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HELICOPTER WORLD

ON THE COVER: Giant Scale at its best! Arne Rapp of Springhill, Florida did a super building job on this highly detailed 1/4-scale Fleet biplane, photographed by Frank Gudaitis at a Big Bird fly-in at the Cedar Creek RC Club's field on Long Island. Scratch built from plans, the big Fleet spans 85 inches, weighs 20 pounds, is powered by a Zenoah G-38, and is equipped with a Futaba radio.

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Seaplane for cheap electric power! Ready for covering!

HLOB004 **Donald 4 Electric Seaplane** SALE $187.00
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Ready Built and Covered for cheap electric power!

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HCZ203 Hacker **Timothy 400 Electric Sailplane** SALE $99.00
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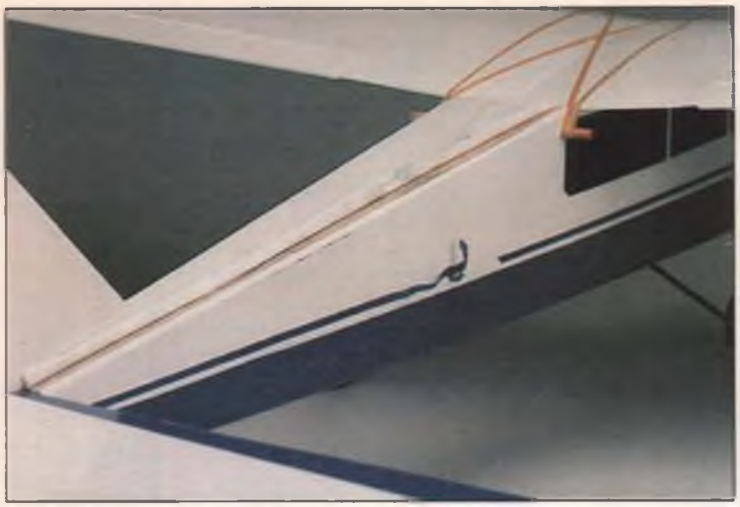
Larry Paikos of Bloomfield, Indiana writes to say that in his 2-1/2 years of retirement he has built seven Old Timers, one of which is this absolutely gorgeous Mystery Man, designed by Elbert "Joe" Weathers. The original Mystery Man is famous for the furor it caused with its drop-off landing gear; what looks like a conventional gear was actually a takeoff dolly that was left behind at liftoff. Even at a wing loading of 16 ounces per square foot, Weathers' ship was cleaning up at West Coast contests, so much so that it was officially decided that the Mystery Man was "dropping parts in flight" (even though the dolly never left the ground) and was henceforth barred from competition. Paikos' model is authentic right down to the drop-off dolly, Brown Jr. engine, silk covering and red-white-and-blue color scheme. *Larry Paikos, 209 River Dr., Bloomfield, IN 47424-1000.*

In the June issue we featured a reader's electric-powered Genesis HLG; now here's a colorful stock Genesis glider as built from the Peck-Polymers kit by Alabama modeler Don Trammel. The Genesis uses elevons (ailerons and elevator mixed) and separate rudder controls, all mixing being done with an Ace MicroPro 8000 radio. Wing covering is a combination of MonoKote and Superkote, with Ultracote being used on the canopy; the fuselage was glassed and then finished with Top Flite's MonoKote-matching LustreKote paint. Don says it was a hot little sloper, but alas, is no longer with us. *Don Trammel, 6532 Old RR Bed Rd., Toney, AL 35773-9587.*

The classic Old Time rubber job seen here is a "Miss Canada Sr.," and was built for Flying Aces Club events by George Lewis. The model spans 36 inches, sports a free-wheeling prop, and is covered with tissue finished with three coats of thinned nitrate. John Pond can probably set you up with plans if you'd like to duplicate it. *George Lewis, 3602 St. Clair Highway, China Township, MI 48054.*



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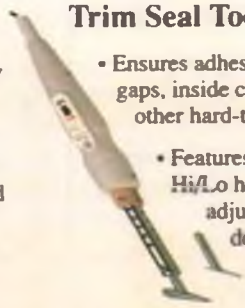

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- Features two tips, Hi/Lo heat settings, adjustable shoe depth and safety stand. 2-year warranty.

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George F. Lieb spent over a year searching for three-views from which to build his Nemesis control line profile scale (Goodyear) racer—time well spent, we'd say, as the result is one mean looking machine! The 29-inch span screamer is powered by a long-stack Nelson .15, weighs 20.5 ounces, and is finished with K&B Super Poxy and transparent MonoKote on the wings. So far the model has won one contest and failed to finish another. *George F. Lieb, 5202 Emeline St., Omaha, NE 68157-2151.*

Charles Mendenhall started modeling in the early '40s, built some of the 10¢ and 25¢ Joe Ott models that he could never get to fly. Had some minor success with a Comet Sparky, but then came WWII and the end of his modeling. He returned in the early '50s with control line, but quit altogether when RC came along and CL activity took a big dive. Charles continues: "About a year ago I idly picked up *Model Builder* at the grocery and an ad for Herr's Ryan ST popped out at me. I bought the magazine and ordered the kit. Since then I have scratch built the Korda Wakefield, Orr's Pacemaker, Howard DGA, Eular Triplane, Herr Piper J-3, Bostonian Pup, and a Sterling Stinson Reliant. I guess I'm back in it and I think this time for good!" The model pictured here is his latest effort, a 36-inch span Fairey Swordfish that he designed and built from scratch. Beautiful workmanship! *Charles A. Mendenhall, 575 Melwood Dr., Rochester, NY 14626.*

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THE NEW KYOSHO CHOPPERS

Kyosho's Concept 30 has been a favorite of helicopter fliers ever since it first came out eight years ago, but now the company has introduced a new machine that takes .30-size heli technology to new heights: the Nexus 30. This is an entirely new model with advancements in all areas—durability, stability, maneuverability, and ease of maintenance. The Nexus sports a new one-piece molded seesaw rotor head, a taller main mast to help prevent boom strikes, two extra bearings in the tail rotor gear case, the tail rotor from the Concept 60 SR, easier engine installation and removal, and lots more. The Nexus 30 can be purchased either as a disassembled kit ($399.99 retail) or as a factory pre-built model with an O.S. .32 F-H engine already installed ($599.99 retail).

Also new from Kyosho's helicopter department is the EP Concept SR, an upgraded version of the classic EP Concept electric heli. The SR version has a new frame that can accommodate standard size servos, has a one-way clutch that makes autorotations possible, has a taller main mast for less chance of a boom strike, uses ball bearings instead of bushings, and features one-piece main rotor grips along with lighter landing skids to reduce weight. The EP Concept SR comes with a K-Speed motor and new design canopy, for a suggested retail of $469.99.

Kyosho products are distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300.

ELECTRIC STUFF FROM HOBBY LOBBY

Seen for the first time in Hobby Lobby's current catalog (#27) is Graupner's diminutive Messerschmitt Bf-109, a 27-1/2 inch span, 145 square inch speedster for Speed 400 motors. Features a modified MH 32 airfoil, all-wood construction and aileron/elevator/throttle controls. Also offered by Hobby Lobby is Graupner's matching GR6064 power package, which comes with Speed 400 6V motor, 5x5 prop, precision machined spinner, capacitors, etc. The kit and motor package together will run you about $100.

HL is now handling several different sizes of the Czech-made Mega motors. The two "Midi" series motors feature neodym magnets, 13-pole armatures, internal RF suppression and adjustable timing. According to the catalog, the Midi 6 on 7.2 volts puts out 28 ounces of thrust and draws 47 amps; the Midi 7 draws the same current but jumps to 31 ounces of thrust on 8.4 volts. New customers can get a copy of Catalog 27 for $2 (includes a $5 discount voucher for your first purchase), from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.

HORIZON NEWS

JR's "Super Servos," the S4000 and S7000, have now been joined by another, the 2700G, an ultra-fast (.09 second for 60 degrees) servo designed for RC cars and trucks but which also excels as a gyro servo for RC helicopters. The Super Servos are unique in that they reach maximum torque immediately off center, and the 2700G's all-metal gear train offers less flex than nylon gears, giving a more immediate response to input from the gyro and radio. Its speed and accuracy allow pilots to adjust the gyro gain higher before hunting occurs, providing a more "locked in" tail.

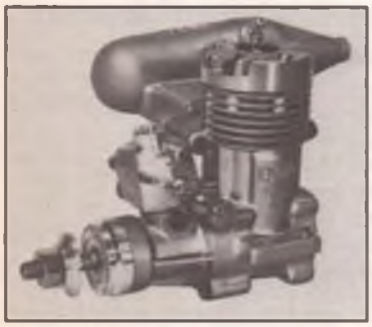
Also new from Horizon is the Webra Speed .40 Sport, an exceptionally user-friendly powerplant capable of swing-

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

ing a 10x6 APC prop at 2,100-14,2000 rpm. Interestingly, Horizon says the engine maintains a relatively constant rpm on anything from 5 to 30 percent nitro fuel. The Speed .40 Sport boasts a dual ball bearing crankshaft, ABC piston/cylinder, and Webra's TNII carb. From Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

ALTECH'S ENYA ENGINE WARRANTY

Altech Marketing, the U.S. importer of Enya engines, has announced an unprecedented five-year limited warranty for Enya engines, including one-year crash damage protection. Here's how it works: Even if you smash it all to pieces in a dumb-thumbs crash straight into the runway, Altech will repair or replace any registered Enya engine free of *all* charges during the first year! During years two and three, Altech will repair/replace any registered defective Enya engine with no charge for parts or labor. During years four and five, Altech will repair/replace any defective Enya parts with no labor charges. This has to be the industry's boldest warranty—proof positive that Enya engines are built to last a long time. For complete details on this limited warranty, write Altech Marketing, P.O. Box 391, Edison, NJ 08818-0391.



SERIOUS ABOUT ELECTRIC?

Those who take electric flight seriously know that high-performance batteries are absolutely essential. One major supplier of such batteries for the RC car market (but which could also be used to equal advantage in aircraft) is Progressive Technologies Inc. Their "SuperGold TEAM" Sanyo 1700 SCRCs pictured here are available in six- and seven-cell "matched" sets; that is, the individual cells

are cycled until stabilized, then discharged at 20 amps from a full charge to cutoff at 0.90 volt. A computer-printed label affixed to each cell indicates how long, in seconds, it took to reach that cutoff point; also the average voltage and internal impedance. The cells are then packaged in matched sets for the buyer to assemble into a pack. A pack made up of matched cells like these will deliver more power for a longer period of time than a pack of random cells.

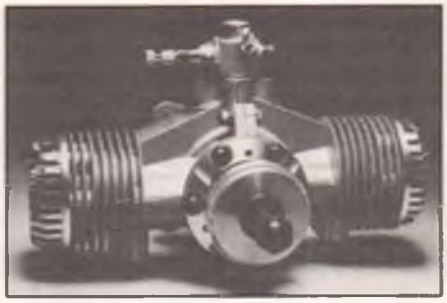
PTI offers an extensive line of hobby products, many of which can be applied to electric aircraft. Three bucks will get you a complete catalog from Progressive Technologies, Inc., P.O. Box 950, Pilot Mountain, NC 27041-0950; (910) 368-1375.

GREAT FF SCALE KITS AND PLANS

Free flight scale buffs will want to check out the new P-40 Warhawk kit from John Bell of Bell Model Aircraft Co. Pictured is a P-40F; the kit also builds the P-40D, E, L, and N versions. The Bell model is designed for rubber or electric power and spans 23-3/8 inches. Included in the kit are printed wood, tissue, decals, propeller, formed canopy, hardware, full-size professionally drawn plans, instructions, and documentation drawings, for $31.95 plus $4.79 S&H. A 20-page catalog of 26 scale scratch-building plans and seven kits, plus a growing list of FF modeling accessories, is yours for $4 postpaid. Call or write Bell Model Aircraft Co., 650 Pine Crest Dr., Largo, FL 34640; (813) 584-4003.

GIANT SCALE TWIN

CS Model Equipment, Ltd. and Richardson RC/Aero have introduced a new Giant Scale twin-cylinder, two-stroke glow engine, the CSG 240. This 40cc engine is the smallest of the CS twins, features AAC piston/cylinder construction, has a bore and stroke of 30mm and 28mm respectively, weighs 2.6 pounds, and is quoted as producing 3 horsepower at 7,500 rpm with an 18x8 prop. More info can be had by contacting Richardson RC/Aero, Bldg. 2H & 2I, 1915 Airport Rd., Atlanta, GA 30341; (770) 458-5044, fax (770) 458-5323.



DUCTED FAN GOODIES

Bob Fiorenze has something new for you ducted fan fliers: a special exhaust header designed at an angle of 7 degrees down and 7 degrees to the left to accommodate models that have bifurcated exhaust ducts. This positions a standard pipe out the left exhaust tube of the model when slipped over the header, eliminating the need for expensive custom pipes. Mounting bolts are included. From Bob Fiorenze, P.O. Box 953042, Lake Mary, FL 32795; (407) 330-1448. An illustrated catalog is available for $3.

A REALLY HOT ITEM!

Importer/exporter James Booth is offering a product that modelers may find useful in the shop: the "Micro-Jet" palm-size butane torch. The most obvious use that comes to mind is soldering large diameter spring steel wire landing gears, but there are bound to be others. The Micro-Jet measures just 2.5 by 4.5 inches and is refillable with regular butane lighter fluid. Can be used safely and comfortably for extended periods, thanks to its contoured shape and built-in heat shield. Priced at $19.95 plus $2 S&H, direct from James E. Booth Enterprises, 111A Hekili St., Suite 293, Kailua, HI 96734. ***MB***

BY FRANCIS REYNOLDS

• Solar Balloons, Gliding Balloons, and Solar Airplanes

Several years ago a man-carrying solar balloon took off under solar energy sometime after sunrise and stayed up until sunset. Further, its altitude could be controlled. Half of the bag was made of transparent material, and half of it was opaque. To go higher the pilot would yaw the balloon so that the transparent side faced the sun and more radiant heat would enter it. To descend, the opaque side was directed toward the sun. But such balloons come down at sunset. To keep a solar hot-air balloon up "forever" takes a bit more doing.

The forever solar balloon was one of many dreams by that great practical (?) dreamer, Buckminster Fuller. Let me keep you in suspenders—we have to have something to hold that balloon up—while I tell you a little about Fuller. He was an active private pilot. He believed that technology was the solution to the world's problems. The majority of his inventions (he was granted 170 patents) were architectural in nature, and they were most unconventional. He thought big and designed big things. For example, he designed a tower, for Tokyo, which was to be 12,500 feet tall—taller than Mount Fuji! (Tokyo decided they couldn't afford it.) Fuller also designed big balloons.

He pointed out that big balloons have big advantages.

The surface area of a sphere varies as the square of the diameter, while the volume varies as the cube of the diameter. Fuller calculated that a 100-foot diameter balloon would weigh 3 tons but displace 7 tons of air, and that a 400-footer would weigh 15 tons but would contain 500 tons of air. The displacement-to-weight ratio went from 2.3:1 to 33:1 for the 400-footer.

It is possible for hot-air balloons to travel in any direction, even against the wind, and to do it without propellers or jet engines! The trick is to configure balloons so they will glide.

Fuller's crowning observation was that if we build a balloon a half mile in diameter, the ratio of internal air weight to structural weight would be approximately 1,000:1; and the air inside would only have to be 1 degree Fahrenheit warmer than the ambient in order for the balloon to lift off. He calculated that the sun would heat it far more than that; and further that this huge mass of air would retain enough heat through the night to keep it floating. Free environmentally correct lift "forever!"

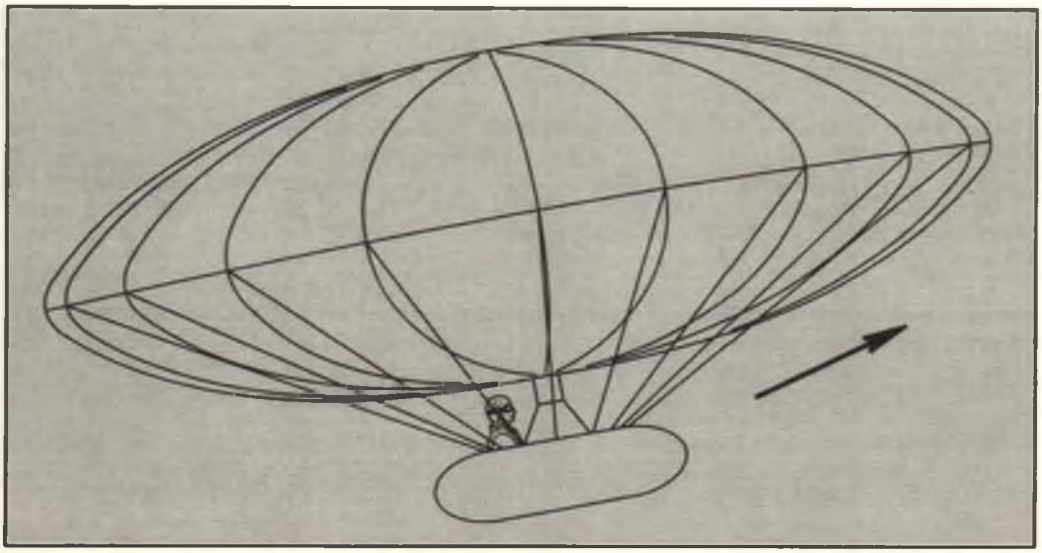
Buckminster Fuller proposed to put communities of homes in such half-mile-diameter balloons! The man thought big.

Getting back down to earth and out of the dream balloon, we note that solar balloons abound in nature. The "thermals" we and birds use for soaring are really hot-air balloons without envelopes. In fact the soaring fraternity often speaks of thermal "bubbles." Putting a bag around a thermal bubble is only necessary when we want to hang a static load (as opposed to an aerodynamically gliding load) from that buoyant batch of warm air.

"NEGATIVE INERTIA"

The hot air or lifting gas in a balloon does not directly produce the upward or lift force, of course; it's the gravitational force on the heavier air surrounding the balloon which displaces the balloon upward. There's an interesting, related, but seldom-observed buoyancy phenomenon: If we put a golf ball or baseball on the floor of a moving car and then step on the brakes the ball will roll forward because of the deceleration of the car. Newton. Inertia. But if we put a helium balloon in the car and step on the brakes, will the balloon roll forward on the car ceiling like the ball did on the floor? Nope! It rolls to the back of the car. Why? Isn't it acted upon by the same deceleration force as the

continued on page 84



A gliding balloon in the excess-buoyancy climbing-glide mode. Francis has lots of ideas about gliding balloons in this month's column.

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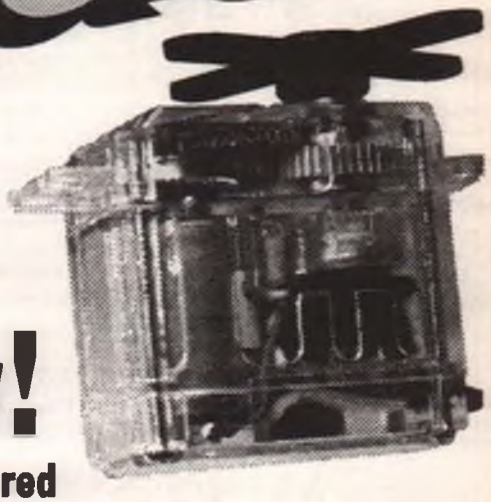

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HANNAN'S HANGAR

BY BILL HANNAN

"Man's mind, once stretched by a new idea, never returns to its original dimensions."

Our quotation, by Oliver Wendell Holmes (1809-1894), was submitted by Bill Kincheloe, who noted that model building offers many mind-stretching opportunities.

FANTASTIC PHOTOS

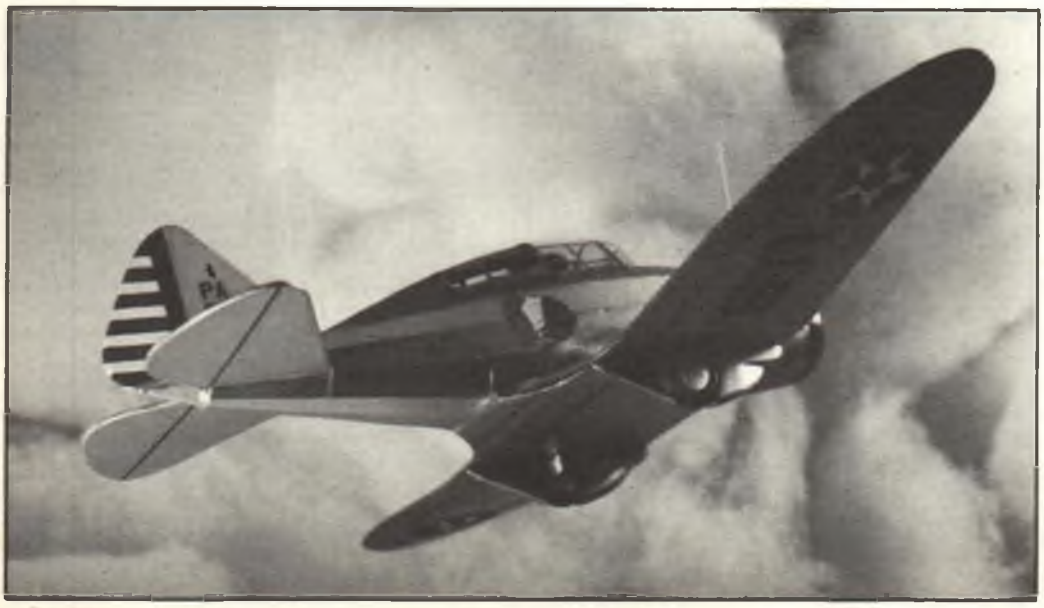
If, as is said, one picture is worth a thousand words, we have a dictionary's worth this month! Don Campbell, of Detroit, Michigan, has been experimenting with staged model photographs, achieving realistic pictures by employing common materials, careful lighting and Kodak ASA 200 speed film. His Seversky P-35, constructed from a 1939 Ace Whitman kit plan, is an excellent example.

Don suspended the model with nylon monofilament (barely visible in the photo) in front of a sheet of artist's poster board and added some poly fiberfill "clouds." He also removed the model's propeller, adding to the illusion of actual flight. The resulting photo speaks for itself.

The Hall Springfield Bulldog racer, by Dan Lutz, of Fallbrook, California, is one in a series of static-display models made for an eastern museum. Built to a scale of 1"=1', the Bulldog is of conventional built-up construction, covered with silk and finished with K&B Super Poxy. Thus far, Dan has completed a Gee Bee, Laird Super Solution, Wedell-Williams and Chester's Jeep.

Last, but certainly not least, is the masterful Polikarpov PO-2 biplane by Vladimir Vanek, of the Czech Republic. The full-size PO-2 was manufactured from the 1920s through about the 1950s, making it one of the longest-lived production aircraft of all time. It served in such roles as club training, crop dusting, aerial ambulance service, glider towing, and various military applications. Vladimir's model sparkles with details, including the laminated propeller, venturi tube, wind-driven generator (aft of the cockpit) and external control rigging. Then too, the model provides an ideal showcase for that magnificent five-cylinder Gasparin CO_2 engine. If you're inspired to undertake such an ambitious project, these engines are available from Peck-Polymers, who advertise regularly in *Model Builder*.

How's this for a beautiful finish? Dan Lutz made this fine Hall Springfield Bulldog racer for a museum racing aircraft display.



This dramatic photo of Don Campbell's Seversky P-35 was achieved by simple means—see text.

GONE WEST

Two more towering figures in the hobby industry have left our ranks. Irwin Ohlsson, famed manufacturer of model engines and accessories for so many years, passed away recently following a long illness, according to Tony Nacarrato. With partner Harry Rice, Ohlsson was one of the world's best-known producers of model engines during the 1940s and 1950s. Irwin remained steadfastly interested in models throughout his life, having actively participated in many facets of aviation from free flight through full-size. Ironically, Irwin's wife of 48 years, Ann, had also been in ill health lately and died less than a month after Irwin.

Howard "Bud" Voss, an American who lived in Japan, also died recently. An award-winning builder of

highly detailed RC scale models, Voss also was an important participant in the plastic model kit business, and traveled extensively performing research and documentation duties. Additionally, he flew a restored Piper Cub—quite a rarity in Japan. In spite of his formidable working schedule, he found time to serve as a scale judge for the Nagoya International Peanut Scale contests for many years.

AMBITIOUS PROJECTS

Three exceptionally fascinating projects have been brought to our attention recently. The "Rubber Bandit" is a *rubber-powered* man-carrying craft nearing completion in Van Nuys, California, according to *Model Builder* contributor Ken Johnson. Originally planned as a publicity stunt for a Los Angeles radio station, the Bandit has evolved into a serious engineering endeavor. Spanning 68 feet, and with an expected weight of 180 pounds (plus the pilot and 90 pounds of rubber), the craft, designed by George Heaven, should have a range of about a half-mile. The design has already been successfully tested in 1/4-scale model form, however progress has been slow, owing to limited finances and the small number of participants involved.

By marked contrast is a $300,000 human-powered plane under construction in Seattle, Washington, which is expected to be ready for testing during August. Imagine trying to effectively coordinate the efforts of people from more than 10 schools, several private industries, plus a couple hundred volunteer workers! Designed by two Boeing engineers, Paul Illian and Heather Costantino, the 115-foot span craft is extremely high-tech in concept. Apart from computer design and flight simulation technology, exotic construction materials are being employed, as well as sophisticated electronic guidance and an autopilot. The goal is an ambitious one: A 100-mile over-water flight, expected to take about 5 hours.

Perhaps the most refreshing aspect of the project is the purity of the designers' motives. No commercial rewards are anticipated—just the satisfaction of completing the objective, and having fun in the process!

And finally, moving to the opposite end of the size spectrum, how about a Stealth Pistachio? Based on a report sent to us by Daniel Walton, of Kansas, a government agency is seriously interested in developing tiny aerial vehicles for indoor surveillance missions! How tiny? Only 15 centimeters (about 6 inches) wingspan. Other requirements include one-hour duration, 16 kilometer range, and electronic guidance. Present speculation assumes electric powered microturbine propulsion. The mind boggles . . . .

Splendid Polikarpov PO-2 "Mule" by Vladimir Vanek, is powered by a Gasparin radial CO2 engine. Photo by Otakar Safek, via Fritz Mueller.

HELICOPTERS ARISE!

In response to our column about helicopter history a few issues ago, a Texas reader gave us this quotation from Phil Oestricher, retired director of flight-testing for General Dynamics (and a lifelong model builder): "Helicopters do not fly; they are merely rejected by the earth."

BREAKING EARTH'S BONDS

As Oliver Wendell Holmes stated at the outset of this column, man's mind can indeed stretch. Certainly the distance between a pedal-powered plane and a sinisterly motivated indoor model is enormous. Perhaps we need to reflect on the many ways people have found to get airborne, as suggested by Martha Esch Sands. Here is just a portion of her list: Balloons, dirigibles, kites, gliders, airplanes, autogyros, helicopters, parachutes, trampolines, ski jumps, and finally, cannons, as in "human cannonballs."

Somehow, model flying seems a much more relaxing

ARTICLES WANTED!

In case you missed the classified ad that's been running the last few months, Model Builder is once again actively soliciting articles for the magazine. We're looking for construction projects (all types of sport FF, CL and RC—preferably with neatly drawn, camera-ready plans so we don't have to redo them), interesting how-to features, good cover photos . . . you get the idea. From what we've seen in this column, readers of "Hannan's Hangar" are among the most creative group of modelers anywhere—seems like the ideal "gene pool" for supplying the sort of material we want. If you have something in mind that you think would fit the bill, why not call or write and run it past us? Contact MB's editor at the address or phone number on the magazine masthead. A copy of our writer's guidelines is available on request.

HANNAN'S HANGAR

way to commit aviation, doesn't it?

MODEL WARPLANE GUIDE

Dr. John C. Fredriksen, Ph.D., has released the second volume in his plans and kits source directories, entitled *Model Warplanes, 1919-1939.* Thirteen different countries are represented, and each design is described by wingspan, power (rubber, CO_2, electric or gas), type (free flight, control line or radio), price and source. Included is a useful list of model documentation and accessories suppliers. This softbound 94-page book sells for $15 postpaid, from Dollar Scholar Press, 461 Loring Ave., Salem, MA 01970; (508) 745-9849.

FLYING ACES PLANS

The Flying Aces Club Plan Packet Number 4 has been announced by Lin Reichel, 3301 Cindy Lane, Erie, PA 16506. Included are eight Peanut Scale plans, including the Curtiss-Page Racer, Spad 13, Fiat CR-32, Curtiss OC-2 and the Pemberton-Billing PB-9. Also featured are an Embryo Endurance model, a profile Howard Pete, a 19-inch span Gere Sport biplane and a 29-inch span Handley-Page W8-F. The price is $10, postpaid—quite a bargain!

Also offered by the Flying Aces Club are T-shirts in various sizes, emblazoned with a five-color rendition of a Boeing P-26, art by Doug Wilkey, priced at $12 postpaid.

Speaking of T-shirts, the Cactus Squadron of Arizona is now taking orders for T-shirts and hats which feature the Curtiss Sparrowhawk club logo, beautifully rendered by Otto Kuhni. For price and ordering details, contact squadron president Dave Smith, 1041 E. Rawhide, Gilbert, AZ 85234.

SIGN-OFF

We conclude this month's offering with a down-to-earth thought from Herb Weiss, about building and flying model aircraft: "There is always something new to learn, and it is often within our individual capabilities to hypothesize, then 'try it out and see if it works!'" Amen to that.

Bill Hannan, Box 210, Magalia, CA 95954. *MB*

Designer/builder George Heaven with his 17-foot span, 1/4-scale RC model of the "Rubber Bandit," the rubber-powered man-carrying aircraft that was pictured on last month's Model Builder cover. More in text.

"Next time you recommend a trainer — make it new and improved Great Planes' Perfect Trainer."

Don Anderson

President and Founder
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If you know someone who wants to get into R/C flying, get him started off right. Steer him towards a Great Planes Perfect Trainer kit, and he'll be well on his way to a successful, enjoyable flying experience the first time out.

PTs have long been known for being the most stable, the most forgiving trainers around; in fact, more R/C pilots have learned to fly with a Perfect Trainer than any other kit. Now, based on comments we've received from experienced modelers just like you, we've refined and updated the PT-20 and PT-40. And with the advancements found on these new MKII versions, you can feel even more confident in suggesting them to entry-level fliers as your trainers of choice.

Solid in the air.

Chances are, you "earned your wings" with a Perfect Trainer. If so, you'll really appreciate the stabilizing features found on the MKII editions of the PT-20 and PT-40, which include:

- "D-Tube" framing that locks in the wings' built-in washout
- a flexible wing design that can be built with two dihedral options: for slow, self-recovering flight, or with the capability for basic aerobatics
- "torque link" landing gear with heavier-gauge wire, to smooth out landings and takeoffs
- adjustable servo tray positioning for better balancing of the plane's weight, and a wider range of engines

Easy to build.

Here's where the PT MKIIs really shine. Since beginners may be apprehensive about assembling their first kit, Great Planes has made putting these planes together virtually goof-proof, with:

- interlocking fuses that actually hold themselves together during construction
- redesigned "I-Beam" wings, with ribs that plug securely into the center web, and grooved top and bottom spars
- notched leading, trailing edges and marked locations for pushrod routing
- the option of attaching the wing with rubber bands or bolts
- step-by-step, photo-illustrated instruction manual simplifies kit assembly.

The Best Ways to Get Started Right in R/C!

PT-60: ***The easy-to-see trainer — a perfect fit for bigger, more realistic .60-size engines.***

Wingspan: 71 in; **Fuselage Length:** 53.25 in
Engine: 2-stroke .45-.60, 4-stroke .48-.70

PT-40: ***The popular-size trainer — uses very interchangeable .40-size sport engines***

Wingspan: 60 in; **Fuselage Length:** 52.5 in
Engine: 2-stroke .35-.46, 4-stroke .40-.52

PT-20: ***The budget-sized trainer — works well with more economical .20-size engines***

Wingspan: 52.75 in; **Fuselage Length:** 45.5 in
Engine: 2-stroke .15-.25 , 4-stroke .26-.30

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When you're recommending a trainer, you should have all the facts. Naturally, we're excited about these innovative entry-level planes, and we're sure beginners will be too. We'll send you a complete instruction manual, brochure and special booklet about getting started in R/C so you can see for yourself just how remarkable these kits are. Just call 1-800-682-8948 and mention code #03AW for your free information package.

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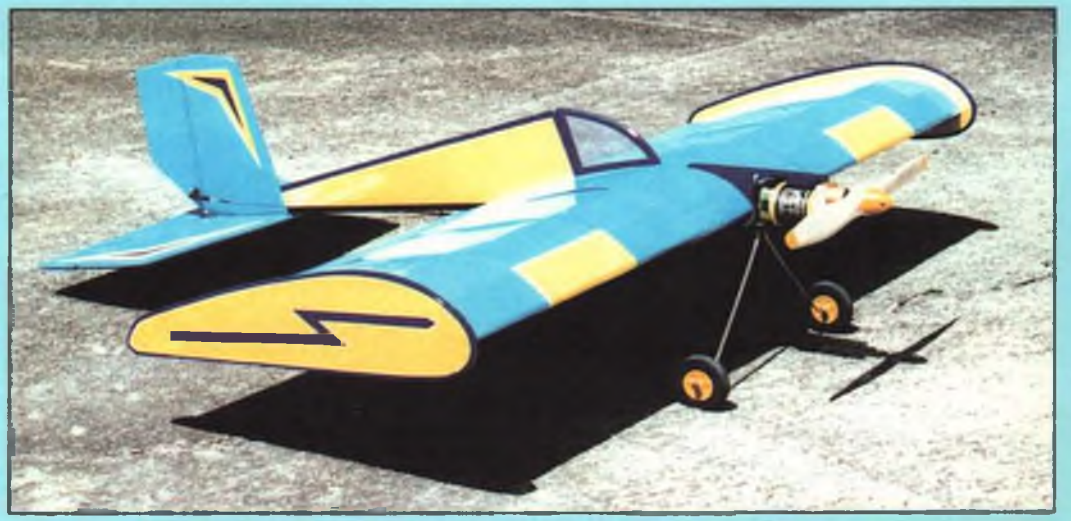
BY WILLIAM I. WHITTEN

THE ELECTRIC BLUES!

Got the "electric blahs"? Or are you maybe just tired of that tame sportplane or glider? How would you like to try an electric but want something with some real zip, something that's easy to build and won't cost an arm and a leg?

If the answer is yes then maybe you need the Electric Blues! It's highly aerobatic on low-cost motors and the wing hatch makes changing batteries fast and easy. Some may find the Blues' short wings, profile fuselage and motor hanging out in the breeze a bit homely, but I prefer to think of it as having "character." The stubby wing packs a lot of area and also allows the use of standard 36-inch balsa without splices. The Blues' main drawback is that it may ruin you for most other electric planes!

The Electric Blues is patterned after the "fun-fly" planes seen in recent years. Two versions are shown on the plan, the major differences being the airfoil and wingtips. I prefer the semi-symmetrical version with rounded tips. This airfoil was lifted from Bill Northrop's "Apprentice" from many years ago. The flat-bottom plane with tip plates also flies well, though a bit slower. All-up weight with a seven-cell 1400-mAH battery pack is 42-44 ounces.



The two versions of the Electric Blues as developed by the author; the one with the yellow wingtip plates features a flat-bottom airfoil, the other has a semi-symmetrical section. Construction is so simple that it shouldn't take more than a few evenings to get one framed up and covered.

POWER SYSTEM

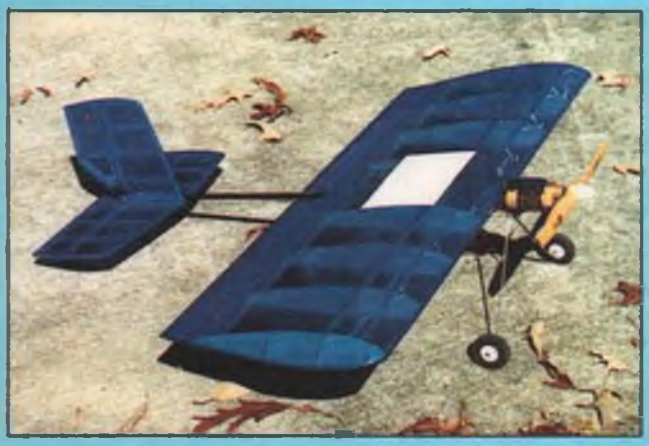
There are any number of 05 motors that will fly the Blues, but the best combination I've found is a Trinity "Sapphire" 17-turn car motor retimed to operate in the

EDITOR'S NOTE: It was late last year that William Whitten approached us about doing a construction article on his Electric Blues design. When the package finally arrived in mid-May he apologized for taking so long; the respiratory problems that had plagued him for the past 10 years had lately become much worse, to the point where even the smallest task left him completely exhausted. How he managed to draw the plans and write the article, we can only imagine. But he persevered, and managed to keep his sense of humor despite his failing condition. In his cover letter he wrote: *When my time comes, it just so happens our family plot is in a cemetery just over the hill from one of our club's flying fields. Maybe I'll be able to pop over and haunt the fliers and rattle a few chains!*

At the age of 41, William's time came much too soon. He passed away on May 26, just ten days after we received his manuscript and plans. We at *Model Builder* are honored that William chose this magazine as the venue for his last creative efforts, and extend our sincere condolences to his family and friends.

Combine a hot geared 05 electric system with this lightweight aerobatic airframe and get ready for a wild ride! Features simple, conventional construction throughout, with your choice of airfoils and wingtip treatment.

This view illustrates the difference in the wingtip design—the rounded tip version with the semi-symmetrical airfoil is the author's favorite. The square-tip model sports an Astro 05, but William favors the less expensive Trinity "Sapphire" car motor with a 3.5:1 gearbox. Both models use a Futaba Attack-E radio with the MCR-4A receiver/speed control. Use a BEC setup to eliminate the weight of a separate receiver battery.



Without the faux fuselage and canopy the Blues looks just like a modern competition fun-fly model. The ship can be flown like this, but lacks the character of the "fuselage" versions. Fuselage also provides visual reference in flight. Radio and seven-cell motor battery are completely contained within the wing center section; access is via a top hatch.

THE ELECTRIC BLUES

Designed by William I. Whitten

WINGSPAN ..... 36 in. with tip plates, 39 in. with rounded tips.

WING AREA ..... 460 or 495 sq. in.

FLYING WEIGHT ..... 42-44 oz.

WING LOADING ..... 13.2-13.8 oz./sq. ft. (tip plate wing) 12.2-12.8 oz./sq. ft. (rounded tips)

OVERALL LENGTH ..... 30.25 In.

AIRFOIL ..... 15 percent thick semi-symmetrical or 16 percent thick flat bottom.

RADIO ..... Three channels required.

CONTROLS ..... Coupled ailerons/rudder, elevator, throttle. Optional coupled flaperons/elevator.

POWER ..... Seven-cell 05 electric. Recommended setups with seven 1400/1700 SCR cells:

- Trinity "Sapphire" motor (retimed for reverse rotation) with 3.5:1 gearbox and Master Airscrew 12x8 electric wood prop.
- Astro Flight geared cobalt 05 (sport or FAI) with Master Airscrew 12x8 electric wood prop.

right direction and fitted with a 3.5:1 gearbox. Astro's geared cobalt 05 also does well and the "War" series motors from Model Electronics should do likewise, though I haven't tried one.

In any case, I suggest you use only the new Master Airscrew "electric" wood props. I use an 11x7 with eight 1000-mAH cells and a 12x8 with seven 1400-mAH cells. I get close to four minutes at full power, with the eight-cell pack having a slight edge in performance. The 12x8 on eight cells gives extreme power but I doubt the Sapphire motor will take it too long. With the motor out in the breeze, it stays cool but be sure enough air flows through the wing to keep the batteries and speed control from overheating.

CONTROL SYSTEM

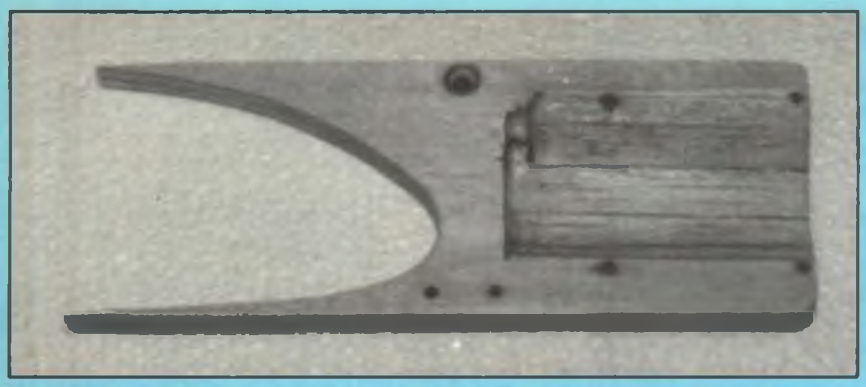
The controls are unusual in that I get up to four "functions" from just two servos. The rudder is driven via pull-pull cables from the aileron servo. The elevator is also driven via pull-pull cables. If you want to try coupled elevator and flaperons, a Du-Bro mechanical mixer on the aileron servo can be driven by the elevator servo via a turnaround bellcrank forward of both servos. Flaperons will tighten up loops and make takeoffs shorter, but I'm not sure they're worth it. The plane won't spin with 'em, and when you make the ball joints free enough for mini servos to operate, the whole system gets a bit sloppy. You can always try the mixer and take it off if you don't like it.

CONSTRUCTION

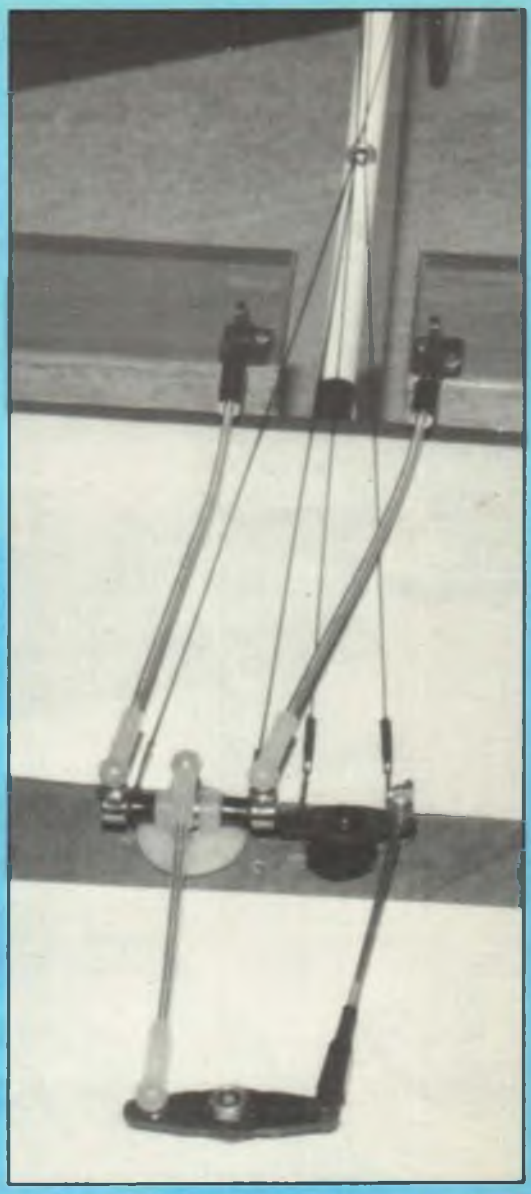
Pick your balsa carefully. Look for stiff but light balsa except for the wing spars; use some good straight medium-hard stock for them since there are no shear webs. Try to keep weight down wherever you can. I use thin CA for almost all of the construction, plus a little epoxy when joining the tail feathers to the boom and the motor mount to the wing.

Empennage: Get these out of the way first. Make sure all the joints are tight and don't forget the corner gussets. The slot in the stab for the vertical fin needs to be a nice tight fit on the fin. The tailboom will be epoxied into the fin/stab junction later.

Wing: Make two W-2 and six W-3 ribs from 3/32 balsa. Add the 1/8 balsa doublers to the tops of the W2 ribs as shown on the plan. Laminate an oversize W1 rib blank of 1/64 ply and 3/16 balsa (balsa/ply/balsa sandwich), then cut it to the W-3 rib pattern but without the spar notches.



The nose piece is a balsa/plywood sandwich cut to match the airfoil and carved out on one side to fit the motor casing.



View of the bottom of the wing reveals the ingenious linkage setup that provides coupled ailerons and rudder and coupled elevator and flaperons, using only two mini servos. Pull-pull cables are used for the rudder and elevator. The elevator/flaperon coupling can be deleted by omitting the turnaround bellcrank and the Du-Bro mechanical mixer. Both control systems are detailed on the plans.

Carefully cut the tailboom slot as shown in W-1; the boom should be a snug but not tight fit in the slot. Depending on your tailboom, you may need to trim the sides of W1 or even add a thin layer of balsa to get a good fit. The tail boom is a carbon fiber or fiberglass arrowshaft with a 1/4-inch I.D. (approximately 5/16-inch O.D.) and 18 inches long, including the part inside the center rib slot.

Once the slot is made, laminate a sheet of 1/64 ply to one side and trim to the rib outline, then do the same on the other side. Carefully sand and cut the whole thing to match rib pattern W-1. Use this as a pattern to make two W-4 half-ribs.

Pin down the bottom spar and the trailing edge sheeting over the plans, then glue the trailing edge stick in place. Glue the ribs in place, followed by the leading edge, top spars, hatch support and top trailing edge sheeting. Take the framework off the board and carve the leading and trailing edges to shape, then sand everything nice and smooth. Add the antenna tube and rounded tips if desired (note the triangle braces and filler pieces on the rounded tips). If you plan on using the tip plates, leave them off until the wing is finished and covered.

Next cut a piece of 1/64 ply for the center bays. Trim it to an exact fit before gluing. Glue it first to the top doubler spar, then wrap it toward the leading edge. Glue the ply to the tops of the ribs, then wrap it around the leading edge, wetting the ply if necessary. Wrap the ply under the center bay and glue it to the ribs and bottom spar. Sand the ply smooth and blend it into the balsa. Make sure the ply is glued well to each rib, especially the wide center rib as this joint holds both the motor mount and landing gear.

Cut or drill the air holes in the underside of the wing and in the trailing edge, plus the hole for the tailboom and two for the servo output shafts. Pieces of sharpened brass tubing will cut clean holes with little splintering.

Ailerons: Take a full length of 3/8-inch balsa triangle stock and glue it to a full length of 1-1/2 inch shaped trailing edge stock. Sand smooth, then cut it in half and trim each piece to fit the wing.

Motor and Landing Gear Mount: Laminate pieces of 3/16 balsa and 1/32 ply into a ply/balsa/balsa/ply sandwich. Cut it to the appropriate shape and sand the edges smooth. Mark where the motor is to go and carve and sand out a half-round recess to fit the motor. (You can also just glue on pieces of balsa triangle stock, but it doesn't look as nice.) Drill the holes for the landing gear and brackets and the motor straps. Wick a bit of thin CA around the outer edges and the holes to harden the balsa, then sand smooth. Sand the airfoil cutout so it matches the wing center section.

Faux Fuselage/Canopy: This is just for show so make it as light as possible. On one plane I used pink foam covered with low-temp film; on the other I used some very light balsa. The foam is hard to cover so I suggest the balsa. You could also use 1/4-inch square balsa sticks. Use the shape shown or change the profile to resemble some other plane. You can even leave it off if you want, but the Blues look a bit naked sitting there with nothing.

Landing Gear: Simple—just a piece of 1/8-inch wire bent to shape. Trial fit the gear on the mount, then unbend it enough to get it back off until the mount is finished and on the plane. Use a pair of the 2-inch Dave Brown electric wheels. For rough grass a larger size may be needed, but keep 'em light. The thin L.G. wire may seem a bit spindly but it does the job. If it bends in a hard landing just bend it back for the next flight.

FINAL ASSEMBLY

Cover your Blues with one of the lighter plastic films. Make sure you iron the covering down to each rib and spar rather than just around the edges—this wing is light and needs the extra rigidity. I suggest using bright, contrasty colors; I like transparent colors as they are easier to see on

THE ELECTRIC BLUES!

dull days. (You do understand that some part of the color scheme must be blue or you can't call it Electric Blues!) Spray the motor/landing gear mount with several coats of whatever paint you have on hand.

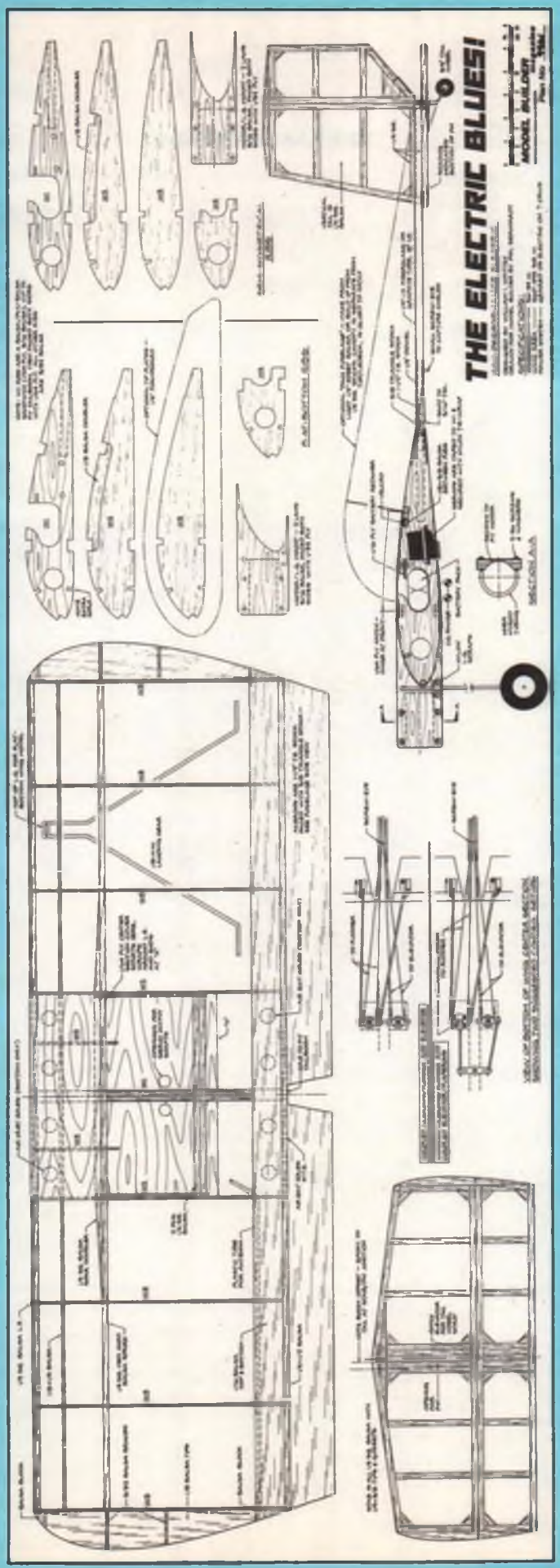
Hinge the tail surfaces and the ailerons and install the six control horns. Glue the fin into the slot in the stab and trim away a bit of the covering where the tailboom will be glued. Make the hatch cover from 1/64 ply and cover it with film (leave 1/2 inch of covering hanging off the front edge to serve as a hinge and leave a bare area for the "canopy"). Trim a strip of film off the wing where the motor mount will be mounted. Use a soldering pencil to melt the covering over the various holes in the wing.

Glue on the motor/L.G. mount with 5-minute epoxy—be sure it's straight and centered on the wing. Using the same epoxy, glue the tailboom to the fin/stab and also the length of 1/4-inch dowel inside the boom where it exits the wing. When dry, drill the pilot hole for the screw eye cables guide. Slide the boom into the wing, line it up square and wick in some thin CA to lock it in place.

Install the control horns, the tailwheel assembly and the landing gear. You'll have to unbend it some to get it through the hole, then carefully squash it back closed enough to put on the plastic retaining clips. Install the battery retainer tab with a flathead screw. Mount the servos with double-sided foam tape, then run a tie-wrap around them and through the holes in the center rib. Tighten it and nip off the excess. Don't trust just the tape to hold the servos.

Turn the plane upside down and put on the cables guide screw eye. Mount the aileron horns and the wingtip skids if used. Make up the aileron links and install the servo output arms and pull-pull cables for the rudder and elevator. I use plastic-coated braided steel fishing leader, but Du-Bro makes a kit with all the hardware. The cables should be snug but not so taut that they bind. If you opt for the flaperon mixer, it and its turnaround can be installed at this time.

Install the receiver, speed control, on/off switch and arming switch if used. Run the antenna inside the guide tube—*not* inside the carbon fiber boom. I use "shorty" antennas made by Hayes—they work well and don't trail outside the wing. Wire up the motor and mount it with 2-56 screws and straps cut from inner nyrod tubing. I put a layer of thin servo mounting tape under the motor to keep it from twisting under torque, plus it dampens the noise a bit.



Attach the faux fuselage to the tailboom—either glue it on or iron on strips of covering under the boom and back up the other side. Lay the hatch cover in place and iron down the loose strip of covering to the top of the wing to form a hinge. The aft end is held down with Velcro on scrap balsa or ply platforms. Glue the canopy to the hatch cover so it lines up with the fuselage. Mount the wheels and prop and you're done.

FLYING

The Blues isn't real fast and can slow down to a crawl on landing, so lots of control surface throw is helpful. Expo or dual rates would be nice if you have them but I rarely use mine. The CG isn't critical and most of the heavy stuff is on or forward of the CG anyway. The low wing loading helps too—with flaperons mine won't even spin. Even without them the flat-bottom plane doesn't want to spin; the semi-symmetrical version will spin nicely. Both versions will loop and roll like crazy although the coupled rudder makes rolls a little barrel-like at times. I like to fly my Blues low and close around myself, much like a control line plane without the wires. Ground handling and takeoffs are easy except when a crosswind gets under a wingtip. Plastic wingtip skids are recommended if you fly off of a hard surface. Be advised that a rapid taxi with the flaps down (up elevator) may result in the plane becoming airborne before you're expecting it!

If you're wondering how the Blues will do in fun-fly events against the gas powered planes, it depends. No way will either of the Blues keep up with the competition "stick specials" with all their mixers and such. However, the one time I flew the semi-symmetrical Blues in a local fun event, it held its own against the gassies. Our club team didn't win but it was more the pilots' doing than the planes'!

I hope you'll enjoy whichever version of the Electric Blues you try. Just watch out—you may not want to go back to your old electrics! ***MB***

■ By David Manley/Photos By Roy Inman

ACE R/C'S 1/2A "GRASSHOPPER"

Low price, pop-apart design and near indestructibility make this foam-wing pod-and-boomer an excellent choice for an RC trainer or sport model.

The Grasshopper, a pod-and-boom, foam-winged aerialist from Ace R/C, joins the other 1/2As in the Ace line-up as the company's slingshot to the butt of modeling boredom.

Until I acquired the Grasshopper, all of my flight experience came by way of pure and self-launched sailplanes. The first flight of the Grasshopper took place with me on the sticks for the first time as a pilot of an engine-powered plane. I made three successful flights in a row with nary a mishap. More about that later.

Designed by Art Bigelow, the Grasshopper originally appeared as the Cricket in a June 1990 *RCM* magazine construction article. The Ace design department made minor changes, added a landing gear (included in the kit) and bestowed upon it a name that most likely reflected the fields from which modelers would fly the craft.

If you handle transmitter sticks with the touch of an ironworker, you'll appreciate the rubber bands that hold the Grasshopper's major components (wings, landing gear, engine and tail feathers) in place. The fiberglass arrowshaft, cut to the required length, seems capable of withstanding all manner of brain-lock.

Ace recommends an .049 of the reed-valve gender. I chose the Cox Texaco engine for duration, power and quietude. The Texaco—a little jewel of typical Cox quality—drives a 7x3.5 prop with ample authority for the Grasshopper without the "scream" of its more powerful 1/2A brethren. I also latched onto a Tee Dee .049 in case I yearned for that scream.

My Ace MicroPro and Pro 810 AM receiver provided glitch-free guidance. I store all my electricity in SR Batteries. Thanks to Larry Sribnick (Mr. SR), I've never had a battery failure since switching to his excellent products.

CONSTRUCTION

Assembling the Grasshopper begins with the fuselage. It takes only seconds to push out the 11 die-cut "tab-in-slot" pieces from the 1/8 lite-ply sheet. The pod can then be framed and taped together in minutes. The right side of the fuselage (looking from the top and behind) is 1/8-inch shorter than the left, the bottom shorter than the top. Thus, following the directions renders the correct amount of right and down thrust.

Medium CA and accelerator can be used to seal the fuselage in seconds. Otherwise, it must be untaped and glue (white or carpenter's) applied before reassembling. Be certain the short side is on the Grasshopper's right, lest your first flight be too brief, too exciting and signal

As you can see, there isn't much to putting one of these little hummers together. Basic construction can be finished in a couple of evenings. Note the lite-ply fuselage pod bristling with dowels; the Grasshopper features "pop-apart" construction, meaning that the wing, tail, landing gear and engine are all held on with rubber bands so that they can pop off in a hard landing or crash, preventing damage or at least keeping it to a minimum.

THE 1/2A "GRASSHOPPER" FROM ACE R/C

WINGSPAN ..... 43-1/2 in.
WING AREA ..... 214 sq. in.
FLYING WEIGHT ..... 20 oz. (25 oz. as tested).
WING LOADING ..... 16.8 oz./sq. ft. as tested.
ENGINE ..... Reed-valve .049.
RADIO ..... Two channels (rudder/elevator).
CONSTRUCTION .. Molded foam wings, lite-ply fuselage pod, fiberglass tailboom, sheet balsa tail surfaces.
SUGGESTED RETAIL ..... $29.95.

Produced by Ace R/C, Inc.,
116 W. 19th St., Higginsville, MO 64037-0472;
(816) 584-7121.

your entry into model railroading.

The arrowshaft boom slips into its pre-cut and pre-drilled block with nary a hassle. Thin CA wicked into the block seals the boom. The rudder and elevator pushrods, which appear to be 18 inches of Ace's nylon Flex Throttle tubing, fit perfectly inside the arrowshaft. Depending on variances in the arrowshaft manufacturing, the outer pushrod tubes may need a bit of soapy water to ease them into the shaft. Ace also suggests a few drops of thin CA (but not in the nylon tubes!) to lock the rods in place. I need the soapy water applied on a daily basis, the pushrods did not. As the tubes seemed quite secure, I skipped the CA treatment.

The instructions say to make the tubes flush with the tail end of the shaft and leave about a half-inch of tubing where they enter the fuselage. That worked fine, no visible flex at either end. However, on my second 'Hopper (yes, I had to try another version), I ran the tubes out to give more support, but not so long as to interfere with tailplane movement.

Not a whole lot of work goes into assembling the tail feathers. The 1/8 sheet balsa needed a tad of sanding before covering and hinging. The plans suggest "X" hinging with film covering or the nearly forgotten method of "sewing" them together with carpet thread in a Figure 8 pattern.

The engine mounts to the firewall with four self-tapping screws. Four more screws go into the firewall to serve as hooks for the rubber bands.

The tail surfaces receive the same rubber band treatment. A 1/8 lite-ply stab plate goes on the boom, and two 1/8-inch dowels, glued to the stab plate, hold the surfaces in place. Ace even supplies the No. 10 rubber bands!

I covered the fuselage and tail surfaces with red and white MonoKote and added a bit of 1/8-inch wide white striping for accent.

The Grasshopper, no doubt, would have been better served with a lighter, low-temperature film covering. But I had a cash shortage and a MonoKote surplus. While it's a bit heavier, MonoKote does add a measure of strength. In addition, the craft's box-like shape means no compound curves to worry about.

Those wonderful Grasshopper foam wings made my day. They can be painted, covered with low-temperature film, coated with polyurethane varnish, or left in the nude. Builders can also trim off some of the trailing edge and glue on 1/4x3/4-inch balsa stock. With a bit of work, those trailing edges can be sharpened to render better performance—a truism for nearly all flying surfaces.

The Grasshopper's wing is a combination of panels from Ace's constant-chord and tapered foam wings. A short section of constant chord panel goes between the two tapered tips. I used five-minute epoxy to join the panels at the specified angles. When everything dried, I applied a continuous strip of 1/2-inch wide fiberglass-reinforced strapping tape that runs from tip to tip, top and bottom. *Don't* omit the tape—it's about all that separates you from a foam snowstorm, a lite-ply box of radio parts and a fiberglass boom with which to beat yourself on the head.

After sticking on the decals, I painted the wing with a thin coat of clear polyurethane. The varnish, which protects the wing quite well, causes a slight discoloration of the foam . . . as well as fingers that get in the way. But a caramel-winged Grasshopper won't destroy one's life and it does save lots of time.

For the airborne system I used two old Ace Bantam servos and an Ace Pro 810 receiver. It took a 500-mAH pack and 2 ounces of lead to get the plane's nose slightly down and my concern substantially up . . . prepositionally speaking. At 25 ounces, the Grasshopper tipped the scales

This ground-level close-up clearly shows the Grasshopper's rubber-band-together assembly. Dave used MonoKote on the fuselage pod and tail surfaces. Pod could also be painted with K&B Super Poxy for a durable, totally fuelproof finish.

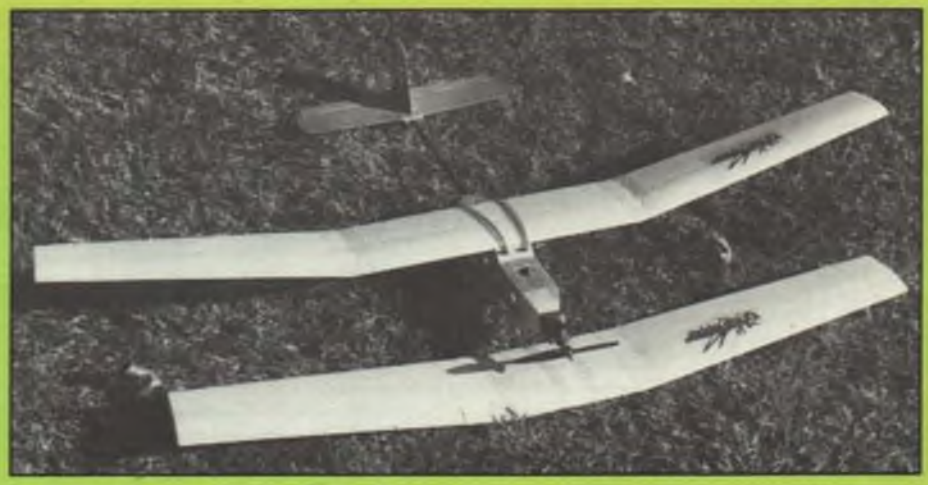
5 ounces overweight. The extra fat would do nothing to help this Little Caesar's flight performance.

FLYING

As we came to praise Caesar, not to bury him, photographer Roy Inman generated three hand-launches of cannonshot quality before obtaining a weed-splitting, dust-swirling, gear-dragging, 30-feet-in-ground-effect sojourn to a reasonable altitude. (Cox thoughtfully provides well-written, easy-to-read, enlightening instructions that clearly indicate the need for a break-in period. Fortunately for me, Cox does not require proof of average intelligence to purchase its high-quality products.) At altitude, the Grasshopper became a docile, predictable flying machine. Despite the extra weight, the plane climbed out nicely.

The first steep turns, carefully instigated, revealed absolutely no tendency to tip stall. The plane goes where you want it without protest. Sharp turns at low speed resulted in some loss of altitude (as is the case with nearly all aircraft), but nothing dramatic.

I didn't try any fancy moves—loops, spins, rolls, etc. Roy needed close-in passes to take the photos for this review. Also, I couldn't squeeze more than about 3 minutes of running time out of the little Texaco. The wonderful person at Cox's toll-free courtesy line offered several suggestions which I will try later.



Dave built a second Grasshopper and modified it for a direct drive Astro 035 electric system. Modifications included drilling 3/4-inch lightening holes in the fuselage pod, installing a tubular plywood motor mount, and stretching the span (to better carry the extra weight) by inserting a full panel from an Ace constant chord foam wing. The project was abandoned for the time being because, although Dave managed to shoehorn everything into that small pod, some of the equipment was just too vulnerable to damage. However, not wanting to waste a perfectly good long-winged Grasshopper, Dave installed a Cox Tee Dee .049 on a tank mount and ended up with a fast-climbing motorglider. Strapping on the stock wing delivers tight loops, rapid rolls and scary spins, says Dave.

Three attempts at R.O.G. generated 160 over 95 blood pressure, 95 beats per minute and zero air time. With only a fixed tailskid, the 'Hopper just wants to groundloop. (In fairness, Ace only recommends hand launches.) The wings must be level and the nose of the plane aimed at a spot about 100 in front of the launching point.

With many Grasshopper flights now in my logbook, my only conclusion is that Ace has succeeded in its goal to produce a fun, friendly 1/2A craft with trainer-like qualities. At about $30 retail (several dollars less at some discount houses and retail shops), the Grasshopper's excellent value equals Ace's goal to provide an inexpensive training tool and incredibly fun sport flying. *MB*

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PRODUCTS IN USE

■ By Eloy Marez

The "New and Improved" Ace R/C Family of Chargers

No matter what your battery charging needs, Ace has something to do the job. Eloy gives a brief overview of six of the company's latest, most useful chargers.

I know, I know—you're sick and tired of advertising phrases like "new and improved"! Well, I feel the same way, but in this case, I can assure you that the chargers and related accessories now available from Ace R/C are really and truly "new and improved." Attractive, yes, but the changes go beyond appearance; they incorporate many new component and circuit changes, and valuable functions.

DDVC

The Digital Dual Vari- Charger is one of my favorites, simply because it incorporates adjustable charge rates and a digital current meter by which I can adjust the rates as required. I'd like it even if it was a single unit; the fact that it's a twin is a bonus. With cords to match all of my charging requirements, the DDVC replaces a lot of miscellaneous chargers.

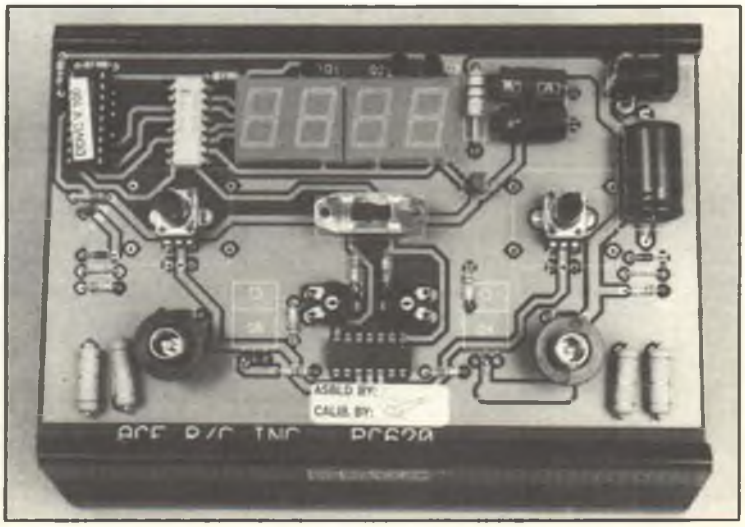
The DDVC is AC or 12VDC powered, will revive all NiCd and NiMH batteries of from one to ten cells, of capacities up to 5000 mAH. It will also recharge lead-acid (liquid or gelled electrolyte) 12V starter batteries. When powering the DDVC from 12VDC, charging is limited to eight cells, and depending on the capacity and condition of your batteries, you may have to use a lower-than-optimum rate, but they *will* be charged. Also, NiMH and lead-acid batteries require different handling than do NiCds; if you're not experienced with their use, it is highly recommended that you study and follow the charging instructions received with them.

Charging starts when the battery is connected; the rate is then adjusted with individual knobs and is displayed on a bright LED digital display to within 5 mA. The DDVC is not a timed or "peak" charger; it's a constant current unit that will charge at the set rate as long as the battery is connected. Though modern NiCds are somewhat accepting of overcharges, NiMH and lead-acid batteries are not, and should be disconnected when the calculated charge time has elapsed. However, any type of battery can be left connected to the DDVC indefinitely if the proper trickle rate is dialed in after the initial charging is complete.

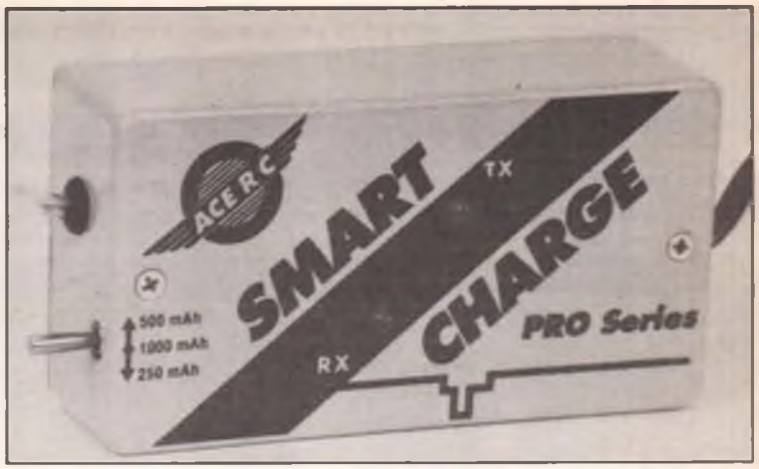
Like all of Ace's "new and improved" products, the DDVC is built into an attractive extruded aluminum case with plastic end caps. It is designed for wall mounting or stacking with other Ace products built into the same case.

DIGIPULSE MULTI-CHARGER

This one is for those with a lot of radios



■ LEFT: Ace's DDVC (Digital Dual Vari Charger), either AC or 12VDC powered, can be used to charge two one- to ten-cell batteries at up to 500 mA; charge rate is displayed digitally.
■ RIGHT: The insides of the DDVC are significant in that they show how well designed and constructed this new equipment is—all modern components and circuitry are used throughout.



■ LEFT: The Digipulse Multi-Charger uses pulse charging techniques to charge and trickle up to six different batteries simultaneously. All pertinent information is displayed on the LED display. ■ ABOVE: The Smart Charge is Ace's answer to the need for a 12VDC powered field charger; it uses the latest Reverse Pulse Conditioning techniques, often referred to as "reflex" charging. The Smart Charge is presently being redesigned to fit into the same stackable aluminum case as the other Ace units described here.

or a lot of airplanes. It is AC powered and provides for charging six separate batteries of from one to ten cells, at individually set rates of 10 to 140 milliamperes. It's a timed charger; after a 16-hour initial charge period at the programmed rate, it automatically switches to trickle at which the batteries can be left connected indefinitely. The status and operation of any function is always readily shown through individual LEDs for each channel, and through a bright LED digital display. It's not necessary to start all charge cycles at the same time; batteries can be connected as required, with each section operating completely independently of each other. Also, if previously charged in some other manner, batteries can be put directly into the trickle function.

The Digipulse Multi-Charger operates in the method most favored by rechargeable battery makers—pulse charging. The amount of on to off time is varied according to the preset rate, thereby setting the amount of energy delivered to the battery during the charge time. This method is claimed not only to charge batteries to their full capacity, but to increase their lifespan significantly.

The Digipulse is encased in the same enclosure as used for the DDVC described above, and connections to it are made with the same fittings and cables. In fact, this compatibility of accessories is one of Ace R/C's trademarks which I appreciate, and I'm sure you will also.

AUTO ADD-A-TRICKLE

Trickle charging has (finally) become an accepted method not only of keeping batteries ready to go, but of prolonging their life. Ace R/C's Auto Add-A-Trickle makes it easy and foolproof. The AAAT, as Ace likes to call it, is small—about the size of a receiver—and is intended to be added to your regular system charger. It works simultaneously on both the transmitter and receiver batteries.

To mate the AAAT to your charger, you simply cut the existing wires, strip off some insulation from each wire and connect them to the appropriately marked screw connectors. The instructions are quite clear on this, including how to determine the proper polarity of the wiring. Since continuity of each side of the charger must be maintained, I recommend that the connections be made one at a time; completely finish the transmitter side before cutting the receiver wires. Everything you need to know is covered in the instructions.

This too is a timed device; after an initial 18-hour charge period, the AAAT automatically switches to a trickle rate approximately 20 percent of the normal rate. Note that it is to be used with wall type system chargers only.

■ LEFT: While not primarily a charger, the Digipace 3 will accurately measure battery capacity, after which it will correctly charge it and switch to a trickle rate, all automatically. ■ RIGHT: The CVC (Constant Voltage Charger) is designed to revive both 6- and 12-volt lead-acid batteries—either liquid or gelled electrolyte—automatically, switching to trickle when done.

In general, I find the design of these new products to make use of modern techniques . . . . All of the units I inspected were obviously assembled with care, and all worked without a hitch.

No additional cables and/or connectors are required for the AAAT—only the original system charger and the desire to improve your charging routine.

SMART CHARGE

This is Ace's answer to the need for a 12VDC powered field charger, capable of fully charging a dead 550-mAH battery in about an hour. Partially discharged batteries will take correspondingly less time.

The Smart Charge, initially developed By Sirius Electronics in Oregon, borrows its name from the mainstream electronics industry, which has had an increased interest in rechargeable batteries and chargers in recent years. The Smart Charge features a so-called "smart" IC; it uses a unique reverse pulse which conditions the battery as it charges, improving its capacity and increasing its life. The technique is coming to be better known within the RC industry as "reflex" charging, though actually, the term is "ReFLEX," being the name under which it is patented to the Christie Electric Corporation. (You may have also heard of it referred to as "burp" charging—incorrect terminology also.)

For those who would like to know more about this battery charging method, Ace has prepared a technical paper which explains it all, including graphs, equations and formulas. Send them an SASE and ask for the "Smart Charge Data Sheet."

The Smart Charge is designed for batteries of from three to six cells, 125 to 2000 mAH on the receiver output; and four to eight cells, 250 to 1000 mAH on the transmitter side, charging simultaneously or individually. It is fully automatic; you connect an input source, connect the battery(s) to be charged, heed the information displayed by two LEDs, and go away. In the case of the unit currently available, the charger outputs to two two-wire cables to which you have to add connectors to mate with your radio system. However, the Smart Charge is soon to become even smarter, at least in looks, as it is being redesigned in one of those aluminum cases such as used in the DDVC and Digipulse. At the same time, the outputs are being changed to the coax connectors also used in the others.

DIGIPACE 3

This is the latest member of the Ace R/C Digipace family, for which a complete review appeared in the April 1996 issue of *MB*. Basically, this unit, and other similar ones generally but incorrectly referred to as "cyclers," discharges batteries at a constant preset rate and indicates the exact capacity. They offer the only method available to us for doing this; contrary to what you have probably read, ESVs (Expanded Scale Voltmeters) cannot provide this information. This information is extremely valuable in gauging the quality and efficiency of rechargeable batteries and it is recommended to be done every three or four months; most definitely before use if the batteries have been idle for some time. The case is the same one described for the DDVC, etc., with which it stacks nicely.

CVC

This also newly updated Ace charger, built into the same metal case as the others, is for use with those all-important 6 or 12VDC lead-acid (liquid or gelled) starter batteries we all find so many uses for at the field. Obviously, it's an AC-powered device, fully automatic and completely safe, even if you should forget to disconnect it. Actually, it charges the battery to 90 percent capacity, after which it switches to a safe trickle rate which keeps the battery from self-discharging. The maximum charge current is determined by the capacity of the battery in use.

Its use is super simple—connect the in an out and monitor its operation on two LEDs. Compete instructions are included (important if this should be your first experience with these batteries and their chargers).

• • •

In general, I find the design of these new products to make use of modern techniques, up to and including computer micro-processors where applicable. Such designs can be depended upon to maintain design parameters and offer accurate repeatability for years. All of the units I inspected were obviously assembled with care, and all worked without a hitch, just as claimed.

All Ace assembled equipment is covered by a limited lifetime warranty; if a failure should happen within 30 days, the unit will be replaced with a new one. After 30 days, it will be replaced with a new or reconditioned one, or yours will be repaired, at Ace's option.

If you would like to improve your battery charging methods, take a look at these products from Ace R/C . . . maybe one of them is for you. ***MB***

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ELECTRONICS CORNER

BY ELOY MAREZ

◎NiCd Battery Charging Has Come Of Age!

◎Mini-Review: The TRC Impulse 2D Charger

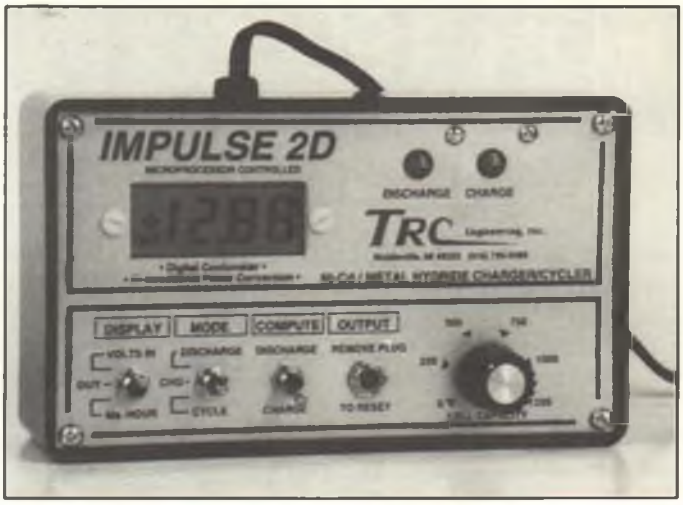
◎Exotic Batteries

As I see it, there are two separate and distinct reasons for the changes we've seen in the field of NiCd battery charging in recent years. One is due to changes in the batteries themselves—today's NiCds are far more dependable and forgiving than those we had in the early days of RC flying. The proliferation of rechargeable battery powered consumer products, from cellular phones to electric back scratchers, has caused the electronics industry to take a close look at what's involved, which has led to a whole new field referred to as "energy management."

Actually, two separate branches have evolved: the battery manufacturers themselves, some of whom, like the Sanyo Electric Company, so well known in RC circles, have also developed some battery charging products; and other companies whose primary products are Integrated Circuits (ICs), some of which are proprietary ICs whose sole function is the proper reviving of rechargeable batteries. Termed "smart" charger ICs, my files include material from seven such manufacturers—and those are only the ones I know about, I'm sure there are others.

Such ICs ("chips" if you will) have been optimized for their one role in life, though with a flexibility that allows the charger designer to select and set all of the parameters best for the battery being charged. They can be programmed for the most basic of requirements—charging current, with a switch to a trickle rate. The designer can also choose the method by which the charge is ended—voltage peak detection, battery temperature, or time. Generally, when either of the first two methods are used, a maximum possible time period is also built in as insurance in case of a glitch, as can be caused by a defective battery.

These chips include many other desirable features, such as pre-testing of the batteries for proper polarity connections and condition before a charge is applied. Another interesting feature is that smart ICs have special provisions for Nickel Metal Hydride (NiMH) rechargeable cells, which, in accordance with both battery and IC manufacturers, require different charging techniques than do NiCds. The bottom line is that a charger designed around one of these chips will charge your battery safely and completely, under charging conditions that will also provide maximum usable life.



TRC's Impulse 2D, a truly state-of-the-art charger designed to correctly and safely charge both NiCd and NiMH rechargeable batteries of from one to ten cells. Complete details included in text.

Far more than just a current source, these "smart" IC chargers use a variety of pulsed current techniques, depending on the maker, to revive a rechargeable battery. The subject is too complex for the available space; suffice to say that they are composed of far more than the few components seen in the typical constant-current charger supplied with most RC systems.

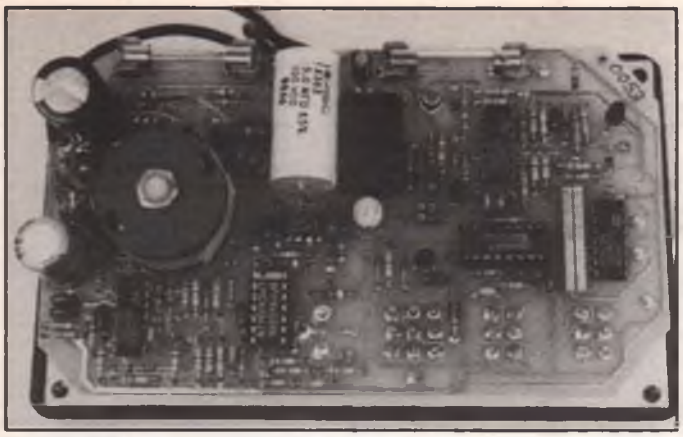
Charger ICs come in 16 or more pin DIP (Dual In-line Package) versions containing components which probably number in the hundreds. I have literature from a number of makers of such ICs, and also complete schematics and instructions for chargers using them. Should you be interested in any of this information, drop an SASE and specify either the IC supplier's list or charger schematic.

Fortunately, it's not absolutely necessary to roll your own smart IC charger, as one is available to you:

THE IMPULSE 2D

TRC Engineering (10707 Whispering Valley Lane, Middleville, MI 49333; 616-795-9585) designed its Impulse 2D around a "Quicksaver" 1722N IC from Integrated Circuit Systems. The 2D not only charges your NiCd and NiMH batteries, it also discharges them under controlled conditions and indicates their actual capacity on the LCD screen. It requires either a 12-volt battery or a 12-volt power supply for its input, drawing approximately 5 amperes when charging a 1200-mAH pack. A DC converter is included so that batteries as large as 10 cells can be charged from the normal 12-volt supply. Internal

The bottom line is that a charger designed around one of these ["smart" IC] chips will charge your battery safely and completely, [and] will also provide maximum usable life.



Being far more than just a transformer/diode/resistor, the 2D charger's insides reflect all the components necessary for true "energy management" of today's rechargeables.

regulation compensates for high inputs such as power from an automobile while the engine is running, and the drop that occurs when powering from a field battery and the engine starter or glow driver are operated. In a one-of-a-kind feature, in the discharge mode, the current drawn from the battery being tested is put back into the supply battery, if one is being used.

Charge current is regulated and user adjustable to the correct value for whatever capacity cells are being charged. The 2D fast charges the batteries to 85 percent of their rated capacity, following that with a 2-hour "topping" charge and then an automatic drop to a trickle rate at which the battery can be left indefinitely—ready to go whenever you are.

In the cycle mode, the 2D drops the battery to 1.1 volts per cell, the value at which NiCds and NiMH cells approach their critical voltage drop. The unit is calibrated for one-, four-, and eight-cell packs; it will also evaluate packs as high as 10 cells, though with some loss in accuracy. The latter is still a useful function, as a standard can be established for a given battery and any significant reduction anytime in the future will warn of reduced efficiency.

After the discharge mode is complete, the 2D automatically starts the normal charge mode. In either discharge or charge, the LCD can be switched to display the exact energy, in milliamp-hours, that was taken out or put back into the battery being processed.

As stated here before, manufacturers recommend different charging parameters for NiMH cells than those used for NiCds, and regardless of what we might read otherwise in the model press, I'm inclined to go with them. TRC recommends a charge setting one-half of the battery's rated capacity, and additionally, an internal plug-in jumper needs to be changed that increases the safety cutoff time to account for the longer charge time.

The 2D is fused for both input and output, with 5-amp fast-acting fuses in both places. If the input fuse is gone, the charger will be completely dead; if the output one is kaput, the display will read about 15 volts constantly. TRC recommends replacement fuses to be not over 7 amps.

TRC's Impulse 2D is professionally assembled using all high-quality components. It carries a one-year parts and labor warranty, and is available direct at an introductory price of $186. I've tested the 2D in both charge and discharge functions, comparing it with other units of both types, and find that it meets all claims. I cannot be that positive about what its effect will be on the life of my batteries, but if the information available from both battery and charger IC manufacturers is to be believed, batteries cared for in the Impulse 2D manner are bound to last longer and be more reliable.

EXOTIC BATTERIES

Still on EC's favorite topic—batteries—there are a couple of new types on the horizon that might well be what the next generation of RC will be using. Both are off-shoots of the already known lithium battery, with the important exception that they are rechargeable They are *lithium-ion* and *lithium-metal* cells. According to the specs, they are both significantly superior to both NiCd and NiMH cells, though there are some differences that will have to be considered.

Lithium-ion cells have a primary voltage of 3.6, though with a rather non-linear discharge curve. At a more or less average RC load of 250 mA, they could be expected to drop to 3.0V for the next 90 minutes, after which, similar to NiCds, they will drop further to their rated discharged voltage—2.0 in this case.

The lithium-metal cells, their unpronounceable chemical name being Li/LixMnO2, will exhibit a flatter discharge curve under the same conditions. Starting at 3.0V, in some 10 minutes, they would drop to 2.8V for more than 3 hours which should be enough flying for most anybody.

Let's compare these new cells to those with which we already have experience, all based on the common AA size; refer to the chart at left.

Now for a short explanation of some of the terminology. Average voltage is obviously self-explanatory, though the value itself will create some questions as it doesn't add up to the nominal 4.8 we are used to. No problem, only slight changes being necessary to current designs to accommodated them. Actually, most present day receivers are operating on 3.2V, produced by a voltage regulator from the initial 4.8. The energy management discipline has also produced many new LDO (Low Drop-Out) regulators which will ease the design.

Energy density is usually expressed in watt-hours per kilogram, being the available electrical energy versus weight. Note that the lithium-metal battery is ahead in this respect, though the lithium-ion is superior to all others we are now using. Energy efficiency is the measure of the energy versus size. The same parameters exist as they do for energy density.

The cost figures, being the cost per watt-hour in dollars, don't look so good for either of the lithium-based cells, though I'm a strong believer in that batteries is not the place to start cutting costs. Besides, looking at what we are willing to pay for our more sophisticated radios, I don't see this as a major factor, once convinced of the operational advantages of the new lithiums.

Self-discharge is given in percentage per month, at which the lithium cells are far ahead, though with the charging habits we have, this is not a major problem with NiCds.

Charging? The electronics industry is already ready; National Semiconductor already has available its LM3420 Lithium-ion "smart" battery charge controlled IC. It's also good news that all of these are U.S. developments; regardless of the ads, very few equipment innovations we see are overseas inventions purely for RC, they are based on something done here although intended for consumer electronics!

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. *MB*

COMPARISON OF BATTERY TYPES

	Sealed Lead-Acid	NiCd	NiMH	Lithium-Ion	Lithium-Metal
Avg. Voltage	2.0	1.2	1.25	3.6	3.0
Energy Density	35	45	55	100	140
Vol. Efficiency	85	150	180	225	300
Cost (average)	.75	1.00	2.25	3.00	2.20
Self-Discharge	5-10	25	20-25	8	1-2

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MIAMI
HOBBY HUT, INC.
12679 S. DIXIE HWY.
PH: 305-235-9584
MIAMI
ORANGE BLOSSOM HOBBIES, INC.
1675 N.W. 36TH ST.
OCALA
ROB'S HOBBY WORLD
8602 S.W. STATE RD. #200 SUITE N
PH: 904-854-0789
OCALA
JACK'S HOBBIES
131 N.E. 17TH PLACE - SUITE C
ORLANDO
BOB'S HOBBY CTR, INC.
7333 LAKE UNDERHILL RD
PH: 407-277-1048
ORLANDO
CENTRAL FLORIDA HOBBIES, INC.
5800 W. COLONIAL DR. #311
ORLANDO
COLONIAL PHOTO & HOBBY, INC.
634 N. MILLS ST.
PENSACOLA
BOBE'S HOBBY HOUSE
6715 N. "W" ST.
(CORNER OF VAN PELT & "W")
DAYTONA S.
ACE HOBBIES HOBBIES
2127 S. RIDGEWOOD AVE.
PH: 904-761-9780
TAMPA
CHARLIE'S DISCOUNT HOBBIES
7530 W. WATERS AVE.
PH: 813-882-4007
WEST PALM BEACH
CRAFT HOUSE HOBBY SHOP
1079 N. MILITARY TRAIL
GEORGIA
ATLANTA
BRIAR VISTA LAWN MOWER
SALES & SERVICE
1667 LAVISTA RD.
PH: 404-633-8741
ATLANTA
FINNEY'S HOBBIES
3455 PEACHTREE INDUSTRIAL BLVD
SUITE 990
PH: 770-495-8512
MARIETTA
THE HOBBY STORE INC.
2784 POWERS FERRY RD.
PH: 770-977-7288
HAWAII
HONOLULU
THE HOBBIETAT
1413 10TH AVE.
IDAHO
POCATELLO
DAPCO HOBBIES
2211 GARRETT WAY
PH: 208-233-8163
Twin FALLS
AERO-TRONICS MODEL SUPPLY
3200 LOCUST ST.
PH: 208-734-5943
ILLINOIS
BEACH PARK
LAKE COUNTY HOBBIES
37032 N. SHERIDAN RD.
PH: 708-662-4044
BELLEVILLE
W. SIDE HOBBY
2629 WEST MAIN ST.
BELVEDERE
HOBBICRAFT
126-128 N. STATE ST.
CHICAGO
STANTON HOBBY SHOP
4719 N. MILWAUKEE AVE.
CHICAGO HEIGHTS
JUST PLANE HOBBIES
13 E. MAIN
PH: 708-754-0660
E. MOLINE
TONY'S HOBBY & KEY
830 - 16TH AVE.
ELMHURST
AL'S HOBBY SHOP
121 ADDISON-PO BOX 449
GALESBURG
WING-MFG.
906 E. SIMMONS
OAKLAWN
PAT'S HOBBIES & CRAFTS
5730 W. 95TH ST.
PH: 708-424-8131
OTTAWA
A WORLD HOBBIES
311 BOYCE MEMORIAL DR.
PALESTINE
KANCAID R/C HOBBIES
LAMOTTE & WASHINGTON ST.
PH: 618-586-2070
ROCKFORD
ROCKFORD HOBBIES, INC.
618 S. ROCKFORD AVE.
SANDWICH
G&D HOBBIES
1090 W. CHURCH
815-786-8033
INDIANA
FT. WAYNE
PHIL'S HOBBY SHOP
1702 LAKE AVE.
PH: 219-426-5068
SOUTH BEND
THE HOBBY SHOP
2224 MISHAWAKA AVE.
IDMA
ATLANTIC
WAYNE'S HOBBY SHOP
304 W. 2ND ST
PH: 712-243-5377
CEDAR FALLS
BOB'S R/C SUPPLY
UNIT E - BLACK HAWK VILLAGE
COUNCIL BLUFFS
BUD'S HOBBIES & CRAFTS
133 W. BROADWAY
DES MOINES
HOBBY HAVEN
7572 HICKMAN RD.
ELDRIDGE
ELDRIDGE TRUE VALUE HARDWARE
650 E. LECLAIRE RD.

MARION
R/C ADVENTURES
130 MARION BLVD. SUITE B
P.O. BOX 284
PH: 319-377-6892
MARSHALLTOWN
HOBBY CRAFT SHOP
21 W. MAIN ST
MASON CITY
D & B R/C SUPPLY
201 S. VERMONT
SIOUX CITY
TRI-STATE R/C
3201 VIKING DR.
PH: 712-258-6190
SPENCER
DOWNSTAIRS ANTIQUES &
COLLECTABLES
418 GRAND
WAVERLY
R/C HOBBY HOUSE
(515 EUCLID AVE. (NORTON RD.)
KANSAS
LIBERAL
MILLER'S BIKE & HOBBY SHOP
108 E. 7TH ST
NEWTON
D&T FARM TOYS
1001 WASHINGTON RD. SUITE 200
PH: 316-284-2000
TOPEKA
DEE AND MEE HOBBIES
3624 S.W. TOPEKA BLVD.
WHITE LAKE MALL
WICHITA
AIR CAPITAL HOBBIES
8969 W. CENTRAL
PH: 316-721-4164
KENTUCKY
HEBRON
HOBBY HANGAR
1992 PETERSBURG RD.
PH: 606-334-4300
WILLIAMSBURG
LEISURE TIME HOBBIES
301-308 MAIN ST
LOUISIANA
BASTROP
QUALITY TV SERV
(HOBBY KORNER)
PO BOX 114 703 E. CYPRESS
BATON ROUGE
HOBBY TOWNE
3112 COLLEGE DR. - SUITE A
MANDEVILLE
MERCURY HOBBIES, INC.
70179 DANIANE' RD.
PH: 504-892-7304
METAIRIE
HOBBY HUT HOBBY SHOP
709 DAVID DR.
PH: 504-733-4629
MAINE
FARMINGTON
MAC'S GUN & SPORT SHOP
R R 3 BOX 2605
TOWN FARM RD
NEWPORT
PAPPY JOHN'S R/C WAREHOUSE
RR #2 BOX 1885 STATE RTE. 7
OLD TOWN
MARTIN'S GENERAL STORE
15 GILMAN FALLS AVE.
PH: 207-827-6861
VASSALBORO
CLIFF PIPER R/C
RT. 201 @ GETCHELL'S CORNER
RR #1 BOX 280
PH: 207-877-0445
MARYLAND
BALTIMORE
STONELEIGH CYCLE & HOBBY INC.
6717 YORK RD.
MIDDLETOWN
LARCH LANE HOBBIES
18 LARCH LANE
PH: 301-473-4567
MASSACHUSETTS
AQUARIAM
STATELINE HOBBIES
1668 MAIN ST.
CHICOPEE
J & J HOBBIES
120 FRONTENAC ST.
PH: 413-592-1472
EAST FALMOUTH
R/C HOBBIES
153 E. FALMOUTH HWY.
FITCHBURG
MOMMRUS HOBBY SHOP
490 JOHN FITCH HWY.
HANSON
HANSON HOBBY INC.
830 MAIN ST.
LEE
BARN SPEED HOBBIES
109 CENTER. ST.
PH: 413-243-2651
PH: 800-499-2651
WATERTOWN
ALEX'S R/C HOBBYWORKS
390 ARSENAL ST.
WORCESTER
RAY'S R/C SPECIALTIES
12 SHERMAN ST.
PH: 508-757-5863
MICHIGAN
ADRIAN
HOUSE OF HOBBIES
1060 S. MAIN
COLEMAN
LONE'S AERO & HOBBY SHOP
5812 W. SAGINAW RD.
CROSWELL
BLACK RIVER HOBBIES
80 N. HOWARD AVE.
FARMINGTON
JOE'S HOBBY CTR., INC.
33205 GRAND RIVER AVE.
PH: 313-477-6266
FLINT
RIDER'S HOBBY OF FLINT
3013 CORUNNA RD.
LANSING
RIDER'S HOBBY SHOP OF LANSING
1509 E. MICHIGAN AVE.
PH: 517-485-5700
LAPEER
J & D HOBBIES
298 S. MAIN
PH: 313-664-1414
LUDINGTON
GALLIGAN'S GUNS & HOBBIES
5755 DECKER RD.
PH: 616-845-6267
ROCHESTER
JOE'S HOBBY CENTER, INC.
CAMPUS CORNER SHOPPING CTR.
105 S. LIVERNOIS
SAGINAW
ROGER'S HOBBY CTR.
3620 STATE ST.
GIANT SHOPPING CTR. W
PH: 517-790-9090

WARREN
PROP SHOP HOBBIES
23326 VAN DYKE
PH: 810-757-7160
MINNESOTA
LITTLE CANADA(ST. PAUL)
HUB HOBBY CTR.
82 MINNESOTA AVE.
PH: 612-490-1675
MANKATO
DON'S HOBBY CO.
424 S. FRONT ST.
PH: 507-387-1300
OAKDALE
OUTLAWS R/C WORLD INC.
7105 10TH ST. N.
PH: 612-731-1925
RICHFIELD
HUB HOBBY CTR.
6410 PERKINS AVE. S.
MISSISSIPPI
DIXFORD
THE MODEL SOURCE
110 S. 11TH ST.
PH: 601-234-8170
MISSOURI
AURORA
AURORA GUN & PAWN SHOP
31 W. OLIVE ST.
GRANDVIEW
FLO-MOW HOBBIES
700 BLUE RIDGE EXIT
PH: 816-761-6471
JOPLIN
JOPLIN R/C HOBBIES, INC.
1944 RANGELINE
PH: 417-623-0011
ST. LOUIS
SCHAEFER'S HOBBY SHOP, INC.
4206 VIRGINIA AVE.
PH: 314-352-5750
ST. LOUIS
J & J HOBBIES
5924 S. LINDBERGH BLVD
SUNRISE BEACH
J & S R/C
RT. 2 - BOX 575
NEBRASKA
WEST POINT
WINGS & THINGS
133 N. MAIN
NEVADA
LAS VEGAS
IMAGINATION UNLIMITED
3262 B CIVIC CTR. DR.
3175 E. TROPICANA - SUITE D1
PH: 702-434-7440
ZEPHYR COVE
PAUL'S MARINE & OUTBOARD MARINE
ROUND HILL MALL - SPACE 2M HWY 50
NEW HAMPSHIRE
DERRY
RHINDELL R/C & ELECTRONICS
6 LONDONDERRY RD.
N. CONWAY
C-V MACHINE CO.
BOX 1152 - 256 KEARSARGE RD.
PH: 603-356-5189
SALEM
BILL'S HOBBY BARN
326 S. BROADWAY
PH: 603-898-5241
NEW JERSEY
BEACHWOOD
OCEAN COUNTY R/C & TRAINS
219 ATLANTIC CITY BLVD.
PH: 908-505-9477
CLIFTON
JOHN'S CLIFTON HOBBY SHOP,INC.
550 LEXINGTON AVE.
JACKSON
JACKSON HOBBY SHOP
BENNETTS MILLS PLAZA - RT 526
PH: 908-364-3334
OAKLAND
BILL'S HOBBY
350 RAMAPO VALLEY RD.
COPPER TREE MALL
PH: 201-405-1740
POMPTON PLAINS
HOBBY HUT
567 RT. 23
PH: 201-835-9577
RANDOLPH
CARL'S HOBBY CTR., INC.
508 RT. 10
PH: 201-366-4300
RED BANK
HOBBYMASTERS, INC.
62 WHITE ST.
STANHOPE
SATELLITE R/C HOBBIES
32-34 MAIN ST./BOX 394
PH: 201-691-8100
NEW YORK
MAHOPAC
AAD'S FASTRACKS
909 RT. 6 STR-2
PH:914-621-3218
MINEOLA
WILLIS R/C HOBBIES
285 WILLIS AVE.
NEW CITY
WORLD WIDE HOBBY
36 CHRISTOPHER DR.
PH: 914-634-8856
NORFOLK
R/C AERO HOBBIES
714 CO. RT. 38
PH: 315-384-4413
ROCHESTER
DAN'S CRAFTS & THINGS
352 EMPIRE BLVD.
PH: 716-654-8388
SYRACUSE
WALT'S HOBBY & CRAFT
2 DWIGHT PARK DR. EXIT 3
RT. 690 W
PH: 315-453-2291
WATERTOWN
THOUSAND ISLAND
R/C HOBBY SHOP
22256 TWIN OAKS DR.
PH: 315-785-8449
NORTH CAROLINA
ARCHDALE
K/C HOBBY
1051-7N N. MAIN ST
GREENVILLE
RAM HORN R/C HOBBIES
RT. 5 - BOX 2008
PH:919-756-8797
RALEIGH
HOBBY MASTERS
6300-122 CREEDMOOR RD.
HENDERSONVILLE
THE HOBBY HOUSE
1211 ASHEVILLE HWY
PH: 704-692-6683
KING
KING R/C
FIVE FORKS VILLAGE
SHOPPING CTR.
PH: 919-983-3969

RALEIGH
HOBBY MASTERS
LYNWOOD COLLECTION
6300 CREEDMOOR RD.
PH: 919-870-1121
NORTH DAKOTA
DEVILS LAKE
GARY'S HOBBIES
515 COLLEGE DR.
PH: 701-662-4605
OHIO
BALTIMORE
FRANK'S SERVICE
145 BALTIMORE
SOMERSET RD. N.W.
CINCINNATI
CARL'S HOBBIES
1168 W. KEMPER RD.
PH: 513-742-5990
CLEVELAND
AMERICAN MODELER
7558 PEARL RD.
PH: 216-826-3066
CLEVELAND
SPECTRUM R/C
1170 E. 152ND ST.
PH: 216-268-0042
ELYRIA
RC HOUSE, INC.
6142 OLD WESTRIDGE
PH:216-323-9429
FINDLAY
JINX MODEL SUPPLIES
721 ROCKWELL AVE.
PH: 419-422-5589
LANCASTER
SLATER'S, INC.
1141 N. MEMORIAL DR.
MAPLE HEIGHTS
SOUTHEAST HOBBY
5150 WARRENSVILLE CTR. RD.
PH: 216-663-7171
MILFORD
HOUSE OF HOBBY'S
314 MAIN ST.
PH: 513-248-9220
N. CANTON
AERO TECH HOBBIES
902 N. MAIN ST.
N. CANTON
MODELER'S HAVEN
6734 WISE AVE. N.W.
PH: 216-499-8000
PARMA
PARMA HOBBY
5275 RIDGE RD.
PH: 216-741-6440
POLAR
GLENN'S MODEL SUPPLIES
1020 W. STATLER RD.
TOLEDO
THE HOBBY STOP-WEST
4550 MONROE ST.
UPPER SANDUSKY
JIM & KEN'S HOBBY SHOP
14605 COUNTY HWY 58
PH: 419-294-1712
WAPAKONETA
DADS TOY SHOP
123 W. AUGLAIZE ST.
PH: 419-738-2007
YOUNGSTOWN
BIGARONNAIN HOBBY CTR.
6800 MARKET ST.
OKLAHOMA
BETHANY
DANNY'S R/C PLANES
7329 N.W. 23RD
PH: 405-787-2362
OKLAHOMA CITY
MIKE'S MODEL'S INC.
1107 N. MAY AVE.
PRAGUE
DJ'S HOBBY STUFF
807 BROADWAY
PH: 405-567-3027
TULSA
ULTIMATE R/C, INC.
11009 E. 41ST
PH: 918-664-1800
TULSA
WING'S 'N THINGS HOBBY SUPPLY
5241 S. PEORIA AVE.
PH: 918-745-0007
OREGON
CORVALLIS
TRUMP'S HOBBIES
2401 N.W. KINGS BLVD.
TIMBERHILL SHOPPING CTR.
PH: 503-753-7540
EUGENE
EUGENE TOY & HOBBY
32 E. 11TH AVE.
KLAMATH FALLS
AL'S BIKE & TOY
838 KLAMATH AVE.
ONTARIO
HORIZON HOBBIES
61 N.E. 1ST AVE.
PH: 503-889-5747
OREGON CITY
QUALITY FARM TOYS & HOBBIES
701 MAIN ST.
REDMOND
CASCADE MODELERS SUPPLY
11432 N.W. KINGWOOD DR.
PH: 541-548-0405
SALEM
LEISURE HOBBIES
982 LANCASTER DR. N.E.
PENNSYLVANIA
BATH
DICK WETZEL'S HOBBIES
514 E. MAIN ST.
PH: 215-837-6861
CARLISLE
EAGLE HOBBY SALES
261 TRAYER LANE
PH: 717-249-5768
CARMICHAELS
BRODAK'S HOBBIES
558 RT. 88
CRANBERRY TOWNSHIP
CRANBERRY HOBBY DEPOT
CRANBERRY GARDENS PLAZA
20327 PERRY HWY
ERIE
MAXWELL'S HOBBY SHOP
6014 STATION RD.
PH: 814-899-1621
HUMMELSTOWN
THE HIDDEN HANGAR
140 S. HOERNERSTOWN RD
LANSDALE
PENN VALLEY HOBBY CTR.
857 W. MAIN ST.
MONONGAHELA
REDS MODEL PLANE SUPPLIES
1407 TAYLOR RUN RD.
MOSCOW
THE HOBBY HUT
RT 6 BOX 6596 (ELMHURST)
PITTSBURGH
MARK'S HOBBY WAREHOUSE
4740 LIBERTY AVE.
PH: 412-681-2533

QUAKERTOWN
J & D WHISTLE STOP
106 E. BROAD ST.
READING
IRON HORSE HOBBY HOUSE
60 S. 6TH ST.
SUNBURY
RACHAUS WINGS & THINGS
136 S. ST.
TAMAQUA
PROP & WHEELS HOBBIES®
139 W. BROAD ST.
WARMINSTER
J.C. R/C HOBBIES
13 YORK RD.
PH: 215-672-5200
YORK
MEL'S HOBBIES
930 E. MARKET ST.
YORK
SKELLY SPORTING GOODS
2227 W. MARKET ST.
RHODE ISLAND
WARREN
NANCY'S HOBBY
300 MAIN ST.
PH:401-247-0298
SOUTH CAROLINA
MYRTLE BEACH
ED'S HOBBY SHOP
HWY. 501 & BROADWAY
PH: 803-448-9592
SOUTH DAKOTA
ABERDEEN
KLEIN'S
408 S. WILSON
TENNESSEE
COVINGTON
MAR-SUPPLY
114 STAR SHOPPING CTR.
KNOXVILLE
M & N HOBBIES
1923 BRANVILLE RD.
PH: 615-525-7532
OAK RIDGE
RIDGE HANDICRAFTS, INC.
205 JACKSON SQ.
TEXAS
AUSTIN
HOBBYTOWN U.S.A.
4107 S CAPITAL OF TEXAS HWY
BELLAIRE
I AND I HOBBY CENTER
6707 CHIMNEY ROCK
EL PASO
HAL'S HOBBY WAREHOUSE
1440 BESSEMER
PH: 915-581-0213
HURST
ROY'S HOBBY SHOP
1309 N. NORWOOD DR.
MT. PLEASANT
RICK'S HOBBY HANGAR
214 N. MADISON
PH: 903-572-2102
ODESSA
ODESSA TV VIDEO CLINIC
808 N. JAFFERSON
PH: 915-332-2831
POTTSBORO
AIRPLANES & BOATS GALORE
401 FRANKLIN AVE.
ROCKWALL
TELEHOBBIES R/C
2530 I-30 E.
PH: 214-771-6204
UTAH
SALT LAKE CITY
W. VALLEY HOBBIES
1765 W. 3400 S.
SANDY
M.R.S. HOBBY SHOP
9445 S. UNION SQUARE
PH: 801-572-6062
VERMONT
CHARLOTTE
TANDOWS HOUSE OF R/C
GREENBUSH RD. S.
VIRGINIA
VIRGINIA BEACH
DEBBIE'S R/C WORLD
2228 COMMERCE PKWY.
PH: 804-340-9661
WASHINGTON
AUBURN
WAGNER'S HOBBY, INC.
131 E. MAIN
BURLINGTON
PERFORMANCE R/C
320 E. FAIRHAVEN AVE. #102
PH: 206-755-9464
EVERETT
TAPS BIKE & HOBBY
2927 BROADWAY
PH: 206-259-5929
PUYALLUP
ALL HOBBIES
1430 E. MAIN
PH: 206-841-0069
SPOKANE
B & B HOBBIES
907 E. FRANCIS
PH: 888-467-2120
TACOMA
ALL HOBBIES
2210 MILDRED W.
PH: 206-565-8674
YAKIMA
MODEL AIRCRAFT SUPPLY CTR.
505 N. 20TH AVE.
PH: 509-453-6258
WEST VIRGINIA
CHARLESTON
THE FOUNTAIN HOBBY CTR.
200 W. WASHINGTON ST.
WISCONSIN
APPLETON
GALAXY SCIENCE & HOBBY CTR.
1607 N. RICHMOND ST.
PH: 414.730.9230
FOND DU LAC
FOCUS, INC.
75 E. MAIN ST.
MADISON
HOBBY CRAFT OF MADISON, INC.
4602 ODANA RD.
PH: 800-423-2728
OSHKOSH
HOBBYTOWN USA-AVIATION
PLAZA
2081 S. KOELLER ST.
PH: 414-426-1940
WALDO
KVINDLOG HOBBIES
104 S. MILL ST.
PH: 414-528-8343
WAUKESHA
ABC R/C, INC.
244 W. MAIN ST.
PH: 414-542-1045
WAUSAU
POPE'S HOBBY LAND
640 S. 3RD AVE.
PH: 715-842-4371

CANADA
CALGARY, ALBERTA
P.M.S. HOBBY CRAFT LTD.
2020B 32ND AVE. N.E.
PH: 403-291-2720
FT. MCMURRAY, ALBERTA
THE HOUSE OF HOBBIES LTD
2 100YE CENTENNIAL DR.
MILLET, ALBERTA
SUNSET R/C
P.O. BOX 716
PH: 403-387-4241
ROCKY MOUNTAIN HOUSE, ALB
JB CRAFTS & HOBBIES, LTD.
4922 50TH ST., BOX 538
BRANDON, MANITOBA
R/C HOBBIES
48 CONFEDERATION
PH: 204-728-9868
WINNIPEG, MANITOBA
CELLAR DWELLER HOBBY LTD.
1554 MAIN ST.
PH: 204-589-2057
BARRIE, ONTARIO
IDEAL HOBBIES
40 BELL FARM RD., UNIT #9
BURLINGTON, ONTARIO
SKYCRAFT HOBBIES, INC
115 PLAINS RD. E. - UNIT 9
PH: 905-631-5211
OTTAWA-HULL, ONTARIO
MULTI HOBBY
450 ST.-JOSEPH BLVD.
KITCHENER, ONTARIO
FLITE CRAFT MODEL CO.
1586 VICTORIA ST. N.
CHARLOTTETOWN, PEI
EAST COAST MODEL CTR.
13 GLEN STEWART DR.
SUITE #1
PH: 902-569-5262
HULL, QUEBEC
MULTI HOBBY
450 ST.-JOSEPH BLVD.
ST. GEORGES - BEAUCE, QUEBEC
PLACE BUREAU, INC.
12515 1ST AVE.
SHERBROOKE, QUEBEC
SHER-HOBBY
2650 KING OUEST SUITE 111
STE. THERESE - QUEBEC
(AUTOR 415 EXIT 25)
MINIATURES & PASSIONE, INC.
304 ST. CHARLES ST. - STE. 100
SASKATOON, SASKATOK
HOBBY WORLD
#108 - 2301 AVE. C N
HASCAMP CTR.
PH: 306-652-4775
GUATEMALA
CIUDAD
FREEDOM HOBBY
20 CALLE 20-60 ZONA 10
GALERIAS LA PRADERA 3ER NIVEL
AUSTRALIA
SYDCREST PTY LTD
UNIT 14/10 YALGAR ROAD
KIRRAWEE 2232, NSW
LTD UNIT 14 / 10 YALGAR RD.
MELTON, VICTORIA
TRIM AIRCRAFT
14 COLLINS RD.
BELGIUM
MECHELEN
ALSIKTROS BVBA
LEUVENSESTEENWEG 758
B-2812
SOUTH AMERICA
BUENOS AIRES, ARGENTINA
AERO SUR S.R.L.
TALCAHUANO 166
ARGENTINA
HOBBY MODEL S.R.L.
PICHINCHA 167
1062 BUENOS AIRES
PH: 541-951-7130
BRAZIL
AEROMODELLI LTDA
AV MOACI, 283
04063-000 SAO PAULO SP
PH: 011-5580-0200
ENGLAND
NORFOLK
PEGASUS MODELS LTD
99 CATTON GROVE RD.
W. YORKSHIRE
ANDY BREWSTER-CRAFTS &
MODELS
THE COACH HOUSE
406A BROAD LN-LEEDS
HOLLAND
P. TOOMEN MODELBOUWSHOP
MINERBRODERSSTRAAT #32
HOEK-SWELLESTRAAT 37
DEN BOSCH
JAPAN
MUSASHIMURAYAMA CITY, TOKYO
WORLD HOBBIES
1-30-14 NAKAHARA
NORWAY
PORSGRUNN
B.S. HOBBY IMPORT
LYNGVN 3C
SINGAPORE 6165
HOBBY SHACK
100 S. BRIDGE RD.
02-02, FOOK HAI BLDG
PH: 065-532-7892
FAX: 065-532-2966
SPAIN
46014 VALENCIA
J.V. SEGRELLES IMPORT
CERAMISTA 'ROS. 3 BAJO (ZOA
SWEDEN
S-471 02 HARNOSAND
MODELL PRODUKTER AB
BOX 2060
SWITZERLAND
CH 5722 GRAENICHEN
CLASSIC MODELL
REFENTAL 3058

HOG-BIPE

CONSTRUCTION:

Ultra-Simple Lite-Ply Fuselage
Traditional Balsa Ribbed Wing

FEATURES:

Computer Drawn Full-Size Plans
Step-by-Step Photo-Illustrated Instructions
Pre-Bent Aluminum Landing Gear
Pre-Bent Aluminum Cabane Struts
Molded ABS Plastic Headrest
Molded ABS Plastic Wheel Pants
Glass-Filled Engine Mounts
Sig Easy Hinges
Complete Pushrods
Complete Hardware Package

RECOMMENDED ENGINES:

.60-.65 cu. in. 2-stroke
.65-.90 cu. in. 4-stroke

EXTENSIVE PREFABRICATION:

38 SIG Laser-Cut Parts
Precision Die-Cutting
Pre-Shaped Leading Edges
Pre-Shaped Trailing Edges
Pre-Shaped Ailerons
Pre-Shaped Elevators
Pre-Shaped Rudder

SPECIFICATIONS:

Top Wing Span:	54.5"
Bottom Wing Span:	51.75"
Total Wing Area:	966 sq. in.
Length:	50"
Weight:	6.5 - 7.5 lbs.

SIG

KIT # RC-69

Designed By: Harold Hester

Since 1957, thousands of modelers worldwide have been delighted with the slow flying, yet fully aerobatic, flight performance of the original ASTRO-HOG (monoplane). As the old saying goes, "NOTHING FLIES LIKE A HOG!". Well, now you can have the same easy-flying aerobatic performance in a sport biplane design - the new SIG HOG-BIPE! Just like the ASTRO-HOG, the new HOG-BIPE performs any maneuver in the book, yet flies slow enough to let you enjoy it. This is barnstorming at its best.

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■ By Sherman L. Knight

NSP's "Dove II" Two-Meter Competition Sailplane

The folks at Northeast Sailplane Products have made some subtle changes to their original Dove and have come up with a no-holds-barred two-meter competition ship. This one's a winner!

The original two-meter Dove, reviewed in this magazine in the April 1994 issue, has matured into a true no-holds-barred competition sailplane. Although it gained a few ounces in the process, it still is the lightest two-meter, full-function competition sailplane on the market today.

Northeast Sailplane Products listened carefully to the concerns and recommendations of those who purchased the original Dove. The new Dove II sports a slightly longer, slightly reshaped nose that satisfies the AMA minimum radius rule; a lightweight (4.5 ounces) Kevlar reinforced fuselage with integral fin; more wing area; a carbon fiber elevator bellcrank assembly; larger ailerons and flaps; and six servos instead of five.

The kit arrived packaged in a sturdy cardboard box. Three small plastic bags contained many pieces of pre-cut wood pieces and hardware such as the hardwood bearing assemblies, hard balsa reinforcement blocks, several pre-formed pieces of plywood, a pre-formed fiberglass canopy, brass tubes, assorted threaded rods and clevises, E-Z connectors and nylon bolts, etc.

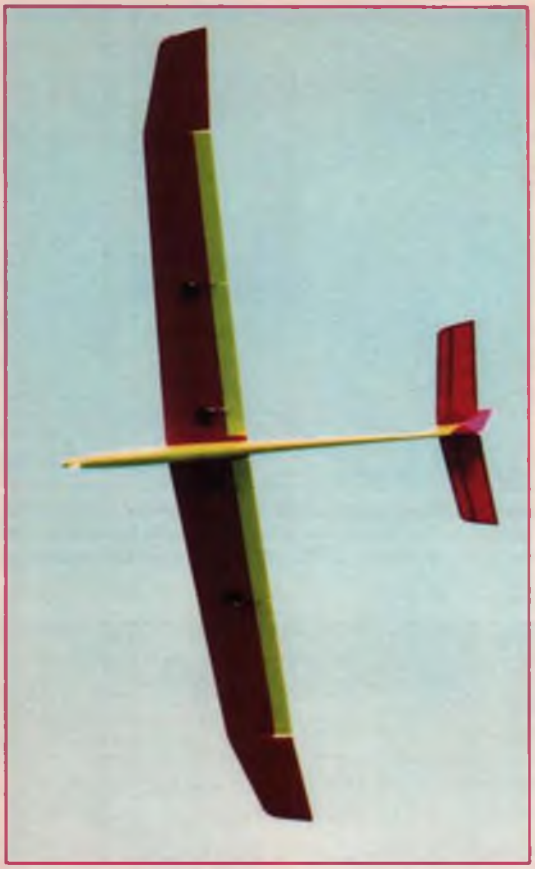
The kit included the instructions for the original Dove and a single 36x48-inch sheet of plans for the Dove II. Although the plans are sufficient, a new set of instructions has been drafted along with modifications to the existing plans. The new Dove II instructions will be posted on Northeast Sailplane Products' web page and can be downloaded by calling http\\:/www.nesail.com.

THE WING

The wing is foam and comes pre-sheeted with balsa. The spar consists of a 1/4-inch balsa web with carbon fiber tow top and bottom. The trailing edge is reinforced with fiberglass tape laminated between the wing skins.

The wing section is the famous SD7037. It has been slightly thinned at the tips, which effectively reduces wingtip vortices. To make sure that handling is not sacrificed, the wingtip has additional camber and some washout. With six servos and a computer radio you can obtain full trailing edge camber and reflex. These two features dramatically affect the flying characteristics of such a lightly loaded airplane.

The wings arrive with the ailerons and flaps pre-routed; you have to cut them loose and face them with the balsa stock provided. You also have to install the leading edges and wingtip blocks. Cutouts were already made in my wing for the aileron servos, but not



The Dove II maneuvering close to the ground. Sherman found he could pull some extremely tight maneuvers at low altitudes without fear of tip stalling.

NSP'S "DOVE II" TWO-METER COMPETITION SAILPLANE

SPECIFICATIONS:

WINGSPAN ..... 78.75 in.
WING AREA ..... 536 sq. in.
WEIGHT ..... 26 to 28 oz. (27.2 oz. as tested).
WING LOADING ..... 7.0 to 7.5 oz./sq. ft. (7.3 as tested).
AIRFOIL ..... SD7037 thinned at the tip.
CONTROLS ..... Ailerons, elevator, rudder and flaps.
CONSTRUCTION ..... Fiberglass fuselage with integral fin, balsa sheeted foam wings, built-up tail surfaces.
PRICE ..... $249.95.

Available exclusively from Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482.

for the flap servos. I understand that new kits will have all four cutouts. Total weight of my bare wing was only 7.3 ounces.

It's inevitable on a wing of this size that even micro servos protrude out slightly from the bottom of the wing—so be it. I used my favorite servo, the JR 341 micro. On a model such as this, these servos are probably overkill—it's the same servo I use for ailerons, elevator and rudder in my unlimited class airplanes. For the flaps I used the new JR 351, which is a metal-geared version of the 341. The 351 is approximately .2 ounce heavier. This new servo has no slop at all! I've never experienced flaps as solid as these.

If you're like me and prefer to use fluorescent films for covering your models, attach the balsa pieces to the wing with white glue and hold them in place with masking tape. This reduces the discoloring effect that CAs and epoxies seem to have on fluorescent film coverings.

THE FUSELAGE

The nose moment on the new Dove II fuselage is slightly longer than its predecessor. It also contains significantly more room for servos and batteries. Keep in mind that since this is a six-servo sailplane, many of the available five-channel micro receivers won't work. You'll need one of the larger seven- or eight-channel receivers that come with most of today's computer radios.

The construction of the fuselage is very simple. There are no bulkheads. You need to install the wing hold-down block and a wing mounting block both at the front and the rear of the wing. Servo rails or trays also need to be installed.

There's enough room in the Dove II for a 600-mAH NiCd pack. Installing the larger battery pack and moving the servos as far forward in the canopy area as possible resulted in a model that balanced without nose weight. In fact, I ultimately had to remove the case from the receiver to obtain the proper CG position.

The control mechanism for the tail surfaces is push-pull cable. Interestingly, the kit arrived with one stainless steel rod and one braided wire cable. The braided cable was to make an approximately 10 degree bend at the fin to the elevator bellcrank. However, I replaced it with a stainless steel control rod (same diameter as the supplied rod) which has resulted in an extremely effective elevator control system.

The tailfeathers are built up of extremely light balsa. First impression is that they will never last. My immediate thought was to add bulk and to increase the size of the joiner wires and connecting rods. However, as I did with the original Dove, I bit my lower lip and built it exactly as shown on

■ LEFT: Radio compartment is tight, but the receiver, two servos, switch, charging jack and 600-mAH NiCd pack all fit in front of the wing. The author ultimately had to remove the case from the receiver to get the CG right on. ■ RIGHT: Close-up of the gear setups on the JR 341 (left) and new 351 metal-gear micro servos. On his Dove II, Sherman is using the 351s for the flaps and 341s for everything else. See text for his comments.

the plans. I found that the elevator is plenty strong and has survived some real gorilla launches.

ASSEMBLY

I saved the final assembly of the various sub-portions of the model until the end. In other words, the fuselage and elevator are complete but the pivot tube is not final-glued into the fin. The wings are complete but the holes have not been tapped for the nylon bolts. Now that all these portions are complete, perform the final assembly in the following sequence:

1. Align the elevator perpendicular to the fin. Once aligned, permanently glue the pivot tube in place.

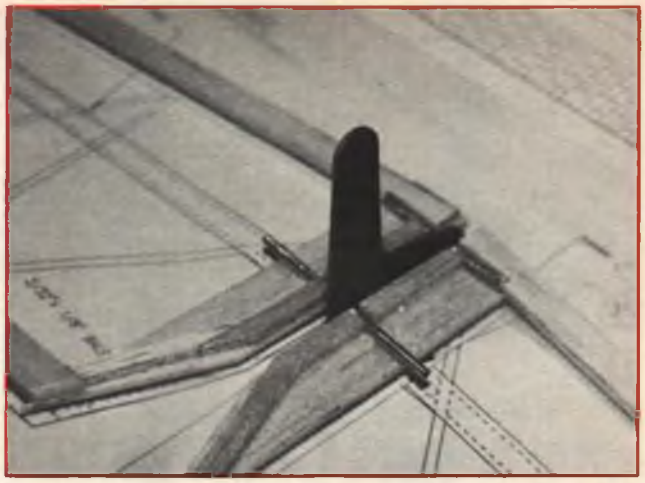
2. Temporarily place the wing on the fuselage saddle and drill and tap for the 1/4-20 nylon bolts. Eyeball the wing from a distance to verify that it is level with the elevator.

3. Make sure that the wing is firmly seated in the saddle. If they still don't align, carefully warm the fuselage boom with hot towels or with your heat gun. (If you smell warm resin, it's way too hot.) Now simply twist the tailfeathers into proper alignment and let the fuselage cool. It sounds simple. It is.

FINISHING

I finished my model with the new Ultracote fluorescent films from Carl Goldberg Models. The bottom of the wing and the top leading edge is power pink, as are the stab and rudder; the remainder of the top of the wing is fluorescent safety yellow. I've never had any problem distinguishing my airplane from others in the pack!

The fuselage was sprayed with the Ultracote/Oracover matching paint packaged in Germany by Simprop and available in the U.S. from both NSP and Hobby Lobby. The paint matches the fluorescent yellow perfectly. Although rather expensive, this paint provides one of the finest finish jobs I've ever done. The fineness of the paint spray rivals that of many airbrushes.



Stabilator halves are built over the plans with the pivot wire tubes and carbon fiber bellcrank in place to assure proper alignment. Sherman says the bellcrank and steel wire pushrod setup is more effective than the original Dove's pull-pull cable elevator control system.

Tail surfaces look pretty lightly built, but Sherman built them according to plan and has yet to damage one in the air despite some lead-footed "gorilla" launches.

The "skullsplitter" landing skeg on the author's Dove II. Does an effective job of bringing the model to a quick halt for those 100-point landing scores. After getting it sorted out, Sherman flew his Dove II in a local Seattle Area Soaring Society contest, walked away with 1st place its first time out!

FLYING

I located the battery and servos to balance the aircraft 4 inches from the trailing edge, then added weight to put the CG

approximately 1/8-inch behind the location shown on the plans. With the battery and servos mounted as far forward as possible, I had to add about an ounce of nose weight.

First flights were made late on a Saturday afternoon. It was approximately 50 degrees and getting colder. The first hand toss was perfect—no elevator trim required. By the third toss, it was easy to launch the model, turn it through a large circle and catch it.

My friend Jim Thomas had a quickie upstart available which rocket launched the ship to about 150 feet. A couple of quick dive tests indicated that it was nose heavy. By the end of the next few launches, the ounce of nose weight had been completely removed.

The following day we were able to winch the Dove II to competition heights. The model performed significantly better than the original Dove on a winch. Our winch had heavy #21 line and was wet from the grass, but the heavy line didn't appear to pull the Dove II down like it did on the original Dove. Not only that, the zoom launch was significantly improved.

Most impressive about this ultra-light airplane is how fast it goes up on a winch. With very little tension it literally goes straight up. It goes straight up, *right now!*

After several launches to winch altitude and plenty of time to adjust the control settings, the model calmed down and began to fly like I hoped it would. (Originally I started with too much control throw just about everywhere.) The airplane is capable of extremely tight maneuvers with no tendency to tip stall. Of significant importance to the contest flier is the increased ability of the Dove II to cover ground quickly. Even at its extremely light wing loading, its upper speed range was a pleasant and welcome surprise.

I set up the radio to add additional rudder throw to the ailerons during the launch phase. The model needs very little additional rudder mix for launch. After spending most of the day adjusting control throws, I am extremely pleased with Dove II. I've removed all of the nose weight and the case from the receiver. The CG is now 4 inches forward of the trailing edge.

I like a lot of wing incidence in a model. Airplanes that carry their tails high on approach are easier to land and just seem to turn better. After two days of flying I decided to increase the wing incidence at the leading edge by approximately 3/16 inch. The aircraft is somewhat better behaved in a turn and the nose is much easier to spot land.

The stopping power of the larger flaps is quite impressive. With the new larger ailerons, much less differential is necessary than with the original Dove.

CONTEST TIME!

With another couple hours of spot landing practice I was ready for the first club contest of the season. I was really looking forward to flying this lightweight hotrod against some of the other two-meter ships weighing 10-15 ounces more.

The contest started in such poor conditions that it was almost canceled. An hour later the sky started to clear and some white fluffy clouds rolled through. An hour later a micro front came through, launches were suddenly downwind, there was some drizzle and it got cold. An hour later the sky opened again to big white fluffy clouds. The Dove II wasn't phased. In the first round I was 1 second short and made a 100 point landing. The following rounds were no better but the Dove II won the contest.

Do I like this model? You betcha. The people at Northeast Sailplane Products did a good job of listening to the comments and the desires of their customers. The response is an evolution of the kit that satisfies the desires of any competitive pilot. With its light wing loading and pre-sheeted wings, it is as close to a two-meter floater as you will find, with six servos making it an ideal choice for your first full-function sailplane. ***MB***

CERMARK'S ARF PORTERFIELD COLLEGIATE

An old favorite is back! Astro Flight's electric Porterfield returns in a slightly smaller ARF version, and offers trainer-like performance on seven-cell power systems.

To my mind, one of the finest models specifically designed for electric power is Astro Flight's Porterfield Collegiate. At 69-inch span and with a geared Astro 25 running on 14 cells, it's a fairly large plane, is *very* easy to fly and is perfectly suited for a beginning pilot. The only thing that might dissuade a modeler from purchasing the kit is the knowledge that he or she is going to have to build it! You don't really have to be a master craftsman to construct the thing, but it does take time to build and requires that you have some model building experience under your belt.

Now Cermark has come to the rescue by giving modelers who don't have the time or the experience to build the Astro Flight kit the opportunity to fly something very similar, albeit scaled down a bit. Cermark's ARF Porterfield is just what the doctor ordered for those warm, sunny Sunday afternoons when the best medicine for a hectic week is a great-flying, great-looking scale bird.

The Cermark model is designed primarily for 05 seven-cell electric power, but can also be flown with a .10-.15 gas engine. Cermark offers the high-performance CEM 05 ("the other cobalt motor") in both direct drive and geared versions and kindly provided one of the latter for this review.

Roger found the Porterfield to be exceptionally easy to fly—much like your standard high-wing two-channel trainer. Sure looks great in the air!

THE MODEL

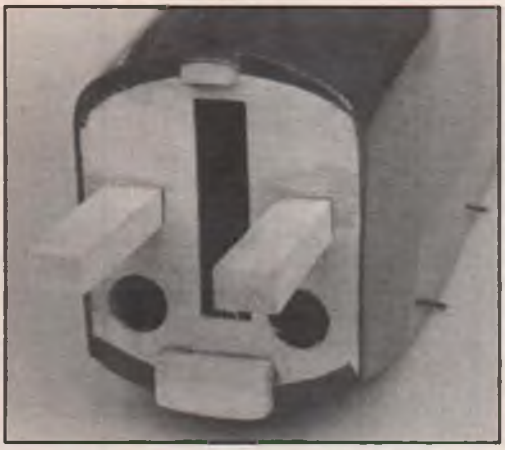
The Cermark Porterfield isn't a plastic model like so many other ARFs; it's a built-up balsa and plywood aircraft, and as far as I can tell, it follows the Astro design very closely. (Having built three of the Astro kits, I am very familiar with the structure!) The pieces include the fuselage, painted and drilled fiberglass cowl, tailwheel, stabilizer, elevator, fin, rudder, two wing halves, molded fiberglass landing gear, bottom hatch, wing struts, pushrods, window decals and assorted hardware. All surfaces are expertly pre-covered with Goldberg's Ultracote, in your choice of green and yellow (like mine), all green, all red, or all blue.

ASSEMBLY

After everything was inspected, it was time to build! Cermark supplied me with one of their early production models and

The kit contents right out of the box; not shown are the instruction manual and a small hardware bag with all of the necessary screws, clevises, hinges, horns, motor mount, etc. The fiberglass cowl is painted, but everything else comes pre-covered with Goldberg's Ultracote. Model is available in different colors—see text.

"The other cobalt motor." Cermark's powerful CEM 05 motor has been on the market for the past couple of years in a direct drive version but is now also being offered with a 2.33:1 gearbox, which is the setup Roger used in his Porterfield. The gearbox features a contoured, black anodized aluminum body and helical gears. Note the cooling air openings in the motor's front end bell and the way the rear end bell is cut away to expose the brushes and commutator.



Beefy hardwood rails are provided for mounting the motor. Roger had to cut an opening in the firewall to get the motor back far enough, otherwise the prop sticks out too far in front of the cowl.

CERMARK'S ARF PORTERFIELD

WINGSPAN ..... **60 in.**
WING AREA ..... **511 sq. in.**
FLYING WEIGHT ..... **46.6 oz. (gas).**
53.5 oz. (electric).
WING LOADING ..... **13.1 oz./sq. ft. (gas).**
15.1 oz./sq. ft. (electric).
OVERALL LENGTH ..... **39 in.**
CONSTRUCTION ..... **All-wood structure, plastic film covered.**
RADIO ..... **Three channels required (rudder, elevator, throttle).**
POWER ..... **Geared or direct drive 05 electric on seven cells, or .10-.15 gas engine.**

Distributed by
Cermark Electronic and Model Supplies, 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888.

the instruction manual was still "under construction," so to speak, so I had to go by an incomplete draft set. The draft had quite a few holes but these have all been remedied in the current version of the instructions, which covers 14 pages and includes several computer-drawn illustrations.

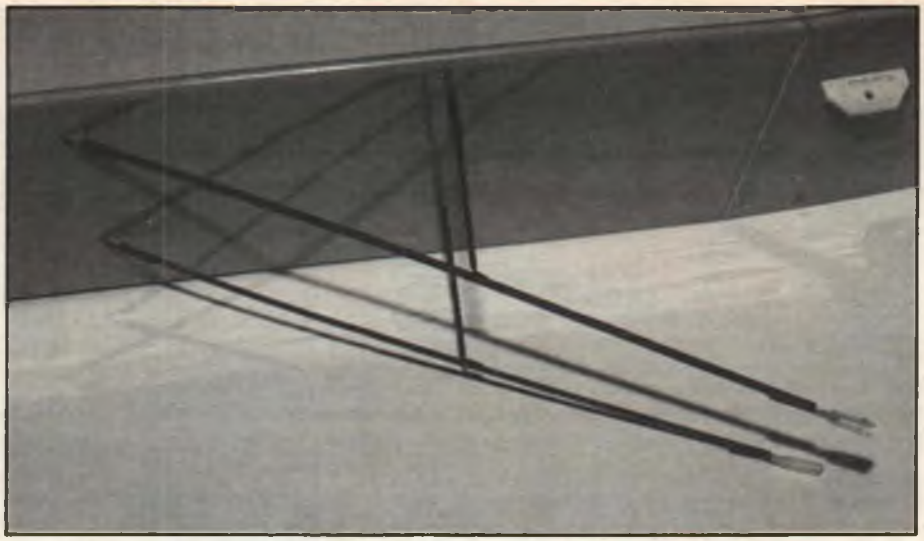
The wing is a typical D-tube structure with leading edge sheeting and rib capstrips top and bottom. The left wing panel and center section come already glued together; the right wing panel gets epoxied in place over a lite-ply joiner that slips between the spars. The finished wing is strong enough for normal flight loads, but the instructions warn that this model is not stressed for violent or high-G maneuvers, even with the wing struts in place. I quote: "As bad experiences in RC go, a wing failure is close to the top, so trust us on this one."

The wing mounts to the fuselage with the familiar dowel-and-bolt setup. Actually the dowel is part of the fuselage; a lite-ply plate, drilled to slip over the dowel, gets glued to the wing spar through a slot in the bottom of the center section. The slot is already cut and I just had to remove some covering to glue the plate in. A single bolt secures the trailing edge.

The fuselage is made mostly of 3/16-inch square balsa. A plywood servo plate and two balsa battery rails are already installed. The stabilizer has rectangular balsa fin braces already attached; you just slide the fin into place and add glue. The elevator and rudder have pre-cut slots for the supplied mechanical hinges. The instructions say to use epoxy to glue them in place, but I prefer woodworker's yellow glue (it's much cleaner), and I pin the hinges with small straight pins.

The formed fiberglass landing gear is attached using wood screws fastened through pre-drilled holes in the plywood plate in the bottom of the fuselage. I replaced the supplied plastic wheel collars with steel ones—easier to put on and take off. Finally, the functional wing struts are made from rectangular plastic stock covered with heat-shrink tubing. Attachment wires are secured to each end of the strut just like you would do with a pushrod, i.e. drill a hole in the strut end, bend the wire and pass it through the hole, and secure it with heat-shrink tubing. The exact locations of both the strut attachment holes in the wing and the landing gear screw holes are clearly shown in dimensioned sketches in the instructions. The struts are very easy to attach—a Z-bend fastens one end to the wing and a clevis at the other end attaches to a cotter pin in the fuselage. These struts do more than just add scale looks; they help take some of the flight loads. *Don't fly this model without them!*

Two pre-made 1/4-inch square balsa pushrods are supplied for the elevator and rudder. The servos are put in from the bottom, so the output wheels face the



Here's how the functional struts connect to the wing. Struts are plastic, covered with shrink tubing, and have the end fittings already installed. They hook into the wing via a Z-bend and attach to the fuselage with standard clevises.

bottom of the fuselage. Slots are pre-cut in the aft end of the fuselage for the pushrod wires to exit—all you have to do is cut away the covering to expose the slots. Control horns are attached in the usual way. All in all, the radio installation is pretty typical.

Cermark provided one of their hot CEM-05 cobalt motors for this review, along with one of their brand new 2.33:1 gearboxes, which allows for an 11- or 12-inch prop. A geared motor is definitely the way to go with this model, as a direct drive setup—i.e. a much smaller prop spinning at a much higher rpm—is not nearly as well matched to the model's flying speed as the larger, slower turning prop.

Mounting the geared motor on the bottom of the beefy hardwood rails puts the prop shaft at just the right height to fit through the hole in the cowl. I had to enlarge the hole in the cowl a bit to accommodate the prop driver. Also, the motor shaft extended too far out through the cowl, so I had to carve some wood out of the firewall so that the motor could be slid back on the mounting rails. This gave me the proper prop shaft position.

Be sure to plan your battery and speed control installation carefully. In my model the battery pack wires are difficult to get to for charging. The bottom hatch gives easy access to the pack, but the wires in my installation have to wrap around the plywood servo mounting plate to connect to the speed control, so I also need to take the wing off to remove the battery. If I had longer wires on the speed control I could avoid this, but I didn't want to change things on my existing equipment.

The window decals went on with no problem. The NC199 numbers on the wing were added courtesy of Vinylwrite. This custom vinyl lettering company is back in business after their office, workshop and home were devastated by the Northridge earthquake of 1994. Their reputation for quality vinyl lettering continues and I urge you to give them a try. Contact them at 16043 Tulsa St., Granada Hills, CA 91344-5339; (818) 363-7131.

As it turned out, no adjustments of any components or the battery pack were necessary to get the model to balance properly. There were no control throw recommendations in my early manual so I just set up the elevator and rudder throws to what looked right—about 3/4 inch for the elevator and 1 inch for the rudder either way. In just a couple of hours from start to finish I was ready to fly!

FLYING

Just like the other Porterfields I've owned, flying this plane is a joy. With full throttle into a light breeze the plane was in the air in about 15 feet. Takeoffs were smooth with no tendency to turn or groundloop; after takeoff the plane tracked straight and true and no trim adjustments were required—a testament to its accurate construction. It flies just like a rudder/elevator high-wing trainer—not terribly maneuverable, but very stable. Landings are extremely easy—it will just about fly itself to a proper landing.

Cermark's Porterfield is a great way to break into electric-powered aircraft. You won't have to spend the next month building it, yet this lightweight, built-up ARF version does justice to the full-scale Porterfield. Cermark has given you a great chance to enjoy this classic aircraft. The Porterfield ARF retails for $150 from Cermark Electronic and Model Supplies, 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888.

As always, I'd love to hear your comments about this plane or about anything else electric. You can direct them to me at 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 (Monday through Friday between 8 and 5 Pacific time) or via e-mail at 74164.3237@compuserve.com. ***MB***

The Super Quality 40 Series — the ultimate ARFs are here.

Built the way you would build a kit, with features like:

- *High-grade heat shrinkable film covering*
- *Hand-applied trim schemes*
- *Hand-painted components*

Space Walker shown with optional pilot figure.

Space Walker

For all you modelers who want a 40 size ARF that doesn't look like one, your wait is over. Introducing Kyosho's Super Quality Series — a lineup of pre-assembled planes with detail that rivals that of the most intricate hand-built kits. Now you can impress the other fliers at the field with a model that looks professionally put together, but actually took you only a few evenings to finish.

The relatively few number of parts in these kits, combined with their interlocking construction, translates into an enjoyable building project.

ARFs that feature matchless craftsmanship

Unlike many almost-ready-to-fly planes, these ARFs do not sacrifice quality for assembly ease. Each one is hand built to exacting specifications, and hand covered with high-grade, heat-shrinkable film covering. Trim schemes are also applied by hand, and the vacuum-formed parts accentuate each plane's scale lines. With such painstaking attention to detail, these models are almost works of art.

Kyosho's done all the work... you reap the benefits

As beautiful as these all-wood ARFs look, you'll really appreciate how easy it is to complete them. Each one builds straight and sturdy, with illustrated instructions that guide you through every step of the finishing process. And in the air, their stable flight characteristics and capacity for aerobatics will inspire confidence in your piloting skills.

"The components were of high quality, and the glued joints were well-bonded and very tight. (In the air,)... the Cub was able to perform all the maneuvers in the book."

— Roger Post, Jr.,
Model Airplane News

Choose from several classic designs

Kyosho Super Quality Series ARFs come in 3 distinctive styles, all patterned after actual full-size aircraft. The open cockpit Space Walker is the only preassembled model of this unique design on the market. The airshow favorite Extra 300 features a one-piece cowl that's hand-painted to match the covering, in two different trim schemes. And the popular J-3 Piper Cub comes in regular and clipped-wing versions, with the regular-wing version covered in Cub Yellow fabric material that adds to the authenticity.

For the location of the Kyosho dealer nearest you, please call **1-800-682-8948**, and mention code #0310K.

Piper J-3 Cub

Clipped Wing Cub

Clipped Wing Cub

Extra 300

Extra 300

All planes require 2-stroke .40-.46 or 4-stroke .48-.52 engine.

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FREE FLIGHT

BY BOB STALICK

•Free Flight Memories

•The "Jupiter Moon" HLG

•A New Low-Tech FF Event: Slo Power

Active free flighters who have attended the AMA Nationals over the years may recall Homer Smith. Homer was the AMA Nats FF Director for many years, but he went into free flight retirement about six or seven years ago. Well, Homer's back. Here he tunes the Tee Dee .020 in his Magow Ranger prior to an official flight at a recent Harts Lake Prairie contest.

I reminisce frequently in this column. I guess that's the prerogative of those of us who have been around the block a few times. These recollections give me a framework to understand today's modeling activities. I can look back to those thrilling days of yesteryear and relate them to the developments of the current generation. So, bear with me for this brief recollection of my free flight past.

I recall dreaming about those new and powerful glow plug equipped engines that I read about in *Air Trails* magazines. I remember when my fondest wish finally came through at Christmas, 1952, when my folks bought me a brand new Baby Spitfire engine and a Baby Bootstraps model to put it in. I remember its first and only lazy flight, culminating with a crash into a fence post on our farm. The names of my heroes still appear like magic: Goldberg, Taibi, Korda, Wright, Sotich, and Grant.

I recall seeing my first-ever free flight contest, which I happened upon by mistake while on a springtime drive just outside of Portland. I moved to Albany, Oregon in 1960 and overheard a fellow teacher talk about a model airplane club that had just formed. I remember my first club meeting with that group—The Willamette Modelers Club. I recall finally saving up enough money to join the AMA—the fee was $6! I still have the same AMA number I was issued in 1961.

I remember entering my very first free flight contest and never getting in an official flight. I recall my first trophy, my first AMA Nationals and my kids' first flights, first trophies and first Nationals.

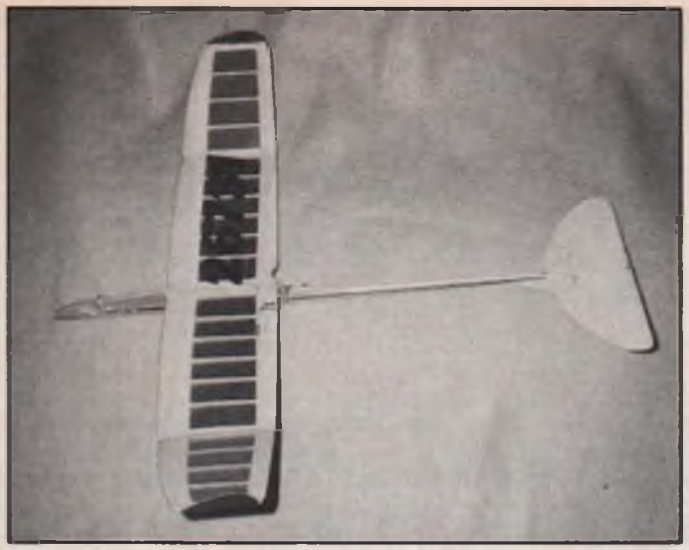
I recall the many friends and acquaintances that free flight modeling has brought my way. I edited the first issue of our club newsletter in 1962. I'm still editing it today—34 years later. This must be some kind of record. I recall the conversations between Frank Ehling, Carl Fries, Dick Black and myself regarding the need in the AMA for a national free flight voice, which later became the National Free Flight Society; for a free flight publication, which became the Free Flight Digest; and for a NFFS Symposium publication to fill the void left by the absence of the irreplaceable Zaic Yearbooks.

I recall reading the columns by Lee Freeman in the Model Engine Collectors Journal asking for recommendations to replace the Antique Model Association title with something not to be confused with the "other" AMA. I submitted the name Society of Antique Modelers (SAM), which is still in use today. I recall reading about the first Old Timer contests held in Denver and Stockton, California. Now, we speak of the SAM Champs as though they've been with us forever.

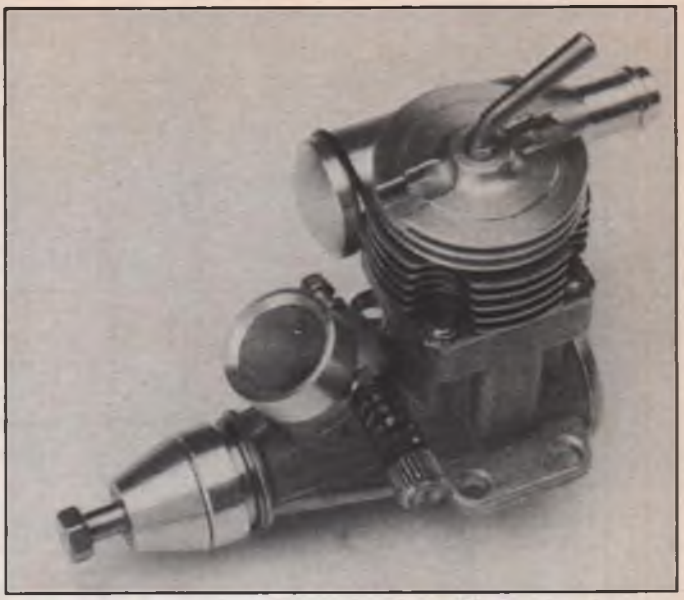
I remember my first ever article published in *Model Airplane News*, followed by a series of "Where The Action Is" columns in *American Aircraft Modeler*.

I recall receiving a phone call from Bill Northrop in the fall of 1973, asking if I would write a free flight column for Model Builder, and except for a four-year hiatus when the late Tom Hutchinson wrote this

Great news! The plans for 24 of the fondly remembered Flyline free flight scale kits are once again being made available. Prices range from $4 to $7, depending on the size. To get a complete list, send an SASE to Flyline Models, Plans Division, 15127 N. 100th Way, Scottsdale, AZ 85260.



Our columnist's version of this month's featured full-size plan, Ed Berray's "Jupiter Moon" HLG.



As we reported in "Over The Counter" last month, the Russian AME .049 and .061 screamers are also available as diesels. Price is still the same at $33 each plus shipping. More info from Norvel, 3656 State Rd., Cuyahoga Falls, OH 44223.

column, I've conducted this forum on a monthly basis since.

When I read about the history of our hobby/sport, I'm impressed with all that has happened during just the time that I have been active in it. In my early days, we had just a few gas classes, a couple of rubber classes and a couple of glider classes. The 1948 AMA rules book was 18 pages long, the pages were only 5-1/2x8 inches and contained some advertising. Now, we have a huge rules book for AMA, another for FAI, others for NFFS Nostalgia, for SAM and for the vast variety of specialty events.

It's no wonder we long for the simplicity of yesterday. Things really were slower and easier then. For many who are no longer active fliers because they're getting long in the tooth, memories of yesterday consist of spark ignition engines, big lumbering models lovingly covered with silk, unlimited flights on verdant pastureland with plenty of space to chase. Maxes were 10 minutes and unlimited flyoffs were the rule. Texaco models were limited only by the amount of fuel we allowed, and we measured it in ounces.

For those of us a little younger, our memories of yesterday consist of those classic designs during the 1950s—Civy Boys, Zeeks, RamRods, and Spacers. They were powered by Green Head K&Bs, Wasps, and Cubs. Maxes were 5 to 10 minutes. Engine runs were 20 seconds and flyoffs were unlimited. Many stories were told about these days when models were entered by the hundreds in meets with sponsors like Plymouth, Pan Am and Times-Mirror.

Now, a younger generation has come along. Many of their memories are of models like the Starduster and the Mini-Pearl. Cox Tee Dee engines are considered classics. They disdain the high-tech models of today and long for the thrilling days of yesteryear. The SAM models are well before their time. The early days of Nostalgia are pre-history to them. It's now the time for post-Nostalgia competition. As you will read later in this month's column, another new set of FF events is being proposed. It's currently called Slow Power, and if its promoters have their way, it will be coming to a contest venue near you very soon. It may be the latest effort to hold back the future or to somehow return to the past. It may be our next ticket to revive the sport of free flight. Only time will tell.

PLAN OF THE MONTH

Ed Berray of Vancouver, Washington has made quite a name for himself locally with his abilities as an indoor flier. After years of improving his indoor glider capabilities, he designed an outdoor glider that looked similar to this month's model. It first saw the rigors of competition in 1995. It was at one of these 1995 meets that glider guru Mark Sexton saw the model and determined to make it his next winner.

Mark decided that the model needed to be named something other than "Ed Berray's Glider," so he came up with "Jupiter Moon." I'm not sure just what the origin of this name is, and knowing Mark, I'm reluctant to ask! Mark proceeded to redesign the model so that it would have a built-up wing. This feature alone serves to save weight on gliders this large.

I've competed against the Jupiter Moon and lost. It's a very forgiving and competitive model. With the DT system, you can build one or two of them and have them available for the entire season.

The model is very simple to build. Choose stringy A-grain balsa for the fuselage and lightweight wood for everything else. Use aliphatic glue or epoxy to adhere the parts. The stabilizer shows dihedral, but this can be left out with no ill effects. Try to keep the weight of the model to 35 grams or less (mine weighs 29).

Finish the model with one or two coats of filler and two coats of nitrate dope. Cover the wing with tissue or plastic. Fly the model in a right launch, left glide mode. A bit of right bank on the launch will keep it from zeroing out and landing at your feet. Slight left stab tilt and a bit of left rudder tab should take care of the glide. Glide circles should be loose—no more than 100 feet in diameter, but tightening up in thermals. Light the fuse every time and enjoy one of the true fun events in free flight.

ANOTHER FREE FLIGHTER GONE

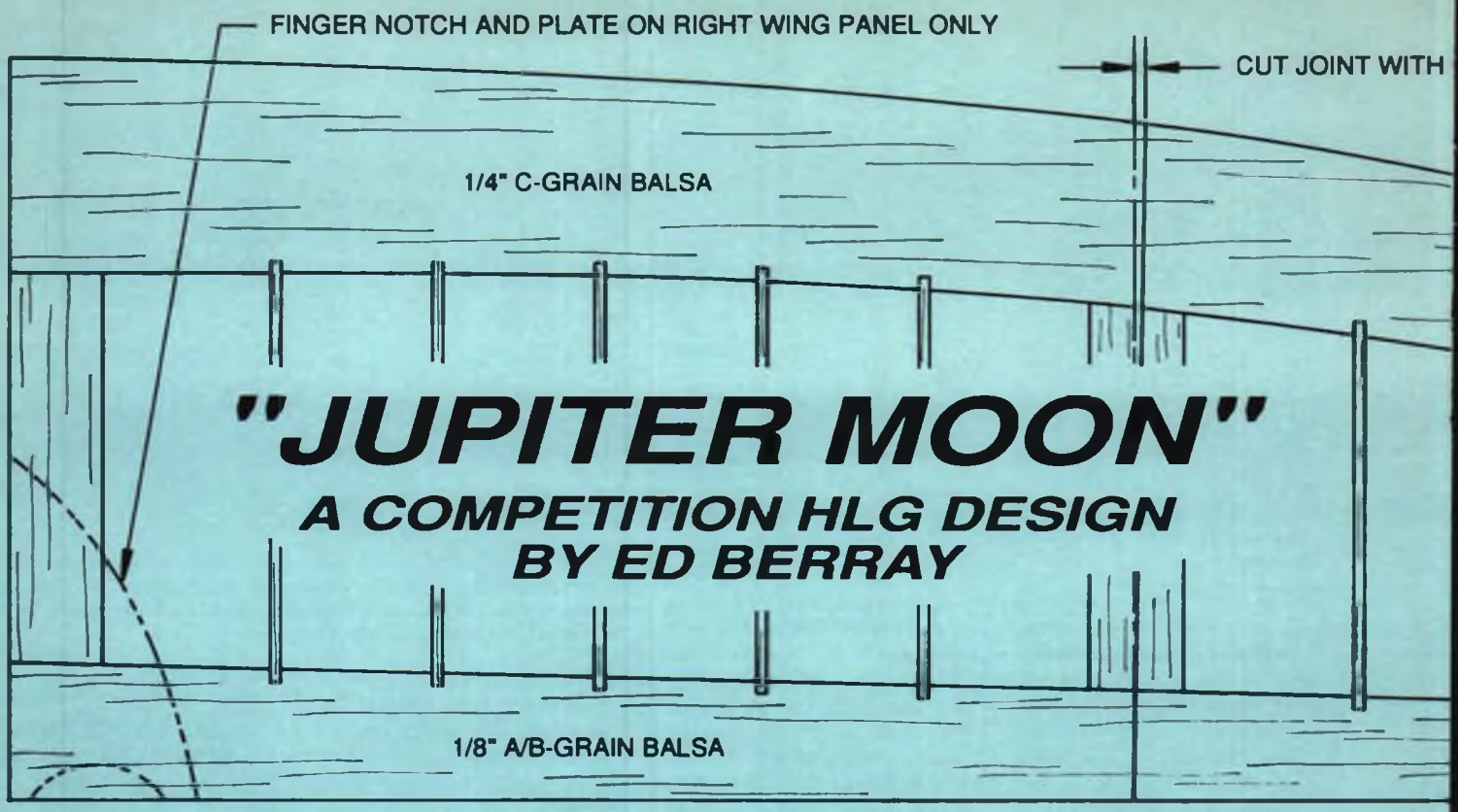
Phil Hainer died on April 24 after a lingering illness that included emphysema, diabetes and heart disease. Phil was a prolific designer of high-performance models, including two that won NFFS Model of the Year designations—the Air Express 330 and the Flip 18 HLG. Other designs were published in the magazines spanning back at least 45 years. Recently, his Boomerang HLG was featured as a Mystery Model in this column.

Phil was 67 years old, and his wish that his ashes be spread over Harts Lake Prairie, Washington to join those of his friend Don Zipoy was granted in conjunction with a moment of silence at a recent free flight contest.

SLO POWER

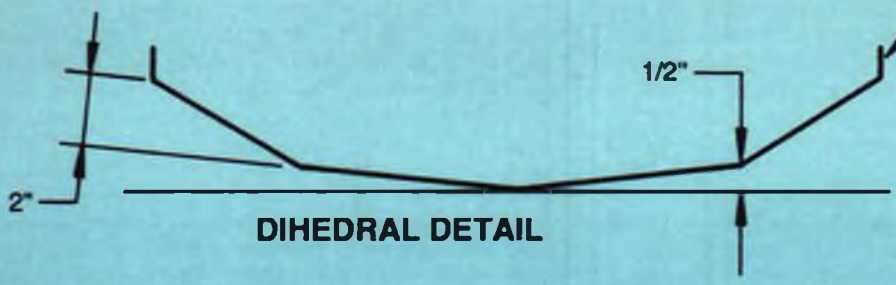
Fliers who compete in Cat. III know that small fields equal short maxes and short engine runs. To compensate, the models have become more sophisticated, the engines better and the costs higher. Models are equipped with VIT, bunt, and the strongest engines on the market. Many are constructed of carbon fiber components and equipped with beepers or electronic locators. Flyoffs frequently take eight to ten flights to determine the

Free Flight plans on next page, story continued on page 82

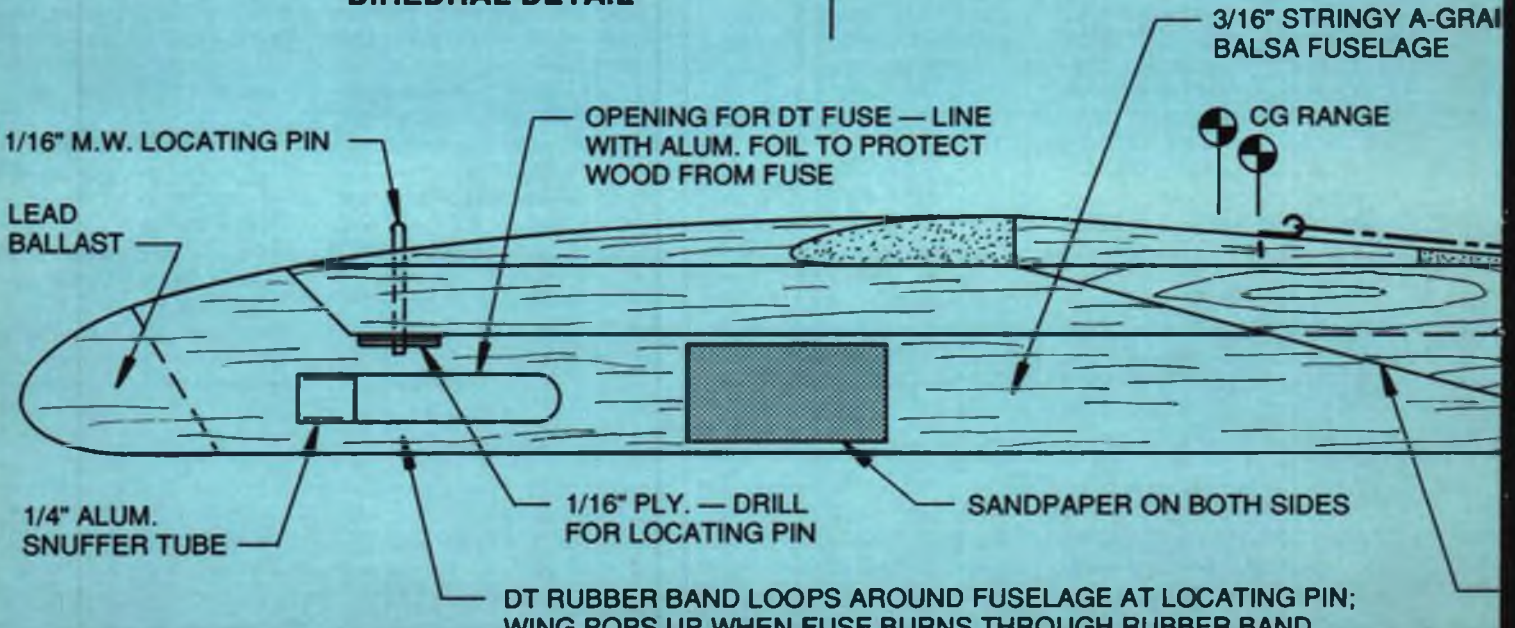


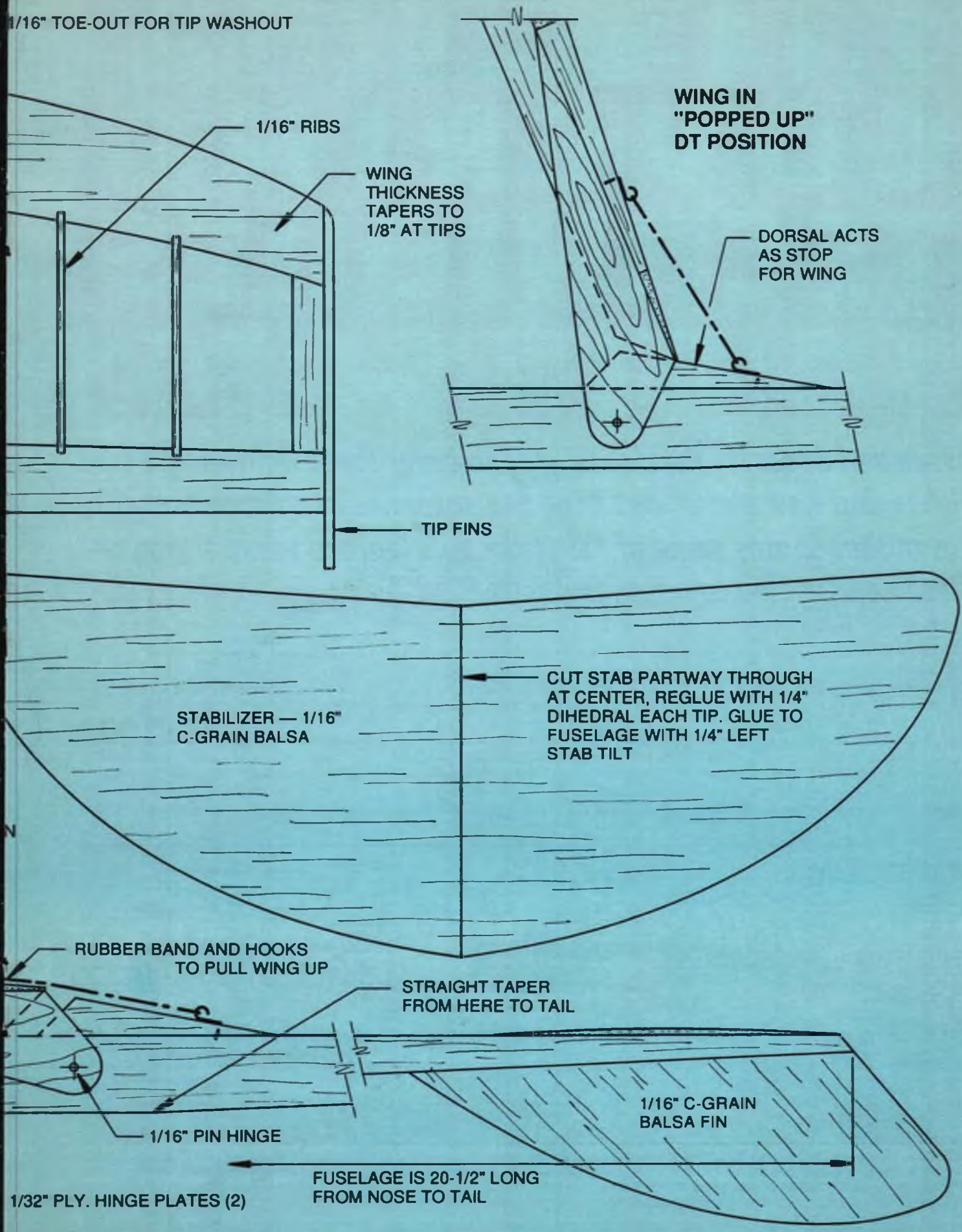
"JUPITER MOON"

A COMPETITION HLG DESIGN BY ED BERRAY



DIHEDRAL DETAIL




1/16" TOE-OUT FOR TIP WASHOUT
1/16" RIBS
WING THICKNESS TAPERS TO 1/8" AT TIPS
TIP FINS
WING IN "POPPED UP" DT POSITION
DORSAL ACTS AS STOP FOR WING
STABILIZER — 1/16" C-GRAIN BALSA
CUT STAB PARTWAY THROUGH AT CENTER, REGLUE WITH 1/4" DIHEDRAL EACH TIP. GLUE TO FUSELAGE WITH 1/4" LEFT STAB TILT
RUBBER BAND AND HOOKS TO PULL WING UP
STRAIGHT TAPER FROM HERE TO TAIL
1/16" C-GRAIN BALSA FIN
1/16" PIN HINGE
FUSELAGE IS 20-1/2" LONG FROM NOSE TO TAIL
1/32" PLY. HINGE PLATES (2)

FREE FLIGHT COVERING TECHNIQUES FOR THE '90S

Tissue and dope. It's the classic way to cover those lightweight free flights, but now tissue and dope has succumbed to tissue and glue. Our author shares some of the tricks he's learned while trying out these newfangled covering methods.

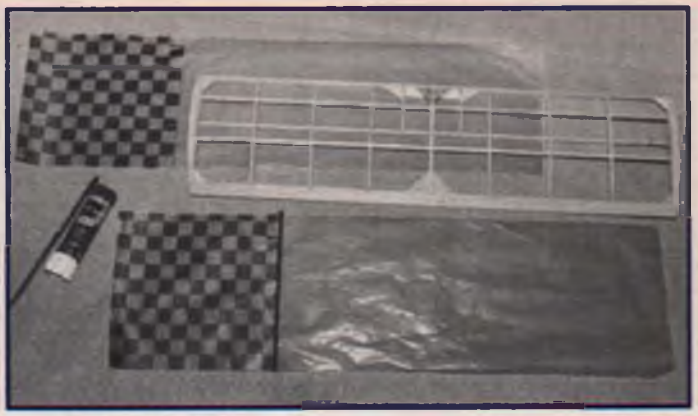
By Bob Stalick

I used to look forward to covering models with all of the delight of having a tooth filled. First of all, the dope had an atrocious odor, which made the entire house stink. Second, the process was messy, and it took a fair amount of time to prepare the model for covering. More recently, I've also noticed that contemporary nitrate dopes seem to be missing some of the "stickiness" I recall from my earlier experiences. So, it was time to go on a search for some options to the traditional tissue-and-dope system.

What I found was a simple, inexpensive and odorless way of adhering tissue to a model framework. Gluestick is the answer. I'm particularly partial to Uhu brand "UhuStic," which is made in Germany and distributed in the U.S. by FaberCastell; most good stationery stores carry it. It's sticky, it's washable, and it works. There are other brands of gluesticks on the market, but I like UhuStic the best because it has a purple color to it, but dries clear. The purple color allows you to tell where the glue has been placed and how much you've placed there.

I did some experimenting with different adhesion methods in preparing this article. Just about the time I was preparing to write, Michael Morrow showed me one of his

■ LEFT: The finished wing, stab and fuselage of the author's Dixie Pearl 1/2A free flight. The solid and checkered tissue on the wing and stab were adhered with gluestick and gluespen respectively; the fuselage was also covered with Japanese tissue but using Superseam and thinner. The aft section of the fuselage is covered with white tissue, the front with yellow. Trim strips and lettering are cut from black tissue, glued in place. ■ RIGHT: The sanded, ready-to-cover Dixie Pearl framework lying on top of the various colors of Japanese tissue to be used for the covering. Shown are checkerboard, white, yellow and black tissues.



■ LEFT: The bottom of the wing is covered first—here the tissue has been adhered to the trailing edge, using UhuStic. After it's been smoothed out, the tissue is folded back and UhuStic is applied to the ribs, spars and leading edge. On an undercambered wing like this, it's important that the tissue be adhered firmly to the underside and the glue left to dry thoroughly, otherwise the tissue can pop loose when shrunk. ■ RIGHT: Here is the stab for the model. Before covering, Bob first glued the solid yellow and checkered tissue together with UhuStic; one has had a black tissue trim stripe added where the two pieces are joined. Actual covering of the stab was done with an O'Glue gluepen; see text for the differences between the gluestick and gluepen adhesives.

classic indoor profile scale models which he had covered using a different type of glue applicator called a gluepen. As with the gluestick, Uhu has its own version, called GluPen (which Michael used), and there are other brands available as well. It is also water soluble, odorless and comes in squeezable plastic tubes. Consequently, I decided to include this adhesive as part of the article. And to give us old timers a flavor of the good old days, I also used the traditional dope system as a comparison. So, here's the skinny for using gluestick, gluepen, and dope.

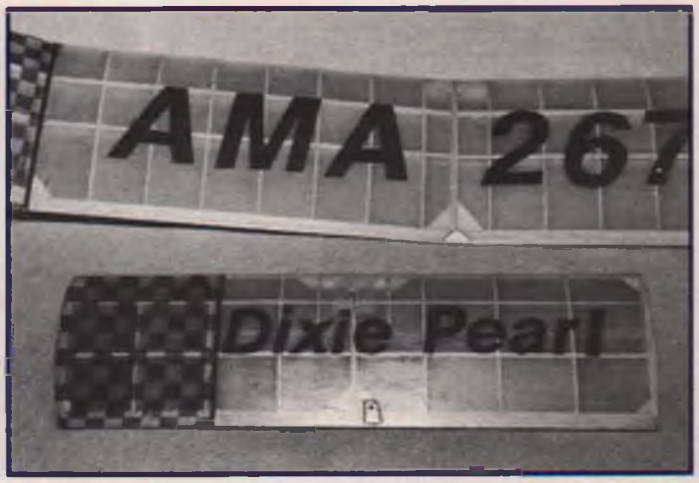
By the way, the model in the photos that served as the guinea pig for these efforts is a 1/2A gas model called the Dixie Pearl; a dimensioned drawing with full-size wing and stab ribs appeared in the Free Flight column in the November 1993 *Model Builder*.

COVERING THE WING WITH GLUESTICK

I decided to use the gluestick first, since I had some previous experience with it and found it easy to use. I used it to cover the Dixie Pearl's wing. The preparation of the wing, which has an undercambered airfoil, was to brush a coat of nitrate dope on all areas where the gluestick would be used—leading and trailing edges, the underside of all of the ribs and the tops of the dihedral and polyhedral ribs. After the dope had dried, I lightly sanded off all of the fuzziness with 400 wet-or-dry paper.

Here the completed stabilizer is awaiting shrinkage using isopropyl alcohol and a cotton ball. Bob recommends alcohol over water for tissue shrinking, because the tissue-and-glue covering method allows you to get the tissue on quite tight and water can cause the tissue to overshrink, with predictable results.

Starting with the main panel underside, I cut a sheet of tissue (grain running spanwise) about 1/4-inch oversize on all sides. I coated the underside of the trailing edge with gluestick until I could see the purple color on the wood, then I placed the paper evenly onto the glued portion and pressed it into place with my fingers. After it was smoothly in place, I rubbed the gluestick onto the bottom of the ribs and the leading edge, plus I used a stiff bristle brush soaked in warm water and dragged across the gluestick to place glue in



■ LEFT: Designs for the lettering and numbers are drawn up and enlarged to the proper size on a photocopier, then the pattern is taped to a pad of newsprint. Black tissue is inserted behind the first page of newsprint. Note that some letters need to be cut in duplicate, such as the "I" in Dixie and the "e" in Pearl. In these cases, a second sheet of black tissue is inserted behind these letters. ■ RIGHT: The finished wing and stabilizer with the tissue numbers and letters doped in place. A final coat of Aerogloss fuelproofer is then applied to produce a glossy finish and protect the nitrate dope, which is not fuelproof.

corners that I couldn't reach with the stick itself. I then pressed the tissue in place and smoothed it out. It's important on an undercambered wing like this that the tissue be rubbed firmly into place on the bottom of each wing rib. It *must* be adhered securely.

The next step was to complete the bottom of the other inboard wing panel and then the tips. The entire underside of the wing was finished before going to the top. Use the wet-brush-rubbed-across-the-gluestick technique to get glue into any corners that are not securely adhered. After the glue sets, which takes about two hours, remove the excess tissue on the leading and trailing edges and tips by sanding lightly with 400 wet-or-dry paper.

Do the top of the wing just as you did the bottom, except you don't have to glue the tissue to any ribs except those at the dihedral and polyhedral joints—and the tips, of course. Once again, wait at least two hours for the glue to set before removing the excess tissue. Gluestick doesn't entirely cure for a minimum of four hours, so my suggestion is that you put the wing aside overnight at this point.

COVERING THE STAB WITH GLUEPEN

Since I had no experience with gluepen, I decided to try it on the stabilizer. The gluepen I bought is called O'Glue Jr., and I also found a similar product by Pentel called Roll'n Glue. Both are clear, odorless and water soluble. I decided to use the O'Glue since it has a wick-type top instead of the Pentel, which has a roller applicator.

I prepared the stabilizer the same as the wing, applying a thin coat of dope to the areas to be adhered and sanding lightly. I decided to give the stab some character by decorating it with checkerboard tissue similar to the wing. The checkerboard tissue and solid color tissue were first glued together (with gluestick) with about a 1/4-inch overlap, then a strip of black tissue was added (again with gluestick) to mask the joint line, and the pieces left to dry thoroughly.

The next step was to cover the stabilizer. I turned the O'Glue tube upside down, pressed its sides and glue poured out of the wick profusely. The first thing I noted was that it was very easy to get too much glue on the trailing edge, and it's difficult to tell how much is there since the glue has no color. Using a wet brush, I was able to spread the glue evenly across the surface, then I placed the pre-cut tissue in place and smoothed it out. Since this glue is "wetter" than the gluestick, it is much easier to soak and rip the tissue.

After the trailing edge was glued in place, I placed some O'Glue onto the leading edge and tips of the stab and adhered the tissue, smoothing it with my fingers so that all areas were glued down and without wrinkles. After the glue dried, which took about an hour, I sanded off the excess tissue and covered the top of the stab. Once again, I found that I could use a wet brush to place glue where it was needed.

SHRINKING THE TISSUE

I strongly suggest that you do *not* water shrink any model if you use either the gluestick or the gluepen adhesives. I use isopropyl alcohol instead, applied with a soft sponge or cotton ball. The reason is that it's much easier to pull the tissue snug using these water-based glues, and when shrunk with water the tissue can pull too tight and either warp the structure, buckle the rib trailing edges or rip the tissue itself. With undercambered wings, the glue adhesive *must* be thoroughly cured before shrinking, otherwise the tissue will pop off the wing ribs and destroy the undercamber.

COVERING THE FUSELAGE

Not everyone I know covers balsa sheeted fuselages, but I always do. The tissue adds strength to the fuselage and it allows me to add color via the tissue instead of using paint, thereby keeping the weight of the model in check.

I find that gluestick doesn't work well if the surface to be covered is a large expanse of balsa—which is often the case with FF model fuselages. What happens is that the gluestick adhesive becomes waxy, and the tissue slips and slides around on the surface. Gluepen is a little stickier and tends to adhere more easily and securely if applied judiciously. On the Dixie Pearl, I therefore adhered the tissue not with dope but with an adhesive called Superseam, which is used in covering full-size aircraft. Superseam comes in a quart can, is expensive, and is *very* thick and *very* sticky. I thinned it by 50 percent with dope thinner to get it to the right consistency.

I put a coat of Superseam over the entire fuselage, let it dry, then sanded everything with the 400 wet-or-dry. The fuselage was covered by brushing dope thinner through the tissue, which dissolved the Superseam and adhered everything in place. When I came to an overlap, I used Superseam applied with a brush to hold the tissue down. As with any dope-like product, Superseam cures in a matter of minutes.

TRIM AND LETTERING

The final step is to put on the trim and the AMA numbers, which are cut from tissue and doped in place. In this case, I decided to do the AMA numbers and the Dixie Pearl name only. I taped my pattern to a thick section of newspaper; under the first sheet of newsprint, I placed a sheet of black tissue paper. Using a sharp knife, I cut through the pattern into the newspaper and through the black tissue, producing a nice set of numbers and letters. Nifty!

I prepared the airframe by brushing on two coats of nitrate dope, sanding between coats. When the second coat had cured, I placed the letters and numbers onto the surface and aligned them carefully, then tacked them in place by brushing thinner through them with a small brush. Once satisfied with the placement, I adhered each one completely by brushing it with thinner. While wet, you can rub out some of the wrinkles using your fingers.

Once all of the letters and numbers are in place, the last coats of dope can be applied. I usually put a total of five or six coats of dope on all of my tissue-covered gas models, lightly sanding between each coat. Gas models need to be fuel proofed; I use a clear epoxy finish on my fuselages (either HobbyPoxy or K&B Super Poxy), Aerogloss Fuel Proofer on wings and stabs.

Here are my recommendations for covering your next model with tissue. Use UhuStic, applied as described above, for the wing and stab or any open structure. Use O'Glue or similar gluepens or Superseam and thinner for any sheet or solid balsa fuselage.

Gluesticks and gluepens are available from any stationery store. Superseam can be purchased from Aerodyne at 1924 East Edinger, Santa Ana, CA 92705. It costs $22.95 per quart plus 20 percent postage; however, a quart should last you several years. I've heard that Randolph's dope still uses the "old formula" and has plenty of stickiness for adhering tissue. I haven't checked this myself, but you can by contacting Alexander's Aeroplane Co., P.O. Box 909, Griffin, GA 30224. Send an SASE and ask for their price list for Randolph's dope.

I hope you find this article helpful when tissue covering your next model. Good luck, good flying and may your covering have no wrinkles! ***MB***

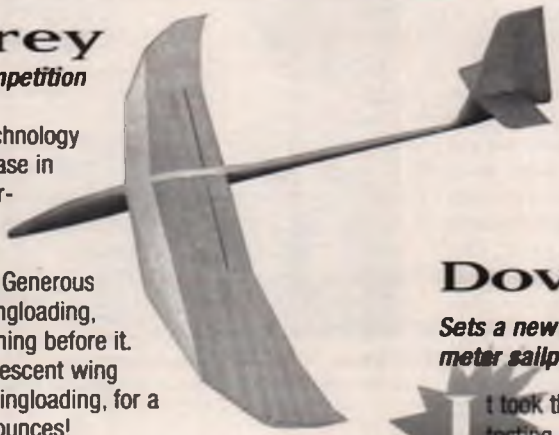
Not everyone I know covers balsa sheeted fuselages, but I always do. The tissue adds strength to the fuselage and it allows me to add color via the tissue instead of using paint, thereby keeping the weight of the model in check.

NSP

Let Your Dreams Soar!

Bird of Prey

- absolutely the best in TD competition



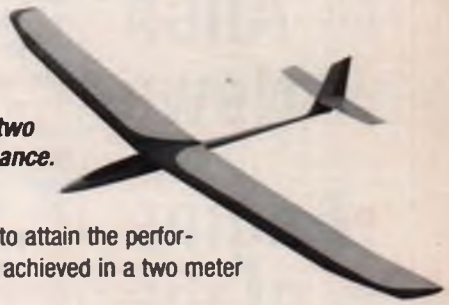
Kasner Crescent wing technology offers you a 10% decrease in induced drag for enhanced performance. Special, ultra-low drag fuselage with Kevlar.
Lightweight, strong tail surfaces. Generous use of CF reinforcement. Low wingloading, will out-thermal and handle anything before it. The rearward CG inherent to a crescent wing planform results in a very light wingloading, for a typical flying weight of 60 to 63 ounces!
The Bird of Prey is the ultimate in thermal competition performance. It sports the L/D of sailplanes with much larger wingspans; yet its agile handling gives you the feel of a much smaller ship. Due to its special planform and modified tip airfoil, the BOP has very low drag which means much-improved penetration.

Wingspan: 121"
Airfoil: special SD7037

Reg. $399.95 / Special **$359.95**

Dove II

Sets a new standard in two meter sailplane performance.



It took three years of testing and research to attain the performance we knew could be achieved in a two meter sailplane.

Its high aspect ratio and very low weight and wingloading, coupled with an extremely low drag planform, result in a sailplane that offers a distinctive, superior glide ratio. The Dove II has over 20% less frontal area (read: drag) than any of its competition.

The Dove II has a light wingloading for a very low sinkrate; its high strength airframe will withstand severe winch launches and a sustained 45-degree dive with no damage to the airframe.
Maneuverability is one of the Dove II's high points. Ample flaps and ailerons combined with lightweight tips and tails, give it not only control authority, but the agility to turn *now*. The result of these performance improvements is a two meter that will out-turn and out-thermal anything in its class.

Landing speeds are brought to a crawl by the he light wingloading and generous flaps, making the Dove II unbeatable in the winners circle.The Dove II is without a doubt the highest performance competition sailplane available today.

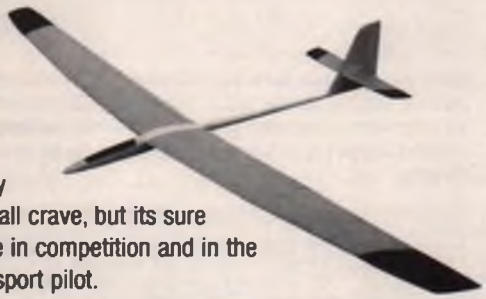
If you need the best, the Dove II is it. Period.

WINGSPAN: 78.75"
AIRFOIL: SD7037 MODIFIED AT TIP

Special **$239.95**

Victory

...can be yours!



The Victory not only has the looks we all crave, but its sure to be in the winner's circle in competition and in the heart of the intermediate sport pilot.

This beautiful open class sailplane has a Kevlar reinforced FG fuse with a long, slender tail boom, and a sleek nose to slice through the air with minimal drag. The wings are triple tapered, with a strong spar. The airfoil was specially designed to maximize L/D, so handling is a dream. Manufactured strong but light to aid in its low wingloading, the flaps, ailerons and servo bays are routed out.

The Victory has very smooth handling characteristics, good penetration in windy conditions, will float like a butterfly and the price won't sting like a bee.

WINGSPAN: 121"
AIRFOIL: SPECIAL SD7037

Reg.$350.00
Victory Introductory offer **$329.95**

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PLUG SPARKS

BY JOHN POND

•Irwin Ohlsson

•Jimmie Allen News

•Engine of the Month: The E.D. Mk. I Bee

What a shock it was to learn that Irwin Ohlsson, of old time engine fame, died on April 29 in his sleep. In a strange twist of fate, Ann Ohlsson, Irwin's wife of 48 years, passed away less than a month later. Memorial services were held May 30 near their home in Southern California.

Ohlsson was a longtime friend. I first met him in 1934 at the Sacramento State Annual Model Championships held over Labor Day weekend. Most anyone of any competitive bent came to this large meet. This included a large contingent from the Los Angeles area consisting of Ohlsson, Louis Shocke, Henry Stiglmeier, Bill Atwood, and the local opposition of Dick Shumacher, Rod Doyle, Nick Sanford, and of course, the San Francisco group, headed up by Pond, Werle, Gunther, and Amos.

It was at this meet that I became acquainted with Ohlsson (Photo No. 1) and his group. Everyone flew the rubber events, endurance and speed, flying scale, glider, and of course, the compressed air event which was considered big time. Ohlsson was easy to get to know, with his affable attitude and general regard of models and modelers.

It was also in 1934 that the State Fair put on the first gas model event, Texaco style. As usual, the fellow with the longest engine run would generally win. Irwin flew his 6-foot

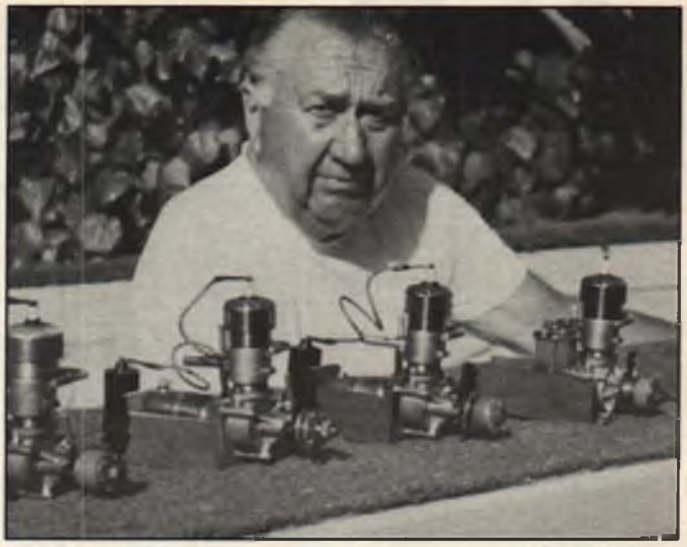
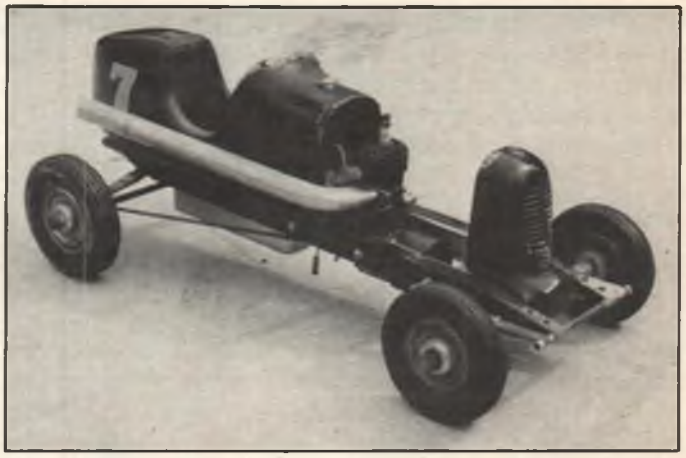
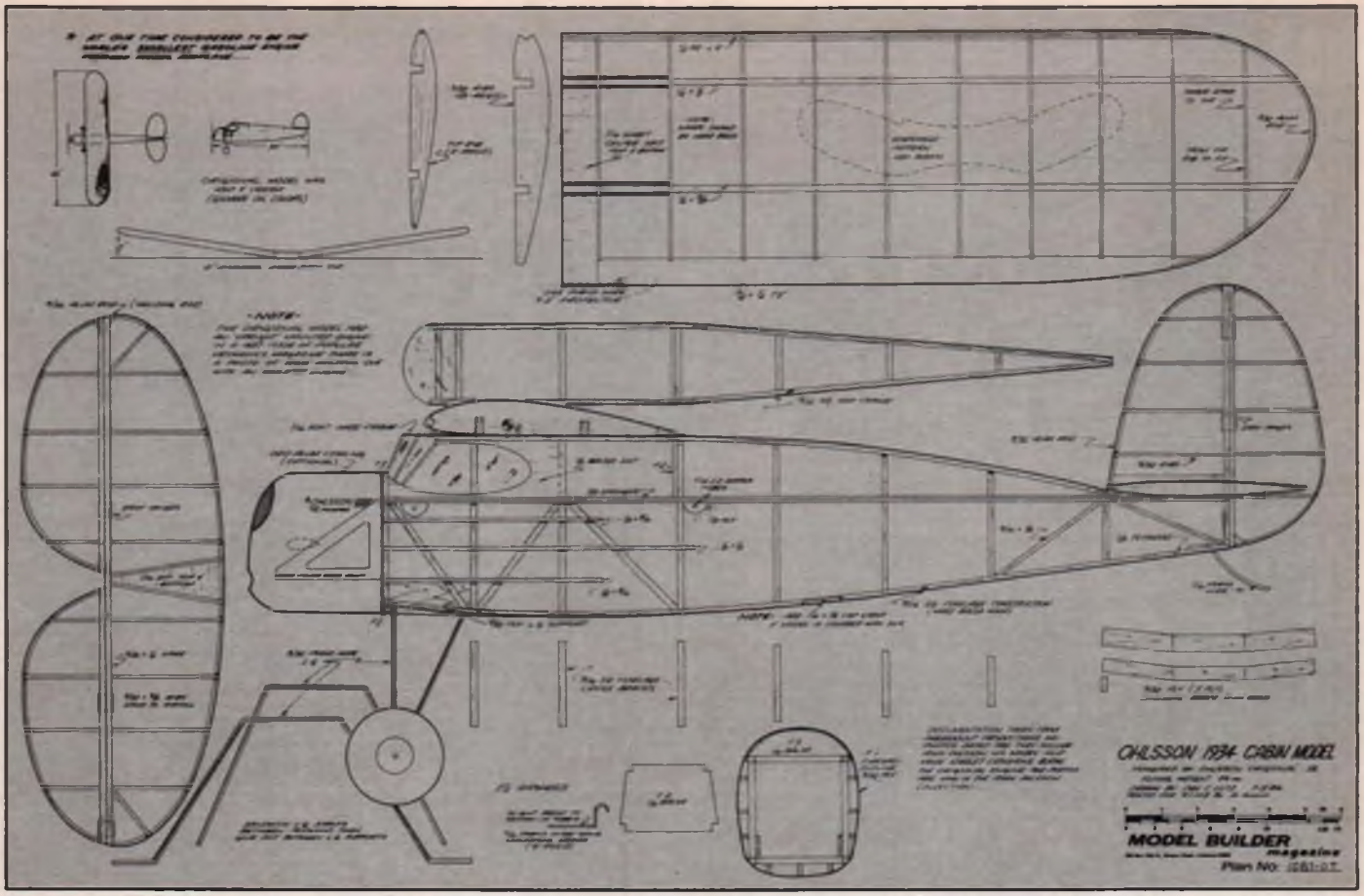


Photo No. 1. The late, great Irwin Ohlsson admires part of Bob Von Konsky's collection of every Ohlsson engine ever produced; only one variant is missing.



Model race cars were extremely popular during the 1935-40 era. Several companies produced both engines and bodies. Irwin Ohlsson and his early partner, Frank Bertelli, built this one-of-a-kind racer; balsa body was carved and finished in high-gloss enamel. Ohlsson made the engine, frame and running gear. Engine was an early "step fin" Ohlsson Miniature.

Photo No. 2. One of Irwin Ohlsson's best-known models in later years was this fabulous Grumman Widgeon, built by master craftsman Dan Lutz and flown by pattern flier and kit manufacturer Joe Bridi.



It was in 1934 that Irwin Ohlsson built his first spark ignition model engine, a diminutive .12 cubic inch powerplant. He matched it with this 42-inch span cabin job, which he also designed, and which was considered at the time to be the world's smallest gas powered model airplane. In the mid-1980s, Irwin's friend Dan Lutz drew up a set of plans based on photos taken by Paramount Productions in 1935. Those plans are available from Model Builder (Plan #1687-O.T., $8.50).

Photo No. 3. The one and only Jimmie Allen (left, whose real name is Ken Fryling) and Karl Spielmaker with their J.A. models. Karl's group, the Michigan Antique Modelers, is really big on the Jimmie Allen models and events; see text for the latest goings on.

model with a Brown Jr. engine, and it flew fairly well considering its weight. Perhaps the most impressive model was Stiglmeier's 5-foot gas job (published by Zaic in his 1935-36 yearbook) that climbed spectacularly. Then came Atwood with his model called the California Champ and his new Baby Cyclone. The climb was very slow and long. The last I saw of that model was when it was drifting over downtown Sacramento.

By this time, Ohlsson was firmly into engine manufacturing. His first commercial attempt was a small engine seen in the Los Angeles newspapers. This very engine was lately resurrected by Larry Jenno, who produced about 100 replicas for the engine collectors.

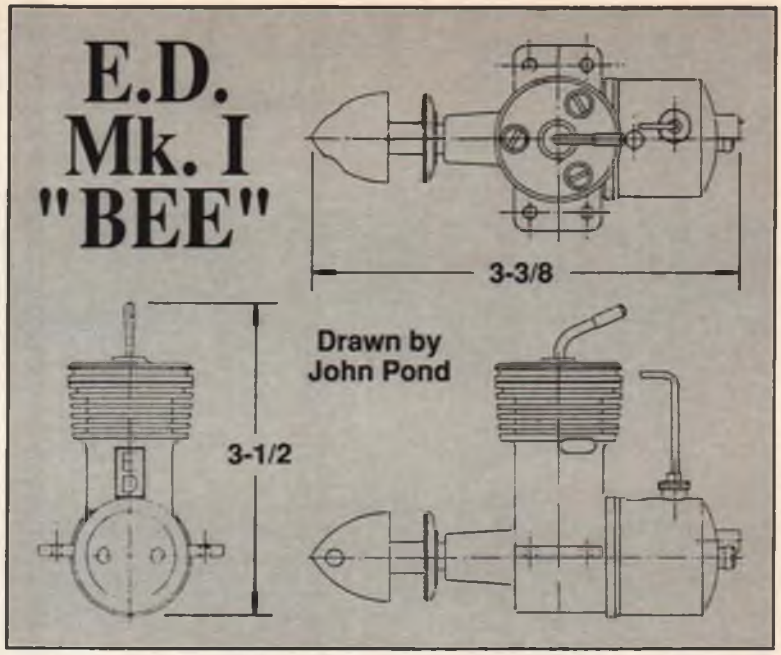
Ohlsson then began producing his own engine, the Ohlsson Miniature, which featured an auto carburetor gas float for a tank. The engine was an immediate success and Ohlsson paired it with his Pacemaker cabin design that was a tremendously popular combo.

Ohlsson finally won the California State Gas Champs and at the same time had his new engine entered in the new Industrial Display section. In those days, you received a certificate and a "Gold Seal" medal. Naturally, Ohlsson called his engine the Ohlsson Gold Seal.

Ohlsson's first partner was Frank Bertelli, who was with Irv for a year. Soon business was so good, they had to move to larger quarters. It wasn't very long before Irv had a new engine, the Ohlsson .23, that was an absolute sensation. It was featured in practically every new Class B model construction article in the various model magazines. Almost every kit manufacturer produced a design featuring this engine. Bowing to the demand, Irv reduced the bore of the engine to obtain a .19 version for Class A.

Success piled on success! The Ohlsson .60 Custom was an instant success at $21.50. Simplifying the engine slightly (no roller bearings), the Ohlsson .60 Special was the biggest seller of all. This engine, with very few changes, ruled the roost for 15 years.

Photo No. 4. Photo taken at a 1930s Junior Birdmen contest shows James P. "Slug" Lovett (left) collecting a $250 check from Lawrence Shaw, National Director for the Junior Birdmen of America. Photo supplied by Gordon Codding.



ENGINE OF THE MONTH

About this time, Ohlsson took on a partner, Harry Rice, and formed the Ohlsson & Rice firm. This was natural as Ohlsson was subcontracting his engine parts to Rice. What consummated the deal was when Rice figured he could build an engine as good as Irwin's. Big surprise! His "James" engine, although priced well below the Ohlsson, sold poorly as the performance did not come close to matching the Ohlsson, then considered the standard of the world.

With Rice now in the firm, they manufactured tool kits, wrenches, etc. for the military during WWII. The firm was required to buy numerous automatic screw machines to demonstrate their ability to conform to contract specifications.

When the war ended, here were all those machines just ready and able to produce model engines. In spite of the tremendous volume, it took several years to catch up with the demand!

Things were so good, the plant offices were completely paneled. Topping that off, a DC-3 was purchased for travel purposes. This writer can still remember Ohlsson arriving at a contests (and also the Nationals) in his well-maintained DC-3.

Ohlsson was always generous to a fault. In that DC-3 trip to Chicago, all the outstanding modelers were carted back to the Nats along with their boxes of models and equipment.

As a sidelight, 20 years ago, Irwin contracted with Joe Bridi to fly his Grumman Widgeon (Photo No. 2), built by that impeccable scale man, Danny Lutz, who was working for Kraft at the time. Irwin sent out invitations for a party to be held at Lake Elsinore. This writer was fortunate to be there! Certainly was a beautiful model and a good flier.

Ohlsson remained active in his later years, often stopping by the Pond booth at the Pasadena IMS trade show to renew old acquaintances and just chew the rag. Those moments are dearly treasured as Irwin was a true friend.

Photo No. 5. Bill Crovelle did an excellent building and decorating job on his 1939 Kansas Wakefield, as originally designed by Ernie Linn.

JIMMIE ALLEN COMES TO TOWN

Karl Spielmaker of SAM 4 reports in his latest Michigan Antique Modelers SAM 4 issue that he had the unexpected pleasure of meeting Jimmie Allen in person as seen in Photo No. 3.

Karl was excited about meeting Ken Fryling, who plays the part of Jimmie Allen coming to help publicize the 1966 postal contest as created by SAM 41. Seen in the photo is Jimmie Allen (Fryling) with Karl Spielmaker in front of a PT-17 in Navy colors. Jimmie holds a J. A. "Skookie" while Karl has the British version, a BP Special.

Karl reports that the J.A. Challenge Team Contest will now feature three-man teams. This should increase interest and participation. At SAM 4, Chuck McLanis suggested that SAM 4 members be formed into two teams, one to be named Jimmie Allen and the other Speed Robertson (Jimmie's mentor).

Karl also reports that J.A. events will be held at 1966 SAM Champs in Florida. Tom McCoy talked Karl into running these events plus the Twin Pusher Mass Launch event. Nothing but fun!

PROPOSED ELECTRIC RULES CHANGES

At the April 20-21 SAM 49 Annual Spring O.T. Annual, a general meeting of interested electric power fliers was held to discuss the existing electric rules and offer suggestions as to how they could be improved.

Some 20+ electric fliers met at the White Elephant restau-

Ohlsson's first partner was Frank Bertelli, who was with Irv for a year. Soon business was so good, they had to move to larger quarters. It wasn't very long before Irv had a new engine, the Ohlsson .23, that was an absolute sensation.

rant in Taft. After considerable discussion, the assemblage decided not to make any equipment changes, but rather focused on flight procedures. Modifications consisted of:

1) In Electric Texaco, two attempts would be allowed to make two official flights.

2) In the Limited Motor Run event, three attempts would be allowed to make two official flights, with the max increased to 10 minutes (previously three flights for 7 minutes each).

The rule changes appear to be successful, based on the SAM 49 contest, and will be formalized into a rules change proposal for the coming rules cycle.

JUNIOR BIRDMEN MEMORIES

This writer can always count on the unexpected from Gordon Codding, 3724 John L. Ave., Kingman, AZ 86401. Gordon recently sent Photo No. 4, showing what was going on in the 1933-1937 era of Junior Birdmen contests.

As can be seen in the photo, Lawrence Shaw (right), the National Director of the Junior Birdmen of America, is presenting a $250 check to James P. "Slug" Lovett for placing in three events: 1st in Rubber Stick, 3rd in Rubber Cabin, and 3rd in Hand Launch Glider. Quite an accomplishment among all the regional winners at the finale held at Atlanta.

Interestingly enough, one would guess that Lovett benefited from the home field advantage as he no doubt knew the area much better than the rest of the 15 builders from the various parts of America wherever a major Hearst newspaper was located. Regardless, this was the first time that the William Randolph Hearst Trophy was won by a local contender. The model builders lost a great sponsor when the Junior Birdmen folded up, mostly because of Shaw's aversion to gas-powered models. He failed to recognize the tremendous popularity of gas model flying, insisting they were dangerous.

BUILD YOU A MODEL, MAYBE?

Received a most interesting letter from Dale Myers, RD #3, Box 414A, Stewartstown, PA 17363, introducing himself as a commercial builder of models. Dale turns the profit from the sales to promote the mission work with which he is associated.

For the curious, Myers reports the most popular models he builds are the Playboy Senior (for pylon competition) and the Scientific Mercury for the cabin class. Models can take anywhere from four days to two weeks to frame up. Even at that rate, he is 20 planes behind! If you're interested in having a particular model built, send Dale an SASE and ask for a quote.

PROOF OF THE PUDDING

This columnist was pleased to receive Photo No. 5 from Bill Cushenberry, showing what Ernie Linn's 1939 "Kansas Wakefield" looks like. For years, Ernie has been telling this writer how well his original Wakefield rubber design flew. Bill was quite enthused about the performance and has talked his buddy Bill Crovelle into building one himself.

Ernie states his design owes a lot to C. H. "Charlie" Grant, who was a great exponent of model stability. Linn's foremost goal was duration rather than stability. He states that only minor modifications were made as he realized that they have to fly stably before high durations can be obtained.

OBIT NOTICES

The latest notice I received was from Vivian Cain, whose husband, Wayne, passed away in February. This came as quite a shock as Wayne, a longtime O.T. enthusiast, was still building and flying right up to the end. One of the earliest of the Old Timer plans that used to be printed monthly in *Model Builder* was Wayne's .020 Replica Goldberg Interceptor, published in the December '73 issue.

• • •

George Niebauer of the Las Vegas VAMPS club writes to pass on the sad news of the death of Conrad "Connie" Hansen back in January at a Dayton hospital. Born in Beloit, Wisconsin in 1915, Connie was the advisor to the first model airplane club in 1928. When the club was reorganized in 1932 with 13 members, it became known as "Hangar 13." The club gas project with the same name was believed to be the first successful 10-foot gas model in Wisconsin, being flown August 25, 1935.

• • •

Al Doble writes to relate that a routine medical examination of E. William "Bill" Hanmer revealed he had cancer of the lower tract. Standard treatments—radiation, chemotherapy, etc.—began affecting his heart and creating other physiological problems. Treatments were halted.

Around the 5th of April, Phyllis Hanmer called Al to say that Bill had deteriorated further and only was given three more weeks to live. Bill was fairly weak but wanted to say good-bye in person. That telephone call was the saddest thing Doble ever experienced. Bill was considerably more composed and philosophical about his impending death than Doble was in hearing about it.

Al says: "We have had some good times and I know I will miss my friend more than words can say."

ENGINE OF THE MONTH

When Art Watkins went to England for the British SAM Champs at Middle Wallop, he made a few trades and brought back four engines for possible use in this column. This is the third one of the four.

The E.D. Mk. I Bee is a dandy running diesel of .09 cubic inch displacement. Claimed performance is 10,000+ rpm using a 9x4 Rev-Up prop. The short stroke and integral tank makes the engine quite compact and easy to mount in one's prize model.

For those interested in specifications and material, the ED Mk. I diesel weighs 2.75 ounces, has a compression ratio of 16:1, uses aluminum alloy castings for the one piece crankcase and cylinder, and a case hardened steel cylinder liner. The balance of the engine is quite straightforward with plain main bearings, case hardened crankshaft, cast iron piston, and a contrapiston of case hardened steel.

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

MODEL BUILDING 101

An IRS 501(c)3 company dedicated to education

BY J.J. LEVINE

Meet Donna Miller, one of MB101's most dedicated teachers.

Last night I slept for 12 continuous, undisturbed hours. This hasn't happened to me except once, in my Air Force days in the early '40's. At that time we spent 72 sleepless hours, moving our squadron to new quarters and making certain it was secured.

What caused this latest extended engagement with Morpheus was two consecutive weeks of assisting teachers conduct an MB101 Delta step-1 building class with 131 sixth graders and a Tennyson Step-2 class for 141 eighth graders. At this writing, Marvin Malicki and I have completed over two years at Simpson Middle School. We have been instructing various teachers, while fine tuning our complete aeronautical educational program. It is MB101's intention that from the technical knowledge gained during this course, students will be able to design their own aircraft and that these craft will perform successfully. Most of the class not only grasped and understood the concepts involved, but were eager to accept the challenge. We firmly believe that by acquiring the knowledge and understanding of basic MB101 aerodynamics, any teacher, using our course, can explain the various theories to the satisfaction of Middle School students.

We found in Simpson an unusual array of talented science teachers, within all three grades. Some proved to be more enthusiastic and dedicated than others. Each is capable and qualified. Yet, as it is with people, there are those who wish to go the extra mile and some who would just as soon stick to the book and grades as presented today.

Last month you read about Tiffany Green, a sixth grade teacher, determined to provide her class with the experience and knowledge of flight. This month, for our final report on this fine school, we outline another dedicated teacher who, by her performance, proved to be an inspiration to us all.

Donna Miller has been a teacher for over 17 years. She was fortunate, as she explained it, to have a husband who is a modeler and longtime employee at Lockheed. He always wanted her to accompany him on his modeling adventures. Donna happily relates the times she actually brought a sleeping bag to the field while hubby untiringly adjusted, flew and competed with his airplanes in the field.

Mrs. Miller quickly found out how enthusiastic her eighth grade students were to learn about and build the Tennyson (most of the students had completed the Step-1 Dart as required). Thus she started to prep them about understanding basic airplane flight theories, prior to beginning her building sessions. Despite the challenge, she agreed to have the entire 141 students build the Tennyson within a period of five one-hour classes, followed by a sixth day devoted to flying.

As it will in all schools, conflicts of scheduling, lack of storage space for the building boards and a general miscommunication disrupted our schedule after the second day. But Donna persevered and worked sessions prior to class, in addition to having other teachers in her pod allow students to work Miller's class in lieu of their own.

We completed and successfully flew almost all 141 planes. More than that, Donna created a test pertaining to the course, consisting of over 60 multiple choice questions having five possible answers, only one of which was correct.

All this under her own inspiration and drive!

Her classes were fortunate indeed to have this teacher at this time. The majority of students appeared eager to participate. Another achievement to be noted was that Mrs. Miller attracted about a dozen parents as helpers. In the main, the helpers were astounded to discover that MB101 funded the entire course. I'm now convinced that only the Manhattan Project of WWII was held in greater secrecy than the fact that MB101 even existed!

We have yet to come across, among many worthy teachers, a more shining example of a caring, teaching and working individual dedicated to communicate, to her young charges, the potential of what aviation can play in their lives.

In passing, I wish to recognize the cooperative spirit of Principal Terry Poor and Assistant Principal Chris Scopa. Without their tolerance and assistance, MB101 could not have achieved its goals.

Next month, "Teaching children with organ transplants the joys of airplane building and flying." Each year and perhaps because I am a kidney transplant, we are invited to participate in this Transplant ReunionFest. It is Emory University Hospital in Atlanta's celebration of the survival of their transplant patients.

Please remember that we can use all the help available, and any donations to our tax deducible program will be greatly appreciated. All funds are dedicated to further our Middle School programs throughout the country. Address all inquires and comments to Model Building 101, Inc. 1891 Branchview Dr., Marietta, GA 30062; (770) 973-3598, Fax (770) 422-2765.

May calm winds, tall grass, bright sunny days and the time to enjoy it be with you the rest of your days. ***MB***

We found in Simpson [Middle School] an unusual array of talented science teachers. Some proved to be more enthusiastic and dedicated than others. This month we outline another teacher who proved to be an inspiration to us all.

the Colt 40™

QUICK BUILT, SUPER TOUGH SPORT LOW-WING TRAINER

Colt 40 shown with optional GP wheel pants

The PERFECT FIRST LOW-WING PLANE

If you're looking for a great low-wing plane, look no further! The **Colt 40** is a quick-built, super tough way to learn low-wing basics. Completely pre-decorated, the **Colt** has show-room looks, air-show agility, outstanding durability and a very forgiving attitude!

Fold & Fly™ Technology - Simple, Quick & Inexpensive

This is a plane you can build in a few evenings!!! The **Colt 40** is precision die-cut and scored, ready for you to fold up and apply simple contact cement. No hours of sanding, shaping, expensive iron-on covering or paint needed, Your **Colt 40** will get lots of compliments at the flying field!!! AirCore material is three to four times tougher than balsa and 100% fuel proof!

Plenty of Options

Your Colt can easily be equipped with optional wheel pants for that extra sporty look. If you prefer nose gear, the Colt is just as happy!

For versatility, it's easy to build your Colt as both a tail dragger and a nose gear airplane, and you can switch from one to the other in minutes at the field! When you're ready, leave the pilot's box and head for the lake with exciting, supertough **Explorer™ Floats**. Explorers mount in minutes and are great fun on snow, ice or even wet grass.

Switch from tail-dragger to optional nose gear in minutes at the field!

*Add optional **Explorer floats** for snow, ice, wet grass or the lake!!! Explorer floats fit all AirCore planes!!!*

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For the location of the dealer nearest you, please call 1-800-682-8948, and mention code #038L.

World's Toughest Airplanes - Almost Indestructible

AirCore planes take hard landings, cart wheels, nose-ins and other abuse that send balsa and styrofoam planes to the scrap heap! You'll be amazed! *"They take a lickin' and keep on tickin'"* says Art "All About Art's" Steinberg **(Model Builder Magazine)**

The TURBO OPTION

If you're beyond the learning stage, build the Turbo option. The Turbo version (all parts and instructions included with each standard kit) gives the Colt a 58" wingspan and slightly smaller tail. The **Colt Turbo** will please even the most discriminating aerobatic pilots with its gentle stall characteristics and outstanding maneuverability! Start with the standard Colt, then shift into Turbo with a separate wing kit!

The Power Cartridge™

Who says you have to buy a new radio, battery pack, gas tank, servos and engine every time you build a new plane? Your Colt 40 kit includes the **Power Cartridge (PC)**, which is a

Patent Pending

The Power Cartridge™ (PC)..."AirCore's Power Cartridge is unique...revolutionary concept" **Model Airplane News**

tray that contains all of your "expensive" stuff, and it slides into the nose of your fuselage on a set of rails. In ten minutes at the field, you can slide the PC out of your Colt 40 and insert it into any other "PC compatible" plane you own!

Colt 40™ Specifications

Kit includes everything you need except engine, radio and wheels!!!
Low wing, semi-symmetric airfoil
Wing Span – 64 in (Turbo version - 58 in)
Fuselage Length – 41 in
Weight – 5.75 lb
Wing Loading – 18.8 oz/sq ft
Engine – .40-.45 2-stroke , .50 4-stroke
Radio required – 4 channel w/4 servos

AirCore Fleet Continues to Grow

CoroStar 40**, "Warbird Extraordinair" ...get a CoroStar and fly the heck out of it" **Model Builder

Slide your Power Cartridge into a CoroStar 40, the high-speed, combat-proven aerobatic champ. This super tough, quick-building "Warbird Extraordinair" can be decorated to resemble the WWI Fighter or race plane of your choice.

If you're nostalgic, build the Classic Cub 40™,

*The **Classic Cub 40**, "Ultimate Bush Plane"...a classic little tail dragger" **Model Builder Magazine***

"ultimate bush plane." The Classic Cub not only flies great, the brilliant cub-yellow AirCore design makes it a sure winner at the flying field! The AirCore 40™ Trainer comes completely pre-decorated, ready to fold up and fly. PC compatible, it flies great and gets you to the flying field fast!

*The **AirCore 40 Trainer**, "...a great first airplane...the AirCore owner is way ahead of the game!" **Model Airplane News***

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SCALE SAILPLANES REVISITED

This month Bill puts in a plug for the largest source of scale sailplane plans in the U.S., and also talks about "Plane Geometry," a computer program for model designers and scratch builders.

Following an article like my April 1996 column on the Winter Soaring Festival of vintage and modern scale sailplanes, I can count on letters from readers who get all fired up to build what they see in *Model Builder*. Well, here's one source of plans that might be a big help for modelers out there with the desire to build and fly something totally unique.

The Scale Gliders Catalog has been called "the world's largest selection of scale glider plans" by its publisher and proprietor, Bob Holman, and after looking it over, I've no reason to doubt his claim. Bob doesn't make up the plans he sells, rather, he imports them from Europe where scratch building—and we're talking *total* scratch building from published three-views!—has always been more popular than here in the USA. His sources are principally these five: ASP Scale Glider Plans (model plans published in the English magazines *Radio Modeller, Radio Control Models & Electronics,* and *Silent Flight*), *RC Model World* (another English magazine), Mike Smart (English plans service), Richard M. Green (an English modeler who specializes in PSS slope gliders), and *Flug- und Modelltechnik* (German model magazine).

Each model in Bob's catalog is displayed with at least one representative photo to give you a good idea of, say, what a Slingsby Kite looks like if you've never seen one. Along with the photo is a one- or two-sentence description of the model and the basic specs like wingspan and radio requirements.

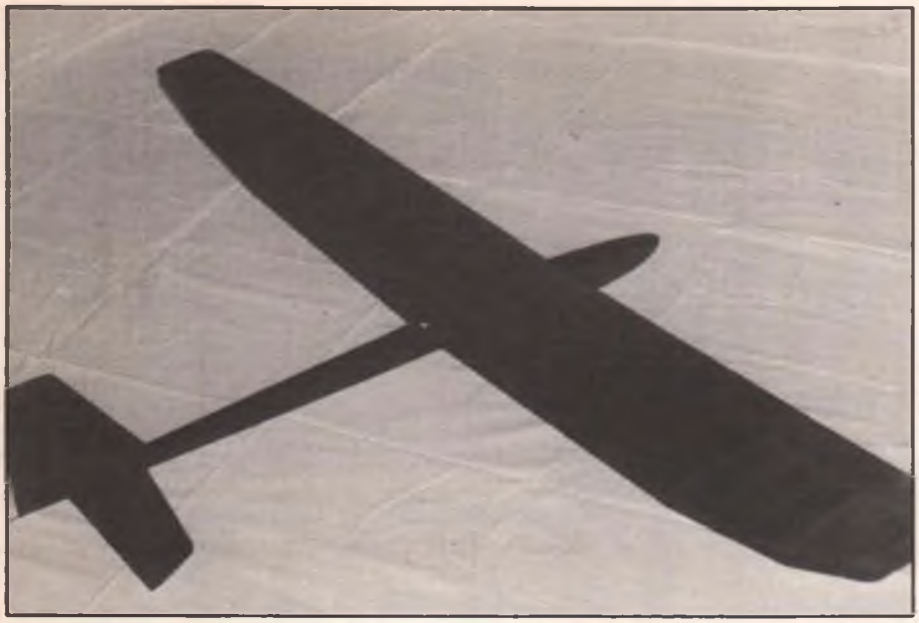
For those who are motivated to scratch build a scale glider (or even one of the scores of good-looking sport gliders shown) from plans but don't want to mold and fabricate canopies, some of Mike Smart's models and most of *RC Model World's* models have canopies available from Holman directly.

Bob sent along a photo of one of his favorite offerings—a scale model of a 1950's-era V-tail ship called the Ka-1, by Rudolf Kaiser. What's special about this model is first of all its smallish span of 68 inches and its constant chord wing. It might just make a great first-time scratch-built scale model. And to make it even more attractive, not only can you get full-size plans, but also a set of hand-cut balsa wing ribs (36 ribs) for an additional $8. Add this to the $11 tag on the plans and $3 shipping for the both and you're on your way. See you at the Winter Soaring Festival in December!

Bob Holman's Scale Gliders Catalog has scores of great ideas for the scale and sport sailplane model builder, including this neat little 1950's Ka-1 at 68-inch span. The original sailplane as designed by Rudolf Kaiser featured a plywood sheeted fuselage and fabric covered wings. Ribs and plans are available from Holman—see text.

After speaking with Bob on the phone, I learned that he has laser-cut ribs in the works for this model and many others in the catalog—the most popular ones at first, no doubt. There may even be laser-cut formers for many of the more complicated scale subjects. Just think, partial kits for the 1/5-scale Rhönbussard or 1/4-scale Minimoa you've always wanted to build! Give Bob Holman a call at (909) 885-3959 or fax (909) 889-9307, or e-mail at BHPLANS@aol.com, or write to P.O. Box 741, San Bernadino, CA 92402. Send $3 for the catalog and you'll be faced with hundreds of sailplanes to choose from! Get out the glue!

No scale sailplane enthusiast should be without a copy of Martin Simons' great book, "The World's Vintage Sailplanes, 1908-45." Over 80 different sailplanes, all with accompanying three-view drawings, are presented, along with interesting historical text and B&W and color photos. Copies are available for $60 postpaid from Vintage Sailplane Association archivist Raul Blackstun, P.O. Box 307, Maywood, CA 90270.



Two views of Bill Erwin's (Rt. 8, Box 40-16, Amarillo, TX 79118) HLG design based on columnist Bill Forrey's 3-4083 wing plan published in the December 1995 Model Builder. The wing was built pretty much stock except Bill also kicked up the outboard panels (last two rib bays), making a triple-dihedral wing. Standard sheet balsa fuselage and built-up tail construction. Covering is Goldberg's Ultracote Lite, which Bill really likes; interestingly, the wing was covered in just four pieces, with no splices at the dihedral breaks. Radio is Hitec's 535 FM micro receiver and HS-80 micro servos, with a 270-mAH battery. Bill says the model weighs 12 ounces and flies very well, reports several other fliers are building similar models after seeing his fly.

AND THEN THERE WERE TWO

I recently received the following letter and thought it might be of interest to all you vintage scale sailplane fans. The letter explains itself:

"Dear Bill, I just received the April issue of *Model Builder,* and scanned through the magazine looking at the pictures and other items of interest. Your column RC Soaring really sparked my interest, and I enjoyed the pictures and article.

"I would like to add a correction to your picture comment which says that Wayne Spani owns the sole remaining flyable example of an original full-size Bowlus Baby Albatross. Well Bill, I have not seen Mr. Spani's Bowlus, but I have seen the other one. That's right, there are two of them.

"Jeffery Byard of Tehachapi, California, has restored his Bowlus Baby Albatross to flying condition, and during 1995 both he and Wayne Spani trailered their gliders to Elmira, New York. The exact details are a bit fuzzy to me, but as I understood it, both sailplanes sustained damage while on their trailers. One going to the meet, the other one coming home.

"I saw Byard's Bowlus at the Sailplane Homebuilders Association fly-in and workshop at Tehachapi's Mountain Valley Airport on Labor Day weekend, 1995. He had just finished repairs the night before, and at that time had the distinction of having the only flyable Baby Bowlus in the world (at least for a short time).

"Another interesting note: the sailplane was ground towed, not aero towed. A light pickup truck towed the Bowlus to about 900 to 1000 feet for a flight of about 10 to 15 minutes. There were no thermals at the time but Jeff did find zero sink on one flight for a flight of about 20 minutes.

"I particularly liked your article coverage of the vintage sailplanes, as I plan to build one someday. I belong to the South Bay Soaring Association; we enjoy monthly contests of thermal duration, scale and slope racing. As well as lots of just plain fun flying.

"Thanks again for some good reading, may all your air be rising. Chet Haworth, Fremont, California."

Thanks for setting us straight, Chet. When I first met Wayne a couple of years ago he did indeed have the only flying Baby Bowlus in the world. However, time has a way of changing things, and they have indeed changed . . . for the better!

DESIGNER/SCRATCH BUILDER PROGRAM

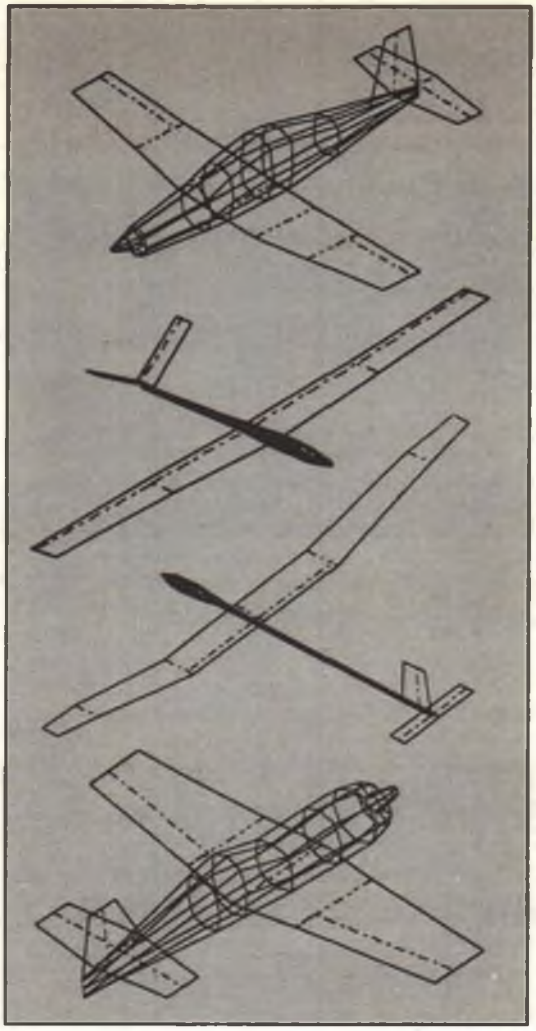
A longtime friend of mine, Blaine Beron-Rawdon (I knew him when he had only one last name, Rawdon, and designed model sailplanes like the Mirage), called me the other day and told me of a new computer program that he developed which is first and foremost inexpensive, and secondly quite useful in basic design, setup, and evaluation of model airplanes of all types—including sailplanes, which are one of Blaine's favorites.

"Plane Geometry" is a package of spreadsheet programs written to run on Microsoft Excel Version 4 or higher, in either Mac or IBM format (your choice). Blaine says, "It's pretty easy to fool with, especially if you are familiar with Excel." If not, "The instructions are very detailed so that they can function as a tutorial/textbook." Indeed, if you have a technical background or are just handy with computers, you can easily march through Blaine's step-by-step instructions and complete descriptions of terms. For example, if you don't know what pitch dampening, elliptical planform, or aerodynamic incidence are, he'll tell you, and in plain English.

Getting back to Plane Geometry, you're probably asking, "What's it for?" Well, it helps you get answers to frequently asked questions in new designs, such as: Where should the CG be? Where is the mean aerodynamic chord? What should the wing and tail incidence be? How much dihedral should I use? How big should the tail be? How long should the tail moment arm be? What's the best setup (size, angle, etc.) for a V-tail?

Plane Geometry is divided into two separate programs:

Measure mode: From measurements that you can make from any scale three-view or lunchtime paper napkin drawing, you can generate many geometric characteristics—wingspan, tail span, aspect ratio, sweep, taper ratio, tail moment arms, tail volumes, control surface chord fractions, wing loading, equivalent dihedral angle, approximate fuselage wetted area, basic stability info (static margin, measure of spiral stability), pitching and yawing



Sample illustrations produced by the "Plane Geometry" computer design program created by Blaine Beron-Rawdon—details in text.

characteristics.

Design mode: In reverse, if you are a designer, it will generate geometry (shapes) from your desired geometric, stability, and control characteristics. It'll even generate a 3-D drawing of the desired aircraft and tell you how much it should weigh to achieve your characteristics.

Both the Measure and Design spreadsheets are tailored to either conventional ("C") or V-tail ("V") configurations to account for four of the six spreadsheet programs you receive.

The fifth includes a growing database of measured airplanes of many types (full-size and model, power and sailplane). These can be plugged into the Measure or Design programs for analysis or for your own personal design modifications. This gives you a known, reasonable starting point in a new design.

The sixth is called "RadGyr." It calculates pitch, roll, and yaw mass radius of gyration (don't worry, he tells you in plain English what that is) from simple measurements of actual models. The output is used in Design to calculate pitch dampening characteristics.

A key feature of both Measure and Design programs is a 3-D plot of the airplane which may be viewed from any angle! This is one of the most useful features of the program since it enables the designer to "eyeball" as he works.

Plane Geometry comes with a 30-page illustrated manual which guides even the novice designer through the process. It is supplied on a 3.5-inch floppy in either Mac (1.4) or IBM (1.44) format. The price is a very affordable $19.95 plus $2 shipping and handling, and second and/or subsequent copies are available for $15.95 each. Californians must include the Governor's tip (sales tax). Send your check or money order to Envision Design, 4207 Exultant Dr., Rancho Palos Verdes, CA 90274, or send a message via e-mail to evd@netcom.com.

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Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92330, or e-mail at BFORREY@aol.com. My phone number is (909) 674-0939—please leave a message if you get the @!x*% machine, or fax me at (909) 245-1702. ***MB***

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BIG BIRD RAMBLINGS

Bruce talks about a variety of topics—Giant Scale Thompson Trophy racing, IMAC scale aerobatics, safety issues, and more.

A lot of exciting things have been happening since you last visited the Big Bird hangar. In addition to the regular Big Bird fly-ins, we have a very active IMAC scale aerobatics circuit up here, and the new Northwest Giant Scale Air Racing group has planned three races this year.

The NGSAR's purpose is to establish standardized rules for racing giant scale planes in the Thompson Trophy class. They will issue race numbers, promote giant scale racing, and provide continuing education on building, racing and teamwork.

The NGSAR wants to insure that their rules and regulations are parallel with those of the GSARA (located in Gainsville, Texas), so that pilots enticed to come to the NGSAR meets will have a familiar course to fly and uniform rules. NGSAR members will be prepared to race at Gainsville and/or Madera, California.

The Thompson Trophy course has three pylons: One and Two are 1,200 feet apart with the number Three pylon in the center about 250 feet off of the line between pylons One and Two. If you would like a full set of rules and specifications, write to Larry Roberts, 3907 S. 271st Pl., Kent, WA 98032.

As mentioned and pictured in the July column, Northwest Hobby Technologies has a growing line of Thompson Trophy racers that will accommodate the maximum 4.6 cubic inch engines. Carl Hickey, owner of Northwest Hobby Technologies, has designed five planes to compete in the races. They are the Caudron, Keith Rider R-4 Firecracker, Laird Turner, Laird Super Solution, and Gee Bee Model Z.

(On a side note, several readers have asked why I give Big Bird competition so much publicity when the original concept for Big Bird flying was no competition. That concept is still valid and works for many of the people flying Giant Scale and sport Big Birds; however, the fact that competitive events such as racing and scale aerobatics take place has been beneficial to our entire Big Bird family regardless of anyone's particular preference or flying style.)

BRUCE THE PATTERN FLIER

On Sunday, April 14, 1996 I entered a Scale Aerobatics meet hosted by the Seattle Radio Aero Club. Their flying field is located in Marymoor Park near Redmond, Washington. The SRAC's meet kicks off the contest season around the Seattle area and is called the Polar Bear contest, however we were blessed with sunny, shirtsleeve weather and I managed to fly all the basic maneuvers in a complete, recognizable sequence. I had only managed 20 minutes of practice. I hoped to do better in May, at Canby, Oregon.

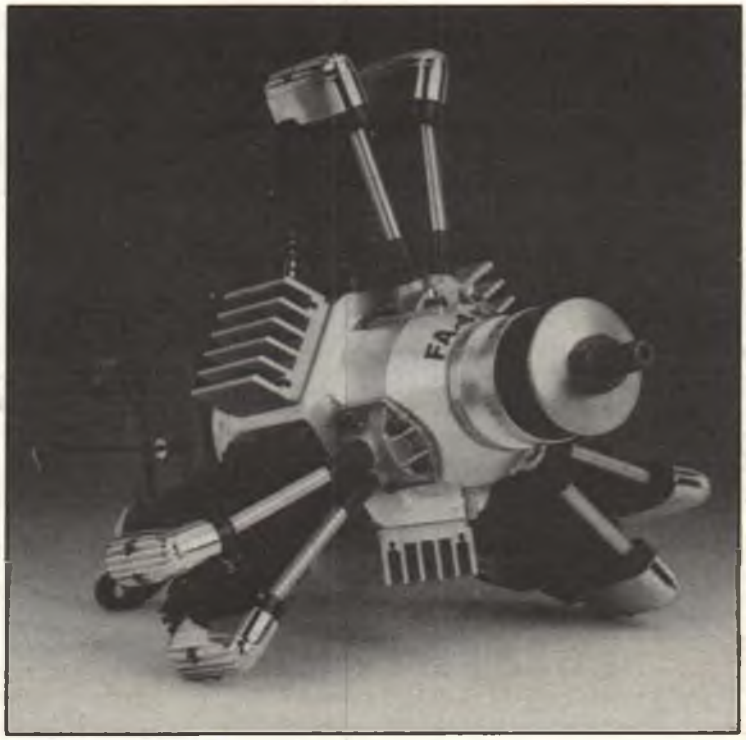
I did fly better at Canby but my flying was cut short when I snapped off my nose gear on my Ultra Sport 1000. I had been running my Irvine 1.20 too rich and experienced a flame-out when I pulled up into the Half-Cuban Eight maneuver. The hazards of aviation caught up with me during a less-than-perfect dead-stick landing. The Irvine 1.20 had been performing flawlessly, with steady, reliable power in all attitudes. It was a very cool, damp day and I should have leaned out the engine a little more.

I was flying my Ultra Sport 1000 in the contest because basic contestants are exempted from the scale requirement. However, after the meet was over I decided I wanted a plane that is more in keeping with IMAC rules, so to speed things up I called John Eaton at J&K Products to see if he still had his TR 260 ARF available. John said he did, so I chose my color and rushed off a check.

Johns' ARF TR 260 has a 93-inch wingspan, and I intend to use my Eaglette 4.2 cubic inch engine. I'll also be using my JR XF622 radio system. The 622 is my first computer radio, and I'm still amazed at the versatility that such a system gives you in setting up the controls on your plane.

I had been reluctant to try a computer radio, due to such a dismal experience with my personal computer. But I found JR's instructions easy to understand and I was able to use all of the functions on my XF622 after only a few minutes reading the instruction manual.

My scale aerobatics routine is improving, in part because of JR's transmitter sticks. They give you an "up close and personal" feeling with your plane as you guide it through the sky. It's possible to adjust stick length and spring tension on the transmitter to suit your style of flying. The 622 also



Horizon Hobby Distributors has Saito's latest and biggest four-stroke engine available for the Big Bird enthusiast. The new FA-450 three-cylinder radial displaces a whopping 4.5 cubic inches and will turn a Bolly 22x10 propeller at 8,000 rpm using 15 percent nitro Powermaster two-stroke fuel.

Chuck Gill, who runs The Aeroplane Works, now has a giant sport plane available for your flying pleasure. The "Big Feller" design by John Tanzer has an 81-inch wingspan and will fly well with engines in the 23 to 50cc range. The complete kit sells for $235 and is available from The Aeroplane Works, 2134 Gilbride Rd., Martinsville, NJ 08836; (908) 356-8557.

Our columnist's first experience with a computer radio (JR's six-channel XF622) was a happy one—see text for comments.

Dr. John C. Fredriksen, Ph.D. has the second volume of his directory of scale kits and plans from around the world available. The planes in Volume 2 are Golden Era planes from 1919-1936. The kits and plans listed are all sizes, including giant scale. Manufacturers address are included. Copies go for $15 postpaid each, or get all five volumes for $55. For details or to order, call or write: 481 Loring Ave., Salem, MA 01970; (508) 745-9848.

allows dual rate for ailerons and elevator on one switch, or you may use the soft center variable trace ratio (VTR) for mild control movements around neutral while still providing maximum servo travel at full stick. But I think my favorite feature in the XF622 is its ability to control the servo movement in such small increments; as the adjustments are made you are provided with an audio and visual response to your adjustments.

SOAPBOX

It has come to my attention through the mail and several items in IMAA's High Flight publication that there are a couple of growing problems at some fly-ins—particularly, open flying time being reduced by specialty flights, and submitting inaccurate information when applying for fly-in sanctions from the IMAA and AMA.

I'd like to remind contest organizers to be accurate in the description of their event when sending out invitations and flyers. Some folks travel long distances to attend Big Bird fly-ins, and it's a real shame to drive 500 miles, looking forward to doing lots of flying, only to discover that all flying will shut down for a two-hour airshow in the heart of the flying day. The flight lines are long and hot at really large fly-ins as it is, and to have to give up a quarter of the flying day to watch a specialty event is asking too much.

It's not a good idea to have a combined airshow and fly-in because neither will be well served. Have either a good airshow or a good fly-in. Be specific in your flyer so that those who attend will know exactly what to expect.

The second problem involves clubs purposely giving inaccurate information to IMAA and AMA sanction officials to draw attendance to their event. The event is advertised as a fly-in, but when out-of-town pilots show up, they find out that it's an event for club members only. Fortunately this problem does not show up too often because the word gets around real quick from those who are burned by such bad faith information.

Be accurate in your flyer and information and invitations. Your event will grow and get a good name. If you're dishonest about what's going to happen at your event, your club's name will be mud.

Flying safety remains a problem both in full scale and in model aviation. When you start telling yourself or your friends that there is no problem, that it's only an airplane, or that there's nothing to fear, then you're in need of a major attitude adjustment. Such a statement shows lack of respect for the forces and laws of nature that you will encounter as an airman of any sort. It also shows lack of respect for life and limb of not only oneself but also those around you, whether close family members or your fellow pilots.

The "it's only an airplane" attitude leads to even worse things. Next you may start telling your flying buddies that you've been getting away with some unsafe flying habits for years and nothing ever happened!

I've been offered flights in full-scale aircraft, some I really wanted to accept, but if the pilot expresses any of the foregoing ideas, I decline to take the flight. Big egos do not cancel the laws of flight or nature. Knowledge, a respectful attitude of aviation in any form, and a professional attitude towards the rules of flying give confidence based on more than supposition and conjecture.

If you refuse to fly when you know something is wrong or you even suspect something is wrong, you're a wise pilot. When the problem is eventually cleared up, you will enjoy your part of aviation even more because you've done the right thing.

THE WRAP-UP

I told you about Bee Gee's heavy duty starter in my coverage of the Northwest Model Exposition back in February of 1996. Since then I've been able to observe the big starter in use at several local Big Bird events.

Bennie Phillips, owner of Bee Gee, tells me that the starter is actually a go-kart starter that has been adapted to start Big Bird engines. The starter routinely starts engines of 5 cubic inches or more with ease. If you need a heavy duty starter to safely start your big engine, contact Bennie Phillips at Bee Gee Industries, 17336 40th Ave. S., Seatac, WA 98188.

Next time you visit the Big Bird hangar I will be reminiscing about the last 25 years of Big Bird activity in *Model Builder*.

Bruce Edwards, 8304 53rd St. Ct. W., Tacoma, WA 98467. ***MB***

CONTROL LINE SPANS THE AGES

John presents two examples that demonstrate how control line appeals to young and old alike, and offers other useful tidbits of interest to CL fliers.

When it comes to control line model aviation, there's not much of a generation gap. Evidence of that truth was provided recently in two ways. One was the arrival of a report of the return to CL flying of one of the hobby's grand masters of its early years. The second was a delightful spring contest in Portland, Oregon, where a dozen or so junior and senior class fliers enjoyed a day of mouse racing.

Lee Strickland of North Hollywood, California described the return to flying—after a layoff of nearly two decades—of Bob Palmer, designer of some of the most famous CL aerobatics and sport planes:

"I retired about four years ago and began flying several times a week in the early mornings at our wonderful Sepulveda Basin site. Usually I would be the only CL flier there until later in the day.

"About a year ago last summer Bob showed up one morning and watched me fly. Now there's an intimidating thought for an aspiring precision aerobatics flier! Bob and I were sort of field buddies in the late '50s to mid '60s until we both dropped out of CL flying, me to career and family and Bob to RC and other things. As we talked over old times and the state of CL at the present we renewed our acquaintance and became fast friends.

"Over time I began to pressure Bob to fly the beat-up Ringmaster I was using while building my T-34 converted Challenger. He resisted successfully for some time, but one day he showed up with his special handle and agreed to fly.

"What a thrill it was to see my old Ringmaster being piloted by the Grand Master himself. When he landed, the look on his face said it all. Within a few weeks he began to talk about building a Pollywog

Aerobatics grand master Bob Palmer returned to control line flying this year with his Pollywog Chief. Photo by Lee Strickland.

Juniors are active in Class I Mouse Race in several areas of the Northwest. At a contest in Portland, Oregon, in April, Dawndee Brittain, Nathan St. John and Travis Morgan battled it out in the feature race.

At the Portland meet, Mouse Race Director Jim Cameron took extra time to go over rules and circle etiquette with a large group of junior and senior fliers. Teams showed that they learned fast with such assistance.

Chief to fly in Old-Time Stunt and soon I began to see it taking form in his shop.

"First life for the Chief occurred on February 15, a beautiful Thursday morning. Bob, having been away from CL for so long, insisted that I fly it first to check it out, and I felt privileged to do so. It took four flights to figure out trim adjustments, propeller, engine settings and so forth. Bob still didn't want to fly it, so we put it away until the following Sunday morning.

"It's no surprise what a lot of attention that event attracted. Cameras came out from everywhere (including mine) and a host of CL fliers-turned-photographers crowded the runway in front of the plane as I prepared it for flight.

"I gave it one more check flight and then Bob took it up. We all thought after such a long layoff that he would be taking it easy, but that's just not in Bob's nature. On the second lap he started looping and the rest of the flight was spent looping, climbing and generally feeling out his pretty new plane.

"I don't have to tell you how pleased we are to have Bob back as one of our regular flying partners at Sepulveda Basin. Welcome home, Bob, it's good to have you back among the flock."

At the other end of the spectrum—both in experience and in the size of airplane—were the kids at Delta Park in Portland, where the Northwest Fireballs put on a spring racing and carrier meet. They anticipated a strong entry from the younger set because there are three areas in the Pacific Northwest region where junior fliers are developing their skills fast, thanks to the work of local clubs making strong efforts to recruit and train new young pilots. The kids, who specialize in Class I Mouse Race, came from Madras and Roseburg, Oregon, and from Hoquiam, Washington, in addition to some of the regular Northwest open class racing competitors.

In addition to the crowd of junior fliers, there also were quite a few senior class fliers who had shown up to race Class I Mouse, not realizing that junior was the only class to be offered. (There's a lesson for novice competitors: Read the flyer and know what to expect at the contest!) But because there were so many teenagers there with planes, the Fireballs spontaneously arranged a senior class race. No trophies were available, but the racing was excellent.

(Winners in the regular events, by the way, were delighted by a new idea in awards. Contest Director Wayne Spears dug into his magazine collection and arranged for full-color reproductions of some classic magazine covers, framed and marked with the contest information. They were a big hit with all age groups.)

Beyond just conducting a race, the Fireballs used the day as a training ground. Mouse Race Director Jim Cameron held extensive pilots meetings with the kids, explaining some of the details and nuances of racing and having a couple of the expert fliers on hand give some tips and demonstrations.

It also was interesting to see some of the young fliers developing their own racing partnerships, independent of the grownup mentors. One notable combination was the joining of new racer Dawndee Brittain with experienced young racer Julie Rice. With Julie pitting, Dawndee cruised to a 2nd place finish in the hotly contested Junior Mouse class.

Nathan St. John of Madras was 1st in Junior Mouse. Todd Ryan of Pasco swept the unofficial Senior Mouse class as well as the Flying Clown and Northwest Sport Race classes.

There were only a couple of entries in the carrier event, but the Fireballs demonstrated an inexpensive and simple approach to carrier deck construction, using a simple board-and-rope deck over a grass surface. It worked fine, and both competitors made arrested landings on their first try.

It was definitely good to see competition return to Portland after a couple of years off, and to see that the youth movement in the region is still building. It would be interesting to hear from other areas where similar youth movements are getting started.

SPEAKING OF "MOVEMENTS" . . .

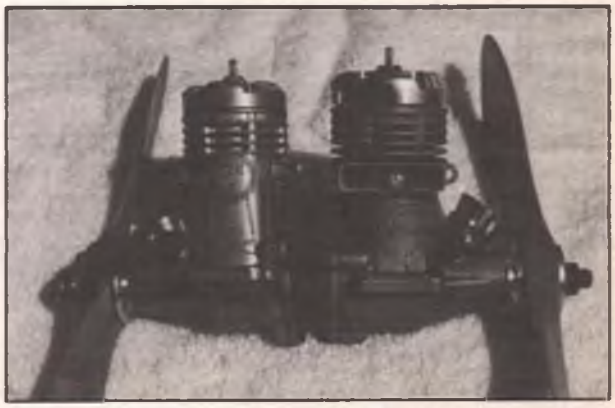
Control Line is on the move in the Raleigh, North Carolina area, reports Bill Mitchell. A new AMA chartered club is the Triangle Skymasters, and Ed Culver is president/newsletter editor. Bill says anyone who would like to exchange newsletters should contact Ed at 120 Tammy Dr., Garner, NC 27529.

Plans were underway for the club's first contest, and in pursuit of that goal they have developed a special set of Sportsman Carrier rules. The rules are geared toward eliminating the advantage of prop-hanging, without banning the practice. The rules and scoring are identical to AMA Profile Carrier, with the following exceptions:

1) Low-speed time is limited to a "max" of 120 seconds (a test number, which may be modified).

2) Fuel is supplied by the sponsoring club, and limited to a maximum of 10 percent nitromethane.

3) Engines are as specified by AMA Profile rules, except: Plain bearing engines, single or multi, may be used, up to .4028 displacement, of the type typified by but not limited to the O.S. .40FP, Thunder Tiger GP .40, Magnum GPA .40, Tower .40, and Fox .40. Porting modifications and mufflers are allowed. Mufflers may be either stock tube type or aftermarket chip



Tom Dixon is importing the Double Star Classic .40 (right), designed to be a drop-in fit into planes designed for the Fox .35. More in text.

About a year ago last summer Bob [Palmer] showed up one morning and watched me fly. Now there's an intimidating thought for an aspiring precision aerobatics flier!

type. Tuned exhaust is prohibited.

4) Ten bonus points will be awarded for scale as per AMA Profile rules. Multi-engine bonus applies, plus 10 points will be allowed for biplanes. (Interplane rigging is not required; struts must be scale in profile except as necessary to accommodate leadouts.)

CONTEST ANNOUNCEMENT

You'll get this copy of the magazine in time to make plans to attend the 13th annual Seebree Hayes AAA Control Line Contest October 12-13 at Whittier Narrows in Los Angeles. Presented by the 101st Squadron Screaming Eagles, the Seebree Hayes is Southern California's largest CL contest. Events are Sportsman, Profile, Class I/II and Nostalgia Carrier; Precision, Old-Time and Classic Aerobatics; Fun, Profile, Sport and Precision Scale; all racing and speed classes; and 80-mph Combat. For information, contact Virgil Wilbur, 9984 Cedarville Dr., Santa Fe Springs, CA 90670.

Southern California scale enthusiast Fred Cronenwett has developed an extensive schedule of California and West Coast CL activities that is an excellent aid for Western fliers trying to plan their year. He has a running list of all Western contests by date, as well as a matrix of activities giving both dates and events. For a copy, write Fred Cronenwett, 7352 Independence Ave., Apt. 201, Canoga Park, CA 91303.

PRODUCT NEWS

There's yet another aerobatics engine on the market, this one marketed especially for Old-Time Stunt and Classic Stunt models designed for the Fox .35. Tom Dixon has commissioned the Double Star people in Moldova to build the Double Star Classic .40. It's an AAC design that fits into current Fox-powered planes, is virtually identical in weight and takes mufflers that fit the Fox. Tom reports that the engine needs virtually no break-in and offers slightly more power than a stunt-modified O.S. .40, turning an 11x5 or 11x6 prop comfortably.

The introductory price is $150 plus shipping. The engine comes without a muffler, but Tom can supply an Adamisin tongue-type muffler if desired. He adds that, though they are readily available, they are made and shipped in small numbers, so there may be a wait of a few weeks for delivery of orders. Interested people can write or fax their orders, with payment due on delivery. Write Tom Dixon at P.O. Box 671166, Marietta, GA 30066. The fax number is (770) 973-9238.

In other product news, we recently received the entire list of Zap adhesives, one of several excellent brands of cyanoacrylate glues available to modelers. There are some products on the list that might surprise someone who hasn't seen them all.

Besides the usual Zap thin CA, there also is a dandy product called Zap-A-Gap, a thicker gap-filling CA glue; a slow-setting version, and a kicker to speed up the standard CAs. Another product I find useful is Z-7 debonder, which can be used to take apart tacked parts, to backpedal from errors, and, incidentally, to unstick parts from fingers when necessary! There's a special hinge glue, an odorless CA, a flexible version, and glues for plastic and foam. Zap also has a line of expoxies, a finishing resin and a thread-lock product. There's even a special glue for canopies. Check your hobby shop counter. For further information, contact Frank Tiano Enterprises, 15300 Estancia Lane, West Palm Beach, FL 33414.

FLYING SITE GUIDE ADDITION

Since our survey of flying sites around the U.S. and Canada, which appeared over the past two issues, we've received information on a number of additional sites, which we'll sprinkle into the column as space permits. It turns out that there are more excellent places to fly than we thought!

One of the most interesting sites we just learned about is the Wichihawks Model Airplane Club flying field, provided and maintained by the city of Wichita, Kansas. The field is in Planeview Park at the intersection of Oliver and Fees streets (just north of the Boeing aircraft manufacturing plant), and has two concrete circles and four grass circles. The Wichihawks fly there regularly; the field is open to non-members as well. If you're planning to visit Wichita or are new in the area and want to start flying, contact Marvin Denny at 5714 N. Meridian, Wichita, KS 67204; (316) 838-8494, or Roy Fellows, 122 E. Clark, Augusta, KS 67010; (316) 775-3143.

• • •

Send contest flyers, contest results, club news, good photos, questions suitable for answers in the column, technical tips and other items of interest to CL fliers to John Thompson, 2456 Quince St., Eugene, OR 97404. E-mail at JohnT4051@aol.com. ***MB***

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AT-6 TEXAN

Wingspan: 69 in (1752 mm)

F4U CORSAIR

Wingspan: 62 in (1575 mm)

P-40E WARHAWK

Wingspan: 64 in (1625 mm)

Models pictured are covered with Top Flite MonoKote®. Kits include all decals shown. Scale accessories, such as spinners, in-cowl muffler and static display props, are also available from Top Flite.

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***—Model Airplane News* on the Gold Edition Mustang**

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The '96 Lo
Slope Sca

A brief report on the third running of one of the biggest West Coast RC scale sailplane meets.

Who says they all look the same? Here's just a handful of the many modern scale sailplanes that showed up at Los Banos. Note the wide variation in sizes, from just over 1 meter to about 4 meters in span. Photo by Dan Williams.

Starting on May 16th and running through the 18th, this year's Los Banos Slope Scale Fun-Fly saw more pilots and more planes in attendance than last year. Some 65 pilots participated, and with 175 to 200 models, the skies were indeed filled.

With winds out of the west, the slope that's used is of reasonable size, but get eight or more large scale models up in the same airspace at one time or 12 small PSS models zipping back and forth, and things can get tense. A real plus over last year's event was that the flying was broken up into 40-minute slots between PSS and large scale gliders. With a big turnout of small PSS missiles, this was a terrific way of segregating the big costly models from the small PSS rockets which zipped

Here's something neat and interesting for a PSS subject: Brian Just built this Boeing 727 with Alaska Airlines fleet markings. The fuselage was built with formers and stringers, then wrapped with 1/64 plywood sheeting. No problems with tailheaviness on this bird!

os Banos
le Fun-Fly

By Gregory Vasgerdsian

All of the Alexander Schleicher sailplanes have been modeled in one form or another—this is Lynsel Miller's ASW-20. Lynsel and his buddy Sean Sharif were co-CDs for the Los Banos meet.

Most of the Los Banos regulars favor large PSS models; here's Lynsel Miller with his 1/10-scale Canberra bomber. Model was scratch built from foam and fiberglass, while the hardwood engine nacelles were turned on a lathe.

half-pipes to no end in the great lift conditions. A downside to the abundant lift was that there was no limit on flying time during the 40-minute time slot.

It is becoming clear to this writer that PSS flying is on the rise in the U.S., but it seems to be a somewhat different form than what they fly in Europe. In fact, there seems to be two polarized classes in the world of PSS. In one camp are the semi-scale models designed more for "wring 'em out" slope performance than for scale accuracy. These pilots prefer to fly in combat style, without intending to hit one another—but with the exciting style of flying, they sometimes do. At Los Banos most of these models featured excellent paint jobs, spanned about 50 inches and cost in the range of $40 to $150 in kit form. These PSS models cranked out high-speed 1/2-loops back and forth in front of the slope non-stop, and if you weren't into it you had to first pass this gauntlet of models (often 12 at once!) to get out into unobstructed air.

In contrast to these models were the PSS designs built more for true scale accuracy and realistic flight. Most were scratch built or modified from gas kits. Models in this category tend to be larger, and more costly in time or money. Fine examples were present such as Lynsel Miller's big Canberra, Tom Overton's Me-109 and Willy Grundler's neat A-7 Corsair.

Modern scale made a big showing this year, with a true upswing in modeler interest and kit availability. These models are typically in 1/4-scale and cost from $500 to $1,500 just for the kit. Most impressive was Bill

Liscomb's 1/4-scale Zuni. This model will be released as an all-glass kit, and judging from the craftsmanship of the prototype, the Zuni is not only different looking but is a fantastic flier. Also impressive was a 1/4-scale Fox by Jim Thurmund. A big 1/3-scale Libelle flown by Mark Foster was outstandingly realistic in flight, as were three 1/4-scale Schweizer 1-26s that flew throughout the event. With good lift most all these models could easily have climbed out of sight—a few almost did—but most preferred to buzz the slope for high-speed passes. One of the biggest turn-ons is to grease a nice 1/4-scale glass ship right past you at eye level, but it was just this that caused a number of mid-airs, as well as a few fliers who broke the flight pattern.

A sharp Formula One racer built as a PSS model. Aerodynamically clean, many racing aircraft make natural PSS subjects.

With more models in modern and PSS, vintage had a decent showing of about 10 aircraft. Biggest were Gary Brokaw's Austria Elephant, spanning 21 feet, and John Raley's PWS-101 at 189 inches, not to mention a nice 1/4-scale Grunau Baby, Minimoa, Bergfalke, TG-2 and SG-38 Primary Glider, all exuding plenty of character and beauty in flight—which is what these vintage models are all about. It's puzzling why more vintage models, with their often slower flying speeds and conventional wood construction, are not being built. Perhaps it's an allergic reaction to the term "scratch-built!"

The event saw strong winds on Friday and Saturday; Sunday featured light conditions and cycling thermals. A towplane was available on Sunday and there were about 10 aerotows made. Plenty of learning went on as a number of scale

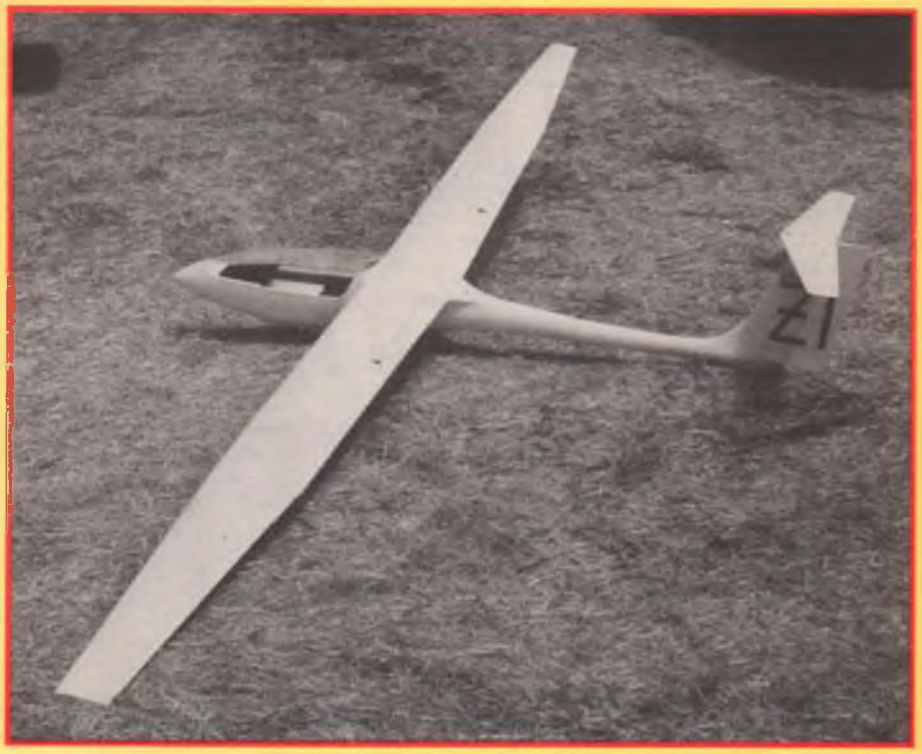
This 1/4-scale Schweizer 1-26 is technically considered a classic sailplane. Lightweight all-built-up construction makes for great light-air performance.

Dave Sanders of Dave's Aircraft Works, whose Ki-61 PSS kit was reviewed in the July MB and who also wrote an article on making markings from iron-on coverings in the June issue, holds a very nice Focke Wulf 190 built from one of his kits. This wood model was fiberglassed, airbrushed and line detailed. The results are outstanding.

fliers got their first-time wings at aerotowing. From the talk going around, next year should bring more tugs from the glider enthusiasts themselves. The event rounded off with a nice raffle, with pilot's choice awards going to John Raley for his 1/4-scale PWS-101 in vintage, Lynsel Miller and his big 1/10-scale Canberra in PSS, and Rick Briggs with his 1/4-scale LS-4 in modern that featured a fabulous cockpit interior.

With a large turnout, one really gets back to what a scale fun-fly is really supposed to be about. Come to fly until sunset? Well, you can do that at home. No, the real fun of a fun-fly is to see all the terrific models that people bring out, and to see them in the air. Most are quite costly in either their price or the time it takes to build them. Los Banos was an event to make new friends, get new ideas, and just get inspired about scale soaring. Mid-airs aside, almost everyone had a great time, and indeed, that's what it's about.

With the larger turnout this year there were some new problems that cropped up, and because of this, the event directors are already planning to modify the format for next year. With predictable westerlies and a cooperative park service, plus the hard work of event CDs Lynsel Miller and Sean Sharif, we can look forward to an even better event next year! ***MB***



Most impressive to our reporter was Bill Liscomb's 1/4-scale Zuni; the full-scale bird is one of the few American-made competition sailplanes. If all goes according to plan, this striking model will eventually be available as an all-glass molded kit. Scaled from original drawings, it flew beautifully with full trailing edge camber and reflex control.

HELICOPTER WORLD

BY JAMES WANG

THE AIRTRONICS "STYLUS" HELI RADIO AND SG-10 PIEZOELECTRIC GYRO

The latest offering from Airtronics is this full-feature computer system, one that's exceptionally powerful and yet easy to use. Innovative use of memory and expansion cards make the Stylus a system you won't soon outgrow!

The new Airtronics Stylus is an eight-channel radio with enough memory to store setups for four models, which may include a combination of helicopters, airplanes and gliders. The software for all three is built-in. The only differences between the heli and airplane systems are servos and airborne battery size.

The Stylus transmitter can be conveniently used for both fixed-wing aircraft and helicopters because all switches are user-assignable. We can select any switch to be dual rate, to control idle-up, to turn on the programmable mix, or to change the gyro gain. We can even assign a single switch to operate all of the above.

The Stylus is available in FM/PPM or FM/PCM versions. The Stylus I've been using for the last three months is the FM/PPM version. The PCM costs more but you get failsafe and hold for each channel. Hold means that in case of interference or loss of signal, the servos will hold the last received command; failsafe moves the servo to a predetermined position. I suggest assigning everything but throttle as hold; make the throttle failsafe and program it to go to idle when there's a loss of signal. Another feature of the PCM Stylus is an airborne low-voltage warning that automatically reduces throttle to idle briefly every minute when the receiver battery reaches 4.7 volts.

The Stylus is the only radio on the market that utilizes plug-in expansion cards. There is a memory card that can store setups for 50 models, plus there are program cards for helicopters, airplanes and gliders. The program cards give additional programmable features to make the radio even more versatile. For example, after plugging in the Heli card, we get more programmable mixes, trim memory, VTR, and more.

The Stylus transmitter has another unique feature: a switch

An impressive looking piece of equipment, no? There are eight toggle switches, two rotary knobs, and two trim levers, and they can be assigned by the user for any function. The only difference between the Stylus heli and airplane systems is the airborne package—transmitters are identical.

The Stylus heli radio comes with five 94322 or 94735 servos (your choice), a dual conversion narrow band receiver, 1600-mAH receiver pack, DSC cord, and a wide neck strap. Airtronics claims the Stylus 1024 PCM has the fastest refresh rate of any system on the market, meaning it updates the signals more frequently than the others. Stylus PCM equipment is not compatible with other Airtronics PCM systems.

Programming data is easily seen on the Stylus' large LCD screen. At the bottom are the six editing keys, plus the "Display On" switch that lets you make changes to the programming without transmitting a signal.

Unique to the Stylus are the optional Program and Memory Cards, which are inserted through a small door in the side of the transmitter. The Stylus comes with memory for four different models; the Memory Card increases that to 50 models, and the Program Cards (available for airplanes, sailplanes and helicopters) greatly enhance the programmable features to make the radio even more versatile.

that turns on the liquid crystal display and the programming functions only, allowing us to make changes to the program settings without transmitting a signal. The radio also comes with a DSC (direct servo controller) cord for controlling the receiver and servos in the pits without transmitting a signal. It simply plugs in between the transmitter and the receiver battery charge receptacle.

The transmitter sticks are very smooth. The throttle/collective stick has a shorter throw than the fore/aft cyclic stick. This is nice because we are constantly moving the throttle/collective stick from end to end, so we want less physical throw. Users can program the radio to operate in mode 1 or 2 simply by pushing a few buttons.

PROGRAMMING

All program changes are done via six buttons on the transmitter. To make an entry, you simply scroll through the feature names; when you find the feature that you want to edit, just hit the YES button and use the + or - key to change its value. For example, let's say we want to change the middle point of the idle-up 2 throttle curve. We simply scroll through the display until we see TH-CURVE, then hit the YES button. Use the +/- keys to shift from Normal mode to idle-up 2. Use the arrow buttons to go to point 3 of the throttle curve. Finally, use the +/- keys to set a value for the throttle curve.

There are four pitch curves: normal mode, idle-up 1, idle-up 2, and throttle hold. Each of the pitch and throttle curves is defined by five points (see illustration). The radio comes with factory pre-set values for the pitch and throttle curves, which are excellent. For beginners, I recommend using the factory preset values as a start. If you screw up the settings you can always reset the radio back to the factory default settings by pressing a button. The instruction manual explains clearly what each function is for, and why the factory default values were chosen.

The values for the low end, middle points and high end of the pitch curves are also adjustable from outside the transmitter, using the trim levers on the right and left sides of the transmitter. There's also a hovering pitch knob and a hovering throttle knob on the front of the transmitter; these only affect the pitch or throttle setting for the three middle points in the normal mode. Idle-up and throttle hold curves are not affected. The knobs can shift the middle points up or down by +/- 25 percent. If that's not enough, we can use the LCD menu to further shift the three middle points by another +/- 25 percent. Usually only top-of-the-line radios have all these features.

In addition, the Stylus has a separate revolution mix for each of the four flight modes. We can have a linear tail rotor revo mix for normal mode, a V-shaped mix for idle-up, and very little mixing for throttle hold. We want a V-shaped tail rotor revolution mix because we only need minimal tail rotor pitch at zero degrees collective, but as we increase collective to positive or negative pitch angle we want the radio to automatically feed in more tail rotor pitch to compensate for the extra torque. We don't need revolution mix in throttle hold because the engine is disengaged during autorotation.

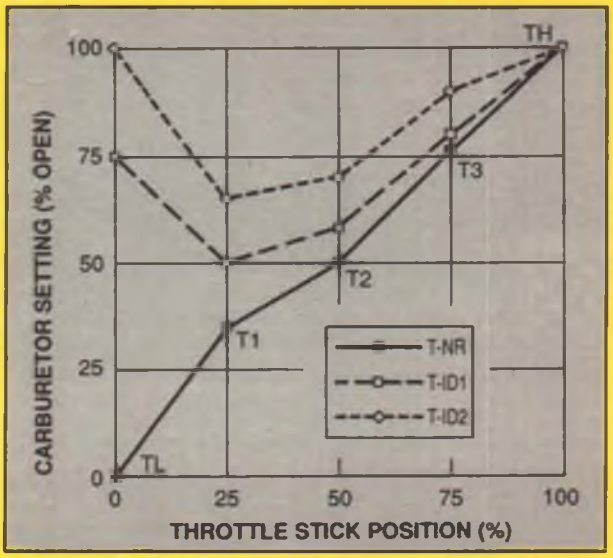
Tail rotor revolution mix is programmed like most other radios—one value for up and one for down. At center throttle stick position there is no mixing between the tail rotor and throttle stick. The revolution mix feature could be further enhanced if the radio allowed the user to define the center of the V-shaped mixing curve, because zero pitch angle on the main blades usually does not occur when the throttle stick is at the center. This is where the optional Heli card comes in. After plugging in my Heli card, I get a five-point tail rotor mix for each of the flight modes. Now, I can define how much tail rotor mix I want at five separate throttle stick locations!

Another excellent feature on the Stylus is it has three dual rate settings. I use 100 percent cyclic and tail rotor controls in idle-up 2 for 3-D hotdogging. In hover, I always use the normal flight mode, and dual rates are set at 75-80 percent. I use idle-up 1 for forward flight aerobatics, with dual rates set at 85 percent. I assigned the dual rates to be all controlled by the three-position idle-up switch.

If you're using the Heli card, you also have the choice of

HELICOPTER WORLD

Two of the Stylus' auxiliary channels are controlled by rotary sliding levers on the upper corners of the transmitter.



An example of the Stylus' five-point throttle curves. At "0" the throttle trim is shown all the way down.

VTR or exponential. Both make the control sticks less sensitive near the center position, but VTR makes the controls more sensitive only when you move the stick beyond a certain range, while exponential increases the control sensitivity gradually.

Alternate Setup is a powerful feature of the Stylus, one which none of its competitors has. It allows you to go into an entirely different setup (by switching to a different model memory) in flight by flicking a switch. Now we can have the pitch curves, throttle curves, servo travels and gyro gain for smooth FAI style flying in one memory and a completely different setup for hotdogging in another, and can switch between the two in flight at the flick of a switch.

When you're not using a program card, the Stylus' four model memories can be used for airplanes, helicopters or gliders. However, when a Heli card is plugged in, all four model memories will be for helicopters only. If you have airplane setups that you want to save, the only solution is to store them on a memory card first, then insert the Heli card.

The memory card can store setups for 50 models and they can be for any combination of airplanes, gliders, and helicopters. However, every time a memory card is used, the existing setups for the four models stored in the transmitter will be wiped out and reset to default. The only way to get around this is to save the setups for the four models as part of the 50 models on the memory card.

The Data Copy feature copies the entire setup from one model memory into another. This speeds up setting up a second helicopter, or setting up the Alternate Setup for the same model.

The standard Stylus includes only one programmable mix. With the Heli card, I have three programmable mixes at my disposal. I use one of them to mix fore/aft cyclic with collective stick, so that when I feed in more throttle/collective in forward flight, I automatically get some forward cyclic to prevent the model from nosing up. I also program it to get some aft cyclic when I pull the collective back; this helps keep the model level when doing switchless inverted forward flight. I use a second program mix to couple roll cyclic to collective stick. Again, the purpose is to get a hands-off straight and level flight at any forward airspeed.

I use the left rear triple-position switch to turn on idle-up 1 and 2. I also assign this same switch to control dual rates, exponentials, gyro gains and the three programmable mixes. I use normal mode for hover only. In normal mode, the gyro is on a very high rate, cyclic controls are reduced and exponentials are high. For forward flight aerobatics, I switch on idle-up 1, which gives me more cyclic throw, slightly reduced gyro gain, less exponential, a shallow V-shaped tail rotor revolution mix, trim offsets for pitch, roll and yaw, and the programmable mixes. I use idle-up 2 for 3-D hotdogging only. In idle-up 2, the U-shaped throttle never dips below 80 percent throttle opening. In idle-up 2, I want maximum cyclic throw, very high gyro gain for the back loop maneuvers, and very little exponential. Since I have the Heli card, I also have idle-up 3, which I use for high-speed dashes. The carburetor is really opened up, top end collective is reduced to boost

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rotor speed, cyclic control is reduced to prevent overcontrolling, and a new set of trim offsets for pitch, roll and yaw are programmed to give hands-off straight and level flight.

The Stylus' powerful capabilities and its user-friendliness make it an excellent choice for 90 percent of all heli fliers. If you're contemplating getting a heli radio, definitely consider the Stylus. I also recommend getting the Heli card—it adds many more useful features. Give Airtronics a call at (800) 567-6867 to request a free catalog or ask technical questions.

The brand new 92185 PCM receiver was specifically designed for the Stylus system. Is not compatible with other Airtronics PCM transmitters.

THE SG-10 PIEZOELECTRIC GYRO

Airtronics' new SG-10 piezoelectric gyro is the cutting edge in gyro technology. I've been using the SG-10 for three months and find it far superior to any mechanical gyro.

Because a piezoelectric gyro has no mechanical moving parts, engineers can design creative characteristics into it that are impossible with mechanical gyros. For example, the SG-10 has a very high frequency response range. It can sense tiny, quick tail twitches. Most mechanical gyros cannot respond to such small and quick inputs because the electric motor is mounted on a gimbal which is subject to friction, inertia, hysterisis, breakout force, etc.

Since piezo gyros are very sensitive, we need an accurate and very fast servo to control the tail rotor. I used an Airtronics 94735 servo, but I may switch to the new 94742 or 94743 because they can travel 60 degrees in 0.11 second—almost twice as fast as any standard servo.

The SG-10 has two other features that most mechanical gyros do not. It has an AGC (Automatic Gain Control) circuit that automatically adjusts the gain to prevent tail wagging. This allows us to run a piezo gyro with much higher feedback gain than conventional gyros. The SG-10 really locks the heading when you're hovering, or doing 3-D stunts, or backward flight.

Airtronics' excellent SG-10 piezoelectric rate gyro. It is compact, and James finds it locks the heading better than any conventional mechanical gyro he's tried.

The SG-10 also has an exponential trimmer that allows you have different tail rotor control sensitivity at different stick positions. Now we can have a very "locked on" tail when we're hovering with the stick near the center, and more pilot authority as we move the tail rotor control stick away from the center.

Piezoelectric gyros are costly, but I believe that in five to ten years the price will come down and mechanical gyros will become extinct. In the meantime, the SG-10 is still a worthwhile buy because you really get a noticeable improvement with your helicopter. You won't be disappointed!

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

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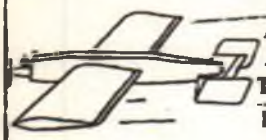

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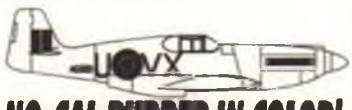

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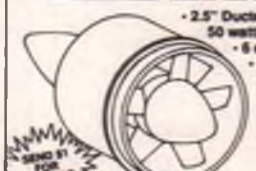

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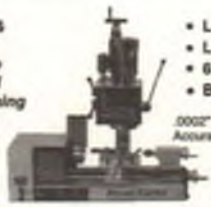

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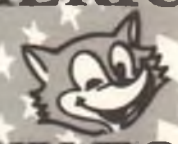

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SINCE 1981

FREE FLIGHT *cont. from page 45*

winners. The predictable result is that fewer contestants enter these events and the meets are dominated by an ever decreasing number of fliers.

And it's just a matter of time before such a level of sophistication reaches Cat. I and Cat. II. One solution, of course, is to compete in Nostalgia events, where the time warp is pretty much defined by the rules. The same holds true for the SAM events. Another option is to attempt to limit the current AMA rules to disallow high-tech models, saving this level of development for the FAI classes. Still another option is to propose another event—it's the American way!

The latter route is the one chosen by Harry Murphy and Lee Campbell. Both have been communicating lately with others around the country and will be proposing the Slo Power (or Slop) event as an addition to the AMA Provisional Events. Although the specifics are still under discussion, the event will undoubtedly feature restrictions similar to the following:

1. No Schnuerle ported engines. Ball bearing engines are permitted.

2. No VIT, no bunt, no flappers or other movable surfaces, except for DT and auto rudder.

Other features currently in the AMA rules will be retained—current classes, max times, engine runs, etc.

Comments on this proposed event should be forwarded to either Harry Murphy, 3824 Oakwood Blvd., Anderson, IN 46011 or Lee Campbell, 7233 Signature Lane, San Antonio, TX 78263.

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SIGN-OFF

Good, sharp photos of your models and flying activities are always welcome—send them to Bob Stalick, 5066 N.W. Picadilly Circle, Albany, OR 97321. Also, I understand that *Model Builder* is now looking for FF how-to and construction features, so if you have something in mind that you'd like to submit, drop a note to *MB's* editor. *MB*

TECH STUFF *cont. from page 14*

ball? Yup, but remember that the balloon represents a "negative weight." When we step on the brakes the inertia force on the air in the car displaces the lighter balloon to the rear—the same way the force of gravity on the air displaces a lighter balloon upward.

GLIDING BALLOONS

Normally balloons go only where the wind takes them. Blimp and dirigible airships were invented to overcome that limitation. Some naive pioneers tried sails on balloons. For reasons which were not obvious to these "inventors," they "sailed" (drifted) only directly downwind. But it *is* possible for hot-air balloons to travel in any direction, even against the wind, and to do it without propellers or jet engines!

The trick is to configure balloons so they will glide. I thought I had invented gliding balloons about 35 years ago, but I had only reinvented them. The possible configurations for gliding balloons are myriad, but the principle is the same as that of a conventional glider. We need to shape the balloon, or part of it, a little like a wing.

A glider must have weight in order to glide; the heavier a particular glider, the faster it can glide. In order for a balloon to glide, its buoyancy must be unequal to its weight. Many times I have seen sausage-shaped air-filled toy balloons glide after they have been thrown into the air. The weight of the extra rubber at the neck end provides a forward CG which makes its lifting body assume a gliding angle of attack. By increasing the aspect ratio we could make balloons which would glide much better than the sausage balloons do.

Note that unpowered gliders without thermals can't sustain a glide unless they are descending. Gliding balloons can glide both when descending *and when they are rising!* Excess buoyancy can be considered "negative weight," and the net upward force produced by it is just as useful for developing gliding thrust as is the net downward force of a positive weight differential. When a gliding balloon is descending we pitch it down, and when ascending we pitch it up. Symmetrical airfoils work best on gliding balloons because we will be developing positive aerodynamic lift when descending and negative aerodynamic lift when ascending.

Hydrogen and helium balloons are not suitable for gliding because their flight lacks the cyclic up and down movements from which we can develop horizontal thrust and movement. Propane-fired hot-air balloons are just the ticket—when the burners are on and the balloon is rising it could be gliding; when the burners are off and the balloon is cooling and descending, it could be gliding.

Most hot-air balloon passengers are little aware of it, but the balloon is almost

constantly either ascending or descending. At times I have been in a hot-air balloon close to another balloon. If the burning cycles of the two balloons happened to be in phase, the false impression of constant altitude is reinforced; but if they are out of phase with each other, the two balloons are seen to yo-yo up and down with respect to each other, with surprising vertical velocities. It always seemed like the other balloon was rapidly dropping or rapidly rising, while our own balloon seemed to be standing still. It wasn't.

A hot-air-balloon pilot will usually "burn" fairly often, so the altitude is kept fairly constant. For efficient gliding we would need to burn less often and for a longer period each time. The longer the burners are off and the colder the balloon becomes, the greater the buoyancy deficit, and the faster the balloon would glide. Likewise, the longer the burners are on, the greater the excess buoyancy, and the faster the balloon will glide while rising. The altitude *must* change in order for a balloon to glide; but on a cross-country gliding-balloon trip the *average* altitude could remain roughly constant.

A gliding balloon must use energy in order to continue to glide—such as the energy available from propane. However, such energy is also required to maintain lift in a regular hot-air balloon; so the gliding feature is a free byproduct! Helium balloons can't glide because they aren't expending any energy.

So much for gliding balloon theory; the design and practice is a bit more difficult. The most efficient shape for a regular lifting balloon is spherical, since that shape has the greatest volume/surface area ratio. That fact, combined with the existence of surface tension, explains why raindrops and soap bubbles are spherical. Minimizing surface area on a hot-air balloon provides two advantages: less weight and slower cooling.

Gliding balloons need to have some "wing area." Spheres won't develop aerodynamic lift unless they spin. Actually a blimp or a dirigible will glide slightly, like a toy sausage balloon does, but their lifting-body aspect ratio of 1:4 or less makes for a very inefficient wing. Unfortunately, if we increase the aspect ratio and thin down the "wing" in order to get a good airfoil, the ratio of contained air weight to structural weight goes down. This difficult design compromise between buoyant lifting efficiency and aerodynamic gliding efficiency has doubtless been a major reason why we do not already have gliding-balloon sporting vehicles.

One could design a conventional wing and tie it onto a spherical or inverted pear-shaped balloon, but the high drag of the big sphere would keep the speed so low that the wing would need to be enormous. A simple approach, if you want to design and build a gliding hot-air balloon, is to make it lenticular in shape

and round in planform. The aspect ratio of this flying saucer would still stink, but it would be better than the AR of a dirigible. Have a look at the sketch.

If we make our lenticular balloon 30 to 40 percent thick we would still have a semi-useful airfoil; and yet it would have a volume to surface area ratio which would not be too horribly bad for the buoyant-lifting chore. Admittedly this dual-symmetrical airfoil (front and back the same as well as top and bottom the same) is not nearly as efficient as one with a sharper trailing edge would be; but it simplifies the air bag, and, as we will see, it greatly simplifies control if we keep the leading and trailing edges the same.

In the glide, any edge of this balloon can be forward with equal efficiency, and we can change which edge is forward at will without yawing the balloon. The pilot and passengers can shift the CG by leaning against one edge of the basket, causing the balloon to adopt an angle of attack. If they are descending, the side they are on will become forward and the balloon will glide in that direction. If they are burning and rising, and still want to face in the direction of the glide, they need to rest their backs against the side of the basket opposite their desired destination.

Piloting this balloon glider would be simplicity itself. Lean against the back of the basket whenever the balloon is climbing, and step forward to the front of the basket to continue in a straight line when it starts to descend. To make a turn, simply step to one side. Step to the left for a left turn if the balloon is descending; but step to the right for a left turn if it is rising.

I fear that, except for sport, gliding balloons don't have much future, but like equally impractical ornithopters, their challenges fascinate me. I'm almost sorry I'm up to my flapping wings in ornithopter development—I'd love to develop an RC gliding hot-air balloon. If one or more of you develop them, I would be delighted to report on your work in this column. But *be cautious:* Fires in the sky can easily set fires on the ground if things get out of control!

Now that I have a few of you convinced that gliding balloons would be easy, let's look at some of the difficulties. I was tempted to do a little test work to see what kind of a glide ratio one could get from a 35 percent thick lenticular disk, but I'm too busy. Maybe 3:1? Actually, that wouldn't be too bad for this vehicle.

Hot-air balloons have a "neck" hanging below the bag. This would create unwanted drag in a gliding balloon. Can we get by without the neck? The sketch shows a streamlined fairing around the "basket," to reduce drag. It would also help if the people were sitting instead of standing.

Unfortunately it will take considerable CG shift to change from ascending glide to descending glide. The problem is a lot more complex than locating the CG on an

airplane. When gliding, we will always have dynamic lift (which may be up or down), and we will always have static or buoyant lift (which will sometimes be greater than the weight, and sometimes less). The plus and minus dynamic lifts are not coincident with each other and are never coincident with the buoyant lift. In the ascending-glide mode the CG must be far aft of the (now negative) dynamic lift, not close to it. To switch from the ascending glide mode to the descending glide mode by shifting the crew would likely require a basket of excessive diameter. Move the propane tanks too? A small streamlined "fuselage" and some means to move it around under the balloon would be more efficient, but also more complex.

Will the dynamic pressure on the top and bottom during gliding be enough to force hot air out of the neck, reduce buoyancy and partially collapse the airfoil (especially if the balloon has no neck)? It was easy to draw the sketch; but a properly engineered gliding balloon would surely look much different than this simple "picture."

SOLAR-POWERED AIRPLANES

Solar-powered airplanes are related to solar-heated balloons, in that they stay up "for free." Solar-powered electric airplanes have been flown continuously from dawn to dusk. According to *Aerospace America* magazine for December 1995, NASA now has an unmanned, flying wing solar-powered airplane, developed by Paul MacCready and named the Pathfinder, which achieved an altitude of 50,500 feet in 1995.

Solar airplanes do well at high altitudes where greater speeds can be obtained, and where there is less pollution and fewer clouds to block the solar energy. Unlike air-breathing engines, solar cells generate more power at higher altitudes, not less.

Airliners now travel great circle routes, the shortest distances between points on a sphere, often traveling near and sometimes over the poles. Solar airplanes would need to take longer paths in some cases, staying nearer the equator to capture more vital energy from the sun.

If a solar airplane is slow compared to the circumferential speed of the earth's rotation at the latitude of the flight, flights would be limited to the time for the sun to travel from some critical angle in the east to the same critical angle in the west. There would be a big advantage for high-speed solar-powered airplanes to fly west, in order to stay under their source of energy longer. To cross any ocean we would have to fly pretty fast, and fly west. "SOLAR AIRLINES" would fly west from Paris to New York, of course; but from New York to Paris they would still need to fly west—the long way to Paris. And optimum summer routes would be farther north than optimum winter routes.

If we could get a solar airplane up to 1,040 miles per hour at the equator we could stay under the sun indefinitely, and stay up "forever." At far-northern or far-southern latitudes the speed required to stay under the sun would be much less. As an example: If our solar airplane left Paris at noon in the summer, flew at 667 mph, and stayed at approximately 49 degrees north latitude, it would still be noon when we arrived at Seattle. And we would have consumed no fossil fuel.

Booster power may be required to get solar airplanes off the ground with the runway lengths we have. This boost power could come from NiCds driving the electric motors which are already there. The battery would be recharged by the solar panels in flight so as to be available for use in landing at a clouded-in airport. So far, solar airplanes look great; but unfortunately we have only talked about the good news.

THE BAD NEWS

A major limiting factor in the development of solar airplanes is the low efficiency of solar cells—around 10-15 percent. They will get a little better, but I believe some law of thermodynamics tells us that "ideal" solar cell efficiencies will always be low.

The second major bad news is that the sun's energy per unit area isn't great enough to do all of the above. Specifically, at the earth's surface with the sun directly overhead (and no clouds), we receive about 1.0 kilowatt of power per square meter of surface. Just outside the earth's atmosphere the energy received from the sun is about 1.4 kW/sq. m. Let's assume that at the altitude we would fly our solar airplanes, they would receive 1.2 kW/sq. m.

Let's also assume we are talking about a fairly large airplane—one with 250 square meters of wing area, and another 250 square meters of stab and projected area of the fuselage, where we could hang more solar cells. Our total effective area for capturing energy from the sun will be 500 square meters. 1.2 x 500 x 1.24 Hp/kW x .15 efficiency = 112 horsepower. Not nearly enough for this big airplane for the high speeds we've been discussing.

There's enough solar energy to keep super-efficient, light and slow airplanes like the NASA Pathfinder aloft; but we see that the grand "free" transportation system I outlined is all an impossible dream—at least for now.

• • •

(Notice to those who obtained the MD&TS Index several months ago. Due to magazine scheduling changes, the "June" entries should be marked July, and "July" entries should be marked August. You have no index for June now, unless you add it yourself.)

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WANTED: L.M. Cox Curtiss Pusher, unbuilt, near mint. Dave Warrick, Box 42, West Point, CA 95255; (209) 293-1249.

ENGINES: IGNITION, GLOW, DIESEL. New, used. Sell, trade, buy. $3.00 for large list. R. Eierman, 504 Las Posas, Ridgecrest, CA 93555. (619) 375-5537.

MODEL BUILDER MAGAZINE is once again soliciting construction articles (all types), features, cover photos, etc. Got something you think our readers would like? We want to hear from you! Contact Phil Bernhardt, c/o Model Builder, 34249 Camino Capistrano, Capistrano Beach, CA 92624; (714) 496-5411.

FOR SALE: Model mags by original owner. 1933 to 1955 M.A.N., Air Trails, Flying Aces, etc. plus used engines and new wood props. Best offer before 9/1/96 buys. For complete list, send $1.00 plus SASE to Bailey Trust, P.O. Box 715, Mt. Vernon, WA 98273.

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MODEL BUILDING PUBLICATIONS! GBs & Gee Bees, Peanut Power, Peanuts & Pistachios, Stick & Tissue, Flying Aces books, Frank Zaic books, aviation history and much more! Illustrated catalog, $1. Hannan's Runway, Box 210M, Magalia, CA 95954.

GEE BEE R-1, R-2, "Z," "BULLDOG" plans used for Full-Scale replicas. Monocoupe, "Goon," "Firecracker," Culver, Rearwin. 1/24-1/3 Scale. Catalog/News $4.00. Vern's Plans, 308 Palo Alto, Caldwell, ID 83605. (208) 459-7608.

WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105. (806) 622-1657.

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GOLDEN AGE REPRODUCTIONS illustrated catalog of 212 plans, 31 kits, canopies, decals, wheels, tissue $3.00. P.O. Box 1685, Andover, MA 01810.

MIXERS & RETRACT CONTROLLERS! MicroMixer for Flaperons, Elevons, V-tails, Flying Wings! MicroRetracts sequences three servos in slow motion from one channel! These are tiny 1/3 ounce airborne computer controllers for standard radios! Without connectors $29.00 each plus $2.25 shipping. Quillan Engineering, 561 N. 750 W., Hobart, IN 46342; (219) 759-5298.

PLANS ACCURATELY ENLARGED or copied. Any scale, any size. Money-Back guarantee. Send $2 for info and customized poster for your shop. Roland Friestad, 22118 155th St., Cameron, IL 61423.

FAMOUS ST-2 15-WATT motor on sale! Motor, Cox 4-1/2" prop, mounting hardware, prop adapter, for only $7.50/set, or $14.00/2 sets. (Really!) Will fly 110-140 sq. in. model, and weighs only 0.62 oz. SASE for free brochure. ScienText Inc., 48 Whitney St., Westport, CT 06880-3753.

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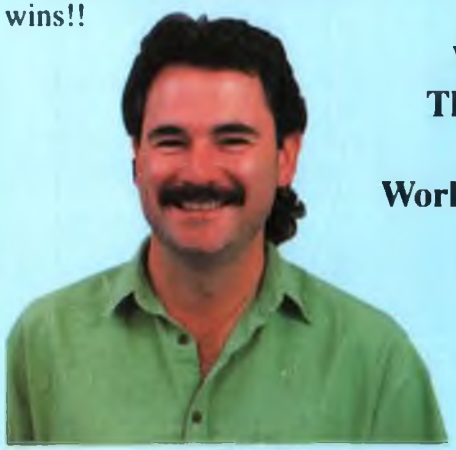

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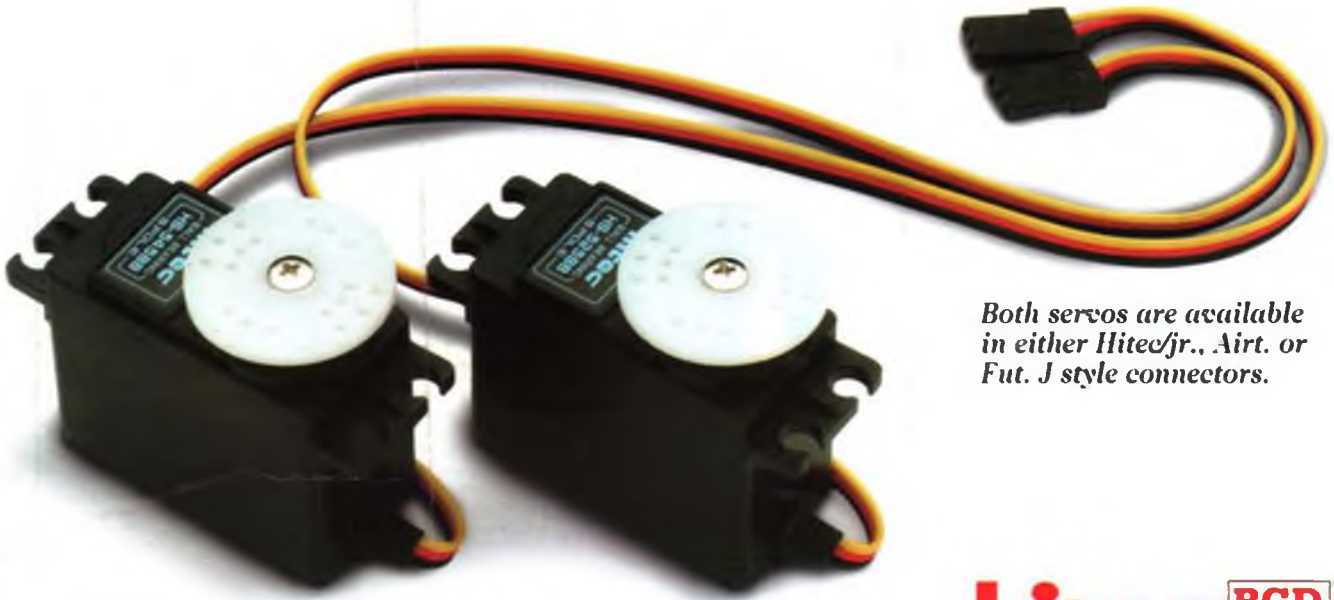

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HIGH TORQUE
Torque=62 oz/in
Speed=0.21 second

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Torque=46 oz/in
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