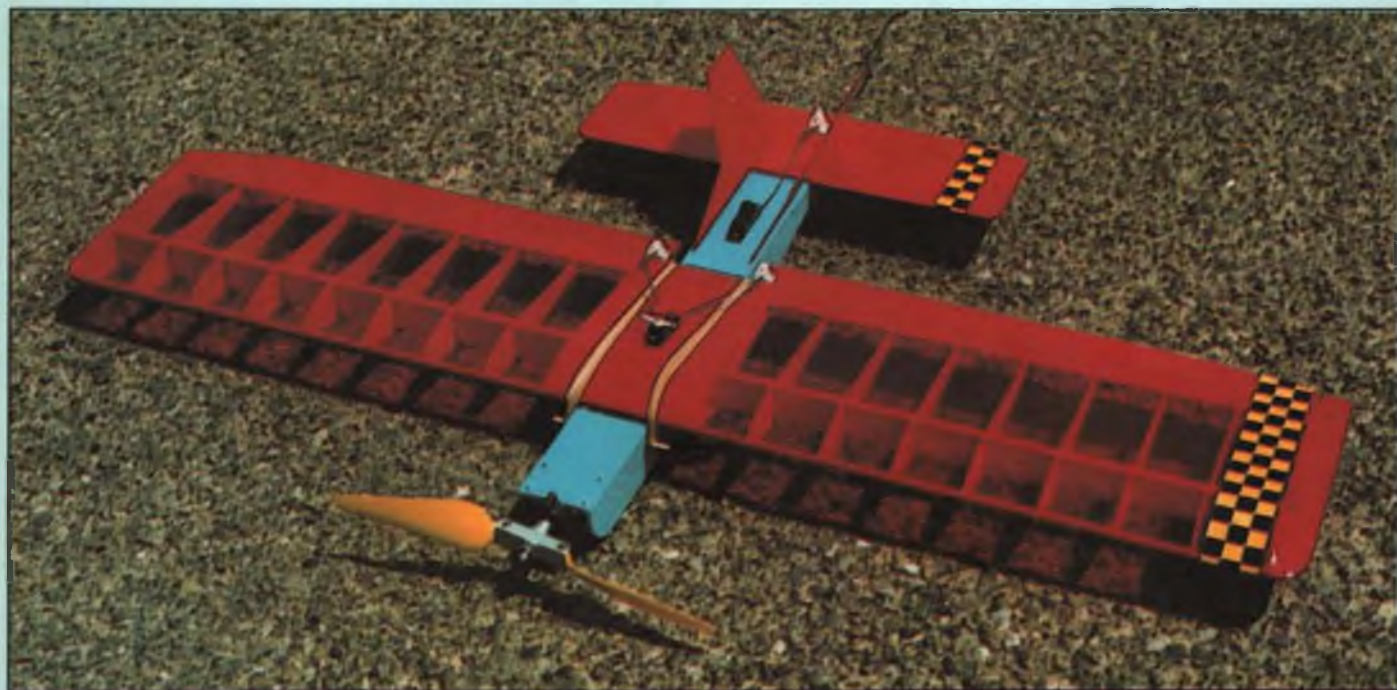
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THE TERMINATOR



Would you be interested in an electric design that climbs almost straight up, does about 1-1/2 rolls per second, allows quick battery changes, and easily fits in the smallest car? The Terminator will do just that. Its construction steps outside traditional design limits and it flies like no traditional electric model. Its fuselage is small but roomy enough to easily enclose the receiver, speed control and motor/gearbox. The motor battery is attached to the belly of the fuselage with Velcro for fast battery changes for more after-work flying time. The servos and pushrods are externally mounted for ease of installation.

The Terminator combines the performance of today's fun-fly type aircraft with an electric model's convenience and lack of noise. It will climb at better than a 70 degree angle and is capable of all of the looping and rolling maneuvers—I particularly enjoy doing consecutive loops with

half rolls at the top. Outside loops are just as easy since the airfoil is fully symmetrical. The roll rate can be set as fast as you like. One thing I noticed right away about this model is that all the controls are tight—the short pushrods and lack of slop make the controls instantaneous.

I wish I could say the first Terminators flew right just off the board, but in truth, several prototypes had to be built before the right combination of size and power system was found. The final version has about 7 percent more wing area than the original for increased lift and easier launching.

One early prototype experienced high-speed aileron flutter; the problem was corrected by trimming the aileron tips to the design shown on the plans. All of my prototypes also use MonoKote ironed across the hinge line to help reduce the likelihood of flutter and for positive control response. The nose was lengthened to allow use of 11-inch folding propellers, and the tail was extended to reduce elevator sensitivity. The final plans show the best of

the above features and I believe that you will find that the final Terminator is one fine flying machine.

The prototypes have been powered with a variety of seven-cell systems, both direct drive and geared. My personal preference is the geared setup, which provides a faster climb at a slightly slower flying speed than a direct drive system. I've had good luck using a double-wind car motor and a Leisure Electronics short gearbox, however any strong seven-cell system should work fine.

CONSTRUCTION

Fuselage and Tail

Glue the plywood doublers and 3/32 balsa wing saddle doublers to the fuselage sides to make a right and left hand side. Drill the four holes for the 2-56 screws in F1 and install the two pieces of balsa triangle stock that support the motor.

Pin the horizontal tail and F1 to the plans. Glue on the fuselage sides and formers F2 and F3. Install the 1/8 square sticks at the junction of the tail and the

No, it doesn't look like a "real" airplane, but so what? This bare-minimum electric is designed to *perform*, not look pretty!

NATOR

fuselage sides. Sheet the bottom of the fuselage with hard balsa. Install the 1/8 square balsa sticks at F1 to reinforce the glue joint.

Take the whole assembly off the board and sheet the fuselage top using medium balsa. Rough sand the edges flush. Cut a notch for the battery wire and drill the hole for the arming switch. Cut the opening for the elevator servo and install the servo rails. Make up the vertical tails and glue them in place; be sure they angle outwards as shown on the plan. Sand the tail surfaces to fit and attach the elevator using short pieces of iron-on hinge material.

Wing

Like the fuselage, the wing is built upside-down over the plans. Pin the spar and 3/32 hard balsa trailing edge to the plans using a couple of ribs to align the spar. Glue the outer ribs to the spar and trailing edge. Glue on the four middle ribs using scrap 1/16 balsa as a spacer to allow for the sheet-

ing. Glue on the top spar and 1/4 square leading edge.

Cut out and glue 1/16 balsa vertical-grain shear webs to fit tightly between the top and bottom ribs. Glue on the 1/16 center sheeting. Cut an opening for the aileron servo and install the servo rails. Glue on the wingtips and reinforce the joint with 1/2-inch triangle stock as shown. Sand the ailerons to fit and attach them to the wing using short pieces of iron-on hinge material.

COVERING

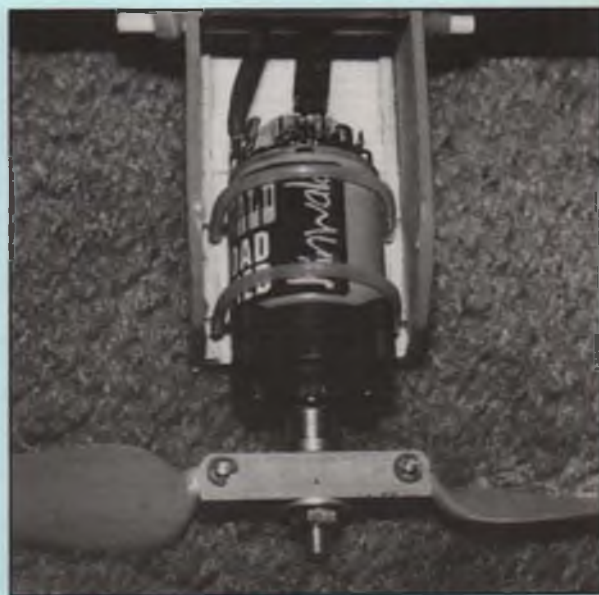
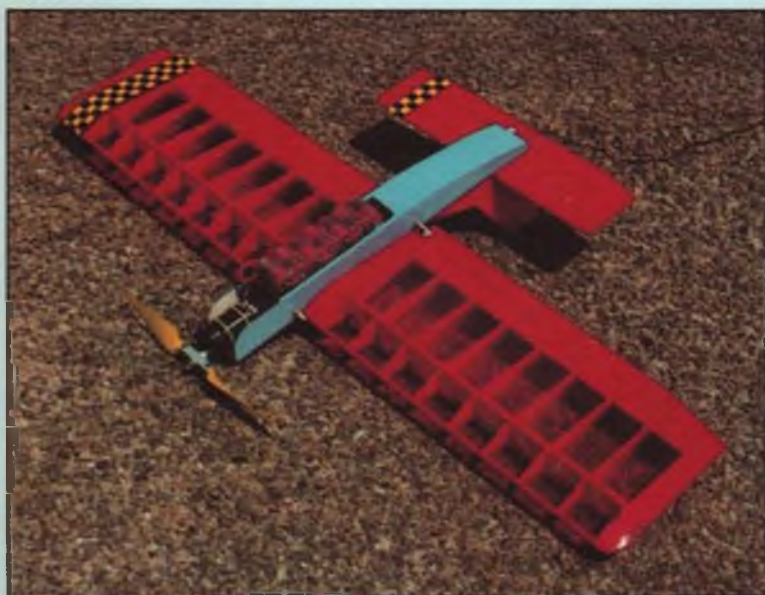
Finish-sand all parts using a sanding block and sandpaper. Dust off all parts using a tack rag and/or a vacuum cleaner.

The Terminator relies on the covering for torsional stiffness,

THE TERMINATOR

Designed by Scott Hartman

WINGSPAN	38 in.
WING AREA	288 sq. in.
FLYING WEIGHT	34 oz.
WING LOADING	17 oz./sq. ft.
OVERALL LENGTH	22 in.
AIRFOIL	15 percent symmetrical.
POWER ...	Any seven-cell electric system.
RADIO	Three channels required (ailerons, elevator, throttle).
CONSTRUCTION	Balsa, spruce, plywood.



LEFT: The Terminator has the best possible access to the motor batteries—they're simply Velcroed to the bottom of the fuselage! We voiced our concerns to Scott about the possibility of damage to the batteries when landing on anything but soft grass, but he's been flying his models from unimproved fields for some time and says he has yet to hurt a battery. We'd be tempted to use a double layer of shrink wrap on the battery, just to be sure. RIGHT: Close-up of the motor installation in the latest version of the Terminator. One of Scott's favorite combinations is a 13-turn Trinity "Buggyweld" car motor with a Leisure Electronics #60058 3.8:1 short gearbox and an 11x7 Sonic-Tronics prop. Scott also favors the strap-type motor retaining method using lengths of Inner Myrod pulled tight with 2-56 screws from the top of the fuselage.

so you should use one of the stronger high-temperature iron-on covering materials. My prototypes were covered with transparent red MonoKote on the wing and light blue MonoKote on the fuselage.

POWER SYSTEM

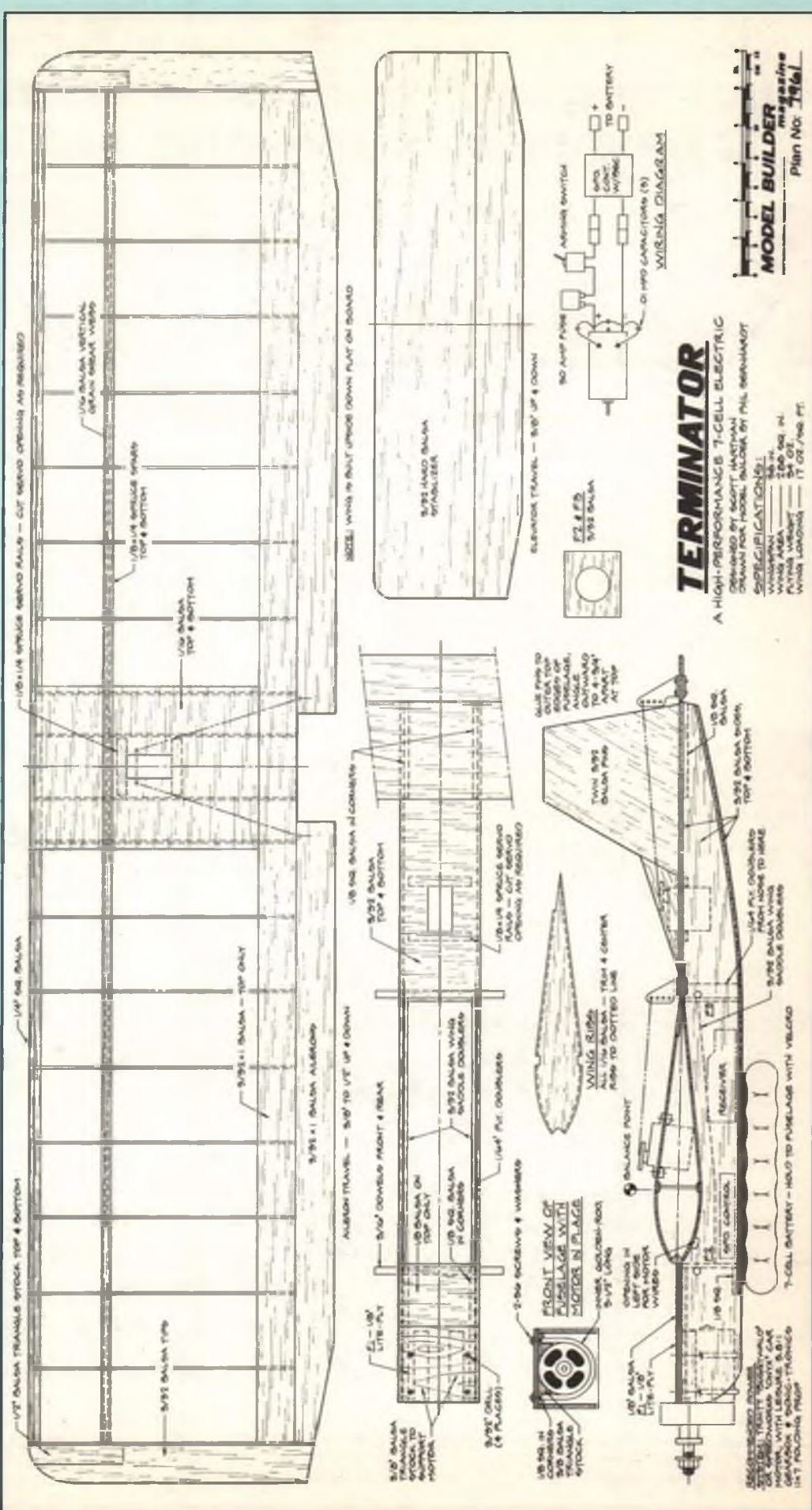
My prototypes were powered with double-wind car motors using 3.8:1 Leisure Electronics gearboxes. The specific motors I used are the 13-turn Buggyweld motor from Trinity and the 14-turn Onyx motor from Speedworks. Both provide sparkling full-throttle performance and near-vertical climbs. The Buggyweld motor runs about 3 minutes at full throttle, the Onyx motor about 3-1/2 minutes. The Onyx is a good match for normal altitude flying fields. The Buggyweld motor likes to unload more than the Onyx and seems to work better at higher altitudes.

I used an 11x7 Sonic-Tronics folding propeller on my prototypes; it works very well at 3,600 feet of altitude. You might try a 10x6 Sonic-Tronics if you fly closer to sea level.

Installation of a gear drive on a car motor is easy. Install the pinion and capacitors on the motor and adjust the motor's timing about 1/8 to 1/4-inch clockwise as viewed from the rear of the motor. Break-in the motor as per the manufacturer's recommendations, noting the proper motor rotation. Now install the gear drive on the motor, paying particular attention to the gear mesh. The mounting screws, prop adapter set screw and pinion must be secured using Lock-Tite to prevent slippage.

Wire up the motor using the fuse, arming switch and Sermos connectors per the diagram on the plans. The fuse and switch are located between the speed control and the motor; this maintains power to the radio even if the fuse blows or if the arming switch is accidentally turned off during launch.

The commutator on the car motor requires periodic cleaning to insure top performance. I use a commutator cleaning stick after the first couple of motor break-in flights and about every 10 flights afterward. A commutator cleaning stick looks like a thin piece of eraser; you can find them in the RC car section at your local hobby shop. The cleaning takes only a few seconds and is done with the motor still in the airplane. Remove one of the motor springs and its brush, push the cleaning stick into the brush holder, apply a small amount of pressure on the cleaning stick to contact the commutator and turn the propeller a few turns. Reinstall the brush and motor spring. This is the only mainte-



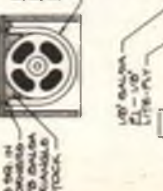
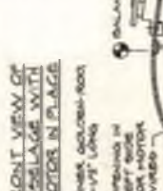
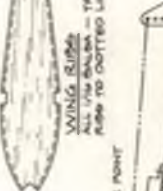
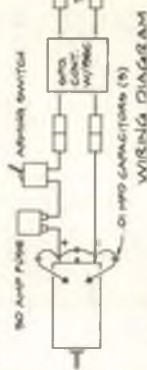
TERMINATOR

A HIGH-PERFORMANCE 7-CELL ELECTRIC
 DESIGNED BY SCOTT HARTMAN
 DRAWN FOR MODEL BUILDER BY PHIL BERNHART

SPECIFICATIONS:
 WINGSPAN 18 1/2"
 WING AREA 200 sq. in.
 WING LOADING 11.0 oz./sq. ft.
 WEIGHT 17.0 oz./sq. ft.

MODEL BUILDER
 magazine
 Plan No: 7161

RECOMMENDED POWER
 3.8:1 TRINITY BUGGYWELD
 OR 3.8:1 LEISURE ONYX CAR
 MOTOR, WITH LEISURE S.B.T.
 14-TURN ONYX MOTOR
 11X7 FOLDING PROP.



nance that's normally required to keep the motor running its best.

RADIO INSTALLATION

Attach the receiver and speed control with Velcro and mount the servos using screws and washers. The prototypes used pushrods made from short pieces of threaded rods and nylon hardware. My models use Flightec SEC-SP speed controllers, which have a battery eliminator circuit (BEC), so a receiver battery is not required.

Two widths of Velcro should also be used to attach the batteries to the bottom



All framed up and ready to cover—total airframe weight is about 5.5 ounces at this point. Note how the two fins angle outward at the top.

of the fuselage; one width does not provide sufficient strength to hold a battery pack in place during flight. I've found that the adhesive on some brands doesn't hold up to heat, so I normally attach the Velcro to the battery with silicone glue.

FLYING

The Terminator has lots of power and a very fast roll rate; it's best to have an experienced flier make the first flights if you haven't flown a model of this type before. Have a friend launch the model for you until you're used to the way it handles. The model settles a few feet when it's first launched, so to compensate we normally launch it upward at anywhere from 20 to 45 degrees. Apply up elevator as required until the model is up to speed.

I normally climb to altitude and then proceed to do aerobatics. The Termi-

nator does both inside and outside loops easily. It also has a very fast, although controllable, roll rate. Although there's no rudder, I've found that the model does very crisp four-point rolls and stops rolling immediately when the aileron stick is released.

I normally set the elevator rate so that when full up is applied, the model loops quickly without snapping. If your Terminator does a torque roll when full elevator is applied, it either has too much throw or is tail heavy. My models are set up closer to a pattern type airplane than a combat airplane.

The motor duration depends directly upon the throttle setting you choose. I've found that I fly the model at nearly full throttle most of the time and get about 3 to 3-1/2 minutes of invigorating performance. If you back off on the throttle the flight times can easily be extended to 5 or more minutes.

Be the first at your field to have a Terminator. It's really a fun design that will put some excitement back in flying. The large, slow-turning propeller is barely audible in flight, and therefore the model can be flown in many schoolyards and other areas where you couldn't fly gas models due to noise restrictions. Build it light and fly electric! MB



Designer Scott Hartman strikes a launch pose for photographer Don Rice. Scott recommends a fairly steep nose-up angle for launch, as the model will tend to bobble until it picks up enough speed to get "on step."

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PRODUCTS IN USE

■ By Dennis A. Tyson
Photos By J.P. Godwin

THE KAWASAKI KI-61 "HIEN" PSS SLOPE GLIDER FROM DAVE'S AIRCRAFT WORKS

One of a series of affordable, quick-building mini slope gliders designed to bring out the fighter pilot in all of us. You gotta have one!

Nothing thrills me more than to see a modeler with a good idea turn it into a successful fledgling company. It seems it's becoming more and more difficult for small "garage" companies to survive in the pond with all the bigger fish, but every now and then a few scrappers come along that have a unique product and the determination to stick it out. I believe this is the case with Dave's Aircraft Works.

There seemed to be a market for small, affordable, combat-type semi-scale slope

soarers, and this is the niche that Dave Sanders set out to fill. Dave spent three years in the research and development stage before he offered his first kit to the soaring market. He has been officially in business for about a year now and is experiencing an excellent growth rate.

Dave has created a series of 30-1/2 to 36 inch span WWII warbird gliders that cost around \$40 and build in about 24 hours. Currently in the line-up are a P-51, P-40, Me-109, Ta-152 (long-wing Fw-190), Hurricane, and the Ki-61 I built. His criteria

was to make them stable (which is an accomplishment in itself for such small planes), extremely maneuverable, realistic in the air, able to withstand reckless treatment, and easy to repair. These are *tough* little planes; Dave is big into slope combat and has many stories of his airplanes being involved in near-fatal crashes and which were back in the mix fighting it out the next



■ LEFT: While designer Dave Sanders has taken some liberties with the scale outline, it's easy to recognize the famous Japanese WWII fighter. Covering on our author's model is a combination of MonoKote and Ultracote; the spotted camouflage is Testor's enamel, sprayed on with an airbrush. ■ RIGHT: Dennis illustrates the diminutive size of his newest slope rocket—and with a 36-inch span, the Ki-61 is the biggest model in the series. We've flown one of Dave's P-40s—Dennis is right, these things are a real blast! Dave has his models set up on a hairtrigger, so touchy you can almost hold the stick motionless and THINK climb and dives and turns. These models could also be easily adapted to Speed 400 electrica—see text.

day. We all have a little fighter pilot in us and these great gliders will bring out the killer instinct in even the most passive pilots.

THE KIT

The shape of the box suggests sausage and cheese from a distant relative, but instead there are the makings of one terrific performing slope model. The white foam cores will surprise you when you first see them; they appear to be about the size of the stabs on an open class glider. All of the wood was excellent and the density of each piece seemed to fit its application. The fuselage sides, formers and tail surfaces are pre-cut and shaped for you. The wing sheeting is 1/16 balsa and there is plenty of it. I didn't even have to trim the edges to glue the sheets together.

The excellent plans are CAD drawn, and the instructions are quite entertaining and complete. To top it off, all of the hardware needed to complete the plane is included.

CONSTRUCTION

My favorite method of sheeting foam wings has been with transfer tape ever since Bob Dodgson introduced me to it in 1987. I've never had any type of wing failure or delamination with it and it's a pleasantly simple method to use.

The tape is 3M #924, 3/4-inch wide. Sand your cores and sheeting, then vacuum them *thoroughly* to remove all dust. *This is a key step in achieving a good bond with transfer tape.* Apply the tape to the core spanwise, then peel off the backing. You don't want more than a 1/16-inch gap between the strips of tape, and it helps to rub the tape with a soft cloth before the backing is removed.

Now place the core in its bed, align the

sheeting with the leading edge of the core and press it on. Work from the center to the tip and from the center to the root while moving from the leading edge to the trailing edge. In only about 20 minutes I had both wings sheeted and sanded.

The strip ailerons use torque rods. I temporarily glue the whole T.E. on, add the tip blocks (don't glue the aileron stock to the tip yet) and sand the tips to shape, then remove the aileron stock and cut the aileron free from the root section. This makes sure your aileron and tip contours match each other perfectly.

There's not much to do to the tail pieces except round the edges and glue the torque rod into the two elevator halves. In keeping with the simplicity theme, the fuselage is a snap to construct. One suggestion that Dave passed on to me was to not be afraid of really sanding into the triangle stock in the corners. Take a Bic pen and tape a piece of wood to it so it extends past the point; lay the wood against the fuselage surface and the pen will give you a mark about 1/4 inch from the edge. Do this for all four corners. After you carve or sand a 45-degree bevel to these lines, then you can start rounding, and your fuselage will come out looking real scale.

RADIO

One major plus to these planes is that you can use just about any radio gear you wish. Even the fullest of the full-size stuff will fit, and the most basic radio will get the job done. However, I wanted to keep my model as light as possible, and after seeing a review on Hitec's terrific

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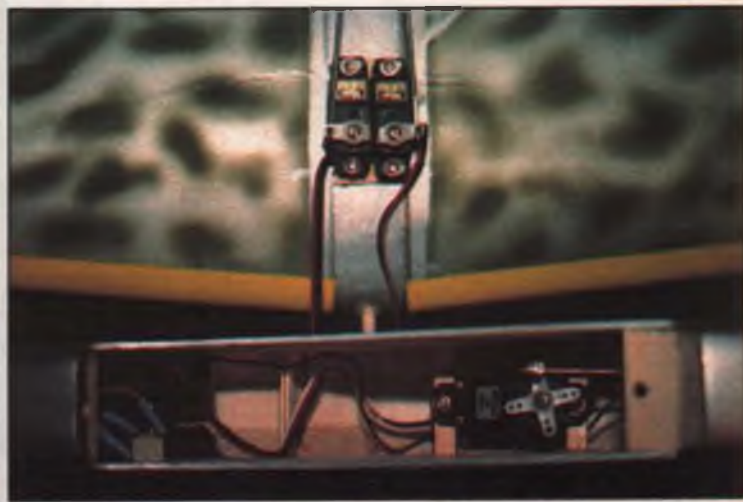
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new HS-60 "super micro" servo it occurred to me to mount two of them in the center of the wing, one for each aileron so I could mix them for spoileron control using my Airtronics Infinity transmitter. I also used a Hitec 535 FM micro receiver, a phone jack for the switch, and a Hitec HS-80 micro servo to drive the elevator. A 500-mAH battery in the nose put the CG 1/8-inch aft of the recommended spot. This seemed to be just fine for my initial flights, but if you don't like a sensitive elevator, don't try it. I had to turn the rates down on mine to fit more in my comfort zone.

The tiny HS-60 servos, while not as powerful as the 80s, are plenty strong



LEFT: We met up with Dave Sanders at a local slope and took this shot of him launching his own Ki-61. Unlike the lightweight film-covered versions, this one has been glassed and painted and weighs 22 ounces. Note how Dave is careful to keep the nose down until the little ship has built up a good head of steam. RIGHT: Despite their small size, these models have enough room inside for standard-size radio gear. Dennis wanted a lightweight model, so he installed Hitec RCD micro equipment—a 535 receiver, HS-80 servo for the elevator, and two of the new super-micro HS-60 servos for the ailerons, electronically mixed for spoileron control. All-up weight even with a 500-mAH battery aboard is only 14 ounces.

enough for this application, and if you think an 80 is small, wait until you get a look at a 60! I believe this is truly a revolutionary servo that will set the standard for sub-micros.

FINISHING

I used aluminum MonoKote to cover most of the model. Since the wing skins are 1/16-inch thick there isn't too much fear of melting the foam underneath. Someone told me that the heat actually helps the tape underneath grab even better. There is no scientific proof for this, so you can just chalk it up as hearsay.

For the tail surfaces and all the markings I used Goldberg's Ultracote Plus. This was my first experience with this stuff and I have to tell you it is excellent. It has a self-adhesive back, and for covering solid surfaces it is ideal. Press it on, rub out all the bubbles, apply heat and admire your completely bubble-free finish. For markings the Ultracote Plus is even better. The sticky back allows you to press your markings on



Four beautifully built examples of Dave's mini P3S kit models—two Mustangs, a Ki-61 and an Me-109. These models have all been glassed and painted and have full panel line detailing, done with Rapidograph drafting pens. Dave authored the article on making iron-on markings in last month's Model Builder and is now in the process of preparing a finishing/detailing "how-to" article for us—stay tuned!

and even move them around if you have to. Then just apply low heat and they're permanently in place.

Before I painted the camo scheme I roughened the MonoKote surface with steel wool. I used Model Master enamel to airbrush the camouflage on. It appears to

be staying in place, but if you rub real hard you can take it off. But that's OK, warbirds were never pretty in war!

FLYING

There's nothing like the feeling of walking to the edge of a slope and throwing your ship out to the mercies of Mother Nature. The Ki-61 flew right out of my hands and after some quick moves to the dual rates, things were going smoothly. I intentionally kept my model light so I could fly in light conditions, but on test day the wind was blowing about 30 knots and the lift was strong. A couple clicks of down trim and the little Kawasaki was zipping all over the place. My heart rate was way up and I was having a blast!

The Ki-61 is fast and the roll rate is mind-boggling at full throw. High rate for me is where Dave shows the settings on the plans. Dave must be a wild man, because these settings were way too hot for me. I'm most comfortable with half of the recommended throws, but I do suggest full rate for the first flights. I

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expected a 14-ounce plane to struggle a bit with 30 knot winds but the penetration was awesome!

Another thing that amazed me was how much energy the Ki-61 would retain. I most enjoyed turning into the slope, picking up speed and then pulling into a high-G turn back into the wind and going nearly vertical. The Ki would shoot about 150 feet straight up in the air and I would top it off with a victory roll. Some of this performance must be due to the Kawasaki's low frontal area. It wasn't long before I was wishing I had someone to chase around the sky. It's easy to see how this combat stuff could get addicting in a hurry.

(Editor's note: These mini-warbirds also make great little electrics with 400-size Graupner or Robbe motors installed. Northeast Sailplane Products sells Dave's full line of PSS kits as well as a complete matching power package—motor, prop, controller, battery, wiring, the works. Contact NSP at 802-658-9482 for details.)

Dave Sanders has a lot to be proud of in these little warbird slope rockets! If the rest of the line flies as well as my Ki-61, then take your pick and get a friend to do the same, and get ready for a whole bunch of fun! You could even get your club to buy several and divide into squadrons. Either way, I can guarantee you will have heart-stopping excitement! **MB**

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FREE FLIGHT

BY BOB STALICK

- The
"Hervat"
O.T. Hand
Launch
Glider
- Industry
News
- More on
the AME
.049

As an active free fliker who has always fancied himself one of the younger competitors on the field, I find with frightening regularity that many of my fellow fliers are not older than I am. The number who are older seems to diminish as the years go by. As a consequence, when I begin talking about magazine articles I may have read "recently," I find that some of those listening do not consider 1965 to be "recent." In fact, they don't even think 1975 or 1985 is all that recent. I attempt to put them in their place by reciting the familiar refrain about kids not being interested in history anymore and similar babble. All to no avail.

So, as I approach the certainty of older adulthood, I find myself drawn to the historic models that I recall as a youth. I think it's a defense against reality, or something like that. In my younger days, I recall reading *Air Trails*, *Model Airplane News* and an occasional *Flying Aces* magazine. I marveled at the prices charged for spark ignition engines (would I ever be able to buy one?) and the development of



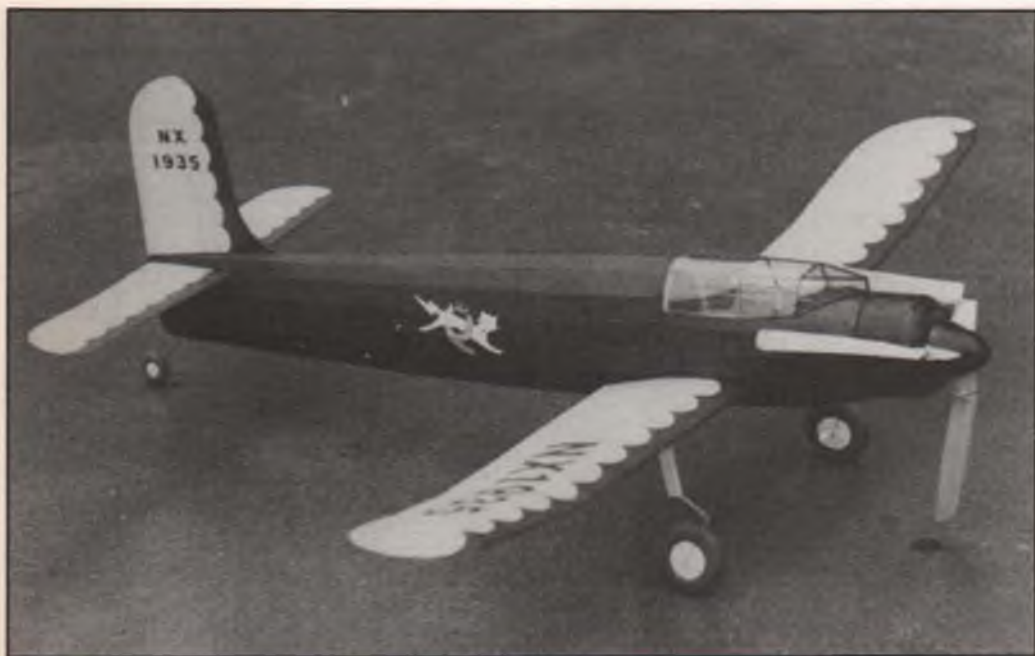
Don Bekins (right), president of SAM, shows off his Johnson .35 powered RamRod at a SAM 34/51 contest last August in Carson City, Nevada. The young fellow on the left is RamRod designer, Ron St. Jean. The RamRod is a classic model from the 1950s and a consistent winner in FF Nostalgia events.

a new invention called the glow plug. I dreamed about free flight models drifting downwind in a thermal. I dreamed about meeting Dick Korda, Carl Goldberg, Sal Taibi,

Pete Sotich, Jerry Ritz, Bob Chemy and other heroes.

Some O.T. designs seem to have characteristics that hold them in good stead for more contemporary competitions. I look over the Playboy Senior and its small (for the time) stabilizer; this model was ahead of its time. The same holds for the Rambler. How did Gil Shurman conceive this model when he did, given the state of model design at the time? Goldberg and the pylon. Taibi and stab tilt. And a similar thought seems appropriate for the Hervat glider, this month's featured model. This glider, with its high aspect ratio wing and smaller area stab, make it seem more like a model from the '60s or '70s than something from the '30s.

When we can look at our past, whether it's from old magazine reprints, conversations with our elders, the generosity of our friends and their magazine collections or from the Zaic Yearbooks or NFFS Symposiums, it provides us an unparalleled viewpoint about the history of this great hobby and sport of ours. We



David Lewis, of Cleveland, Ohio, designed and built this nifty 39-inch span rubber scale model of the Breda Ba-65, an Italian ground attack fighter of WWII vintage. Features a hand-carved three-blade folding prop and very lightweight construction. Plans are available for those interested; write David at 4827 Rocky River #26, Cleveland, OH 44135.

FREE FLIGHT

are fortunate to have such a record of our own activities . . . our history. It provides our roots and gives us perspective. Besides, it's really fun to reminisce!

PLAN OF THE MONTH

For years I've watched fellow club member Clarence Bull fly his Joe Hervat-designed glider in local HLG contests. It has proven to be a winner in his hands, as he frequently beats out the younger and more limber fliers with their modern ships. A quick perusal of the winners of recent

Old magazine reprints, conversations with our elders, the generosity of our friends and their magazine collections, etc. provide us an unparalleled viewpoint about the history of this great hobby and sport of ours.

SAM Champs will show this glider to be in the top three on a regular basis. I found a small drawing of the model in the 1938 Zaic Yearbook (page 170). This month's plan is an enlarged copy of that drawing.

I reviewed the design to see just what it was that made it such an outstanding model. What stands out for me are the following characteristics:

1. The high aspect ratio elliptical wing. The wing spans 21 inches, making it 3 inches more than the typical current model. The added span plus the elliptical planform give this model a better power-to-glide ratio.

2. A relatively short tail moment and moderate stab size. This combination makes the model easier to throw and less critical on launch.

3. The large fin is offset by a large frontal area. It was typical for the time to use fins that were large (by current standards), which contributed to the bugaboo of many O.T. models: spiral dive. The Hervat has a large fin but it also has a large fuselage side area in front of the wing. So, although you'd expect this model to have a tendency to spin, it doesn't.

BUILDING THE HERVAT

Photocopy the patterns from the magazine pages. Laminate the lightest 1/4-inch C-grain balsa you can find for the wing and cut it to shape. Face the leading edge of the wing with a 1/64-inch basswood strip. Carve and sand the wing airfoil as indicated.

Cut the fin and stab from lightweight 1/16 or 1/20 A-grain balsa. Sand the fin to a symmetrical airfoil shape. Sand the stab to a flat-bottom airfoil shape with a high point around 33 percent.

Although the plans show the fuselage cut from pine, I suggest stringy 10-pound

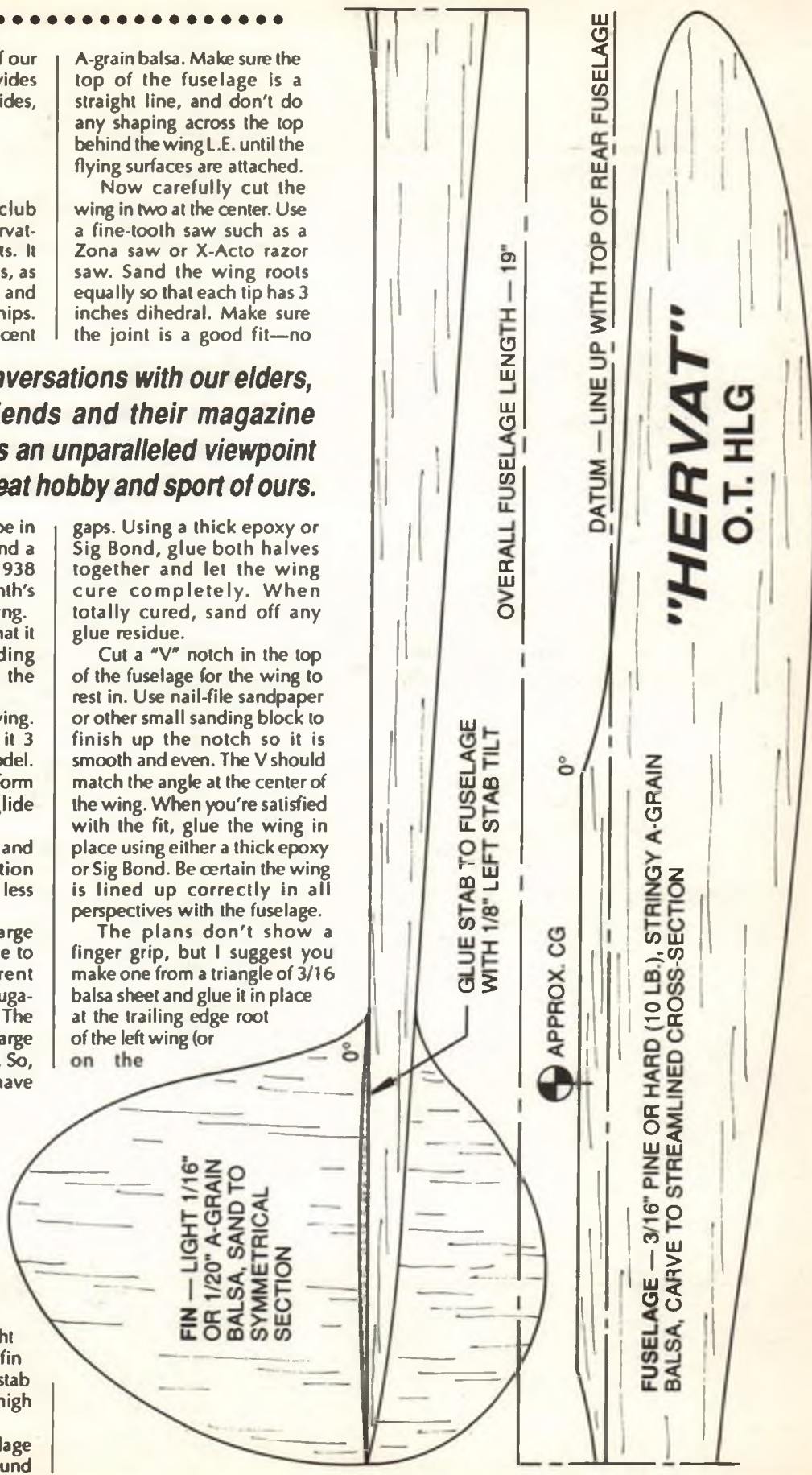
A-grain balsa. Make sure the top of the fuselage is a straight line, and don't do any shaping across the top behind the wing L.E. until the flying surfaces are attached.

Now carefully cut the wing in two at the center. Use a fine-tooth saw such as a Zona saw or X-Acto razor saw. Sand the wing roots equally so that each tip has 3 inches dihedral. Make sure the joint is a good fit—no

gaps. Using a thick epoxy or Sig Bond, glue both halves together and let the wing cure completely. When totally cured, sand off any glue residue.

Cut a "V" notch in the top of the fuselage for the wing to rest in. Use nail-file sandpaper or other small sanding block to finish up the notch so it is smooth and even. The V should match the angle at the center of the wing. When you're satisfied with the fit, glue the wing in place using either a thick epoxy or Sig Bond. Be certain the wing is lined up correctly in all perspectives with the fuselage.

The plans don't show a finger grip, but I suggest you make one from a triangle of 3/16 balsa sheet and glue it in place at the trailing edge root of the left wing (or



right wing if you're left-handed) where it meets the fuselage. This will give you better control of your launches and keep the wing from being damaged by your index finger.

Glue the stabilizer in place on top of the fuselage. When viewed from the rear, the left stab tip should be 1/8-inch higher than the right side; this will give you a left glide turn. Glue the fin in place on the top and bottom of the fuselage as shown. Be certain no offsets are built in.

Apply one coat of sanding sealer to the entire model and sand with fine wet-or-dry paper. Apply your AMA numbers on the wing, followed by two coats of low-shrink nitrate dope, sanding lightly between coats.

Check the model for balance; it should balance about 2 inches from the leading edge. Add clay to the nose if needed. If it's nose heavy, trim off some of the wood at the front. When satisfied with the balance, it's time to fly.

The secret in hand launch glider is the angle at which the model is launched. If the launch is too steep or without a bank, the model will typically go up, stall, and come down at your feet. You should bank the model to the right (if right-handed) and throw it up as strongly as you can while still maintaining control. Trim the model by adding and removing weight to adjust the balance and by gently warping either the stab or the fin to get a right climb and a left glide.

Since this model has no dethermalizer, it might be wise to test-fly it early in the evening, when the air tends to be calmer and thermals are less frequent. Trim it out until you're satisfied. Get one of your buddies to assist. When the model is flying consistently, you're ready for competition. Good luck!

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the ongoing
Mystery
Model
feature
was*



Kenneth Fisher's "Flying Goose," an unusual looking Class A contest job with clean lines and a single retracting wheel. Although published in the May 1947 issue of Air World, the Flying Goose has been approved by SAM for O.T. competition, based on the text's reference to the model's 8th place finish in a 1941 contest on Long Island. Of the five entries we received, the winner of the one-year MB sub is Norm Reames of Middleburg, Ohio.

INDUSTRY NEWS

Last December, Ken Sykora, owner of Oldtimer Model Supply, passed away. His offerings of unusual model plans, supplies and other goodies were left in doubt. Who would come to the rescue and continue to provide the service many of us felt to be essential? The answer is now in: Al Heinrich, proprietor of Aerodyne, has taken over OMS. Al has moved all of the product line to his shop and will operate it as a separate entity. The address is 1924 E. Edinger, Santa Ana, CA 92705; (714) 258-0805. Send \$2 for a current catalog. And while you're at it, thank Al and tell him you read about it in *Model Builder*.

Joe Klaus announces that Kustom Kraftsmanship has moved to a new place of business. Contact Joe for your orders now at P.O. Box 1538, San Marcos, CA 92079.

continued on page 84

WHERE THE CONTROL LINE ACTION IS

Next time you're on the road, drop in and visit the local fliers. If you just moved to one of these cities—or didn't realize there was CL activity in your home town—here's where the action is. Part One of a two-part directory of regularly used U.S. flying sites.

What's the first thing a CL enthusiast does when he moves to a new city, or even just makes an extended visit to unfamiliar territory?

He goes looking for the local flying field, of course.

(OK—maybe he goes to the hobby shop first . . . but mainly to ask where the flying field is!)

In some places there are areas formally set aside for flying by a local government, company, or private landowner. Sometimes the regular flying site is a schoolyard or parking lot that's just informally taken over by the local club for occasional Sunday flying. One way or the other, there's probably a CL flying site near just about every population concentration.

But it's sometimes a challenge for the newcomer to find the site—or to find a time when the site is going to be in use.

To help these wayward CL travelers, we conducted a survey of known clubs and fliers around the U.S. and Canada, and collected information on a number of regularly used flying sites. We even collected information on some overseas flying sites which we may be able to work into a future column.

What follows is an admittedly incomplete list of active CL model flying sites. If you know of an active site not listed here, drop me a letter or an e-mail at the address listed at the end of the column, and we'll mention the site in a later edition.

The sites are listed in alphabetical order of the cities where they're located. Also included with some is some commentary from the modelers who supplied the information, and a contact person in the local area. Because of the volume of information, the directory will be broken into two parts; more sites will be described in next month's column.



One of the more popular designs for Old Time Stunt is the Trixter Barnstormer, originally kitted by Gullflow. This one's powered by the venerable McCoy Red Head stunt engine.



Pat Johnston of Boise, Idaho produced an excellent flying profile precision aerobatics version of the famous Gee Bee racer. Photographed at the 1995 Northwest Regionals.



Here's a unique idea for the Precision Aerobatics Concours d'Elegance trophy—a plane at the top of a vertical rig. Trophy was awarded at the 1995 Northwest Regionals.

• **Alameda, California**

The Bill Osborne Model Flying Field is on Doolittle Drive in Alameda, adjacent to the Oakland Airport. There are two grass circles with concrete takeoff areas; one circle has a 70-foot radius and one is smaller for 1/2A planes. AMA insurance and a permit are required. Contact Bill Osborne at (510) 522-3128 or (510) 521-5210.

• **Albuquerque, New Mexico**

Local flier Bill Jacklin reports that there is no permanent flying site in the Albuquerque area, but local fliers have a loosely organized phone list and get together informally periodically. They use a couple of areas for informal flying: a paved pad near the RC field at Boca Negra Park, and the west end of University of New Mexico's basketball arena. The high school athletic fields at Bernadillo and Santa Fe are used for more formal flying events. More information about Albuquerque area flying sites can be obtained from Bill Jacklin at his e-mail address: wjjackl@somnet.sandia.gov.

• **Canutillo, Texas**

Gallagos Park is used by some of the El Paso area fliers on Friday mornings. For information, contact Robert Compton at (915) 772-6835 or Ken Jones at (915) 592-3939.

• **El Cajon, California**

This is one of three sites used informally by San Diego area fliers, according to Bob Fogg. The site is at Cuyamaca Street, past



Here's another variation on the airplane carrier rack—and it's filled with carrier planes! Made of plastic PVC pipe and foam padding. Photo by Fred Crossman.

Reuben Fleet Drive near Gillespie Field airport in El Cajon, 30 minutes east of San Diego on Interstate 8. There is a grass area with room for two circles.

Sport and combat fliers use the site on weekends. It's a privately owned field that usually is unmowed, but the grass remains short during the dry summer months.

• **El Paso, Texas**

Burnett Field, off McCombs Street at the northeast edge of the city, is an RC field with two CL circles. Local flier Robert Compton says the circles were paved in the 1950s and are in poor but usable condition, and CL activity takes place on weekends. AMA membership is required. For information, contact Robert Compton at (915) 772-6835.

• **Eugene, Oregon**

The Eugene Prop Spinners club flies regularly in an overflow long-term parking lot at Eugene Airport, made available to CL flying by the city. The site is across the road from the main terminal and parking area. (Follow the "Airport" signs from Interstate 5 at the Belt Line Road interchange.) The site has three asphalt circles (one each marked for aerobatics, racing and speed) and four grass circles with concrete center pads.

Club members fly on Sunday mornings, though the site is available seven days a week when not used for parking or other city-designated activities. Fliers must be AMA members. For information about local activities or access to the field, contact John Thompson at 295 W. 38th Ave., Eugene, OR 97405 (e-mail JohnT4051@aol.com).

• **Eureka, California**

Cooper Gulch in Eureka has room for two circles on a grass field often used by soccer groups. It's near Burre Center, off Myrtle Road, which is off Fifth Street.

There's no formal club, but there is quite a bit of flying on Sunday mornings. AMA or SFA membership is recommended for insurance purposes. For information about local flying activities, contact Jess Walls at (707) 826-1601.

• **Fountain Valley, California**

Mile Square Park is a Southern California one-site-gets-you-all hobby area, including RC, FF, rockets and RC cars as well as CL flying. To get to this Orange County site from the Interstate 405 freeway, go north on Euclid Street about 2 miles. The park entrance is on Euclid about a half mile north of Warner. Control line is flown on three marked asphalt circles and one unmarked asphalt circle. There are no grass circles.

Mile Square is regularly used by the Knights of the Round Circle CL club, the California 500 Stunt Club, and many unaffiliated sport fliers. The site is open seven days a week, with most flying activity on Sundays from about 9 a.m. until 1 p.m.

Engine runs are restricted to after 9 a.m., and mufflers are required. Club membership is not required, but some sort of liability insurance (AMA or similar organization) is. There is a park entrance fee of \$4 on weekends and \$2 on weekdays.

For information about Mile Square activities, contact Knights of the Round Circle president Kenn Smith, 521 Jansen Ave., San Dimas, CA 91773; or California 500 Stunt Club president Lucky Pyatt at (714) 775-8364 (evenings).

• **Garland, Texas**

Hobby Park in this suburb on the east side of Dallas offers two asphalt circles, at least two grass circles, electricity and two shelters. It's at the intersection of Garland Road and Northwest Highway, visible from Interstate 635 (take 635 east from the Toll Road and exit at Garland; the site is to your

right as you head east).

The field is owned by the Dallas Parks and Recreation Department, and is used by the Dallas Model Aircraft Association. The site is busy with stunt activity on Sunday mornings, carrier, racing and combat on Sunday afternoons. The site also is in use weekday evenings during the summer. Major contests normally held on President's Day, Father's Day and Labor Day, with smaller contests on other weekends.

Information about the Garland site and activities can be obtained from Bill Bischoff, 3734 Truesdell, Dallas, TX 75244; (214) 247-5046.

• **Hoquiam, Washington**

The site is the Hoquiam High School practice football field. There's room for four grass circles. The flying field is next to the main highway in front of the school. To get to the site, on entering the Aberdeen-Hoquiam area on Highway 12 from Olympia, follow the one-way street to Hoquiam, which passes directly in front of Hoquiam High School. There is a large gravel parking lot on the school grounds next to the field and plenty of room for setup and pits.

Fliers must be AMA members, except for students and youngsters seeking flying lessons. The normal flying sessions start about noon on Sunday. The Hoquiam group also has occasional organized activities such as fun-flys and small contests. For information, contact Alan Olsen at (360) 532-8544 (e-mail aolsen@techline.com), or Ted Dineen at (360) 532-1804 for weekend flying information.

• **Houston, Texas**

Scobee Memorial Field is a multipurpose site which includes world-class CL facilities, according to local racing flier Bill Lee. It's in the middle of Cullen-Barker park, a large park on the west edge of the city. To get there from the Houston Airport, take Beltway 8 West to Interstate 10 West, to

Highway 6 south, to Westheimer Road West (Highway 1093), enter Barker Dam, and the field is on the right.

Scobee Field was designed by fliers and built with a combination of public and private grand money. It was completed and dedicated in 1986. There are two smooth concrete circles and two grass circles with concrete center pads. In addition, there's room for a number of unofficial grass circles, which are used for large combat contests. Most flying is on weekends, and flyaway shutoffs are recommended for combat matches.

The site is used by the Proptwisters of Houston and by the Clearlake Winders. Contact persons: For the Proptwisters: Richard Stubblefield, (713) 358-3522. For the Winders: Frank Williams, (713) 488-1371.

• **Kent, Washington**

The parking lot of the Boeing Aerospace Center is used on weekends and evenings for aerobatics, carrier, racing and other CL activities, when it's not in use for car races or other conflicting activities. It is one of several informal CL sites in the Seattle area, and is the home of the annual Stuntathon summer aerobatics contest and the Raider Roundup in September. For information about activities at the Boeing site and other Seattle area flying activities, contact Seattle Skyriders president Paul Walker, 25900 127th Ave. S.E., Kent, WA 98051; or Howard Rush at 73763.746@compuserve.com.

• **Las Cruces, New Mexico**

Bill Melton Field on Valley Drive lures CL fliers from all over the region. There are three grass circles. The flying site is open any time, but most activity is on weekends. For information, contact Robert Compton at (915) 772-6835, or Larry Cunningham at (505) 526-4216 or at e-mail Larry@peak.nmsu.edu.

• **South El Monte, California**

Whittier Narrows Recreation Area offers

three marked asphalt circles (including one with a speed safety cage and pylon) and three grass circles, one of which has a concrete carrier deck. To get to this Los Angeles County site from Highway 60, go north on Rosemead Boulevard about a mile, turn left on Rush Street, go to the end of the street and turn left into the park.

The Whittier Narrows site is regularly used by the Knights of the Round Circle, the Blacksheep Exhibition Squadron, the 101st Squadron Screaming Eagles, and many unaffiliated sport fliers. The site is open seven days a week, with most flying on Sundays. Liability insurance is required. There are picnic tables and shade trees near the circles. All types of CL flying are seen here on a regular basis.

There are several annual contests at Whittier Narrows, including the Roland Baltes Memorial Scale/Carrier Contest in March, the Knights Joust in June, and the Seebre Hayes Memorial in October. For information about local activities, contact Knights of the Round Circle president Kenn Smith (521 Jansen Ave., San Dimas, CA 91773; 909-592-2100); 101st Squadron Screaming Eagles representative Fred Cronenwett (7352 Independence #201, Canoga Park, CA 91303; 818-719-0167); or Blacksheep Exhibition Squadron representative Tony Naccarato (2121 Hollywood Way, Burbank, CA 91505; 818-842-5062).



To be continued next month with information about sites in New Jersey, Indiana, Nebraska, Hawaii, Arizona, Oregon, Washington, California, British Columbia and Washington, D.C.

Send contest flyers, contest results, club news, photos, questions, technical tips and other items of interest to CL fliers to the *MB* Control Line column. Write John Thompson, 295 W. 38th Ave., Eugene, OR 97405. E-mail at JohnT4051@aol.com. *MB*



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Average Grade	A	C+	B-	C	C-	C-	D

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HANNAN'S HANGAR

BY BILL HANNAN

“Like most authors, he went to work only when he had exhausted every pretext for not doing so.”

Our quote this month is by photojournalist John Phillips, concerning his legendary aviator/author friend, Antoine de Saint Exupery. Somehow many model builders seem to feel the same way about starting a new project, procrastinating until they run out of time or excuses. How about you?

LOOKING BACK OR LOOKING FORWARD?

Reader Herb Weiss, in a philosophical mood, ponders: “Was life really simpler when we were young? I thought it was very complicated, and everyone else seemed to know exactly what it was about, but no one would let me in on the secret.”

Albert and Norma Locker, of Rosenberg, Texas, remember that when they were in elementary and high school, they were impatient for time to pass so that they could get out of school and on with their lives. But now that they have passed their 50th birthdays, “. . . we kinda wish that our time would sorta slow down so we could perform and complete those projects that

we have started.”

Most of us can identify with that!

ANOTHER ZANTFORD!

Ted and Pamela Blakely, of Boring, Oregon, obviously enthusiastic Gee Bee fans, named their recently born son Zantford, in honor of the famed leader of the Granville bro-

ers. How's that for dedication? Ted also plans to build a full-size reproduction of the original Gee Bee biplane, an illustration of which appeared on little Zantford's birth announcement.

MODELS IN THE MEDIA

We are always pleased to see our favorite hobby favorably represented in publications other than the modeling press. The March/April 1996 issue of *Vantage*, magazine of the Y.E.S. Discount Club, of Schaumburg, Illinois, featured a two-page article with five full-color photos about the Arizona Flying Aces Club Cactus Squadron. Authored by William Miller, the story presents a commending image of modeling in general, and the Flying Aces movement in particular.

We especially enjoyed this line: “A casual observer might feel that these grown-ups are just reliving their childhoods, but nothing could be farther from the truth.” The article goes on to explain the skills and experience required for success in the hobby, and the benefits of good fellowship, fresh air and exercise offered by free flight model building. Bravo!



Frantisek Barta, of the Czech Republic, created this intricate Pistachio AVRO IV triplane, powered by Stefan Gasparin's jewel-like G5 CO₂ powerplant. Model features movable controls and shock-absorbing landing gear. At least three Model Builder advertisers market the Gasparin motors. In case you may care to try your hand at miniature powered flight.



Mark Fineman's Cornet III Stinson features unusual Charlie McCarthy markings, as explained in the text. Note single-surface tissue covering, which was typical of early 10c models.



Another of Frantisek Barta's fabulous miniatures is this Pistachio-size Gasparin GS CO₂ powered Folder Eindecker, which weighs only a bit over 8 grams and has an indoor flight duration of more than 50 seconds. Otakar Salbek photograph, via Fritz Mueller.

PUT ANOTHER PENNY IN IT!

John Barker, of Georgia, writing in *The Thumb Print* free flight newsletter, reported that he was demonstrating his Pennyplane to a large class of youngsters. As the model climbed steadily toward the ceiling of the gymnasium, it was accompanied by "oohs" and "aahs" from the audience, except for one boy who asked, "Sir, can you make it fly any faster?"

A NEW OWNER FOR OMS

Oldtimer Model Supply, run by Ken Sykora, who passed away this past December, is now owned by Al Heinrich, who intends to maintain the high service standards set by Ken. The company name will be retained, however the new address is 1924 East Edinger, Santa Ana, CA 92705. Send \$2 for a complete catalog of offerings.

Speaking of catalogs, a new

one is offered by OK Engines, P.O. Box 355, Mohawk, NY 13407. Although their products are no longer in production, many items are still available, including engines, engine parts, glow plugs, company history books, posters, instruction sheets and catalog reprints. Send \$1 for the current brochure.

NEW LASER-CUT KITS

Tom Herr of Herr Engineering continues to turn out

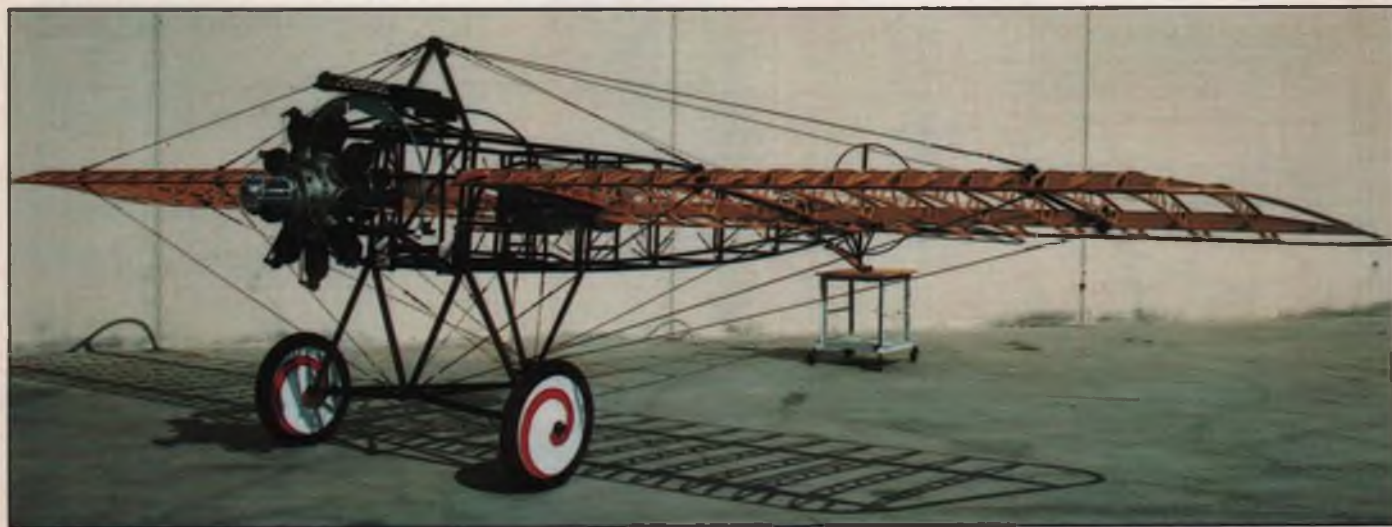
additions to his kit line with surprising rapidity. The latest additions are a Piper Super Cub, with choice of floats or wheeled landing gear; and a Cessna L-19 Bird Dog. Both models span 30 inches, feature laser-cut balsa parts, computer-drawn plans, colored tissue, decals, contest rubber and detailed instruction manual. Herr kits are available at many hobby shops, or may be ordered direct from the factory. See their advertisement elsewhere in this issue.

"Smileys," 23 River Bend, Newmarket, NH 03857, also offers laser-cut parts for some of their semi-kits, especially those rib-intensive triplanes. Additionally they offer many model construction plans from both domestic and foreign sources. New are "pseudo-spoked" wheel kits, to greatly simplify simulation of WWI model wheels. The 34-page "Smileys" catalog goes for \$5.

Please mention *Model Builder* when contacting any of these firms!

BIG OR SMALL, ENJOY 'EM ALL!

This month's crop of photos demonstrates the wide range of possibilities open to modelers—a major factor in keeping



How's this for detail? A "slightly larger" Eindecker, built by Frank Allen III and Bob Greenaway, for the San Diego Aerospace Museum. That's a real 100-hp Gnome rotary hanging on the nose. Frank points out that the wheels belong to a Nieuport 28 and are only temporarily fitted, while more appropriate ones are being fabricated. Bob Greenaway photo.

this obsession so fascinating.

"Dime scale" models are enjoying considerable popularity as nostalgic reminders of "good old days" stick-and-tissue modeling. Enhancing an old design with special markings or extra detail can further add to their appeal. Mark Fineman located documentation for a particular Stinson, owned by ventriloquist Edgar Bergen, which was adorned by silhouette of his "co-pilot," Charlie McCarthy. Thus, with these unique markings Mark increased the charm of his model with minimal effort and great satisfaction.

"The bottom line for me is that I've been striving to make sure that I do not grow up. Since I'm growing down, I expect to reach very soon the wonderful level that kids are at."—
Leslie Nielsen.

If "thinking small" is your specialty, cast a look at the two miniatures by Frantisek Barta. Both his Pistachio AVRO and his Fokker Eindecker are as detailed as museum models, yet they were built to fly. Equally remarkable are their minuscule powerplants, manufactured by Barta's friend Stefan Gasparin. These CO₂ systems are available not only in a variety of sizes,

but in a choice of single and several multiple cylinder configurations.

Moving to the opposite extreme of the size spectrum, take a look at that other Fokker Eindecker shown in framework form; it's a full-size reproduction under construction by modelers Frank Allen III and Bob Greenaway, volunteers for the San Diego Aerospace Museum. The engine is a 100-hp Gnome rotary, and the wing-warping controls work exactly as per the original.

GONE WEST

Two more notables have left our ranks. Don McGovern, former *Flying Models* magazine editor, passed away during January at age 69. Don began modeling as a child and was publishing original designs by the time he was a teenager. During the 1940s he served as a B-17 flight engineer and later became a skilled draftsman, photographer and model designer.

In the 1950s, Don became editor of *Flying Models*, a post he held until 1979. A total aviation person, he was an accomplished pilot of both powered aircraft and sailplanes. McGovern is survived by his wife Donna, four children and five grandchildren.

Henry Serrano Villard also died during January. Henry built his first model, a 1911

Nieuport monoplane, from an Ideal kit, had his first passenger flight during 1912 in a Farman biplane, and by 1915 was the youngest member of the Aero Club of America. When that organization sponsored the "First National Model Aeroplane Competition," Henry stepped forward and donated a silver cup as an incentive for the early model building clubs. The trophy was won three times and retired by the Illinois Model Aero Club.

During WWI, Villard drove a Red Cross ambulance, serving alongside Ernest Hemmingway on the Italian front, and like Hemmingway, became an author in addition to his career as a foreign service officer and U.S. ambassador. His two aviation history books, *Contact* and *Blue Ribbon of the Air*, are both Smithsonian publications.

In 1993, through the joint efforts of Bert Pond, Don Lockwood and Jim Alaback, the Villard trophy was retrieved and donated by Henry to the San Diego Aerospace Museum, a fitting tribute to one man's lifelong interest in model airplanes and aviation.

SIGN-OFF:

From the *Flying Aces* newsletter, in an article by Tim Lavender, this inspiring reminder: "Come and be a kid again. Flying only makes you younger. If you can't bring a plane, come and catch the spirit of free flight."

Bill Hannan, P.O. Box 210, Magalia, CA 95954. MB



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THE 1996 INTERNATIONAL MAYAN SOARING MATCH

The second running of this bi-annual event was an unqualified success. The next one will be in March of 1998—enough advance warning for you to make your vacation plans and squirrel away some money.



The Mayan Rebels from planet Yavin (well, George Lucas liked filming "Star Wars" in Guatemala!) line up for the required group photo. Mornings were almost clear, but as soon as the sun warmed things up, out came the thick cumulus clouds. The U.S. contingent extends a big "thanks" to Aviateca Airlines for its sponsorship and helping make this meet possible.

Fellow soaring columnist Don Edberg said it best when he turned to me and said, "Why don't we do this in the United States? This is a lot of fun!" He was referring to the second bi-annual soaring meet in Central America known as the International Mayan Soaring Match, in which we were both participating. Don's question was etched into my mind because it points to a rare and precious element that's often missing in the U.S.—getting together to eat, drink, laugh and enjoy the simple thrills of soaring the beautiful skies.

This was a contest, but it was such a low-key, laid-back affair that there was never any pressure to fly or even to perform. Two rounds of three flights that add up to 15 minutes every morning followed by a catered barbecue lunch, then recreational thermal soaring and aerobatics all afternoon is just what the doctor ordered

for us work-a-day weary Norte Americanos.

EVENT TASKS, EQUIPMENT, AND WEATHER

Like before, the Mayan Soaring Match was kept simple and easy. Considering the likelihood that the event would attract a wide variety of sailplanes and pilots of all skill levels, both foreign and local, it was decided to fly four rounds of AMA T4 Composite Duration (15-minute add-'em-up) with spot landing bonus. That's a minimum of a dozen flights for everyone over a two-day period, not counting the practice day or the fun flying. This is THE Central American RC event for those who want to fly, not just party.

The flying site is located at slightly over 5,100 feet elevation. The air is a little thinner than what most Americans are used to. And because the site is in the moun-

tains only about 70 miles from the Pacific ocean and Guatemala's vast coastal plains, you can almost always count on winds between a calm 5 mph to a brisk 25 mph or more, fast drifting but strong thermal lift, rogue wave lift, and amazing sink.

The weather overall this year was better than previous years even though long range visibility was poor due to low cumulus clouds and haze. Lift was awesome most of the time with "zop'es" or "zopilotes" (short, broad-winged, black, vulture-like soaring birds) marking lift for the observant pilots. Throughout the event, cumulus clouds formed and drifted by like cloud streets. At times the clouds were thick and black, threatening rain that never came and making action photography in available light difficult. We never did see clear blue skies, nor did we get a glimpse of the famous "Volcan de Agua" volcano.

RESULTS OF THE 1996 INTERNATIONAL MAYAN SOARING MATCH



He's smiling now, but we'll get him tonight at the party! Joe Wurts just can't be beaten in a thermal war. He's been seen to fly HLGs with the Au and a 104-degree temperature and still win 1st place in the hot California sun. This time it was a bad hangover and dehydration (those dry heaves are murder!), and he still took 1st place with his Airtronics Sapphire. Can Super Joe be stopped?

1) Joe Wurts (USA)	Sapphire	4575
2) Ben Clerx (USA)	Mako II	4495
3) Fred Mallett (USA)	Esteem	4264
4) Enrique Mertins (GUA).....	Mako-V & Spectrum	4021
5) Frankie Arzu (GUA)	Mako	3541
6) Don Edberg (USA)	Diamant	3530
7) Bill Forrey (USA)	Falcon 880	3527
8) Julio Quevedo (GUA)	Legend	3299
9) Phillip Myers (GUA)	Legend	3115
10) Claudio Roque (GUA).....	Legend	2558
11) Juan Ramon (GUA)	Legend	2490
12) Gustavo Sanchez (GUA) ...	Olympic II	2390
13) Klaus Wagner (GUA)	Legend & Flamingo C.	2026
14) Peter Wagner (GUA)	Sagitta 600	1775
15) Hector Tchen (GUA)	Windrifter	1566



■ ABOVE: Last year's overall winner, Ben Clerx, offers up a silent prayer to the thermal gods before launching his Mako II, which he kits. Ben finished in 2nd place. The Mako is one of the superhips on the competition soaring scene. ■ ABOVE RIGHT: Claudio Roque (left) and his buddy Gustavo Sanchez pose for a photo with Claudio's Olympic II. Gus is a recent silent flight convert from the glow-bulb camp.

■ RIGHT: A member of the U.S. contingent and a top-rated pilot, Fred Mallett studies the sky prior to launch. Fred's plane, the Esteem, produced by Inventive, is a super-lightweight T-tail design featuring obochi-sheathed foam wings, voided fiberglass fuselage and T-tail. Columnist Forrey is gathering info on this hot new ship for a future column. Fred placed 3rd in the competition.





■ LEFT: Klaus Wagner of Team Mayan Show-Ovs tamps into and releases the Mayan gods prior to launch. Bad idea! Claudio Roquem laughs as he gets ready to time the flight. Does he know what's about to happen? ■ RIGHT: Partway up the tow, the Mayan gods remember the landing. Immediately, the canopy flies off. Seconds later the battery ejects. Then the nose halves parts company with the fuselage. Parts are abandoned as if on cue! At this point the radio is totally silent and the towline is still attached to the hook. The Mayan gods have special functionality, the wreckage was repairable, but the Legend had to be retired for the remainder of the meet.



■ LEFT: Guatemalan Rier Franck Arzu caught in the act of measuring his landing. The landing zone was a pair of tapes about two meters long, graduated into ten 10-point segments. The approach was tricky as it was downhill and downwind. ■ RIGHT: Phillip Myers of Team Mayan was one of several Guatemalans to fly the Airtronics Legend.

Launching equipment was the same as used last time—two commercially built Cy Rahm 12-volt winches and two handcrafted, DSC-clone, BMX wheel type retrievers. The batteries used were Rocket Battery Co. 12v/200AH giants which looked bigger than tank or truck batteries. These monster batteries were kept topped off by constant use of a pair of battery chargers and a Briggs & Stratton gasoline generator.

Also like last year, the retriever line was 60-pound monofilament, which had to be used due to a last minute foul-up in filling an order for the proper braided nylon line.

It broke more often than it would have if it were braided nylon, but the retriever would work for long periods of time with no breaks at all. More of a problem was a worn-out bushing in the motor of one of the retrievers and the broken BMX wheel axle which took it completely out of service late on Sunday. The backup retriever was called into service and the contest was finished in time for lunch and fun-flying.

WHAT WAS FLOWN

There was quite a mix of sailplanes present at the IMSM. Most popular among the Guatemalans was the Airtronics

Legend, with the Ben Clerx Mako a close second. Also spotted was an old Windrifter, a colorful Olympic II, a Multiplex Flamingo Contest, and a Sagitta 600.

Coming with the U.S. contingent was a Czech-made Diamant, a Falcon 880, a Mako II, and an Airtronics Sapphire. But the most interesting to me was my first-ever look at an Inventec Esteem as flown by Fred Mallett of Corpus Christi, Texas. Although Fred admits he's not real hot on the big thermal ships yet—he still prefers HLG and slope soaring—he does like his new Esteem.

Fred's was a 110-inch span, obechi

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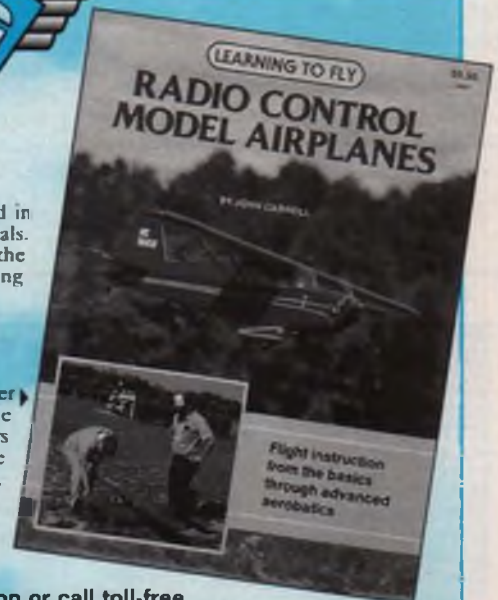


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Dept. X1055

venered model that he said weighed in the neighborhood of 56-57 ounces. Combine that light flying weight with a low-drag fiberglass fuselage, a multi-taper wing and an efficient T-tail, and you can't help but have a winner. I've requested more info from the manufacturer and will include it in the column in the near future.

EXTRACURRICULAR ACTIVITIES AT THE IMSM

If you travel to the International Mayan Soaring Match and then go straight home, you're really missing out on some of the best features of this meet! You wouldn't go to France without seeing the Eiffel Tower, so why go to Mayan country without seeing at least one archeological site? That's what we did last year when we all visited Tikal, a national park in the northeastern part of Guatemala. The pyramids and the temples there are world famous and as impressive as anything in Egypt! If you've seen the first "Star Wars" movie, then you've caught a glimpse of Tikal. It was the jungle base Yavin in the film.

This year my son and I went with Enrique Mertins to the museum Instituto de Antropologia e Historia in Guatemala City and saw some artifacts that were removed from the Mayan digs. Surely less impressive than the stone buildings, but equally fascinating.

This year most of the group opted to venture out to the coast for a little sportfishing and sunbathing. We hired two panga-style boats for four of our group and caught a total of nine sailfish (*pez vela* in Spanish), each weighing around 125 pounds and each released to the sea. There were at least a dozen Dorado (dolphin fish, or Mahi Mahi in a restaurant) also caught which were kept as food for the fishing



Here stand the American and Mayan victors, from left: 1st, Joe Werts (Airtronics Sapphire); 2nd, Dan Clerx (Clerx Make II); 3rd, Fred Mallett (Ivontac Esteem); 4th, Enrique Mertins (V-tail Make); and 5th, Frankie Arzu (Make). The contest may have been over, but not the flying—everyone flew hand-launch gliders and their contest ships until Jurgen Vogel said it was time to put away the launching equipment and go to dinner!

village and for our hosts Jurgen and Mimi Vogel.

Other sightseeing trips are possible. Here's one for the adventurous: how about a river rafting trip down the river where "Indiana Jones and The Temple of Doom" was filmed? You could fish, sightsee and camp out all in one adventure! Or, how about a trip to Antigua, the old Spanish colonial city at the foot of an active volcano that once was the capital? Or, how about a sightseeing trip to Lake Atitlan, where you can check in at a beautiful hotel with tennis courts and well-kept gardens with talking parrots? You could fish or boat there! The touring possibilities are almost endless, and the food there is wonderful (not spicy hot)!

I could go on, but I won't. The less I say,



Enrique Mertins (left) of Team Mayan Show-Offs and Fred Mallett of Team Texas conspire to cheat by adding a little liquid "LJR." Bottled by a Guatemalan RC airplane manufacturer somewhere in the rain forest, LJR is the secret weapon of Team Mayan. Now you know what the Mayans mean when they say, "Build light, then add a little LJR."

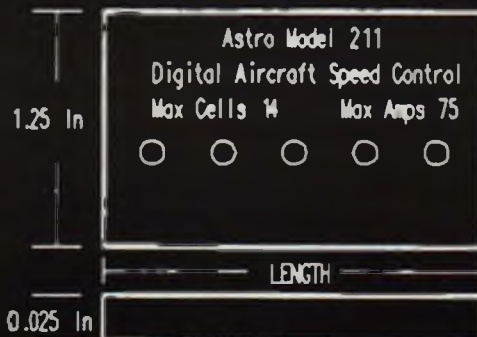
the more photos get used. So, I'll quit now and let the photos do the talking!

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The PREST BABY PURSUIT

for Peanut Scale

One of the many “flivver” lightplanes born during the Great Depression, the unique Baby Pursuit is all but forgotten today. This clipped-wing “speed” version is a bit of a challenge to build and makes a great flying Peanut.

Clarance O. Prest was one of the many bit players on the great stage of the Golden Age of Aviation; he had his 20 minutes of fame and disappeared. His aviation company, based in Southern California, may have lasted only four years, from 1927-1931, but during that brief time he obtained patents on his unusual diamond-shaped fuselages and managed to break the world's speed record for light aircraft. The purpose of the diamond-shaped fuselage was to minimize visual obstructions for the pilot in all directions and to aid airflow around the fuselage, resulting in high performance with minimum power.

Although only a handful of Prest Baby Pursuits were produced, at least one, N17308, survived in airworthy condition and was seen at EAA fly-ins until it crashed in 1958. It was seen again in 1965, almost 35 years since the tiny company went broke.

As a model, the clipped-wing Baby Pursuit makes an excellent subject for a Peanut. The only modifications I made are a slight dihedral in the wing and enlargement of the tail surfaces. According to *Aviation* magazine for August 10, 1929, the only factory authorized color scheme was a black fuselage with silver wings and stab. The rudder was black with silver numbers and there were black numbers on the wings. All struts were black and the cowl forward of the wing was silver.

CONSTRUCTION

•Fuselage

I always start with the fuselage and in the case of the Prest, it's also the only unusual part of the project. This was my first diamond, so I took some extra precautions



This angle illustrates the diamond-shaped fuselage that is the trademark of Prest designs. Details on making those great looking spoked wheels are contained in an illustrated booklet available for \$10 from the author; write to Stan Fink, 1810 Pine St., Philadelphia, PA 19103.

to make sure it came out true.

I chose to use 1/16x3/16 formers instead of cross-sticks to ensure capturing the correct shape of the compound curves. Although this adds a little more work and weight, the uncovered airframe still weighs only 4 grams with solid balsa wheels.

This construction method is similar to the half-shell keel-and-former method used on WWII-era models, but you must start with the top, not the side view. First, lay out the two longerons over the top view using flexible but strong wood, pin down and wet thoroughly with a Q-tip. The wet wood will set the extreme curve. If you want to save weight on the formers, use 5-6 pound 1/16x1/8 sticks stripped from light C-grain sheet. Make the formers by gluing two sticks to the correct angle by laying them over the former patterns on the plan.

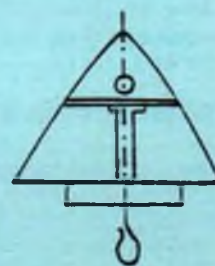
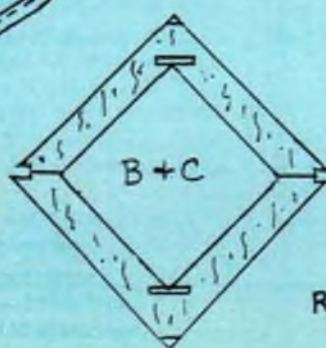
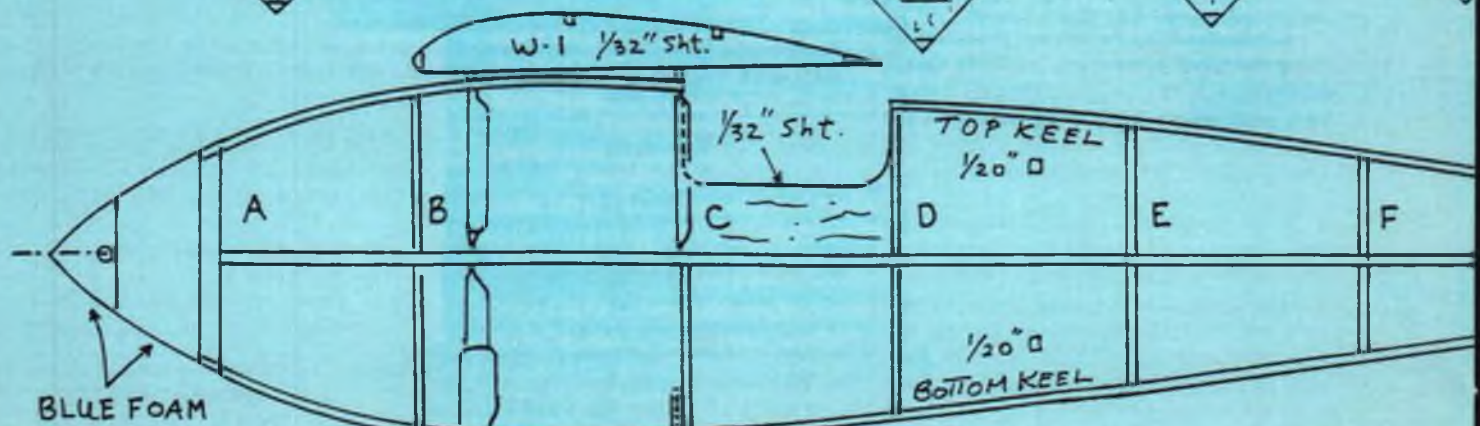
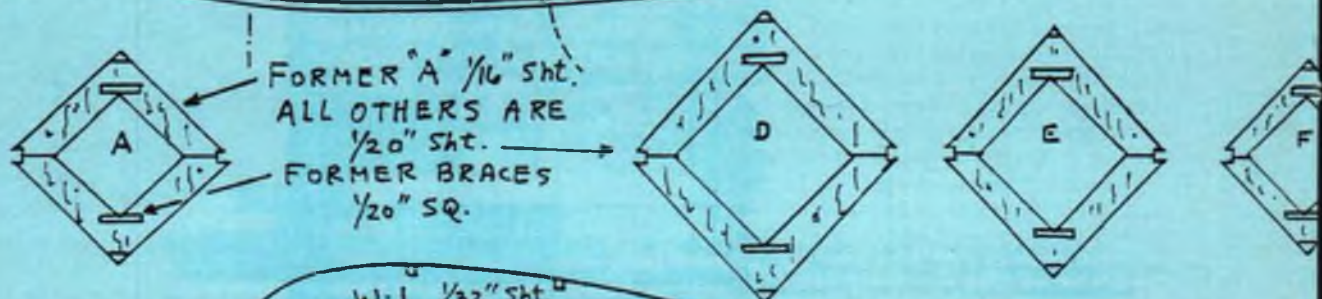
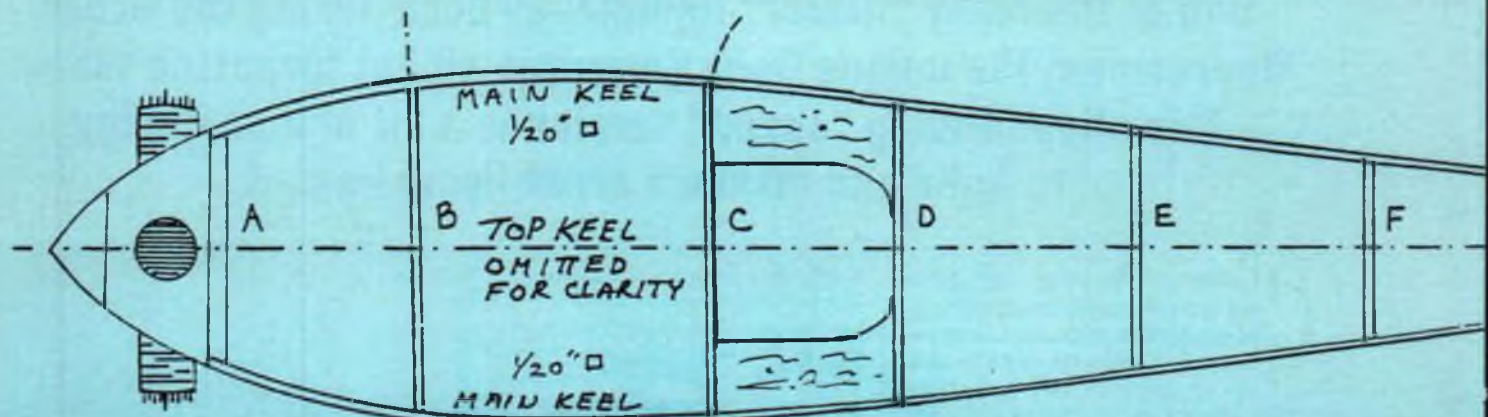
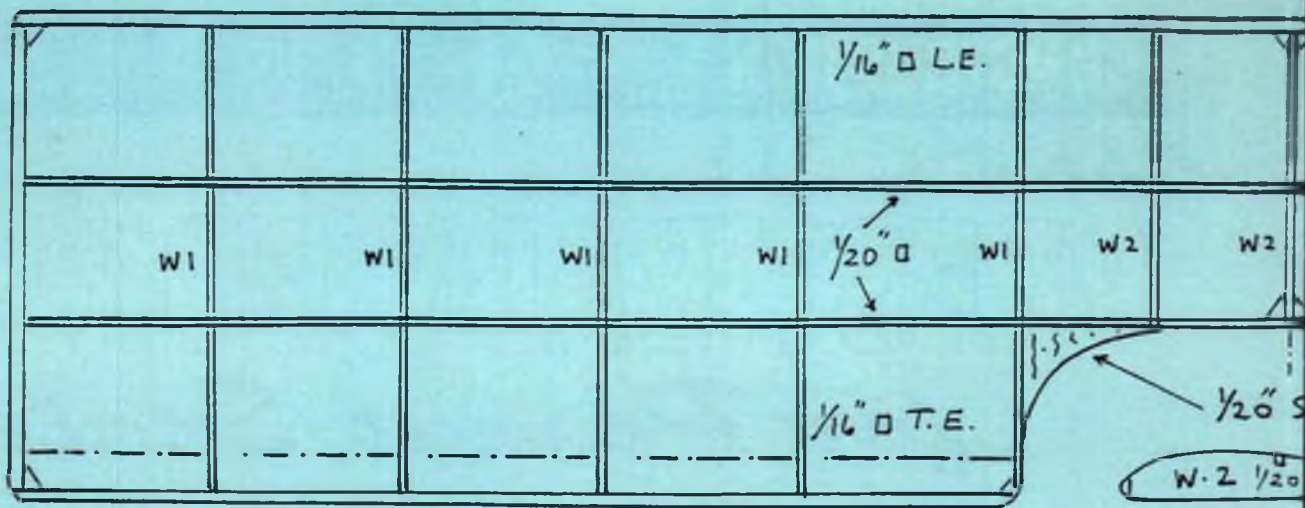
After the two side longerons are dry but while they are still pinned to the board, glue

the top half of each former A-H in place. Notches are optional; I decided against using notches and filled in the gaps later with 1/20 square scraps. Make sure the formers are absolutely perpendicular to the building board.

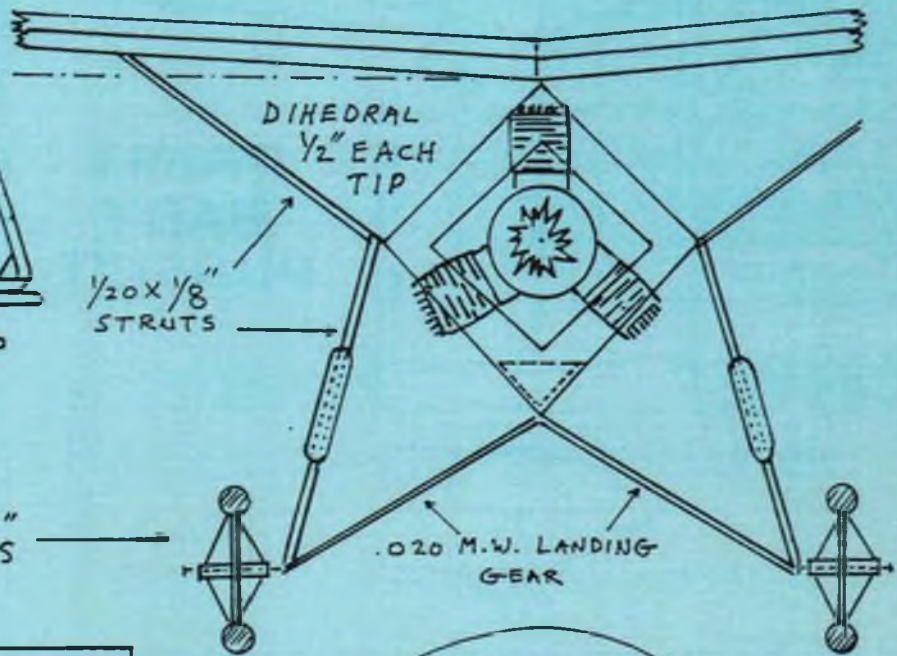
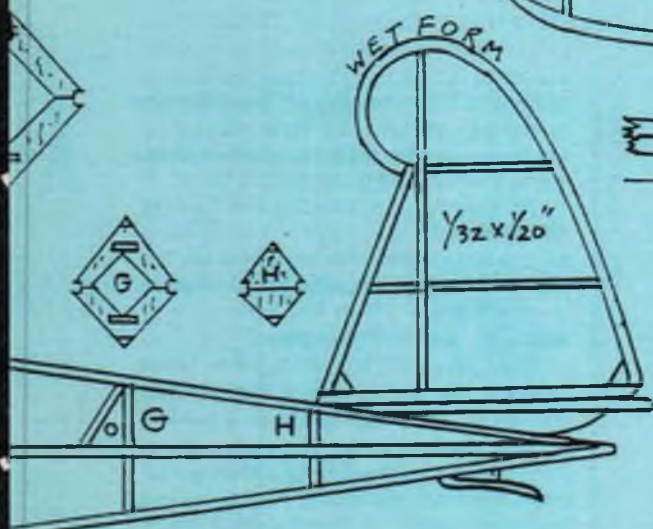
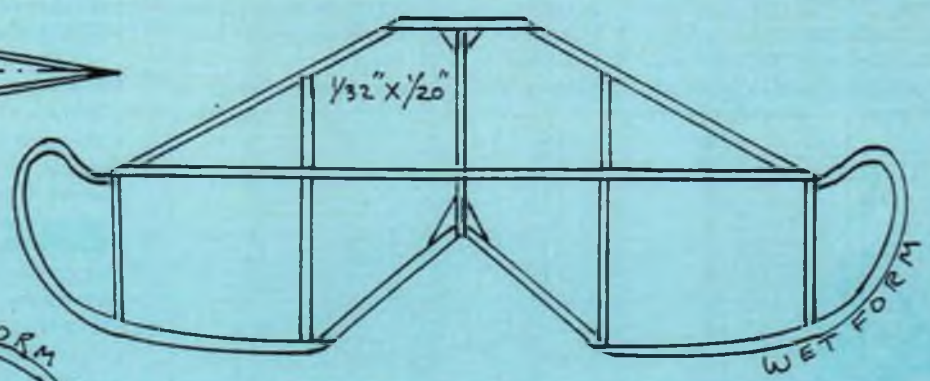
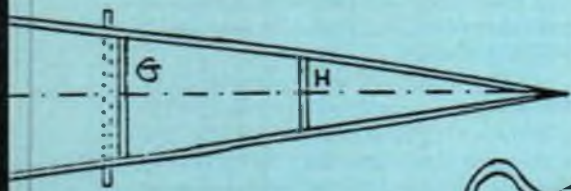
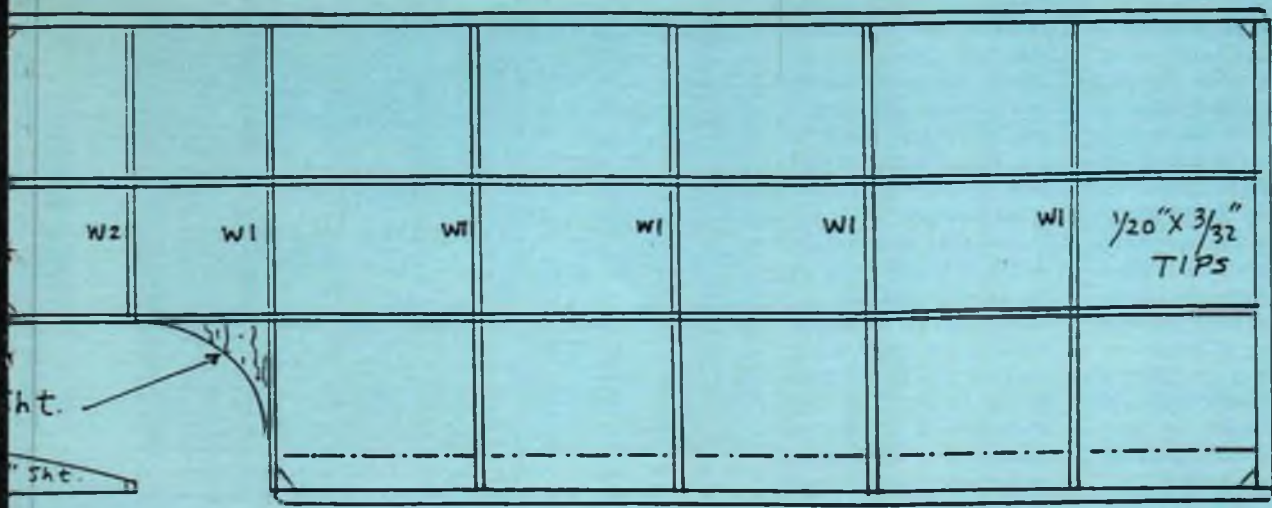
Now remove the top half of the fuselage from the board and glue the

DOMEDUSTER PLAN PACKET #6

This seems like a good place to mention that this month's Peanut contributor, Stan Fink, is offering a “baker's dozen” package of full-size model plans—13 in all, including eight Pistachio, Peanut and Walnut models and five other FF types. Included among the rare, little-known scale models in the set is a different version of the Prest Baby Pursuit presented here. See Stan's classified ad on page 90 for ordering info.



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1930 PREST 'BABY Pursuit'
PEANUT SCALE
By Stan Fink 7/1/95

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bottom half of each former in place while holding the fuselage in your hand. When dry, fill the gaps between the top and bottom formers with 1/20 square sticks cut to length. Before you glue on the remaining two longerons, sand the points off the top of the formers so that the longerons will have a flat surface to lie on. Select strong, pliable sticks for the top and bottom longerons. Use CA glue to secure them in place on formers B and C, working toward the front and rear. Wet the longerons between A and B before attempting to bend them down to glue to A. All of this can be done easily without a jig because of the strength of the formers. Don't cut away the longeron over the cockpit until later, since the fuselage will require more handling.

Build the cockpit sides out of 1/32 sheet, add the wire landing gear and tail skid. I recommend .020 brass wire instead of music wire for the landing gear. It's much easier to bend and is strong enough for any Peanut.

•Wing

All ribs are the same except for the three in the cutout over the cockpit. Use stiff sticks for both the leading and trailing edges to prevent warps. When cutting out the ribs, don't cut the spar notches; the notches are

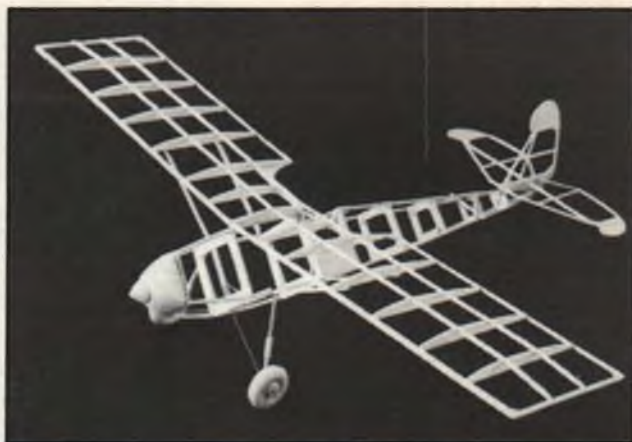
filed in later when the structure is dry. Leave the center rib unglued until one side of the wing is unpinned and lifted for 1/2 inch dihedral on each side.

•Tail Surfaces

In order to avoid the difficult wood bending shown on the plan, use 1/32 sheet balsa for the rudder top and stab tips. The stab sits on a 1/32 balsa mount glued to the fuselage; make sure that you have about 1/32-1/20 inch negative stab incidence.

•Noseblock

The front end is carved and sanded from blue or pink foam and glued to a hard 1/20 sheet backplate. The front of the nose is faced with 1/64 plywood. This noseblock is removable, so make a diamond-shaped box out of 1/16x3/16 wood at the rear to fit into former A. The spinner is made of blue foam, chucked in a Dremel Moto-Tool and shaped with fine sandpaper. A length of



Aside from the diamond fuselage, the Prest follows completely conventional construction practices. Note the sheet balsa stab and rudder tips—much easier than trying to laminate those tight curves around a form.

plastic tubing is attached to the prop shaft wire and inserted into the spinner. Finally, a 1/64 ply backplate is attached to the spinner. The hook in the prop shaft is not bent until the entire noseblock is assembled.

•Final Assembly

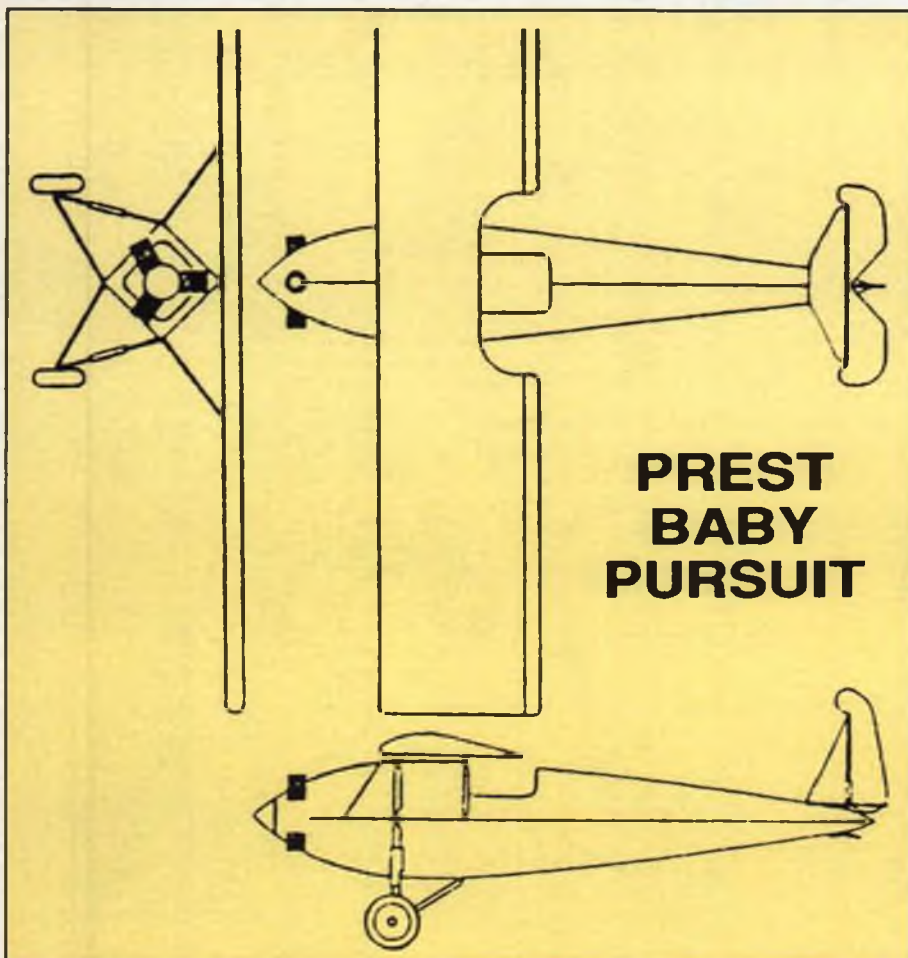
Cover all surfaces with Japanese tissue. Silver tissue is used on the cowl, wing, stabilizer, shocks and wheel spokes. The fuselage is black from the landing gear to the rear, including the tail skid. The wing numbers are black, and the rudder numbers are silver. All struts are hard 1/32x1/8 balsa and are painted flat black. The control surfaces are made with 1/64-inch border tape. You can use Williams Brothers cylinders or make your own from balsa or foam. I turned mine from balsa on a Dremel. A base must be attached to each cylinder so it can be plugged into the holes in the noseblock. This base should be smaller in diameter than the cylinders. Paint the base silver and the cylinders black.

The numbers on the wing and fuselage are cut from tissue through a drawing made on tracing paper. The numbers on the rudder are hand-painted with silver paint on black tissue which has been sprayed with two coats of Krylon clear.

Now put all of the parts together, being careful to line up the wing, rudder and stab with no tilt. The prop must be plugged into the holes in the spinner, so it's advisable to use a foam or bent wood type of prop with small dowels made of very hard balsa or a toothpick which has been sanded down. Install the blades at a 30-35 degree angle.

FLYING

Parasol monoplanes should be trimmed to fly in right-hand circles. First, balance the ship at the front spar, adding clay to the nose if necessary. It is desirable to wash-in the right wing panel. If your plane came out with the right panel washed out, you will have to fly the model to the left. Now that the grass is starting to come up, find some tall green and test fly with 3/32-inch rubber. Have fun with your unique Prest "Baby Pursuit!" MB



Three-view copied from Aero Digest, April 1938. "The Prest Baby Pursuit was a single-place high-wing monoplane built expressly for high performance by Prest Airplanes and Motors of Arlington, California, for the 'lone pilot who wants to go places and do things.' Powered initially by a 45-hp Szekely engine, quickly replaced with a 60-hp Lawrence, the top speed was 115 mph and it was advertised that the Baby Pursuit held the world's speed record for light airplanes. The fuselage was constructed of steel tubing in a diamond cross section. It sold for \$1,875 to \$2,000 depending on how it was equipped."—from *Aerocra C-2, The Story of the Flying Bathub*, by Jay P. Spenser.

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 Wing Loading: 24-32 oz/sq ft (73-98 g/sq dm)
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 Engine Required: 2-stroke .81-.91 cu in (10-15 cc) or 4-stroke .91-1.20 cu in (15-19.5 cc)
 Radio: 4-6 channel with 4-7 servos

The illustration of the AT-6 shown here is covered in Top Flite Manufactured Aluminum, Metallic Red, Cob Yellow and Black. This kit includes the parts and decals to build either the Air Force AT-6 or Navy SNL.

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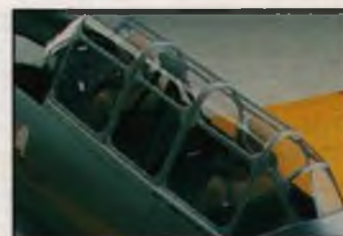
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P-51D Mustang Wingspan: 65 in



F4U Corsair Wingspan: 62 in

PRODUCTS IN USE

■ By Tom Tetrault

ACE R/C's BINGO 40

The most recent of the popular Bingo series, this .40-size low-winger combines simple, straightforward construction with sporty looks and performance.

The Bingo 40 is the newest and so far the smallest addition to the "Bingo" family of low-wing RC sport aircraft, all designed by D.B. "Doc" Matthews and all kitted by Ace R/C. Ace now provides modelers with three great Bingo choices: the 56-inch span, .40-size model presented here; the original .60-size, 70-inch span Bingo; and the biggest of the lot, the Big Bingo, an 85-inch span model designed for anything from a 1.08 two-stroke to a Zenoah G-38 gas burner.

My Bingo 40 kit arrived in a sturdy corrugated box with two full-view color pictures of the plane on the cover. Upon opening the box you will find lots of shredded paper holding everything securely in place. Quick removal of the paper reveals a very high-quality kit, neatly packed with the hardware, pushrods and miscellaneous small balsa pieces in their own separate bags. Two rolled plan sheets protect the spar and stick bundle which is neatly wrapped inside. Other items included are a clear plastic canopy, wheel pants molded from rugged ABS white plastic, pushrod tubes and decal sheet. The 12-page assembly manual is well written, easy to follow, and includes photos of every step to guide you along. Check-off boxes precede every step to ensure you don't forget anything. Use those boxes, guys, they put them there for a good reason.

CONSTRUCTION

The first step in building the Bingo 40 is the wing. The wing is typical built-up construction and goes together very quickly. Two lite-ply shear webs at the wing root, followed by vertical-grain balsa webs out to the tip, add the strength you will need for those high-G maneuvers. Using a good sharp #26 X-Acto blade, you will get to practice your carving skills to rough-shape the wingtip blocks prior to final sanding. Take your time and watch those fingers—you'll need them for flying later!



The Bingo is pretty much an all-straight-line type of design, looks great when given a sporty "homebuilt" trim scheme. Our author finished his model with Coverite's 21st Century film and paints.

"Bones" shot reveals the Bingo's simple structure—balsa/spruce wing, sheet balsa tail surfaces and a mostly lite-ply fuselage. Wheel pants are ABS plastic. The Bingo 40 would also make an excellent floatplane, and Ace just happens to offer a set of 38-1/2 inch molded ABS plastic floats that can be put together and installed on the model in an evening.



There are no plywood wing joiners used in the mating of the wing panels, so make sure you use the dihedral sanding tool shown in the manual; this ensures a no-gap, tight-fitting center wing joint. The aileron servo is located in the left wing panel just outboard of the root rib. This

eliminates the need to cut into the center ribs, maintaining the strength needed there.

A woven cloth product from Ace called "Polymat" is used in conjunction with fiberglass to reinforce the center wing joint. Two 4-inch wide strips of Polymat are applied on each side of the center joint,



K&B .40 installation in the Bingo's nose. Covering is built up of balsa blocks, carved to shape.

overlapping them a half inch at the center. The instructions have you saturate these with thin CA, but I prefer using epoxy thinned with alcohol for this step. If you use CA, be sure to have plenty on hand, because it takes quite a bit. Also make sure you have sufficient ventilation when applying such a large amount of CA. Cut the slots in the wing and the ailerons for the CA-type hinges supplied, but do not glue them until after you have covered the surfaces.

Construction of the fuselage is the typical lite-ply tab-lock method. Everything fits together neatly and allows you to build a straight, strong and warp-free structure. Adding the upper turtledeck really brings the Bingo 40 to life and gives it its sleek lines. When gluing in the wing hold-down blocks, be sure to reinforce them with a piece of balsa triangle stock. I never trust just a butt-joint to hold a wing block, as I feel it's just not strong enough to carry the stresses during aerobatics.

I did find an error in the assembly manual. When drilling the fuel tank hatch hold-downs, the holes should be drilled 3/16 of an inch down from the fuselage/hatch joint, not 3/8 of an inch as stated in the manual.

No engine mounts are included in the

ACE R/C'S BINGO 40

WINGSPAN	56.25 in.
WING AREA	618 sq. in.
FLYING WEIGHT	5.5-6 lbs.
WING LOADING	20.5-22.4
	oz./sq. ft.
POWER25-.45 two-stroke,
	.40-.50 four-stroke.
RADIO	Four channels required.
CONSTRUCTION	Built-up, balsa
	and lite-ply.
SUGGESTED RETAIL	\$95.95.

Produced by Ace R/C, 116 W. 19th St.,
Higginsville, MO 64037-0472.

Bingo 40 kit; I used two aluminum beam mounts I had lying around and these worked just fine. A cowl is built up from 3/8-inch balsa blocks tapering to a 2-1/2 inch spinner up front. Temporarily install your servos and install the pushrods for the rudder and elevator. Also run the linkage for your throttle.

Construction of the tailfeathers is next. The horizontal stabilizer and elevator surfaces are built from 1/4-inch sheet balsa; the fin and rudder are built using 3/16-inch balsa sheets. Construction of both is similar and consists of gluing together pre-cut pieces, adding tip blocks and final sanding. Elevators are joined with a 3/32-inch wire, the surfaces are hinged and you are done. Quick, simple and efficient.

When it came to constructing the wheel pants, I wanted to try a new technique I read about. First I tack glued the ABS halves together using thin CA, but instead of using also thin CA to saturate the fiberglass tape for the center seam reinforcement, I used Sig's "Sig-Ment" adhesive. Spread a thin layer of Sig-Ment on both sides of the center joint and let it set for about a minute, then put your fiberglass strip on. Complete the job by adding a little more Sig-Ment and rubbing it into the cloth. The cement reacts with the ABS and forms a very strong bond. Also, your finger will not stick to the

tape and pull it off like it would with CA. Wow, what a difference! Give it a try.

FINISHING

To cover my Bingo 40 I chose Coverite's 21st Century film. I had never used this product, so I was anxious to give it a try. Using Coverite's handy pocket thermometer, set your iron at 250 degrees and tack down your covering. When you are ready to final shrink, turn it up to 325 degrees and go over the seams and open areas to complete.

The turtledeck was probably the most difficult part to cover, but the Coverite film made this a breeze. I had some pretty good wrinkles which I did not think would completely come out, but when I used my heat gun they just disappeared. I was amazed at just how much this film shrinks. If you have not given this product a try, do so—it's great. The plastic wheel pants were lightly sanded, then primed and painted using Coverite's Black Baron paint. Like the film, this gave me great results also.

Installing the radio (I used my four-channel Futaba Conquest), engine, fuel tank and checking the CG completes the assembly. Remember to check side-to-side (lateral) balance as well as nose-to-tail (longitudinal) balance.

FLYING

Flying the Bingo 40 is pure excitement! Ground handling is excellent, although with its very low stance I had to remove the wheel pants to accommodate the grass field I was flying from. Takeoff was straight and true and with a couple of clicks of right aileron trim, the Bingo 40 was ready for action. The airplane performs all basic aerobatics with ease and has no bad habits. When power is cut, stalls are straight ahead with no tendency to fall off to one side or the other. Vertical performance is good, but installing a Schnuerle ported .46 would really enhance the Bingo's capabilities. Landings are easy, but be sure to throttle back on your approach because the model has a surprisingly flat glide approach.

In conclusion, I cannot say enough good things about the Bingo 40 from Ace R/C. With a suggested retail price of \$95.95, you can't go wrong with this one. Happy flying! **MB**



In the February '93 "Plane Talk" column we ran these photos of Jim Stevens' "kit bashed" Bingo, in which he designed his own set of biplane wings and can switch from monoplane to biplane and back in a matter of minutes. On the biplane version, the wire cage fastens to the sides of the fuselage with nylon bolts; no interplane struts are used. Shows what you can do with a little ingenuity. Creative Bingo 40 builders might want to do something similar.

BIG BIRDS AT THE 1996 NORTHWEST MODEL EXPO

As expected, the 15th running of the Mt. Rainier R/C Society's big annual model show brought out a whole new crop of Big Bird related kits and accessories.

Due to circumstances beyond my control, I was unable to cover the '96 Northwest Model Exposition as thoroughly as I usually do. So what I've tried to do instead is concentrate on what I consider the best of the best.

To my mind, the best new booth at the 1996 Northwest Model Exposition was, without a doubt, that of Air Hobbies. This company offers an extensive line of Sachs Dolmar sport engines, including 2.4, 3.2 and 4.2 cubic inch single-cylinder and 5.0, 6.4, 8.0 and 11.6 cubic inch opposed twins. Competition engines include a 4.6 cubic inch twin for biplane racing, a 6.0 cubic inch twin for IMAC aerobatics and Formula One racing, and an 11.6 cubic inch twin for unlimited racing.

Air Hobbies' Sachs Dolmar engines are ready to run, out of the box. Each is supplied complete with a custom muffler mount system and isolation mounts. The ignition is a throttle-coupled CD type. The crankcase is tapped for a smoke system and the Walbro carburetors have velocity stacks. All Air Hobbies engine heads are painted with red high-temperature (1400 degree) VHT paint for a very distinctive look. A one-year limited parts and labor warranty is standard.

Air Hobbies has an extensive line of accessories available and can install any of their standard accessories on most

any gas engine you may already have. For information, contact Air Hobbies, 1621 Liberty Ridge Rd., Concord, NC 28025; (704) 788-9042 (phone/fax).

Bennie Phillips, one of the northwest's most enthusiastic Big Bird proponents, represented Air Hobbies during the Model Expo and did a great job answering questions and displaying Air Hobbies' wares. Bennie was also exhibiting Bee Gee Industries' two sizes of self-contained Big Bird electric starters. The starter boxes contain two 12-volt batteries, leads and starter. Two switches on the starter boxes allow you to use 24 volts in the starting

mode or 12 volts for accessory use such as radio charging or fuel pump operation. The regular large starter features a Miller/Sullivan geared starter; the extra large starter is actually a go-kart starter with handles 180 degrees apart. Both starters are very professional in appearance.

Bee Gee Industries also produces a pre-built 96-inch Laser 200, framed up and ready to cover. The Laser is not inexpensive, but if you have little building time, a ready-to-cover plane may work for you. Contact Bennie Phillips at Bee Gee Industries, 17336 40th Ave. S., Seattle, WA 98188; (206) 246-3537, for complete details on his products.

A couple of years ago Bruce Tharpe moved back to Rogue River, Oregon after a stint with Sig Manufacturing, where he designed a few of their great kits, including the 1/3-scale Spacewalker. Bruce has now formed his own company, Bruce Tharpe Engineering. His first kit under the BTE label was the Venture 60, a 72-inch span low-wing sport plane.

Bruce's second design for BTE, the Flyin' King, is a high-wing sport utility plane that, at 80-inch span, meets the wingspan requirement for a Big Bird. The Flyin' King's wing has 1,280 square inches. Weight should be about 9 pounds, and it's designed for .60-.75 two-strokes or .80-.90 four-strokes. (John Eaton of



Bennie Phillips did a fine job of showing off Air Hobbies' line of Big Bird engines, produced in a variety of single and twin-cylinder, sport and competition versions. These engines use Sachs Dolmar power heads with their own custom-made crankcases and crankshafts. Too bad we don't have a close-up photo so you can see what they look like.



■ LEFT: J&K's John Eaton is holding Bruce Tharpe's new "Flyin' King" 80-inch sport utility plane. John would like you to try his 25cc Homelite gas engine in one of these sport ships.
 ■ RIGHT: Duayne Sims is showing the fiberglass fuselage for his new Ultimate Sport RC Lancair IV. The kit is about 23 percent the size of a full-size Lancair.

J&K Products feels that one of his 25cc Homelite gas engines would work well in the Flyin' King too. I saw John's little Homelite perform during a fly-in at Medford, Oregon and I would have to agree with him.)

Bruce will have the Flyin' King kit in production and ready for shipment in the summer of 1996. I was impressed with the wood and the accuracy of the wood cut-

ting in the kit. I hope BTE will include some scale planes in their line one day. I'm sure they would be great flying planes, just as all of Bruce's designs have been. Bruce Tharpe Engineering, 13555 E. Evans Creek Rd., Rogue River, OR 97537; (541) 582-1708.

I had time to talk with Duayne Sims and discussed the new additions to his Ultimate Sport RC display. Duayne's new Yak 55 M is a real show-stopper and may be very competitive in turnaround pattern. The Yak has an 85-inch wingspan and 1,500 square inches of wing area. With a 3.0-3.7 engine in the nose, the weight should be around 19-21 pounds. The Yak has a fiberglass fuselage and cowl and aluminum landing gear and wing tube.

Duayne was also displaying his new Lancair IV, which has an 81 inch, 790 square inch wing and features a fiberglass fuselage, cowl and hatch. It is approximately 1/4.35 scale (23 percent of

full scale). Duayne powers his with a YS 1.20 four-stroke, but any engine in that power range would work well. The plane may weigh from 8.5 to 11.5 pounds, depending on how it's built. Ultimate Sport RC can be reached at 139 E. 2nd S., P.O. Box 727, Soda Springs, ID 83276; (208) 547-3742, Fax (208) 547-3700.

Century Jet Models has a lot more than jets to offer the Big Bird enthusiast. Bruce Sanders went over CJM's new Sea Fury for me and explained the kit's finer points. It's a little over 1/5-scale in size, span is 87 inches, wing area is 1,435 square inches, and the length is 78 inches. The engine size is in the 1.8-4.2 cubic inch range. The kit includes a pre-primed fiberglass fuselage and foam/balsa flying surfaces, a formed canopy and a spun aluminum spinner. The Sea Fury is available as a basic kit or as a deluxe kit that has all the necessary balsa and laser-cut plywood parts, detailed cockpit, pushrods, hardware and more.

CJM custom tailors their kit packages to the needs of the modeler. You can order a semi-kit and cut out your own parts, or a deluxe kit that has all the wood laser cut, or a super deluxe kit with landing gear and tail wheel. Decals are available separately or with the kit.

Century Jet Models' Expo '96 booth also included a very nice 1/5-scale Spitfire, available in Mk. XXI, Mk. XXII and Mk. XXIV versions. The Spitfire has an 88-inch wingspan, is 78 inches long, and takes 1.8-3.7 cubic inch engines. Weight should be 18 to 20 pounds. For information, contact Century Jet Models, 11216 Bluegrass Pkwy., Louisville, KY 40229; (502) 266-9234, Fax (502) 266-9244.

Northwest Hobby Technologies' Carl Hickey says his company has three new Big Bird designs ready to please the modeling community: an 80-inch Keith Rider R-4 Firecracker at 10 pounds, an 80-inch Gee Bee Model Z at 15 pounds, and a 82-inch P-51 at 15 pounds with Robart retracts. Carl says the R-4 and Gee Bee are approved for Texas rules Thompson Trophy racing and that a group of Whidbey Island race



■ LEFT: Two of Northwest Hobby Technologies' newest planes are a Keith Rider R-4 Firecracker (top) and a Gee Bee Model Z. Still in the planning stage are two more racers, a Caudron and Laird Turner. These beautiful planes all qualify for Texas rules Thompson Trophy racing.
 ■ BELOW: James O. Olson took well-deserved top honors with his Beech 18. The simulated aluminum skin was extremely well done. Power is two Zenosah G-62s, and the big twin tips the scales at 45 pounds.



fans are attempting to set up a Thompson Trophy Race with Texas rules in our area. Minimum weight for these races is 22 pounds. An Aerrow 75 would be a competitive engine.

Carl now has a Laird Turner and a Caudron racer on the design board, so Northwest Hobby Technologies will certainly be into Thompson Trophy racing in a big way with an exceptional group of aircraft designed especially for the event. You can reach Carl Hickey at Northwest Hobby Technologies, 322 E St. E., Auburn, WA 98002; (206) 939-0884.

Last year Byron Originals introduced their new Mustang 50 engine, and it has been selling well. This year at the Expo, Byron introduced their new on-board starter and alternator for the Mustang engine. They had a Mustang 50 mounted on a test stand with the on-board starter and alternator clearly visible. The engine was tuned to perfection and would spring to life every time with just a touch of the starter. The unit appeared to be very well made and should give the discriminating modeler years of good service. Byron Originals, P.O. Box 279, Ida Grove, IA 51445; (712) 364-3165, Fax (712) 364-3901.

I'm sorry to say that my good friend Chick Young, owner of Excalibur Model Supply, was flooded out of his home and business during the big floods of 1996.



Bob Benjamin took 1st place in electric scale with this Platt Zero, powered by a geared Astro 90 running on 36 1800-mAH cells.

Chick was located in what he thought was a fairly safe area, but unfortunately Mother Nature took out the dike protecting Chick's neighborhood. Local modeler Loni Stuck took Chick in until the insurance company comes up with a new home for Chick. Dave Baxter and several other members of the Mount Rainier Radio Control Society washed all of Chick's tools and equipment and several others sprayed them with WD-40. Chick asked me to thank everyone for their many kindnesses during this

stressful time.

Chick says he will taking orders for his Excalibur engines again in a few weeks, so don't give up on him. It just goes to show that there are some exceptionally good people in our hobby.

I hope to see you at the Big Bird hangar next time. Until then, feel free to drop me a line and a good photo of your latest project. Bruce Edwards, 8304 53rd St. Ct. W., Tacoma, WA 98467; (206) 564-4416. MB

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PRODUCTS IN USE

■ By Eloy Marez

THE AIRTRONICS "STYLUS" RC SYSTEM

Everyone is talking about this hot new radio, a state-of-the-art computer system aimed at competition fliers or anyone who flies sophisticated models.

The eight-channel "Stylus" is Airtronics' answer to a question that has been posed to them many times in the past: *When are you going to come out with a real "pattern" radio?* Because it definitely has all of the functions associated with such systems—and more than a few improvements. This isn't to say, though, that the Stylus is only for those involved in world-class pattern competition; the system has many features that can be used to great advantage by all who fly sophisticated models—scale, ducted fans, sailplanes, helicopters—whether in competition or not. And while other manufacturers offer separate dedicated systems for fixed-wing and rotary-wing models, the Stylus incorporates the ultimate requirements for both. There will be no need in the future to purchase another radio just because your interests grow or change.

The Stylus is in the class commonly known as "computer" radios. All of its features and functions are commanded through a large variable-contrast LCD screen with very legible 3/16-inch high lettering. A "Display On" switch allows one to turn on all programming functions without transmitting a signal—a nice feature during the learning curve and at the field when changes need to be made while someone else is in the air on your frequency. None of the transmitter's auxiliary switches are labeled, since they can all be assigned to any specific function one desires. The system is available in either PCM or FM (PPM) versions. Changes between Mode I and II can be made easily and rapidly. The transmitter uses a proprietary plug-in RF module (earlier Airtronics modules are not compatible), and in the PCM mode will work only

with the companion 92185 receiver. The Stylus is currently available on all aircraft 72 MHz frequencies; 50 MHz versions will follow sometime in the future.

Of a number of one-of-a-kind features designed into the Stylus, the most significant is the use of what is referred to as the "Memory Card System." These are small inserts, 3/32 inch thick by 1-11/16 inches wide by 2-1/8 inches long, that fit into an opening in the lower right side of the transmitter, and which vastly expand the capabilities for each type of model—power, sailplane and helicopter—and includes specific features required for each of these disciplines. To include them all here would take far too much space in the magazine, but a complete list is available for the asking from Airtronics—their new address and phone number are listed at the end of this article.

In addition, there is a Storage Memory Card, on which

you can expand the setup information from the basic four models up to 50. *Fifty!* I know, that sounds like overkill, though I do know guys with as many as 20 airplanes, and you can have slightly different programs for the



The 1024 PCM Stylus is Airtronics' entry into the computerized "pattern" radio field. Though it also includes all of the functions required for competition sailplane and helicopter flying. The Stylus transmitter is a very impressive looking unit, in black and chrome plastic, with a myriad of controls and switches—it will rate high with those who purchase their RC equipment for its snob appeal!



LEFT: All flight data is displayed on a highly visible LCD screen, and is entered by the logically marked buttons. The "Display On" switch on the right turns on the programming without the transmitter putting out a signal—handy for on-the-field programming changes. RIGHT: Unique to the Stylus are the Program Cards—small, completely solid state inserts which greatly expand the transmitter's capabilities and tailor it for one specific type of model. Cards are available for Aero (shown), Glider, and Helicopters, plus one that expands the model memory capacity from four to 50!



The Stylus Memory Cards are inserted into a small door in the transmitter which also provides access to the battery.



The Stylus transmitter uses a proprietary new RF module; its cavity incorporates raised projections that protect the rear of the case when it is laid on the ground. Just below the module is the plug for the supplied Direct Servo Connection (DSC) cord.



The proportional auxiliary channels are not controlled with front-mounted knobs as is often seen, but by more efficiently located slider controls on the upper sides of the transmitter.

same airplane for experimentation or for varying weather conditions. As a matter of fact, there is an "Alternate Setup Switch" available by which you can switch between two completely different flight programs while in the air.

Programming the Stylus for basic four-channel flying proved no challenge at all, only four logically labeled pushbuttons being involved for it and all other program inputs. It's only when the more involved functions are introduced that one needs the manual. The manual itself is 147 pages long, but fear not, you won't have to understand or even read all of it to go flying, as separate sections are devoted to power, sailplane and helicopter models. Best of all, the Stylus manual was and is being worked on by experienced fliers right here in the good old US of A!

RECEIVERS

The receiver for the PCM version of the

Stylus is a new Airtronics design, the 92185. Externally, it's about the same size and weight as other Airtronics receivers of recent years, but it's the only Airtronics PCM receiver that will operate correctly with the Stylus transmitter; previous Airtronics PCM receivers, or those of any other brand, won't. The servos plug into one end, the crystal into the other. Internally, it also resembles recent Airtronics receiver designs, being of all surface mount robotic assembly.

The receiver furnished with the FM (PPM) version of the Stylus is the 92085. It's identical in size and weight to the 92185

and shares all of its other physical features. All other Airtronics FM receivers will work with the Stylus, as will those made by JR and others designed for use with Airtronics transmitters. Additionally, the Stylus can be programmed to operate on what is referred to as PPM/INV, allowing the Stylus transmitter to be used with FM receivers manufactured by Ace, Futaba and Hitec.

A word about the Fail Safe system, available only when the PCM mode is in use, is in order. In case of interference, Fail Safe is selectable between programmed servo settings, or the last given inputs. If the interfering signal stops, normal control is then regained. In addition, there is an airborne battery Fail Safe which warns the flier when that battery is discharged down to a dangerous level (4.7 volts) by pulling the throttle back to idle for 1/2 second. Obviously, you're being told to land!

SERVOS

Stylus systems are available with four different Airtronics servos, all high-performance

ball bearing types, from the general-purpose 94322 to the coreless motor 94732 and 94735 to the 94141 micro. Actually, there's an Airtronics servo available for most anything you will ever care to fly, regardless of size. Other Airtronics accessories include electronic speed controls for electric aircraft and helicopters, and your choice of gyro systems, including a new piezo-based solid state version.

BATTERIES

As is the case with all Airtronics radios, the Stylus comes with Sanyo "Cadnica" NiCd batteries. The transmitter uses a standard eight-cell 9.6-volt pack, rated at 700 mA-H capacity, for a claimed operating life of 2-1/2 hours. Its voltage is displayed on the LCD screen; an audio signal sounds if the battery is allowed to drop to 9.1V. Since there's no series diode installed, voltage and capacity measurements can be made directly when required. Airborne batteries come in your choice of 700 or 1000 mA-H sizes.

There's still another battery to deal with—though not very often. The Stylus transmitter uses an internal lithium back-up battery to maintain your programming inputs if the main NiCd battery is allowed to go completely dead, or is re-



The new 92185 PCM receiver does not differ greatly from previous units in external appearance, but is a completely different breed of cat inside and works only with the Stylus Tx.

moved for any reason. These lithium batteries have a lifespan of some five years in this application, and it's recommended that it be replaced before that time expires—a matter I would leave up to Airtronics trained technicians.

AND FINALLY . . . PRICE

We cannot expect a system as advanced and versatile as the Stylus to be cheap, though actually it is available for less than I first expected. Prices vary according to

the servo type and number, the airborne battery chosen and whether you go for the FM or PCM version; from a minimum \$599.95 for the FM setup with four 94322 servos and a 700-mA-H airborne pack, to \$819.95 for the PCM with five 94735 servos and a 1000-mA-H pack. The Stylus transmitter is also offered by itself (with RF module) for \$449.95. The 50-Model Memory Card and Feature Upgrade Cards are extra. Like everything else these days, the prices will vary from shop to shop, and one should take the time to compare. In a departure from its normal practice, Airtronics is making the Stylus available directly from them.

In retrospect, my first factory assembled RC system, an Orbit 7-14, as basic as a transmitter can be, cost me \$700 . . . and that was in 1967. If you and your aircraft are capable of utilizing the advanced features of the Airtronics Stylus, it really isn't so expensive, is it? Less so when you consider that there's little chance that it will become obsolete in the future!

If you haven't yet got the news, Airtronics is in a new home at 15311 Barranca Parkway, Irvine, CA 92718; (714) 727-1474, fax (714) 727-1962. MB

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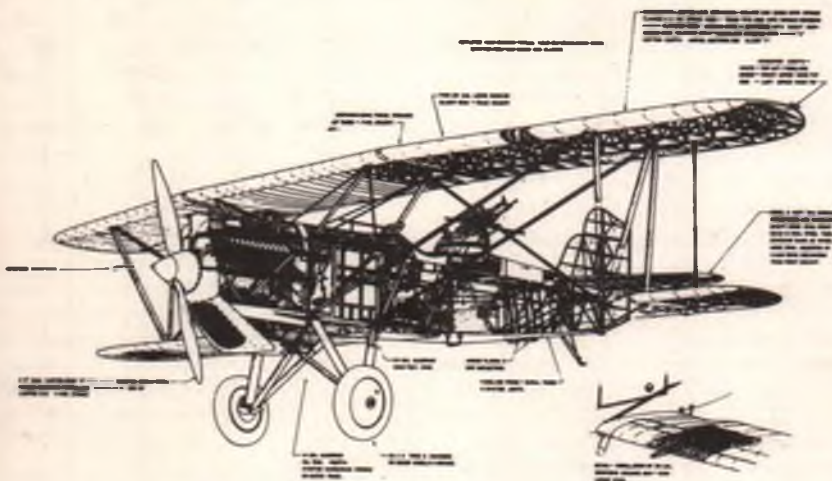
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PLUG SPARKS

BY JOHN POND

•Old Timers in Sweden •The Infamous "8-Ball Club" •Model and Engine of the Month

The surprising success of the Swedish SAM 67, "Old Timer" can be summarized in one word: teamwork. The *Olde Tymers* newsletter's (now a class act) progress in size, news, and photos can be attributed to two editors, Sven-Olov Linden and Sten Persson, who alternate each issue and try to outdo each other. Backing up these editors is Sven's good friend, Bertil Dahlquist, a retired photographer. Distribution is handled by Kurt Sandberg, and as Sven notes in his letter, if the boys in Halmstad had not come to his aid, he doubts if the newsletter would have continued publication.

What struck this columnist's eye was Photo No. 1. This writer was so impressed by the way the older members integrate the younger people into the action. At the left, the winner of the Small Rubber class, Anders Sjoberg, is greatly pleased to receive his plaque from Lisa Hansson (looking a little shy), while others applaud. Standing behind is her grandmother, Berit Hansson, the wife of a very active modeler, Lennart Hansson, who also organized the Nats Championships. Sven-Olov, standing

behind the plaques on the table, is hugely enjoying the young ones being made a part of the activities.

It is most astonishing the way SAM 67 has grown, starting in 1935 as the "Vingama MAC" out of Stockholm. Many of the present members were boys at that time. Sune Stark, one of the founders, won the Wakefield Trophy in 1951 and became the official World Champion. Believe it or not, he flew his original Wakefield to 8th place in London in 1937. Sune's design featured a long flat center section with sharply upturned tips. Gave the boys quite a surprise in France in 1938 with a whistling climb. However, Jim Cahill won with his long rubber motor run in his Clodhopper design.

The distaff side of modeling is greatly encouraged: Sofia Wivardsson, seen in Photo No. 2, has been flying competition models for many years. She's pictured with a Casano Stick with which she has won more than her share of prizes.

Perhaps the most notable tendency among the Swedish modelers is the terrific amount of cooperation and work in putting on their meets. An ex-

ample of this effort is best illustrated in Photo No. 3 with Poul Rassmussen of Denmark launching his 1937 Korda Wakefield from a portable platform. This lightweight launching pad was designed and built by Bert Dahlquist. The many pieces are cleverly fitted and clamped together to form a very stable takeoff area. (It's worth mentioning that Dave Baker and his English boys made up plywood stands in circular form and were painted in English roundels. Real tricky!)

"8-BALL" MODEL MANUFACTURERS FRATERNITY

Seems so long since Walt Billet died some years ago, but thanks to Bud Tamm, I was reminded of the days when Walt was a driving force in the '60s and '70s of the AMA organization.

Walt Billet, a Minneapolis hobby dealer, felt there was no real communication between the industry members at the AMA Nationals and hit on the idea of the "8-Ball Club" for those manufacturers wanting a recreation outlet at the Nats in the form of the 8-Ball Banquet.

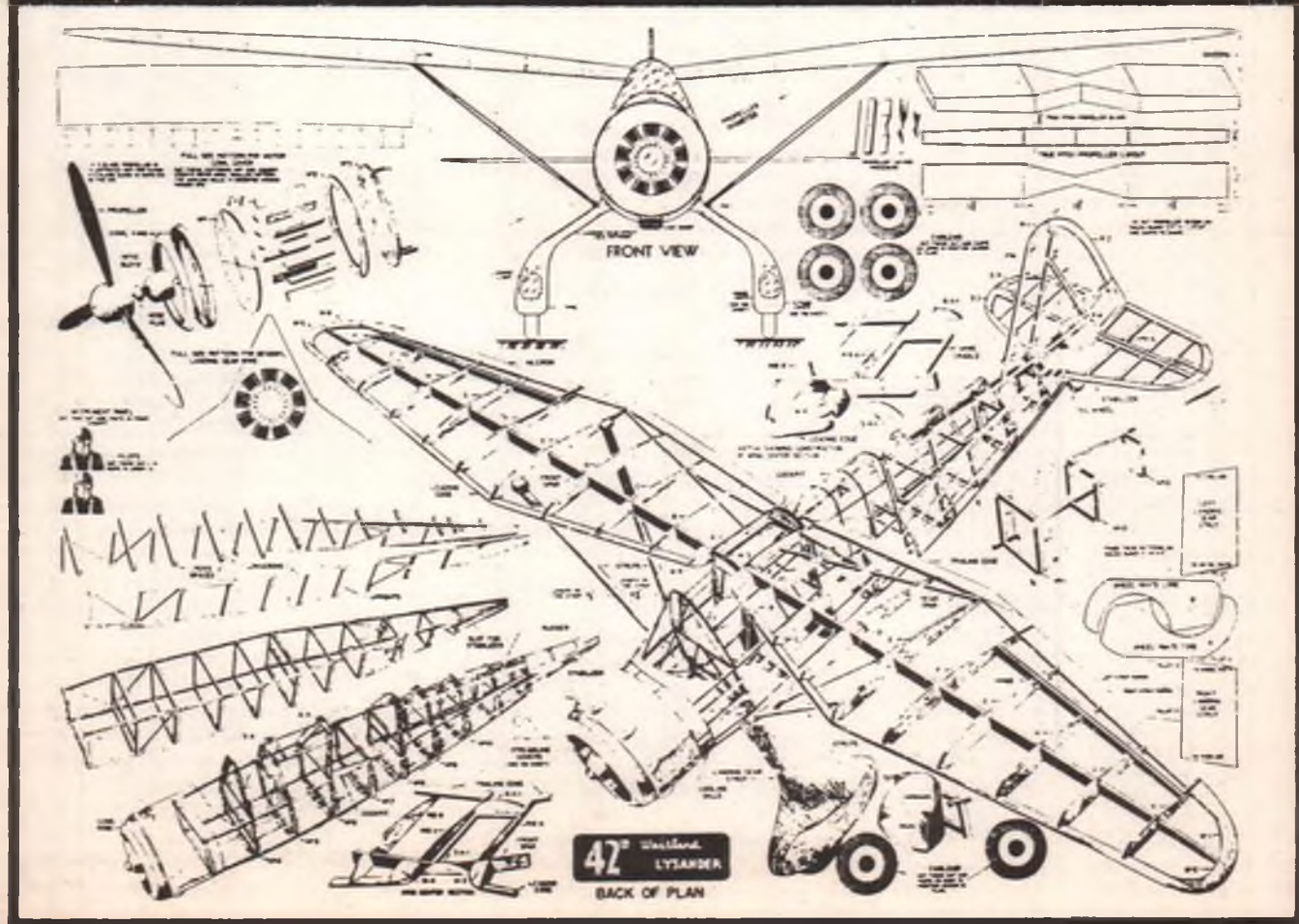
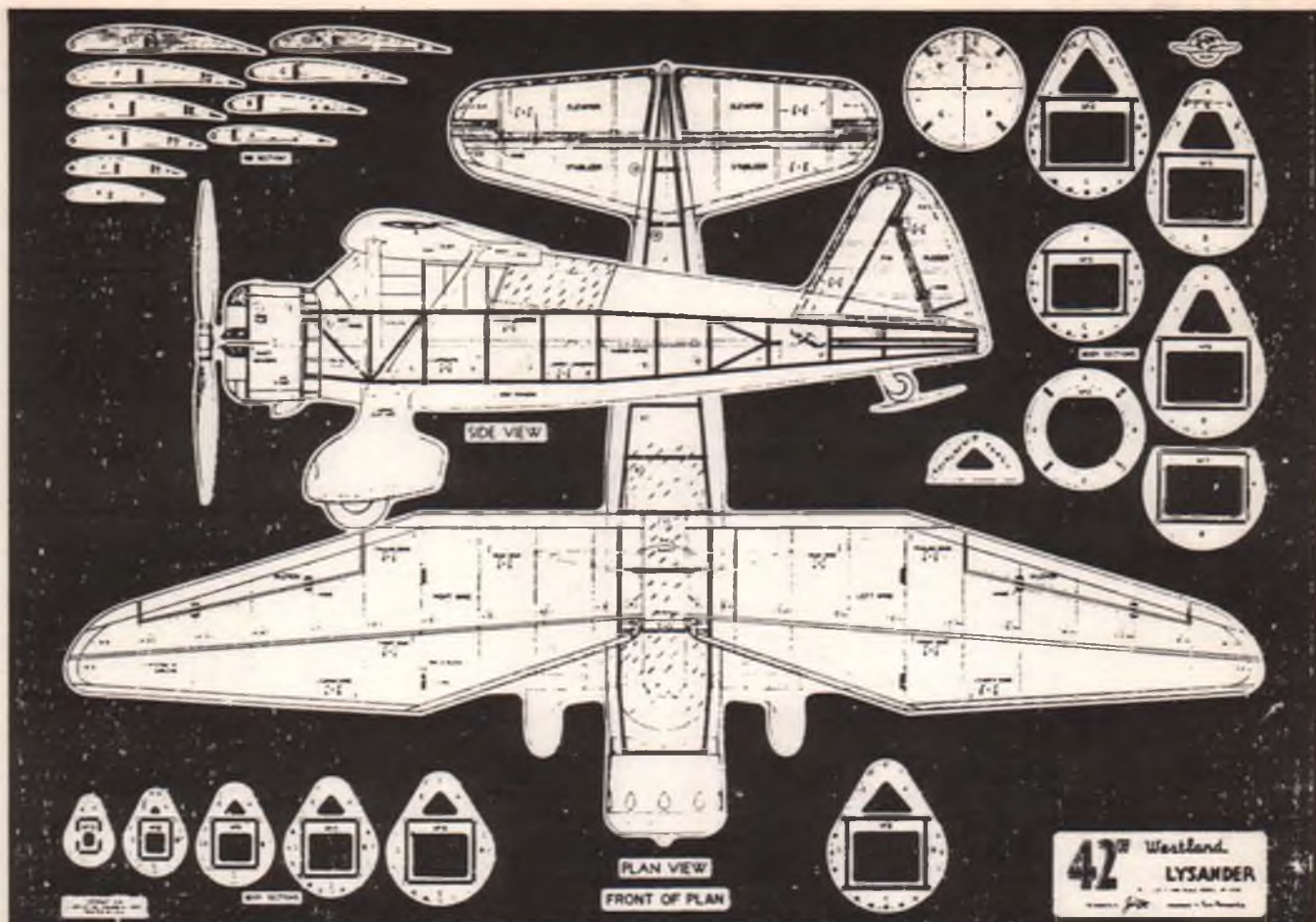
Walt faithfully buttonholed everyone at the Nats. There was no escaping his zeal (yes, he got my dough, too). For your \$10 (I think it was more) you received a membership card and an 8-Ball pin which you were required to wear at all times. Failing to do this, and if caught by another member, the dinner was on you that night. Unfortunately, after Walt's death, the 8-Ball Club gradually deteriorated for lack of leadership.

This writer can remember very clearly when John Brodbeck of K&B got nailed by the grand maestro, Billet, who promptly had John take him to dinner. There was nothing mean intended, as it turned out to be a game to identify your fellow member and catch him if you could.

From this modest start, Billet built an organization that had quite a bit of influence with the U.S. Navy and the sponsor-

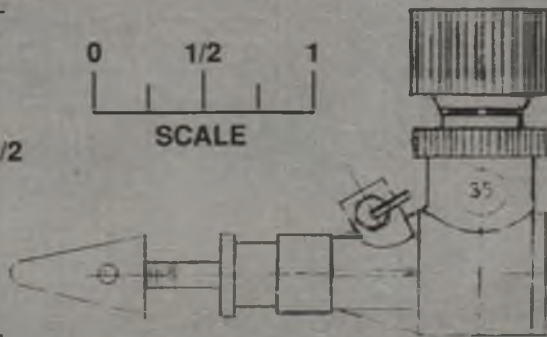
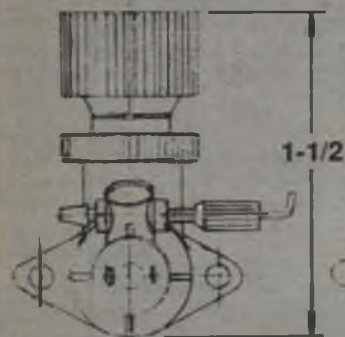
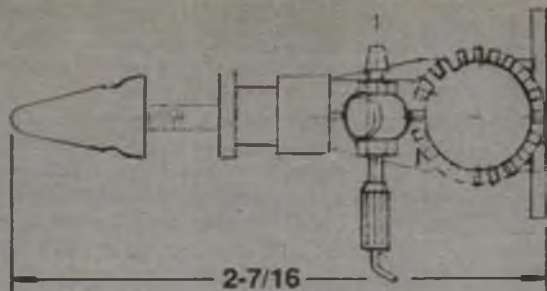


Photo No. 1. Prize giving time at the Swedish Champs. Anders Sjoberg receives a plaque from nine-year-old Lisa Hansson. Photo by Bertil Dahlquist.



JOHN .35cc

Drawn by
John Pond



ENGINE OF THE MONTH

ship of the AMA Nats at Naval Reserve Air Stations. When Walt died rather unexpectedly, AMA lost one of its biggest boosters.

Walt ran a unique hobby shop that supplied ready-to-fly models built at his model shop. One of the best-known modelers working for Billet was Ray Van de Walker, who later moved to California and formed a partnership with Sal Taibi, calling the company Competition Models. When interviewed before his death, Ray recalled that he built a flock of Dennyplanes (complete with engine, ready to fly) and numerous Berkeley Super Buccaneers. The price of \$100 may have seemed high, but in retrospect, it was a real bargain. All you had to do was to fuel it up and lose it!

Another well-known modeler who built ready-to-fly models for Billet was Fred Emmert. Fred eventually migrated to the West Coast to work for Lockheed out of Sunnyvale, California. He has been a member of the AMPS, SAM 32, for many years and has never lost his zest for FF Old Timer models. His main love is rubber models. Several years back, at the Reno West Coast SAM Champs, Fred flew a twin pusher that lost by a very narrow margin, disappearing into the hills.

MODEL OF THE MONTH

This month for a twist, we are going to feature a rubber-powered scale model as designed by Joseph O. Ott. Newcomers may not be familiar with Ott's activities, but Joe was extremely active in model design, plans, and particularly innovative ways to construct models.

Such is the 42-inch Westland Lysander which at first glance seems like a difficult model to construct, but with the Ott-O-Former style of construction, things are con-

siderably simplified. Ott first introduced the "basic box" system where the formers are added to form the proper shape and outline with the stringers and sheeting added. With a little judicious sanding, a very good looking model is constructed.

Joe Ott was a prolific producer of kits, running as high as 5,000 a day during the war years. In substitute materials, Joe's foresight beat all the competitors with the formers of thin card weight paper. Ott employed a lot of cedar to finish his kits as balsa was on the strategic materials list.

Joe, although in the modeling game 10 years prior, attracted a lot of attention with his "Sky Flyer" series of plans that were published in the early 1929-32 issues of *Popular Aviation*. For 10¢, you could get one of his plans postpaid. Joe stated (in an interview at the Pond domicile) that the amount of profit in those days was small, but Joe was selling over 1,000 plans every month!

After 1932, Joe started producing his own kits up to and including the war. Sometime in the postwar years (1950 seems like a good date), Joe retired to go into the business of designing material moving equipment. His bright and innovative mind devised many of the packaging lines we take for granted these days. Now you know who thought of those endless lines of coke, etc. that seem to produce unending sup-



Photo No. 2. The girls can really fly too! Sofia Wivardsson is seen with a hot performing Casano Stick. Great stuff! Bertil Dahlquist photo.



Photo No. 3. Danish competitor Paul Rasmussen uses the portable takeoff ramp to launch his 1937 Korda Cabin Winner. Dahlquist photo.

plies of bottled or packaged foodstuffs. Although Joe Ott died about six years ago, this writer still misses his enthusiasm for new ideas. His last design, the "Golden Eagle," was an RC model that featured his innovative radio transmitter that described all the stick motions, up, down, etc. This idea was intended for the rank beginner in radio. Too bad Joe died so suddenly as the set ideas had merit.

ENGINE OF THE MONTH

This issue we go from the ridiculous to

the sublime in presenting one of the smallest diesel engines being produced, a .35cc engine, approximately the same displacement as a Cox .020. This is after we have presented large engines like the 1.35 cu. in. Mercury Avion and the first commercial model gas engine, the 1911 "Baby," approximately 7.5 inches tall.

When Art Watkins attended the English 1077 SAM Champs at Shuttleworth, he made some trades with engine collectors, obtaining an Elfin 1.48, E.D. 09, a Davis Charlton, and the engine being featured this month, the John .35cc as designed by Czech modeler Carcic. This unique engine featured vertical cooling fins. When grasped it could be rotated, giving a variable compression head.

Although other John engines have been produced (round, square heads, etc.), this is about the most attractive small engine this writer has seen to date. Inspection of the engine reveals it has a socket type piston with the piston and connecting rod. Also noted was the propensity for coming loose like an Arden .09. No informative literature was enclosed, but this writer assumes the same type of tool can be used to tighten up the conrod connection.

John Pond, P.O. Box 90310, San Jose, CA 95109-3310. **MB**

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ELECTRONICS CORNER

BY ELOY MAREZ

● Peizo Gyros— How Do They Work?

● More on NiMH Batteries

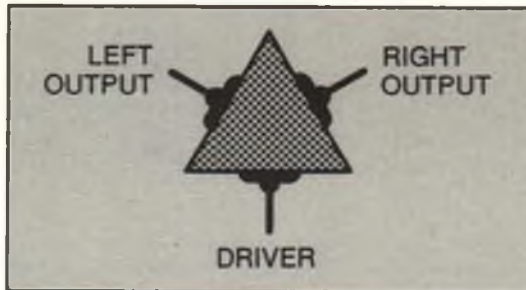
● A Must-Have RC Electronics Book

Before we delve into things electronic this month, let us exercise your imagination. You're off in the Space Shuttle, and can view the whole earth off in the distance. At the very bottom, being the South Pole, you can see a single airplane, seemingly flying around on its back, dropping parachutes up. That was just

one of the many adventures I had during my USAF flying career.

There were many things to be learned before we became successful at it, such as the fact that normal parachutes disintegrate at 60 degrees below zero! This was before satellite navigation, so entirely new navigation techniques had to be learned, because from the South Pole, there's only one direction: north. We used a gyro-compass, a device that integrates rate of turn with speed to determine heading and position. Tricky stuff, and in retrospect, like so much of the equipment that I used for so many miles, somewhat crude. But it worked—thanks to the rate gyro.

Which brings us to what is called a "rate gyro" as used in model helicopters and even some airplanes. Because of my



Representative diagram of the Murata-Erie "GyroStar" piezo element as used in the latest RC gyros. Further explanation in text.

previous use of rate gyros to establish a heading in actual degrees, I find the term erroneous as applied to RC uses. In our application, we're not really concerned with the actual direction the aircraft is headed in, only on its keeping that heading unless we tell it different. Looks to me like what we use is simply a "gyro." (I wonder what any of you out there more intimately involved with the use of gyros outside of RC will have to say about this.)

That said, let's have a short discussion about the new RC gyro technology, the so-called "piezo" or "solid state" gyro as they are sometimes referred to. The word *piezo* is derived from the property, called a piezoelectric effect, of some quartz crystals to generate a voltage when subjected to a mechanical force.

To review, the now old-

fashioned mechanical gyro incorporates a motor-driven flywheel, which wants to remain in its original axis and resists any force to change it. In RC, some electronics are involved to measure this resistive force and to generate a signal to drive a servo to compensate for the unwanted motion.

The flywheel gyro is easy to understand, being something we have seen or can visualize. Understanding the piezo gyro is not quite as simple. Hopefully the enclosed diagram will help somewhat.

Actually, two such devices have been developed, but as far as I know all RC piezoelectric gyros now available use the one shown; it's called a "GyroStar" and is manufactured by a company named Murata-Erie. Within the GyroStar are found three sections of piezo material arranged in a triangle; upon application of the proper drive signal, two exact alternating signals are generated. These signals remain the same as long as the aircraft travels in the original direction. Now, if a change in heading is made, the forces applied to the opposite output sides of the triangle will differ, causing a difference in the output signals. It's this difference that is read by the electronics and by which they generate the required servo output.

Now, aren't you glad you read MB and EC? You'll be the only guy out at the flying field who knows how these things work!

"These things" are the latest in the RC gyro technology, and to my knowledge are available from Airtronics, Futaba and JR. They're a little pricey compared to the motor-driven gyros, but those who are using them swear that they do provide greater stability and reduced reaction time. Plus, not having a flywheel or other moving parts, they should outlive the

Great Planes is marketing their "HydriMax" NiMH batteries as single cells (with and without tabs) and in several differently configured pre-assembled airborne and transmitter packs. You can get flat and square 4.8V packs, flat and bump 6V packs, and 9.6V square Tx packs. The 4.8V flat and 9.6V square packs are also available with Futaba J connectors already installed. Eloy discusses the pros and cons of NiMH batteries in this month's column.





George Stalmer's 8-1/2x11 book removes a lot of the mystery about RC electronics of all types. Comes highly recommended by our columnist—see text for ordering information.

others by far. I'm interested in your experiences with these almost science-fiction devices.

NiMH BATTERIES

Another relatively new product on the RC marketplace is the Nickel-Metal-Hydride (NiMH) battery. So far, only one supplier, Great Planes, has made them available to modelers, but they are widely used in the electronics industry. And, like Nickel-Cadmium cells which bear such trade names as NiCad (Saf), Cadnica (Sanyo), and Ultramax (Energizer), NiMH cells come with a variety of trademarked names, such as Great Planes' HydriMax, Twicell (Sanyo), Hydritech (Energizer), and others.

To the ultimate user, the basic battery design is similar, but the materials and the electrochemistry are entirely different. Of major interest is that NiMH batteries are "green," a term now in widespread use for products that are environmentally safe. In contrast, the cadmium and other chemicals used in NiCd battery production are not popular at landfills!

To the battery user, NiMH batteries have an immediate and obvious advantage: in a size similar to NiCds, their charged capacity—that is, their

An interesting electronics-related product is Liquid Electrical Tape as marketed by Star brite. Makes a neat, totally waterproof, protective coating for electrical connections—helps keep terminal screws from vibrating loose, too. Comes in five colors. In 1/4-pint and quart cans and the 1-ounce tube shown. For info, contact Star brite, 4041 S.W. 47th Ave., FL Lauderdale, FL 33314; (800) 327-8583.



life expectancy in a given application—is longer. For example, Great Planes' AA-sized HydriMax battery is rated at 1200 mA; the highest capacity NiCds now available in that physical size are 700 mA. Both receiver and transmitter HydriMax packs are now available.

We've already read in the model press about crashes attributed to NiMH batteries. Of course there are going to be failures; however, I wouldn't be surprised to learn that the failure was not as much an actual battery failure as it was a case of improper charging. More

about that later. Let's first take a look at some other considerations when it comes to replacing your NiCds.

In similar physical sizes, NiMH cells are more expensive than NiCds; the tradeoff is the higher capacity. NiMH cells have a higher self-discharge rate, therefore night-before or trickle charging becomes more important. They are also reportedly more susceptible to vibration. And

most concerned about. Forget what you might have read elsewhere by a flier who got a set, charged them with a normal system charger, they worked... go buy a set. No way—one test of any product or process is not enough.

In the matter of charging, there is another fact that cannot, or should not, be ignored. The experts—not me and not that guy mentioned above, but the battery makers themselves, most of whom are now producing both NiCd and NiMH cells—specify completely different charging parameters for each type. Additionally, as reported here in past issues, a large number of IC makers have developed "smart" battery charging chips. Every one of them specifies a different supporting circuitry for their IC for NiCds or NiMH. Hey, batteries and their proper care is what these people do, and as much as I respect my friends' flying or building abilities, I'm not listening to them when it comes to batteries.

As can be seen, NiMH batteries do have certain desirable qualities, and should not be overlooked. If I seriously needed what they have to offer, I would look for a modern charger which takes into consideration the unique charging requirements of NiMH batteries. I am aware of only two that are now available: Ace R/C's "Smart Charger," the same unit originally developed and manufactured by Sirius Electronics; and the Impulse 2D charger from TRC Engineering, 10707 Whispering Valley Lane, Middleville, MI 49333. They are somewhat similar in that they are both 12VDC chargers; that is, they have to be powered by a 12V battery or power supply. And they are both designed around one of those chips previously mentioned, and include the charging process they recommend.

If you want to experiment with your existing chargers, which is what I plan to do, follow the rates (16-20 hours at 100-125 mA) printed on the

continued on page 82

NiMH batteries have a significantly higher internal resistance, therefore they are not useful for high-current electric power.

A major consideration in my opinion is that NiMH cells cannot be charged at a rate higher than their rated capacity—forget those 10-minute field charges. Also, fast charging requires a charger that can detect a flatter voltage peak. That translates into a different—and probably more expensive—charger than the one you already have for NiCds.

The proper charging of NiMH batteries is what I am



MODEL BUILDING 101

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BY J.J. LEVINE

The first group of students finishes the entire MB101 program.

The eighth grade class at Simpson Middle School has just completed our Tennyson, learned how to convert it from rubber to electric and was inundated with related aerodynamics. Today (Friday) we fly! At this point I find myself both happy and sad. I'm happy because I've followed most of the students from the sixth grade and watched as they successfully built, flew and understood the aerodynamics they were taught. Some have become avid hobbyists and are going on to build and fly more complicated models. Others have the feeling of achievement that comes from participating and understanding what was once a foreign field.

However, I'm sad at the realization that this will be the last semester we spend together. They will be in High School next semester and out of my Middle School environment. They have been great students and maximum achievers. They are continuing their learning experience, and I know each one of them will be successful.

Jessie Burgin is truly a perfectionist and tremendous innovator. He took my original rough basic concept, refined and improved it, and delivered a magnificent adaptation which enables builders of the rubber-powered MB101 Tennyson Step-2 to convert it to electric power and back again to rubber, in just a few moments at the field. The pre-assembled power unit, consisting of motor, battery and switch, has a "guesstimate" price of under \$25. Pricing and delivery details should be available at the time you read this. Please send an SASE for specifics.

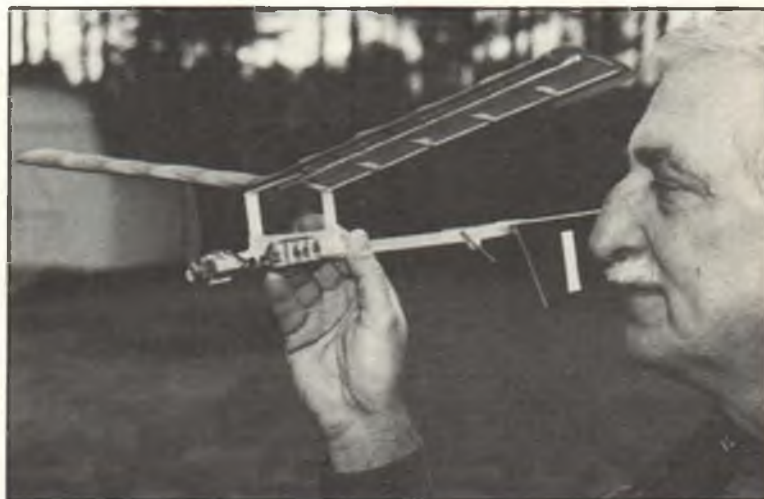
In my 50-plus years in this hobby, I have always been amazed at the dedication and gratuitous nature of those

involved. From the time the entire hobby industry could hold their national convention in the ballroom of the Chicago Sherman hotel, until now, it has always been those gifted giants that "showed us how." Some of us, perhaps not as gifted, are still determined that the lifetime benefits of this hobby will be passed on to the younger generation.

They say that imitation is the most sincere form of flattery. Obviously, the staff at Model Building 101 would hardly appreciate any company or

the possibilities of having a creative, satisfying avocation in some desirable hobby. MB101 was quite satisfied with the number of inquiries we received from schools wishing to learn more about our program.

We are planning to work with Allied Hobbies at next year's show by doing a "make-and-take" of our MB101 Delta Step-1 model during the show. Bernie Cohn, owner of Allied and a friend going back to the '50s, suggested that their retail outlet at the show would



Jessie Burgin with his version of MB101's RUEL (RUBBER/ELECTRIC) convertible Tennyson Step-2, which can be converted from rubber power to electric and back in a matter of minutes. More in text.

group capitalizing on our creativity for their own profit. Since all funds derived from our merchandising go to further our program, any plagiarism of our concepts would be depriving our company, and thereby the students we serve, of their properly deserved funding.

The 1996 East Coast Hobby Show donated a booth to MB101 in suburban Philadelphia, from March 31st to April 1st. This second year's expo proved to be a huge success. Regional in nature but pulling from a vast area in the northeast, we are told that a paid attendance of 14,000 potential customers attended to explore

cooperate.

We are absolutely convinced that regional shows are very effective in spreading the hobby message. We have yet to find a more sincere, dedicated crew than those at the East Coast Hobby Show. Their cooperation with the exhibitors and visitors could become a "how-to" for some other regional and national shows.

In closing, please remember that we can use all the help available and any donations to our tax deductible program. Please address all inquiries to Model Building 101, 1891 Branchview Dr., Marietta, GA 30062; (770) 973-3598, fax (770) 422-2765. We are now able to accept Visa and Master Charge. **MB**

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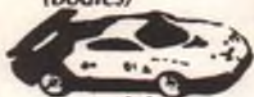
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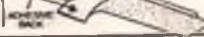


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HELICOPTER WORLD

BY JAMES WANG



KYOSHO'S "HYPERFLY APACHE" ELECTRIC HELICOPTER

The original HyperFly two-channel electric heli was so successful that Kyosho has now come out with a semi-scale version based on the Army's famous AH-64 attack chopper.

Kyosho's HyperFly Apache electric RC helicopter is a unique model. Unlike conventional RC helicopters, which require a four- or five-channel radio and four or five servos, the HyperFly has only two channels of control—up/down and left/right. It's very much like flying a two-channel RC airplane. The flight characteristics are more like a mix between an RC glider and a 1/2A power plane, than an RC helicopter. The HyperFly is very easy to fly for anyone who has any kind of RC airplane experience. However, for an RC helicopter modeler who has never flown an airplane before, it will take two or three flights to get used to it.

The HyperFly Apache is powered by a Kyosho AP-29 electric motor and either a six-cell 1100-mAH Kyosho rechargeable NiCd battery. A typical flight lasts 2 to 3 minutes. There is no motor speed control. To launch the Apache, you grab hold of the model with your right hand and use your left to switch on the motor, then grab the transmitter with your left hand, run five or six steps and gently launch the model forward horizontally with a slightly nose-down attitude. The model will climb out smoothly by itself. It is surprisingly stable. Just don't throw it like a javelin!

It's best to try the first flights on a relatively calm day. On a



The Apache version of the HyperFly is one smart looking bird. The rotor head, mainplate and transmission come pre-assembled by the factory—it only took James two evenings to put the model together. The fuselage is comprised of six molded clear polycarbonate shells which must be glued together and painted. Note the absence of a tail rotor; the HyperFly depends on airflow over the huge vertical fin (only part of which is painted for scale effect) to prevent it from spinning.

HELICOPTER WORLD



A HyperFly trademark is the long trip wire attached to the motor on-off switch in the bottom of the fuselage. Pulling the wire down starts the motor; the wire gets pushed back up upon touchdown, turning the motor off. James eventually replaced the switch on his model with an electronic speed control, and also went to the optional seven-cell motor battery for more sprightly performance.

windy day, the HyperFly can boogie really fast downwind. In a strong headwind, the model can be made to hover in one place. Once you get good at it, the model can even do a loop. The only thing you need to keep in mind is how much juice is left in the battery. When the NiCd battery is nearly consumed, the voltage (and therefore the rotor speed) drops very fast and you are coming down, ready or not. When you feel the motor start to slow down, start your landing approach immediately. Usually, before I launch, I already have a landing area in mind, therefore, after about 2 minutes in the air, I make sure my HyperFly is within the vicinity of my predesignated landing zone.

Even though the HyperFly is a helicopter—a rotary wing aircraft—it cannot hover in the usual sense because there is no motor control and no tail rotor. All RC and full-size helicopters that have a single main rotor produce a reaction torque on the fuselage that wants to spin the fuselage in the opposite direction to the main rotor. A tail rotor is mounted at the tail end of the fuselage to generate a sideward thrust to prevent the fuselage from yawing.

The HyperFly ingeniously avoids having a tail rotor by making the vertical fin very large, thus, in forward flight the

KYOSHO'S "HYPERFLY APACHE" ELECTRIC HELICOPTER

OVERALL LENGTH 35 in.
ROTOR DIAMETER 22.8 in.
FLYING WEIGHT 25 oz.
MOTOR Kyosho AP-29.
BATTERY ... Six-cell, 1100-mAH (not included).
Seven-cell pack optional.
RADIO Two channels required.

From Great Planes Model Distributors,
P.O. Box 9021, Champaign, IL 61826-9021.

airstream flowing over the fin prevents the model from yawing. The lack of a tail rotor and the need to maintain a certain amount of airflow over the fin makes hovering the HyperFly impossible on calm days. But with a headwind of about 10 mph or greater, we can make it hover stationary relative to the ground by toying with the elevator control. This is challenging and fun to do.

Before starting off on the first flight, I suggest using a stopwatch to time how long the rotor will turn on a fully charged battery. During your first few flights, once the time is nearly up, start doing gentle spiral turns to get ready for a slow run-in landing into the wind.

A typical landing speed relative to the ground (assuming a 5 mph headwind) is 3 to 5 mph. This will not hurt the skids at all. If the HyperFly comes in too hot, it may trip over some grass or debris and break the blades or bend the main rotor shaft. If it comes in too slow, by flaring it too much like an airplane, the vertical fin becomes useless and the model can suddenly spin on you. Once the model safely touches down, a wire attached to the motor on-off switch underneath the model will be pushed back to shut off the motor. It sounds funky, but it works every time.

The landing technique is a bit like landing a airplane. You bring it in gently and at the last moment, right before it touches the ground, you flare it to bleed off the forward airspeed. Fortunately, I have done a lot of slope soaring before and still fly RC airplanes, so flying the HyperFly was a piece of cake.

The HyperFly is available in two versions: a simple pod-and-boom version (see the review in the August and September 1995



The original pod-and-boom HyperFly, from which the new Apache version evolved. The mechanics are basically the same for both models. MB's Electric Power columnist, Roger Jaffe, who is not a helicopter flier, reviewed the HyperFly in the August and September '95 issues.

HELICOPTER WORLD



issues of *Model Builder*), and one with a McDonnell Douglas AH-64 Apache attack helicopter body. The mechanics are basically the same. My model is the Apache version. It took me 5 hours to assemble the clear plastic fuselage and paint it in matte olive drab. The mechanics can be put together in one evening. The main rotor head, swashplate control system, and the transmission are all assembled by the factory—very nice! The rest of the mechanics come in six small numbered plastic bags. The instruction manual clearly explains how to assemble each sub-structure. The kit includes a convenient metric four-way wrench; the only other tool you'll need is a screwdriver. And if you happen to crash the model, all individual parts can be purchased separately from the hobby shop.

The Apache fuselage actually requires more time to assemble than the mechanics. The fuselage is molded in a clear polycarbonate material. It comes in six pieces—left and right front fuselage, left and right tail boom, cabin window and tail fins—which must be cut out and trimmed with a sharp pair of scissors or an X-Acto knife. There is a very thin clear protective film on the polycarbonate material that must be removed. I used CA to glue the pieces together. The finished, painted fuselage is very light and scale looking. The Apache model is only 1.5 ounces heavier than the pod-and-boom HyperFly.

Any radio with at least two channels can be used. A simple two-stick RC car radio that costs less than \$50 is what's recommended in the instructions. One

thing I like very much is that the HyperFly is designed for standard size servos and not the more expensive miniature servos. The AP-29 electric motor comes with all wires already connected; you need only to plug in the motor control switch and the battery. This is very nice prep work by Kyosho. The wiring system comes with a BEC (battery eliminator circuit) to power the receiver so you don't need to use a separate receiver battery. This BEC is just a simple diode in parallel with the power supply, but it works!

The only thing that the pilot controls on the HyperFly is the swashplate. By tilting the swashplate fore/aft or left/right, the Hiller control paddles on the main rotor can change their pitch angle differentially as they go through each rotor revolution. The two swashplate controls are also called cyclic controls.

This control system is just like that on an RC helicopter or on a full-size Hiller helicopter. When one paddle increases its angle of attack, the other paddle always decreases its angle of attack, thus one paddle will rise and the other paddle will fall. This in turn tilts the main rotor head. The pilot controls the direction he wants to go by tilting the spinning rotor disk toward the direction he wants to travel, and the rotor thrust then pulls the helicopter in that direction. The HyperFly is a great tool for understanding the basics of helicopter aerodynamics.

After I put about 20 flights on my HyperFly Apache, I replaced the mechanical motor on-off switch with an electronic speed control connected to the throttle channel. Now I can hold the model in one hand and turn on the motor from the transmitter in the other hand. This makes launching easier, and also gives me limited control of flight speed and climb rate. By cruising at less than full power, I can also extend the flight time by about 20 percent. This also makes landings more controllable and fun. I'm using the optional Kyosho seven-cell 1100-mAH battery to get some extra power, but I can always throttle it back using the electronic speed controller.

The HyperFly may be the solution for RC airplane modelers who have been intrigued by rotary-wing aircraft but have been put off by the mechanical complexity or the long learning curve of traditional RC helicopters. And at less than \$200, the HyperFly is less than half the price of most RC helicopters. It is a novel idea, and it works!

James Wang, 7365 Main St., Suite 106, Stratford, CT 06497. MB



Just before going to press we learned that Great Planes, U.S. distributor of the HyperFly and other Kyosho products, is now offering a HyperFly Adjustable Pitch Kit, a \$18.00 option that makes for easier and more precise pitch adjustments. The kit replaces the HyperFly's stock loading blade grip holder with an aluminum unit that incorporates a rubber governor and hex-socket screw. Pitch adjustments are easily made with a hex wrench or ball driver, as opposed to twisting or adding shims. All parts, instructions and a blade pitch gauge are included.

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THE AIRTRONICS QUASAR 6H HELI RADIO AND SG-XBB GYRO

A computer system, easy to program, relatively inexpensive, and with enough features to take you from your first flights up through 3-D hotdogging—what more could a sport heli flier ask?

■ **BY JAMES WANG**

Many of today's high-end computer radios are expensive and intimidating for sport fliers to set up. Most of them are loaded with sophisticated features that sport fliers just don't need. The six-channel Airtronics Quasar, by contrast, is the least expensive digitally programmable heli radio presently available. It is also one of the simplest to program, because only the essential features are included. But those essential features are more than enough to take you from the learning stages up through 3-D aerobatics.

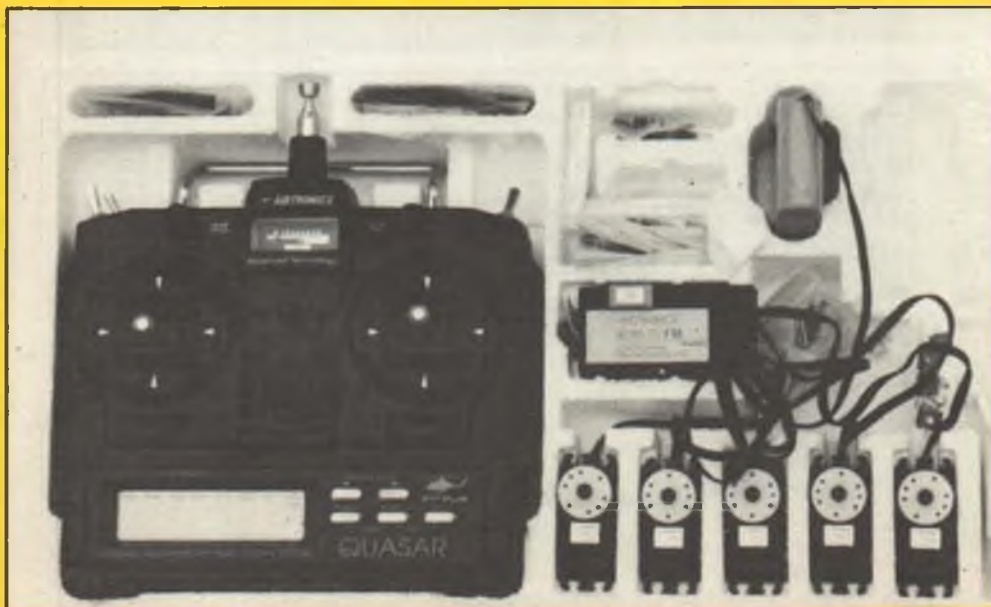
The six channels are for left/right cyclic, fore/aft cyclic, tail rotor, throttle, collective pitch, and gyro high/low gain selection. There are no wasted channels. There isn't even a toggle switch for the gyro (channel 5). If you're using a dual rate gyro such as the Airtronics SG-1 or their new SG-10 piezoelectric gyro, the gyro gain automatically changes when you flip on idle-up. That's nice! So, we can have the gyro on high rate for doing

hover maneuvers in the normal throttle/pitch mode, and have the gyro on low rate for forward flight aerobatics when idle-up is switched on.

Another nice feature is that the transmitter automatically activates aileron and elevator dual rates when you switch on idle-up. We can have low aileron and elevator control sensitivities in hover and maximum control sensitivities in idle-up for aerobatics. Airtronics has even eliminated the normal dual rate toggle switches. By removing these switches and the channel 5 switch, the transmitter becomes less cluttered.

Airtronics did add two very useful controls on the front of the transmitter: hover pitch on the left and hover throttle on the right. I think every helicopter radio should have these two controls. Hover pitch control allows you to vary the main rotor blade collective pitch angle by approximately ± 2 degrees at hover. The hover throttle control allows you to vary the engine power by approximately ± 15 percent at hover by opening or closing the carburetor slightly. With this setup, if the rotor speed is slightly low in hover and the controls seem sluggish, because the weather is hot or because it's windy, you can turn the hover pitch knob to reduce the blade pitch slightly, and also use the hover throttle knob to open the throttle slightly. If the engine is running slightly rich, you can use the hover throttle knob to increase rpm. The beauty of all this is that you can experiment and alter the hovering handling characteristics without ever touching the helicopter.

The Quasar 6H has all of the other essential features to help set up a new helicopter. It has servo reversing and end-point adjustment on all six channels. The latter is used to set the servo arm travel in each direction, from 0



Besides the transmitter, the heli version of the Quasar system includes a 92785 FM receiver, five servos (your choice of two different types available) and a 1800-mAH airborne NiCd pack.

HELICOPTER WORLD

to 150 percent of maximum. For example, if my helicopter yaws quicker to the left than to the right, I would program the EPA to give 90 percent left and 120 percent right tail rotor servo travel. This way, my helicopter will yaw equally fast to the left or right when I give full left or full right tail rotor command.

Airtronics also ingeniously uses the EPA to control the normal, idle-up and throttle hold pitch curves. For example, when idle-up is off, programming channel 6's EPA will only set the high and low end pitches for normal mode. When idle-up is on, programming channel 6's EPA will set the high- and low-end pitches for the idle-up mode. Similarly, the throttle hold pitch curve is set using the EPA by flipping on the throttle hold switch. This method only allows setting the high and low ends of the pitch curves; the middle point on the normal pitch curve is adjusted by using the hover pitch knob. The middle points for the idle-up and throttle hold pitch curves are not adjustable. This simple system gives three separate three-point pitch curves, which provides enough flexibility to handle most flying needs.

Idle-up is set by pressing the ID-UP button first, then use the + and - buttons to determine how much throttle you want at low collective stick. The amount is controlled by choosing a number between 0 and 100; 0 means no idle-up, 100 means a true V-shaped throttle curve (i.e. the carburetor is fully open at full positive collective stick and at full negative collective stick). A V-shaped throttle curve is used for switchless inverted flight and 3-D hotdogging only. In idle-up, the amount of throttle opening at the mid-point of the throttle curve is determined by what value between 0 and 100 you've selected.

Another purpose of the EPA is to set the high and low rate gyro gain settings, if an infinitely adjustable piezoelectric gyro is used. Unlike traditional gyros, piezo gyros do not use trimpots on the gyro amplifier for setting the gains. The gains are set from the transmitter.

Finally, the other two programmable features left are subtrim and revolution mix. The electronic subtrim is similar to the mechanical trim. Subtrim allows you to change the servo centering position by +/- 10 degrees. There is a subtrim for all channels except channel 5.

I don't use subtrim that often. If I ever need to change the servo arm's center, I usually physically remove the servo arm and reposition it by one or two splines. I use the mechanical trims on the front of the transmitter more often. When I'm test flying a new helicopter, I use the mechanical trims and subtrims first, then make the adjustments on the servo arms after the flight. Subtrims are valuable when using one transmitter to operate two or more models, as they allow you to keep the mechanical trims centered.

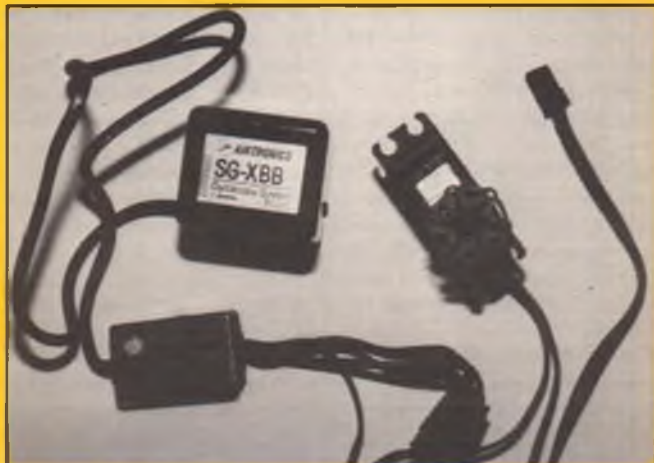
Revolution mix is used to prevent the helicopter from yawing when throttle/collective is changed. This feature is standard on all helicopter radios. But the electronic programming capability of the Quasar allows you to have a V-shaped tail rotor mixing curve for 3-D flying if so desired. On some radios, revolution mix is automatically shut off when idle-up or throttle hold is activated; on the Quasar, revolution mix is always on in any flight mode. Which is better, is a matter of personal preference.

Once you've finished programming the radio for a particular model, you can push the key-lock button to lock up the keyboard so the setups cannot be accidentally erased.

A commendable feature of all Airtronics heli radios is that their factory programmed default settings are very practical, and provide a good starting point for most .30-.60 size helicopters. I need to tweak the setups only a little to make my helicopters fly the way I like. If at any time you screw up the programming, pushing the + and - buttons simultaneously will return that parameter to the default setting. The instruction manual is clear



The Quasar 6H (heli) transmitter differs only slightly in appearance from the 6A (airplane) version, but the programming is completely different. Quasar systems have memory for three different models. All programming is done by pressing the five buttons on the lower right front of the transmitter. The liquid crystal display clearly illustrates the available options for setting up your helicopter.



Airtronics' SG-XBB gyro has a ball bearing supported gimbal mechanism and offers great performance. James says it's also the least expensive gyro on the market.

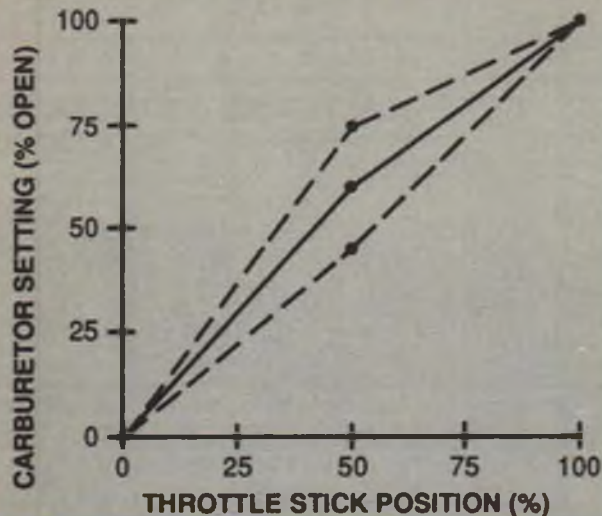
and straightforward, and provides good examples of how to set up each parameter.

It took me some time to get used to the location and use of the throttle hold and idle-up switches. Most radios have the idle-up on the left and throttle hold on the right, and pulling them toward you activates the function. The Quasar is just the opposite; the idle-up is on the right and throttle hold is on the left, and pushing them away from you activates the function.

The Quasar 6H is a no-nonsense, no-frills radio. It packs all of the modern must-have features elegantly. It's ideal for beginners, or as a second radio for scale modelers or advanced fliers. The programmable features are simple, but powerful. The only feature I really miss is a digital display of the transmitter battery voltage. The analog meter on the front is an expanded scale voltmeter, but a digital voltage display is easier to monitor. And the transmitter does not beep when the battery is getting low.

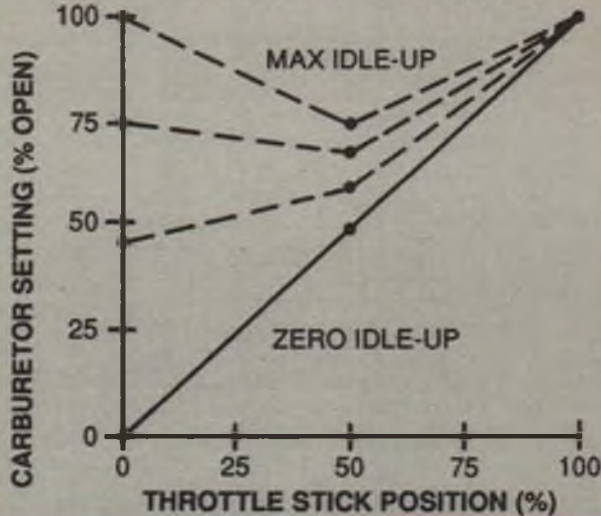
Like all modern radios, the transmitter sticks' length and tension are adjustable. I found the factory settings to be perfect.

NORMAL MODE THROTTLE CURVE



The Quasar's normal throttle curve is defined by three points. The two end points are adjusted by using the EPA (end point adjustment) feature; the middle point is varied using the lever throttle knob.

IDLE-UP THROTTLE CURVE



The Quasar's idle-up throttle curve is selected from 0 to 100 percent. 0 represents no idle-up, 100 gives a maximum V-shaped idle-up curve.

The transmitter also feels very comfortably in the hands. The transmitter comes with a 600-mAH NiCd battery that provides about 2 hours of flight time. This battery can be unplugged and changed quickly at the field if necessary.

The Quasar 6H is available in an FM/PPM version only; there is no PCM version. Personally, I think that is just fine—modern FM radios are so good, one rarely gets glitched. The Airtronics 92765 narrow band receiver is the same one used with the Airtronics Infinity 660, Vision and Vanguard systems. The Quasar comes with a 1000-mAH receiver pack and five servos, your choice of either the standard 94102 servos or the ball bearing 94322 servos. For sport flying, the 94102 is fine, but after prolonged use the output shaft can develop some slop. Depending on your flying style, the size of the helicopter and your budget, it maybe worthwhile to spend few extra bucks to get the 94322 servos. I use a 94102 on the throttle and

the 94322 on the collective and cyclic controls.

THE SG-XBB GYRO

I feel the SG-XBB gyro is one of the best buys on the market. I have long recommended the earlier SG-X gyro as an all-purpose utility gyro because it's the least expensive one on the market and yet performs better than some that cost much more. The Airtronics SG-X and now the SG-XBB can even be used with other brands of radios, as long as you substitute the proper connector and observe the proper polarity. (Airtronics servos and gyros have their positive voltage and ground wires arranged differently as compared to JR and Futaba.)

The SG-XBB gyro works extremely well. It is reliable, and gives a very nice tail rotor control feel that I don't find with other inexpensive gyros. The SG-XBB even comes with a special servo. Unlike the SG-X, the new SG-XBB gyro uses dual

ball bearings on the gimbal mechanism, resulting in even better feedback controls than before. This gyro gets two thumbs up on performance per dollar.

The SG-XBB does not have a motor on-off switch, so it automatically comes on when the receiver is turned on. There is a feedback gain reverse switch to change the direction of the servo movement if needed. Another reason why I like the SG-XBB is that even with the gain cranked up, the tail does not hunt. As an initial guess, set the gyro sensitivity trimpot to about 60 percent of maximum. Keep in mind that the SG-XBB is not a dual rate gyro, so we cannot change its sensitivity in flight. But for sport flying and even 3-D hotdogging, we typically just leave the sensitivity as high as possible. We need the high gain to do 3-D flips and the backward flight stuff anyway.

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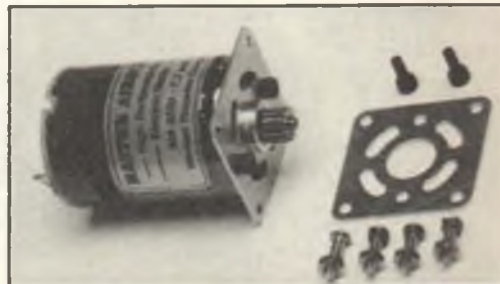
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OVER THE COUNTER *cont. from page 15*

ELECTRIC MOTOR MOUNTS

Master Aircrew's new fully vented electric motor mount weighs only 2.6 grams, is 1-7/16 inches square and is made of .040-inch thick T6 aluminum. It's advertised as being a perfect match for the Master Aircrew Electric Flight Pack



(motor, gearbox and folding prop combination) but will fit all standard 05 "can" motor casings. Comes complete with two 8mm socket head screws and four mounting screws with nuts and lock washers. Easily installed with direct drive setups; geared systems require a minor firewall modification. For a descriptive brochure, send an SASE to Windsor Propeller Co., 3219 Monier Circle, Rancho Cordova, CA 95742.

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three such stands marketed by American Hobby Products. It's designed to handle anything from a .10 to a .90, is made from cabinet-grade birch plywood and maple, includes a 6-ounce Sullivan tank on an adjustable height mount, and features AHP's "throttle toggle" device for operating the throttle. The engine sits on solid maple mounts that support the full length of the engine lugs; steel pins engage the engine bolt holes to give an added measure of safety. Priced at \$29.95 postpaid, from American Hobby Products, 12 West Hill Circle, Reading, MA 01864; (617) 944-8316.

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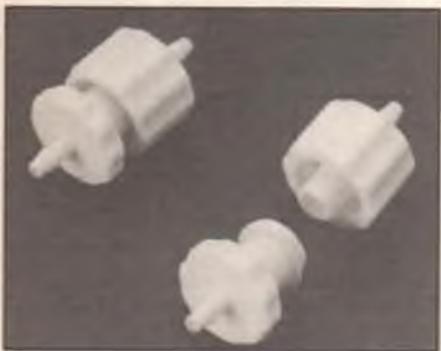
A company called 22nd Century Aero Products is offering its Advanced Aero Fueler, designed to store gasoline and glow fuel with a locking airtight seal to prevent moisture absorption, particle contamina-



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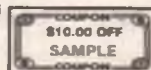
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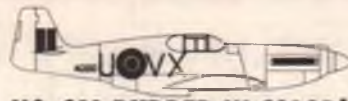
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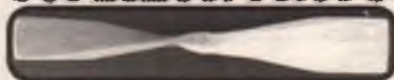
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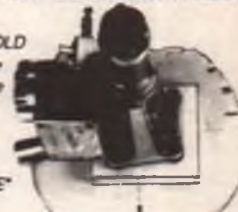
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ELEC. CORNER cont. from page 65

Hydrimax batteries, and be careful not to overcharge to any serious degree. Keep notes, and let's compare experiences sometime in the future. In the meantime, any of you who have already gained some experience

We've already read in the model press about crashes attributed to NiMH batteries. Of course there are going to be failures; however, I wouldn't be surprised to learn that the failure was not as much an actual battery failure as it was a case of improper charging.

With these new batteries, please share with us.

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REQUIRED READING

George Steiner is not an unfamiliar name in RC circles, therefore I won't have to introduce him. What I will introduce is his recently released book, entitled *A to Z—Radio Control Electronic Journal*. Now I have a pretty complete file of RC electronic information, but even so, I found things in George's book that I did not have documented, and I will recommend it as "must" reading for all interested in what makes their RC system tick, how to keep it doing so, and in some cases, how to update or improve it.

A to Z is composed of 143 8-1/2x11-inch pages in eight sections, as follows:

1. RC Basic Concepts.
2. RC Frequencies.
3. RC Requirements.
4. Battery Problems.
5. Servicing Procedures.
6. Servos.
7. Update Modifications.
8. RC Building Projects.

Additionally, there is an appendix, for everything that apparently George could not decide the most suitable of the above sections. This is the only book I know of which covers current RC equipment theory, and is the best thing to appear since Fred Mark's *Getting the Most Out from Radio Control Systems*—but that book is now 16 years old and is based only on AM equipment.

George Steiner's book is available for \$16.95 plus \$3 postage (1st class) from GSP Products, 2238 Rogue River Dr., Sacramento, CA 95826.

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FREE FLIGHT *cont. from page 31*

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MORE ON THE AME .049

In the April issue I wrote about my experience with the AME .049 engine purchased from Northern Velocity. Since then I've mounted it on a new 1/2A model and have begun to break it in. So far, my engine has been run on 10 percent Sig castor fuel using a 5.5x2 APC prop cut down to 5 inches.

With more break-in time, more nitro and a bit of tweaking, I expect [the AME .049] to be the best 1/2A FF engine I've ever used.

I am using a surgical tubing fuel tank and encountered difficulty getting a consistent needle valve setting. This was solved initially by using a pacifier tank, which produces less pressure. Since I don't believe the AME engine will run well without a pressurized fuel system, the ultimate solution for me was to purchase a fine-thread collet-type needle valve assembly from Kustom Kraftmanship and replace the stock AME one completely.

My test engine is still not broken in, but I've been pleased with its performance to date. The engine currently puts out 26,500 rpm using the 10 percent fuel and the 5x2 prop. With a 5x3 Tornado the rpm dropped into the 23K range. With more break-in time, more nitro and a bit of tweaking, I expect this engine to be the best 1/2A FF engine I've ever used.

HELP!

Somewhere out there is someone who can help me find a lost FF design. The model is called "My Sin" and was designed by S. Hackenberg. I believe it was published in a British magazine, although it's not on the X list from *Aeromodeller*. The design is not listed in Pond's plans, nor is it on the NFFS Nostalgia eligible plans list. I do know that it placed 3rd in Jr. B Gas and 3rd in Open C Gas at the 1956 AMA Nats, had a 70-inch span, 675 square inch wing, a 268 square inch stab and a sheeted fuselage. It would need to go through the NFFS approval process to be made eligible; however, this should be easy to do, since it was flown in 1956—well within the Nostalgia time frame. If you have a three-view or full-size plan or know where one can be found, please contact me. Fame, if not fortune, awaits the lucky finder.

Bob Stalick, 5066 N.W. Picadilly Circle, Albany, OR 97321. MB

DEAR JAKE

Advice for the Propworn

DEAR JAKE:

Why do you always take the negative side of any argument?

Carol in Compton, CA

Dear Carol:

My Journalism professor told me to write what I no.

Jake

DEAR JAKE:

Me and my fraternity brothers here at Gamma Alpha Sigma were wondering. Are you a frat man?

Our Chapter is at Stony Brook State University in upstate New York. Many of the brothers here at GAS House are modelers and we look forward to your column every month.

We got to thinking the other day that maybe you belonged to a fraternity when you were in college, and wouldn't it be a hoot if you were a fellow GAS Man.

So what's the story? Were you a Greek? Cooler, Hives, and Meat in NY

Dear Men:

Between undergraduate and graduate studies, and having to transfer schools several times (for reasons I don't care to discuss), I attended four different colleges and/or universities. The fraternities I belonged to were very small, and I never encountered a brother chapter at any of my new schools. So consequently, I also belonged to four different fraternities during my college career.

At Carnegie Mellon, I studied Macro-Economics and belonged to Tappa Kegga. The TKs were a studious and refined lot that concerned themselves with the history of the brewing arts and ancient Roman social customs.

At Detroit Institute of Technology, I studied Astrophysics and belonged to Eta Pi. The pi men were dedicated to the pastry arts, both consuming and throwing.

At Rensselaer Polytech, I studied Computer Science and belonged to Felta Thi. The Felts were passionately committed to the struggle for women's rights, and would just as fervently pursue women's lefts.

Finally, at Cornell I studied Aerodynamics and was a member of the scull and crew

teams. Cornell had a policy that all athletic teams had to stay together in a fraternity devoted to their particular sport. So like all the other scullers, I was a member of Rho Rho Dabota.

Jake

DEAR JAKE:

The local home improvement center ran an ad in the paper stating that their block planes were on sale.

I am not familiar with this type of aircraft. Is it one that is particularly boxy or squared off? Or is it a toddler's construction toy?

Please explain?

Trent in Camdon, NJ

Dear Trent:

I saw that ad!

The store must be part of a national chain, because the one where I live is running the same sale. In fact, in addition to block planes, they also have jack planes, wing nuts, and gliders at 30 percent off.

Who would have thought that a combination lumber yard and hardware store would offer so many aviation items for sale?

Jake

DEAR JAKE:

My 12-year-old daughter is in the seventh grade and is required to do a science

project this year.

Since our family enjoys participating in the model airplane hobby, I thought maybe she could do a science project with an aeronautics or aerodynamics theme.

Do you have any suggestions for a suitable project?

Helpful Dad in Hopowell, MT

Dear Dad:

If you read my column regularly, you probably know that I do a fair amount of traveling by airline. Perhaps some of my experiences in that environment would suggest a few aviation-oriented research experiments that would be appropriate for your daughter's project. See if any of these interest her.

A) Determine the statistical probability of the 450-pound gentleman coming down the aisle having been assigned the seat next to me. Hint: Random occurrence principles do not apply here. If they did, Bluto would at least occasionally sit somewhere else.

B) Determine the chemical composition and half-life of the blue fluid used in the lavatories. Related experiment: Is this liquid naturally occurring, synthetic, or left behind by ancient astronauts?

C) Ascertain the tempering/hardening process used to prepare airline chicken, and apply it to extending the life of road

continued on page 88

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TECH STUFF *cont. from page 12*

would make an excellent engineer or scientist; but it's too early for such decisions. A broad technical education is his need now. Good teachers in school and choosing the right courses, are of course the paramount factors; but I feel I'm helping to shape a significant life. I love it and so does Steve Kuan, one of my best friends.

MAKING MONEY VS. "PLAYING"

I have a millionaire brother-in-law who can't understand me. (Neither can a number of other people understand me; what should I do about it?) Brother-in-law thinks the things I develop in my workshop—mostly models these days—are remarkable; but he's troubled by the fact that I'm "wasting" all this time and effort and not making any money from it. I could understand his concern if I were letting his sister starve or live in a shack, but that's not the case. We're not wealthy by the usual definitions, but we can take all the trips we feel like, and buy not only anything we need but anything we want (as long as our wants don't include such things as a private 747 and a mansion full of servants). The remaining part of our lives is provided for. We've got it made.

The continuation of satisfactions from life is vital. It doesn't matter much whether those satisfactions come from making money, writing poetry, raising flowers, being socially active, or modeling.

Obviously, so do my 70-some-year-old brother-in-law and his wife "have it made"; but strangely, most of his time and efforts are still directed toward increasing his wealth. His goal in life has been making money—and he's been very successful at it. That's about the only activity he recognizes as useful; other efforts are "stupid, silly, wasteful, childish, or frivolous." By his standards, a high percentage of the people in the world are frivolous (which enables him to see that he's among the intelligent few). I too think many people are frivolous, but we model designers and builders do not fall into that category.

I am not, of course, going to show Brother-in-law this column, since it would be unkind of me to jeopardize the feelings which give him pleasure, a sense of accomplishment, and satisfy his ego. But let me

share my broader feelings on the subject with you.

In our working years, making an adequate living for self and family is a vital goal. It ain't easy. Not only working, but saving and investing, even if it seems impossible, provide the best hope for a comfortable old age. Those who, by sloth, imprudence, or misfortune, approach the end of the line still too poor for comfort, may have to continue to strive for dollars in any ways which present themselves.

But those of us who can afford to "retire" can either do something with our retirement time, or do nothing with it except exist. I observe that those who give this matter some thought are much more apt to have satisfying and productive retirement years than those who blindly quit their jobs, careers or professions with inadequate or unrealistic plans for the future. For mentally active people, golf and/or fishing are not apt to be enough. But the word "productive" needs some defining in this case. To Brother-in-law, productive means only making money. This narrow definition is adequate in his case, because he's still able to make money and therefore gain needed satisfactions in his "retirement."

But back to us unrich-but-comfortable retiring or retired mortals. The continuation of satisfactions from life is vital. It doesn't matter much whether those satisfactions come from making money, writing poetry, raising flowers, being socially active, or modeling. The poet is apt to think that modeling is frivolous, the modeler may feel that social affairs are boring, and so on. But different folks need different strokes. The point gets closer to home when we note that the term "modeler" includes boats, cars, trains, (my own RC crane and robot), helicopters, and airplanes. And an airplane modeler may be a designer, a builder, and/or a flier. And the designer/builder/flier may work with free flight, indoor, old timers, scale, sailplanes, speed, electrics, pattern, control line, and on and on.

We should all be doing the things we like to do most; but those things may change with time. When I was a kid flying balsa gliders and making rubber models, there were no "gas" models, control line, or radio controlled models. I enjoyed free flight gas later, then control line stunt, then RC. Those of you who still prefer rubber, for instance, have my respect, admiration and blessing. You have knowledge and skills I lack.

In the meantime, Brother-in-law and millions of others consider adult modelers frivolous. We can live with that. We know better.

PARTING WORDS

"An intellectual is a person who takes more words than necessary to tell more than he knows."—Dwight D. Eisenhower.

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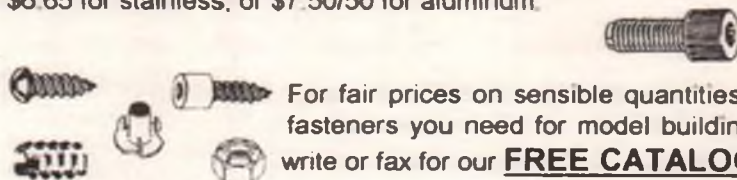
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DEAR JAKE cont. from page 85

and runway surfaces.

D) Use Boolean Algebra to prove that one row of nine seats equals two overhead compartments big enough for one briefcase each. Also, derive the corollary that one salesman from Dubuque will fill both these compartments with novelty napkin samples.

E) Use Chaos Theory to predict the time and place of arrival of my luggage if I arrive in Los Angeles at 11:00 a.m.

Good luck to your daughter. If she can figure any of this out, she deserves an A.
Jake

DEAR JAKE:

Hello, dear. It's your mother.

Did you hear that Aunt Iris had to undergo another phlegm suctioning? Poor thing nearly lost a tonsil during the procedure.

Dad and I are fine. Please don't send me any more of your socks.

Love, Mom

Dear Mom:

A slow-setting epoxy should work fine as long as the wood is somewhat porous. If it's a very hard wood, use a cabinetmaker's glue, such as Titebond, and secure the joint with screws.

Love, Jake

1 encl

3 pr socks

DEAR JAKE:

Hi. It's me, Tommy Smith.

I haven't written for a while because I've been kind of busy with school and sports and girls and all. And the holidays came and went so fast it left my head spinning. By the way, why do stores have their Halloween stuff out for the 4th of July, their Thanksgiving stuff out for Labor Day, and their Christmas stuff out for Halloween?

Anyhow, there hasn't been much time or opportunity for model airplanes, what with all the homework and the bad weather, but I helped Mom and Dad out by using my modeling skills to make some holiday decorations.

I have a few questions: Would a staple puller be the best way to get the mistletoe off the cat? Would stuffing be especially hard to get out of a turkey if the gravy had some epoxy in it? And if her Halloween mask was still stuck to her face, don't you think my sister should have appreciated the debonder I put in her Christmas stocking?

Your Friend, Tommy Smith

Dear Tommy:

An old-fashioned holiday at the Smith house sounds Christmas card perfect.

Your family has a reserved parking spot at the Emergency Room, don't they?

Jake MB

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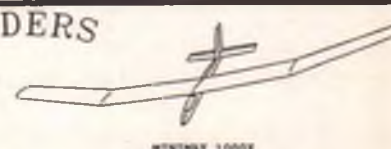
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Introducing the 5xx series of precision servos from Hitec RCD.

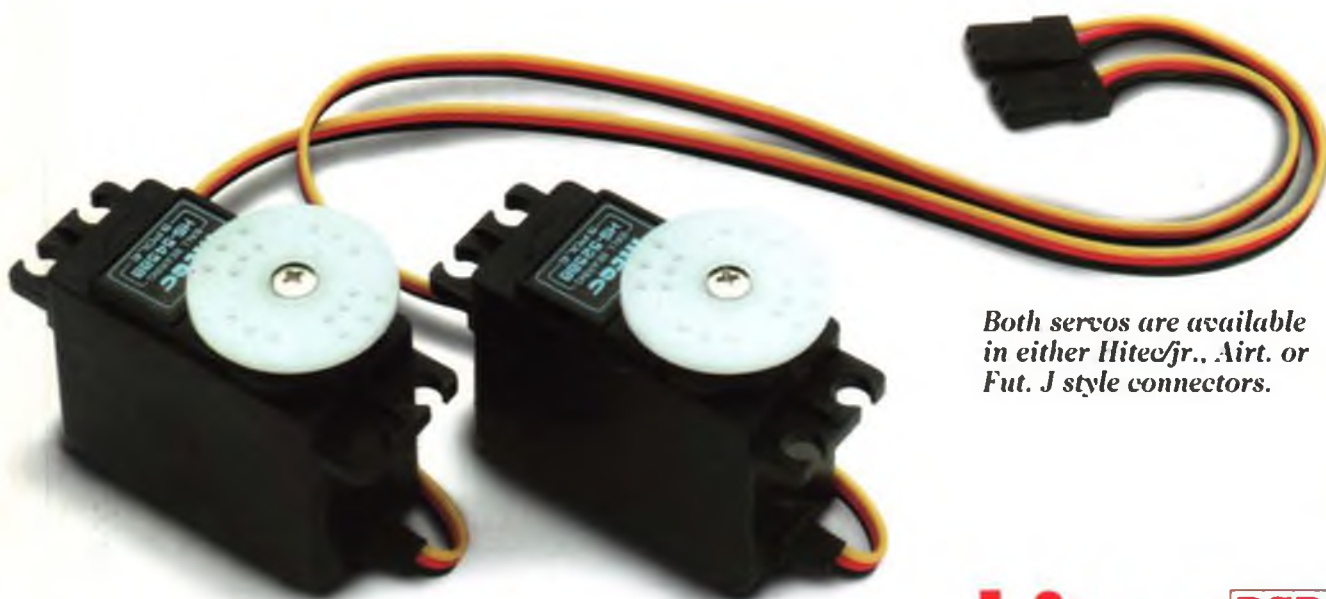
The 5xx series servos utilize a true five pole motor in place of the standard 3 pole.

The 5 Pole Armature



The Heart of the 5 Series Servos.

By doing this, Hitec RCD has been able to come extremely close to coreless servo performance, while offering them at a much lower price. All 5xx series servos utilize a nylon gear train with a top ball bearing and bottom iron/oilite bushing on the output shaft.



Both servos are available in either Hitec/jr., Airt. or Fut. J style connectors.

HS-545 HIGH TORQUE

Torque=62 oz/in
Speed=0.21 second

Size: 1.5"x 0.8"x 1.4"
Weight: 1.75 oz.

HS-525 HIGH SPEED

Torque=46 oz/in
Speed=0.16 second

hitec **RCD**

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