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TEXACO JR .049

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No. 340 .049

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KILLERBEE .051



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CHARLES A. LINDBERGH, Stoff. Here in one source is a very complete collection of the classic Lindbergh photos. Every aspect of Lindy's life from his youth, his flight to Paris, and later years. A stirring tribute to the man who changed aviation history. 165 pgs., 273 photos, 9" x 12", sbd. 4894 \$14.95

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THE LOST SQUADRON, Hayes. The utterly incredible story of a B-17 and five P-38's downed on the Greenland icecap in 1942, and how modern day aviation buffs spent twelve years and millions of dollars to recover one P-38 from a glacial ice tomb 250 feet beneath the surface. 224 pgs., 300 photos, 8 1/2" x 11", hdbd. 1505E \$48.90

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PIPER - A LEGEND ALOFT, Edward Phillips. From the Taylor A-2 Chummy to the Malibu Mirage, PIPER - A LEGEND ALOFT traces the history of C.G. Taylor and William T. Piper, Sr. The establishment of the Piper Aircraft Corporation and its 56-year history as one of the world's most prolific producers of general aviation aircraft. Chronicles development of Piper's single and twin-engine aircraft during the 1950s and 1960s. The most comprehensive Piper history available. Spec., 3 view drawings, 402 photos, 172 pgs., 8 1/2" x 11", hdbd. 2502AA \$29.95

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BELOW:

Andy Clancy has built his Lazy Bee in a bunch of different sizes; here Mina Reynolds shows us his float-equipped, 18-inch span .049-powered version, which he flew at the 10th Annual London Bridge Seaplane Classic at Lake Havasu City. A meet report by Eloy Marez begins on page 36.



ON THE COVER

One of the two multi-engine model kit reviews we have for you this month is Graupner's 1/20-scale replica of the famous German workhorse of WWII, the Junkers Ju 52 trimotor, powered by three Speed 400 electric motors running on a single battery pack. The kit and special power package are available in the U.S. through Hobby Lobby. Jay Burkart's review article begins on page 20.

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Don Anderson



Don Anderson
President and Founder
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- **Switch & Charge Jack Mounting Set** — combining the switch and charge jack in one convenient mount



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PLANE TALK

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All Australian modelers are familiar with the O'Reilly family; Leo O'Reilly and his son Michael together run L. O'Reilly Pty. Ltd., importer of a number of modeling goods, including JR radios and Enya and Zenoah engines. Michael sent along this photo of his dad's brightly painted Giant Scale aerobat, a Cap 231 Ex, which spans 86 inches, is powered by a powerful Zenoah G-62 gasoline engine and is guided by JR's top-of-the-line PCM 10Sx computer radio. Leo O'Reilly, 42 Maple Ave., Keswick, Adelaide, South Australia 5035.



"I returned to the hobby about two years ago after a 12-year hiatus," writes Dr. Walter Thyng. "With the exception of one sloper, all of my stuff is electric. Because of the excellent electric coverage yours is the only mag to which I subscribe." One of Dr. Thyng's models is this 4.5-pound Sig Fazer modified to take a geared Astro 25, FX35D speed control and two seven-cell 1500-mAH packs Velcroed to either side of the profile fuselage under the wing. Flaperons are coupled to the elevator via a Christy mixer and Y-harness. Performance? "Superb, precise flier. Takes off in 30 feet, inverted flight same as upright, outside and inside loops any size you want, rolls lightning fast, five- to eight-minute flights depending on throttle use and flight profile." Dr. Walter Thyng, 20 Sleepy Hollow Rd., Wolfeboro, NH 03894.



We're a sucker for Old Timers, especially one as nicely built as this 1938 Sal Taibi designed Powerhouse scratch-built by Czech modeler Jaromir Pipek from the plans that were published in the August 1974 *Model Builder*. He did it just right, too—fabric covering, 4-1/2 inch Trexler balloon wheels and an Ohlsson .60 sideport. The big seven-footer is an RC model with rudder, elevator and motor cutoff controls. Jaromir flies with the Czech SAM chapter, SAM 78, and has built several other Old Timers for competition as well. Jaromir Pipek, csl armady c 830, 39901 Milevsko, Czech Republic.

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radio that'll eclipse any seven channel outfit ever offered, JR took the 783 a step further.

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As your demand for refined programming accompanies the refinement of your flying, you'll discover that your 783 delivers some options that are unprecedented in a seven channel computer radio. Fact is, the 783's programming capability actually matches that of JR's popular eight channel X388S!



Also like the 388S, the 783's selectable FM, Z-class (512) or S-class (1024) PCM modulation lets you tailor your airborne packages to the needs of each of your models.

What's more, whichever version of the 783 you choose — Aircraft or Helicopter — all the airplane, sailplane and heli software will be there, just in case you want to try a major change of pace.

ALL THIS AND THE JR FEEL, TOO.

What's "the JR feel"? It's the feeling of quality. It's the perfect fit of the 783 in your hands. It's the silky-smooth precision of its stick assemblies. And it's the security of knowing you're flying with an interference-fighting, patented ABC&W JR receiver.

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Plus you'll get the hint of what it's like to own a radio with the JR feel. Up close, personal and firsthand.



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System Features: 7 channel FM, Z or S-Class PCM, 8 model memory, 3 model types, sub-trim, servo reversing, programmable trainer, 3 dual rates, exponential rates, endpoint adjustment, failsafe
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Helicopter Software: 2 programmable mixes, auto D/R, stunt trim, 3 throttle curves w/5 points, 4 pitch curves w/5 points, dual revo mix, accel mix, throttle hold
Sailplane Software: 6 programmable mixes, trim memory, V-tail mix, crow/camber mix, differential, dual flap trim, ail-rudder mix, elevator compensation, flapperon mix, elev-flap mix, flap-elev mix, flap offset

Canadian modeler Ken Ritchie is a real fan of noted electric designer Scott Hartman; he's built two of Scott's models, the Lazy-H biplane (see Plane Talk, June '95 MB) and this vintage-ized version of Scott's Pondside seaplane, later kitted by Ace as the Puddlemaster. Ken calls his airplane a "1925 Vickers Veryvette" and powers it with a direct-drive Astro 05 cobalt running on eight 1400-mAH cells. The radial engine is based on Peck cylinders, and the "oil cooler" mounted on the motor pylon is actually the speed control unit. *Model Builder* has now published four of Scott Hartman's designs and has another in the works—stay tuned! *Ken Ritchie, 105 Carberry Crescent, Winnipeg MB, Canada R2Y 0K3.*



A FEW NOTES ABOUT PHOTOS

Every month we receive a number of photos sent in by readers for the Plane Talk feature. Unfortunately a good percentage of them can't be used, for the reason that they simply would not reproduce well in the magazine—they're either too dark, out of focus, have an ugly or otherwise distracting background that can't be cropped out (i.e. they were taken in someone's living room or in the back yard with garbage cans and bicycles in the background), have too small an image (the photographer was standing way too far away), or simply don't show the model to good advantage.

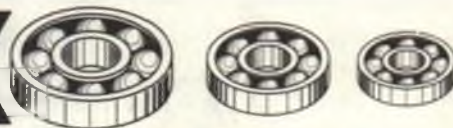
We're not necessarily looking for professional quality photos here, but they do have to meet some basic standards. Photos should be either slides or glossy prints, **sharp and bright**, should reasonably **fill the image frame**, and in all cases should have a **simple, uncluttered background** that contrasts with the model. If someone is pictured with the model, be sure that person is not wearing a cap, otherwise their face will be in shadow and would reproduce in the magazine as an unrecognizable solid black blob.

Lastly, some of the Plane Talk submittals we get include little more information than the name of the model. Be sure to send along enough of a write-up for us to put together an interesting paragraph—model specifications, materials and covering used, brand and size of engine or electric power system, the radio used, flying characteristics . . . the sort of thing that you yourself like to read about other modelers' projects.

OK, now that you know what's needed, let's see what you can do!

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NEW ENGINES

Great Planes has a couple of additions to its O.S. and Super Tigre engine lines. First is the new O.S. .52S four-stroke, quoted as putting out 12 percent more power than the O.S. .48 Surpass with no increase in size or weight. The .52S also has the new



Type 40N carb with automatic mixture control for more stable idling, a special coating on the crankshaft, camshaft and piston ring to prevent corrosion, a sealed rear ball bearing, and a unique locking prop nut. A muffler is included.

Another new more-powerful-yet-no-bigger-or-heavier engine from Great Planes is the massive Super Tigre 3250 two-stroke, rated at 3.3 horsepower at 7,900 rpm—10 percent more power than its predecessor, the S-3000K. The engine weighs 45 ounces and comes with a radial mount; a muffler is available separately. Both from Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300.

HITEC'S MEGA SERVO

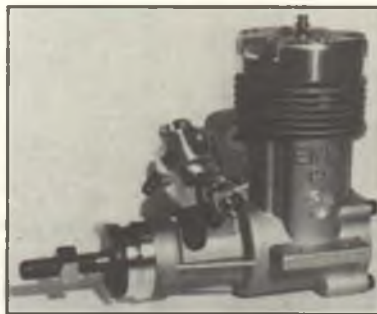
Last month we told you about Hitec RCD's new super-micro HS-60 servo; also new but at the extreme opposite end of the size spectrum is the mighty HS-805BB Mega servo, only slightly larger than Hitec's current HS-700BB but with al-



most twice the torque—224 ounce-inches! The output shaft features a deep 15-tooth spline for extreme strength and is supported by twin ball bearings. Transit time is a fast .20 second. The HS-805BB is available with Airtronics, Futaba J or Hitec/JR connectors, and lists for \$73.95. From Hitec RCD, 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940.

ENYA'S NEW 50CX

When a .60 would be too much but even a hot .45 doesn't quite make the grade in your latest RC bird, consider the new Enya .50CX TN TV, a .51 cubic inch, dual ball bearing ABC powerplant rated at up to 1.4 horsepower. The engine is equipped with a 7.5mm in-



take two-needle carb for precise tuning and comes with Enya's M402X muffler; the super-quiet SM402X muffler is also available as an option. Check it out at your local hobby shop. Enya engines are distributed in the U.S. by Altech Marketing, P.O. Box 391, Edison, NJ 08818-0391; (908) 248-8738.

DU-BRO NEWS

After three years of development, Du-Bro has now released the first in its new series of Treaded Lightweight foam wheels. These TL Series wheels feature hard plastic hubs with tires comprised of a foam interior and a tough, rugged exterior skin; they're presently

available in diameters from 4 to 6 inches, in 1/2-inch increments, and list from \$11.50 to \$15.50 per pair. Smaller sizes



of TL Series wheels are in the works, as is at least one size of lightweight Cub tires. From Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084; (800) 848-9411.

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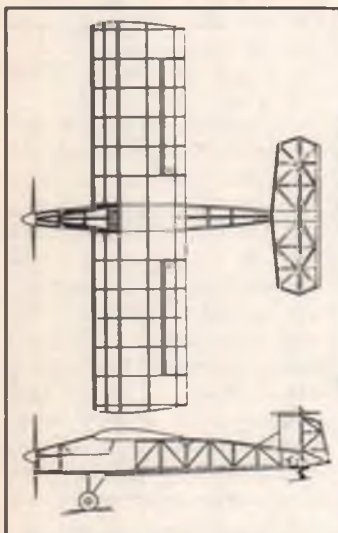
Model Electronics' "Super-Box" (high-performance electric motor gearbox) has recently been joined by the "Dual-Box," an expanded version that couples two motors to a single prop shaft. With this setup, inexpensive motors can be doubled up to produce some real thrust for larger models. Ratios from 3:1 all the way up to 8:1 are available; when ordering, ask for help in determining the best setup for your particular model. Contact Model Electronics Corp., 6500 6th Ave. N.W., Seattle,



WA 98117; (206) 782-7458; Fax (206) 782-9199. A complete catalog of products, with prices and ordering info, is available for \$3.

BIG AIRPLANE, LOW COST

One of the models illustrated in Modelair-Tech's 1996 catalog is the "Megawatt," a large 1300 square inch T-tail sport design that can be built with or without ailerons. At 80 inches span, the Megawatt qualifies for IMAA Big Bird events. Prototypes are being flown at 7-1/2 pounds with 16



1700-mAH cells, Modelair-Tech's H-1000 belt drive and the inexpensive DeWalt 14.4-volt power tool motor. Two plan sheets go for \$20 folded or \$23 rolled, postpaid; full kits should be available soon. Send a pre-addressed envelope with two 32¢ stamps to get your catalog: Modelair-Tech, P.O. Box 12033, Hauppauge, NY 11788-0818; (516) 979-1475.

PAPER WARBIRDS

For those who also like non-flying model aircraft, a company called Paper Warbirds is offering a series of vintage WWII cardstock models, including 13 fighters and three bombers, ranging in wingspan from 15 to 24 inches. Each is available in a variety of colors and includes complete instructions, history



and decals. Would make a great gift for airplane enthusiast of all ages. See the Paper Warbirds ad elsewhere in this issue for full details, prices and ordering information.

HORIZON'S GOT IT WHIPPED

As part of its "Revolution" line of aftermarket helicopter accessories, Horizon is offering a 7-inch base-loaded whip antenna that neatly solves the



problem of routing the receiver antenna in an RC helicopter without crossing over some sort of RF-generating mechanism. The \$10.95 whip antenna mounts in the nose of your heli and in some cases can actually increase your radio range. Revolution products are distributed exclusively by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

GOIN' FULL TILT BOOGIE!

"Full Tilt Boogie" is the name of Patti Johnson's record setting 1993 and 1995 Reno Gold Biplane winner, and now Wendell Hostetter is offering plans for a 34 percent scale,

61-1/2 inch span model for 2-4.6 cubic inch engines, designed to meet the requirements for GSARA biplane racing. Construction is all wood and is detailed on two large sheets; a three-view is included. Kits and all accessories are available as well. Write or call for plan prices and parts list: Wendell Hostetter's Plans, 1041 Heatherwood Lane, Orrville, OH 44667; (216) 682-8896.

AUTOMATIC TRICKLER

Ace R/C's new Auto Add-A-Trickle is an updated version of their already popular RC system trickle charging accessory. The Auto Add-A-Trickle easily and quickly installs between your wall transformer and the charge connectors on any dual output radio system charger—no soldering required. Plug everything in and push the "Charge" button; 16 hours later the unit automatically switches to



a low, safe trickle rate (1/5 the normal rate), allowing you to leave the batteries on charge indefinitely, ready to go on a moment's notice. Retail price is only \$24.95. From Ace R/C, 116 W. 19th St., Higginsville, MO 64037-0472; (800) 322-7121.

BIG DUMMIES

Large-scale vacuum-formed dummy radial engines are now available at an affordable price from Bob Dively Models. Offered are a seven-cylinder model in 1/4-scale (10-1/2 inches diameter, \$14.95) and a 1/3-scale nine-cylinder version (12 inches diameter, \$18.95).



Both are molded from .040-inch ABS plastic to be durable and easy to work with, and both come with the back sides of the cylinders for cowlings that don't completely cover the engine. Available from hobby shops or direct from Bob Dively Models, 38131 Airport Pkwy. #206, Willoughby, OH 44094; (216) 953-9254; Fax (216) 953-9311.

ONE NIFTY NOSE GEAR

Dress up your latest sport or scale model with this dual nose wheel assembly from Bob Fiorenze, designed to mount to 5/32-inch nose wheel struts with two set screws. Comes complete with steel strut adapter, axle, two aluminum rims, tires, and locking C-rings, and is priced at \$34.95. Three bucks will get you Bob's complete illustrated catalog of



hobby items. Order from Bob Fiorenze, P.O. Box 953042, Lake Mary, FL 32795; (407) 330-1448. MB

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

MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS REYNOLDS

• Servoless Remote Control • E=MC² and Model Airplanes • Fly Power!

In the 1940s, I heard stories of controlling indoor model airplanes by blowing a whistle at them. The idea was that the wings of the model were braced with thin flying wires or strings, and one of these strings was tuned to the frequency of a controlling whistle. When the whistle was blown the tuned string was supposed to vibrate

in resonance; in doing so, its tension would increase, and that would warp the wing to make the model turn.

I don't remember whether this was claimed to have been successfully accomplished by someone or whether it was just someone's dream. I strongly believe it was the latter, because I can see no way that a light indoor model structure could be strong enough and stiff enough to permit a bracing wire to be so highly tensioned that its resonant frequency would come anywhere close to the audible frequency range.

Later I heard of a somewhat similar-sounding scheme whereby the wing wires were selectively tuned in length so one of them would act as a resonant receiving antenna for a powerful transmitter in the hands of the pilot. This structural-member antenna was supposed to heat up somewhat from the RF energy it received and absorbed when a command was sent. The increased temperature would of course expand the wire slightly, which would allow the wing to warp and induce a turn. I also don't know if this one ever successfully controlled a flight. I give it more of a chance than I do the resonantly vibrating string approach—but not much more. Note that in both of these schemes, all the energy to deflect the control surface comes from the ground; no

battery, twisted rubber, or other servo power (or receiver power) source is required in the airplane.

We should also mention attempts to use Nitinol and other memory metals in lieu of servos. Memory metals are special alloys. When deformed (stretched, compressed, bent, twisted, etc.) at ambient temperatures they will stay in their new shape until their temperature is raised to some critical level. At that temperature and above they will "remember" and return to their original shape.

I forget the details of specific attempts, but one can see that there would be a number of ways in which memory metals could be used to make control surfaces do their thing. Although more practicable than the two dreams above, memory-metal actuators would also have major problems and disadvantages. Even though the bit of Nitinol or other memory metal required to move a surface would be small and light, the electric power required to heat the wire to the critical temperature would be high compared to the power our model servos consume. The required battery would be heavy, and battery weight gain would probably exceed the weight saved by eliminating the servos.

Another problem with memory-metal actuators would be slow operation. Heating and cooling something takes time.

The resulting control response would surely be far slower than the 2/10-second/60 degrees of rotation we get from standard servos.

I should mention a crude system which was actually used briefly by Jim Walker around 1950. Somewhere among inventing and marketing the U-control system, the Ceiling Walker, winning the RC event at the Nats several times, flying three U-control models simultaneously, building drone control equipment for the military, promoting RC model yacht racing, selling Walker Fireballs, and demonstrating radio controlled lawnmowers, Jim found time to work on sound control of models.

I saw him control—sort of—a model sailboat by sound. As I recall, the control was sporadic, and excuses were necessary. In his method a switch equipped with a diaphragm could be intermittently closed by a remote command such as loud drum beat, and be used to control a model. However, Jim still had to use a servo or some other type of actuator, so this scheme doesn't really fit our category of servoless control methods.

PIEZOE ACTUATORS

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A prime objective of this column is basic technical education as it relates to our modeling hobby, so for those

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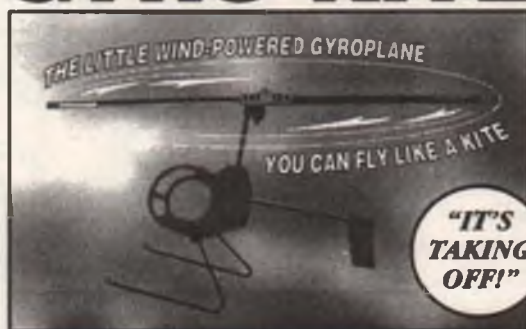
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of you who already know all of the following, please be patient while we review some basics on piezoelectricity.

It's an interesting fact that if we beat on certain types of materials, they say "ouch" by putting out spikes of electricity. Likewise, if we shock them with electricity, they jerk physically. According to the Encyclopedia Britannica, "About two-thirds of all natural crystalline minerals can be made to yield an electric charge by the application of stress." Certain man-made materials also possess piezoelectric qualities. Piezoelectricity was discovered by Pierre Curie (Marie's husband) and his brother Paul-Jacques in 1880.

The word *piezo* comes from the Greek, meaning to squeeze or press. Piezoelectric crystals respond to those forms of attention all right, but they are not fussy; they will also generate an electric charge from being struck, bent, twisted, or stretched. And reversibly, the application of electricity can be made to make them move in any of the above ways.

You probably use several types of piezoelectric devices every day. Most modern beepers, from those on timers and telephones to truck-backup warnings, are piezoelectric. Your "quartz movement" watch or clock contains a bit of quartz crystal precisely ground to piezoelectrically vibrate at a specific constant frequency when excited by a battery and a bit of electronics. These vibrations are electrically sensed and electronically divided to indicate the seconds, minutes, and hours we wish to know. Similar quartz crystals control the frequency of our RC transmitters and receivers, TV sets, computers, radios, and many other things. Piezoelectric relays have even been manufactured (look Ma, no coil!). The voltage which energizes the coil in a normal relay is used to bend a crystal which closes the contacts.

Years ago I read where scientists had determined that some flies have strange little rods with bulbs on the ends of them, which stick out each side of the thorax below the wings; these rods vibrate in flight and act as gyros. The latest gyros for our model airplanes and helicopters are piezo-

electric. Some of the ads for them say "No moving parts." True, in the sense of no motor and gyroscopic wheel, but the piezo crystal which is vibrating to establish an inertial plane of reference is "moving" by virtue of its vibration. We copied the flies.

Quartz is the material of choice for precision oscillators, because it can maintain an extremely constant frequency. Rochelle salt was used for many years in piezoelectric phonograph pickups. Nowadays, man-made lead zirconate titanate (PZT) and a few other similar piezoceramics are used in applications such as beepers, microphones, speakers, sonar transducers and lighters.

Piezoelectric lighters are a surprise when we first learn how they work. Usually a spring is manually compressed by pushing a button. It is then automatically triggered, and its stored energy is used to cause a small "hammer" to pound a piezoelectric element. The resulting voltage is high enough to cause a spark to jump between a couple of electrodes. This spark in turn lights propane or lighter fluid. The surprise is that thousands of volts are obtainable from one piezoelectric crystal.

Piezo spark ignition systems have been used on internal combustion engines. No breaker points, condenser, battery, coil, magneto, or electronics, just a cam and a hammer arrangement which automatically whacks a crystal every time a spark is needed. Several decades ago Briggs and Stratton announced that they had developed and would be using piezoelectric ignition on all of their engines. I recently called them in Milwaukee to find out why they didn't. I failed to locate anyone there who knew what piezoelectricity was, let alone who knew that Briggs and Stratton had considered using it.

PIEZO (SERVOLESS) RADIO CONTROL

In addition to the crystals in our RC gear, flight timers, and in the beepers we put in plane finders, we may someday use piezoelectric transducers in place of servos. The leader behind this work is a modeler by the name of Ron Barrett. Dr. Barrett is an assistant professor of aerospace engineer-

ing at Auburn University. He also works on piezoelectric actuators to operate the control surfaces of guided missiles, at Elgin AFB. In addition, he was involved in work to pitch helicopter blades piezoelectrically (he knows our James Wang). Ron Barrett's phone numbers are: (334) 844-6825 (office), and (334) 844-6832 (lab) at Auburn University, Auburn, Alabama.

Ron sent some photos (which are unfortunately unusable in the magazine) that show a special light RC model Ron and his team of modelers developed for testing piezoelectric actuators. The airframe is a story in itself, by the way.

It is built of fine preimpregnated graphite tows which were wrapped around mandrels and then bagged and cured to form a very light and rigid open framework. The model was then covered with Micafilm. This successful early model (they are now working on an advanced one) is electric powered, and has throttle, elevator, and rudder controls. Its flying weight is 7.5 ounces.

Piezoelectric actuators are fast. Dr. Barrett and company have measured plus and minus 11 degrees of control surface travel in .077 second—two or three times faster than our servos. We can't go into the details of piezoelectric actuators here. If you're interested in the technical aspects, get a copy of The AIAA paper, *Design and Testing of Subsonic All-Moving Smart Flight Control Surfaces*. (Copyright 1995 by Ron Barrett.) That paper has a list of references which includes other technical papers on piezoelectric control.

And why aren't piezoelectric actuators called servos? Quoting Merriam-Webster, "Servomechanism [servosystem, or just 'servo']: an automatic device for controlling large amounts of power by means of very small amounts of power, and correcting performance of a mechanism to a desired standard by an error-sensing feedback." The piezoactuator control systems Barrett and company are developing meet the power-amplification part of the servomechanism definition, but they require no feedback loop in the sense that a motor-driven servo does.

continued on page 88

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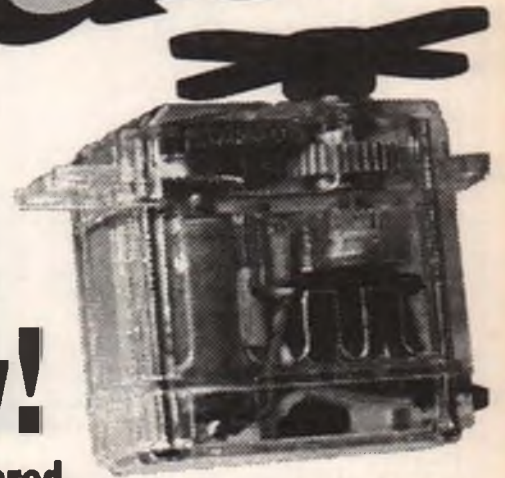
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A PILGRIMAGE TO MUNCIE

For devout control line fliers, Mecca is as close as Muncie, Indiana, home to the National Model Aviation Museum and National Flying Site.

Just imagine:

A hobby shop displaying damed near every vintage control line model kit.

A place where you can get a close look at World Championship-winning control line airplanes.

A library where you can look up anything about model airplanes in all kinds of reference books.

A theater that shows only movies about model airplanes.

A thousand acres of open space devoted to nothing but model airplane flying and competition.

Only in your wildest dreams, right? No, believe it or not, there *is* such a place. It's the headquarters of the Academy of Model Aeronautics.

The headquarters complex in Muncie, Indiana is dominated by the National Model Aviation Museum, a new and growing showcase of model aviation history. Just outside is the national flying site, with facilities for CL as well as for other model types. It will be the site of the 1996 National Model Airplane Championships in July.

Since most serious model airplane fliers are AMA members, we've all read about the existence of the museum and flying site in the AMA member publications. But it takes a visit to Muncie to really appreciate the effort that AMA is putting into this historic project.

Extensive as it is, AMA is quick to point out that the museum and flying site are "works in progress." The museum is designed to be built in three phases—the past, present and future of model aviation. Only the first phase, the past, is complete, and it temporarily shares space with AMA offices. It is nonetheless a true modeling extravaganza.

Though flying facilities already exist for all the categories, AMA continues to buy and develop flying space in a phased project that eventually will provide space for all types of competition to go on simul-



Here is the National Model Aviation Museum (officially the Frank V. Ehling Model Aviation Museum), which also currently houses AMA headquarters. The 8,000 square foot of museum space eventually is scheduled to expand to 25,000 square feet. There was some snow on the ground when our columnist visited the site in November.



Just inside the door of the museum is a counter to greet visitors and some displays that will draw you right in and around the corner to the extensive displays.

aneously, as they do at a traditional one-week Nats.

The Frank V. Ehling Model Aviation Museum will expand as AMA offices move out of the present building and make more space for museum displays.

"Our mission is to collect and preserve

and exhibit the history of model aviation," says Museum Director Gary Prater.

The AMA's collection of model aviation memorabilia already exceeds the display case, but the expansion of the museum and plans for a traveling exhibit will make it possible for more of the collection to be



The museum's 1950s hobby shop displays hundreds of vintage kits and other CL products, all in pristine condition. If only they were for sale!



The first phase of the AMA museum features the early years of model aviation: dozens of CL planes from the '40s, '50s and '60s are on display, such as this "Golden Hawk" 1/2A built by Scientific.

displayed.

Despite the size of the collection, AMA is actively seeking donations of all kinds of old models, kits, engines and accessories.

Observing that many modelers are advancing in age, Prater notes that some significant bits of model aviation history are in danger of being lost. That's why modelers who have interesting old items, or families of modelers who have recently passed away, are urged to contact the museum.

It doesn't matter if the families of departed modelers even know exactly what they have, or whether it is significant. It's not even necessary to write—just a phone call will do. "I just want to hear from them," Prater says. "I can do a little detective work and go from there."

The Muncie site is more or less demographically central for U.S. model aviators—within a day's drive of a large percentage of the members of the AMA. It was selected from several candidate locations on the basis of its central location, land availability and prices, and, among other factors, the Muncie community's enthusiastic welcome. Tourist brochures for

the area prominently mention the AMA museum and flying site.

Muncie is a little over an hour's drive from Indianapolis and an hour and a half from Dayton, Ohio. Several interstate highways pass near Muncie as well. The site is off Memorial Drive just east of the city, off the SR 67 freeway.

After turning in at the large "AMA" sign, visitors see the museum building on the right and a small lake on the left. A gate, with a shack for an attendant, beckons modelers into the flying site. Control line fliers need not be alarmed at the huge power lines the access road passes under just past the gate; the flying site is some distance away.

The road leads past two new, well-marked speed/racing circles. Farther along is another flying area with a shelter for officials or support activities and a broad expanse of pavement marked "general control line." Radio control and free flight facilities are arrayed about the area as well. Because the site is still under development, each visit over the next few months and years will present a slightly

different picture.

The museum is still under development as well, but all a modeler needs to do is step inside the door to have that sense of having entered modeling heaven. The first phase of the museum project, covering 8,000 square feet of a 25,000 square foot eventual facility, is devoted primarily to the first half-century of model aviation.

An AMA staff member at a counter greets visitors. AMA members are admitted free; the price to the general public is \$2 (\$1 for children up to 16 years of age).

Before you even get into the museum's main area you pass nostalgic display cases, including one that contains a 1950s vintage jet speed model with a telegram home from the flier announcing a 1st-place flight.

Round the corner and you're in the museum. Airplanes in every direction—in display cases, on top of cases, in window dioramas, hanging from the walls and ceilings.

One of the first large cases you pass is chock full of vintage CL planes. Ready-to-fly versions of all the kits many fliers built as kids—the old Scientific and Guillow kits, for example—as well as many examples of classic competition planes. Old rat racers, speed planes, combat ships, for example. And lots of oddball designs characteristic of a period when any kid with some scraps of balsa and a little engine might just "put something together."

Nestled in that first case is a somewhat pedestrian-looking balsa wood flying wing with a red streamer attached. Combat fliers, however, recognize it quickly as Tom Fluker's World Championship winner. Look up and spot a pretty beige precision aerobatics plane hanging inverted from the ceiling—Bob Hunt's World Championship Genesis.

More cases contain a mixture of classic RC, FF and CL planes. Gorgeous RC scale planes, pioneering RC and FF designs and unusual projects are everywhere. Some cases are devoted to engines, organized by manufacturer, and to the progress in the technology of radio transmitting and receiving.



Nestled in one of the display cases is Tom Fluker's World Championship combat plane, with streamer still attached.

The dioramas are organized by manufacturer. The American Junior diorama contains all of the familiar Jim Walker products, including a couple of ready-to-fly Fireballs. The Firebaby and various rubber-powered planes and other "U-Control" products—including, of course, a U-Reely handle—are displayed, along with old promotional materials, a picture of the great modeling promoter and other items.

Other dioramas feature Scientific, Comet, Jimmie Allen, White, Ideal Model Aeroplane & Supply, Cleveland Model & Supply, Midwest, Berkeley, and Megow Models. Dioramas also feature some of the earliest rubber-powered and twin-pusher models.

In one corner of the museum is the entrance to the Lee Renaud Memorial Library, and in another corner is the Academy Theater, which continuously shows videos about model aviation.

Longtime modelers and collectors will be drawn quickly into the 1950s vintage hobby shop, Middletown Models. The items in this shop are not for sale, but the experience of looking over (and under) the counters is priceless. It's what the best hobby shop in town might have looked like in that era—every conceivable model kit in its original box, along with engines and accessories of the time. Old handles, forgotten fuel blends, old-fashioned tanks, props, wheels and finishing products are among the hundreds of items.

A few minutes in that hobby shop and a modeler's pocketbook will be burning; AMA has made sure there's a chance to spend a little. There's a small gift shop with T-shirts and other souvenirs of the visit to the model aviation museum.

And since the museum is a work in progress, it's likely that anyone who visits will want to come again.

The museum is a self-supporting wing of the AMA, and thus depends on admis-

sion fees and donations for its existence. For up-to-date information about the museum or to become a museum donor, contact the Academy of Model Aeronautics at 5151 E. Memorial Drive, Muncie, IN 47302.

My November visit to AMA headquarters was only partly a pleasure trip to visit the museum and flying site. The main purpose was to attend a meeting of the chairpersons of the AMA's nine contest boards. Those boards are in charge of developing and maintaining rules for all of the various types of competition sanctioned by the AMA. I am the chairman of the Control Line Contest Board, as well as its District XI representative (Alaska, Oregon, Washington, Idaho, and Montana).

The chairpersons of the various boards met for the first time in several years to examine a number of proposals for updating the AMA procedural document that guides how the board functions. Working with proposals submitted by AMA members as well as with some of their own ideas, the chairperson committee developed a detailed revision of the procedures.

The proposals went to the AMA executive committee for approval in January. The EC also was scheduled in January to receive recommendations from an ad-hoc project team that worked with some broader issues



Control line fliers will be drawn to the American Junior diorama, featuring a couple of Fireball models and other memorabilia from the Jim Walker era.

that the chairpersons could not complete in a weekend. Details of all those proposals and the EC's response will be published in AMA member publications (this column was written before the EC's action).

But the meeting produced some intangibles as well. As the control line representative to the meeting, I was encouraged by the amount of common ground shared by the chairpersons of the other boards, and at the attention devoted to all of the interest groups by the AMA staff.

Competitors should pay attention to the activities of their respective contest boards, because there is ample opportunity in each rules-making cycle for general competitors to make their voices heard.

Here's a brief review of how the

continued on page 82



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Glue Action: Wicking

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Hinge Thickness	A	A	A	B	A	B
Tear Strength	A	A	A	B	A	B
Surface Treatment	A	F	F	F	F	F
Delamination Strength	A	D	D	C+	D	C+
Slots or Holes	A	A	A	A	D	D
Glue Action: Wicking	A	A	B	F	F	F
Delayed Cure	A	C	C	F	F	F
Average Grade	A	C+	B-	C	C-	D

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PRODUCTS IN USE

■ By Jay Burkart

GRAUPNER'S ELECTRIC JUNKERS JU 52

For a multi-engine RC model, you just can't beat ultra-reliable, vibration-free electric power. Graupner's all-balsa semi-scale replica of the famous WWII German trimotor uses three inexpensive Speed 400 motors running on a single battery pack.

The Junkers Ju 52 originally started out as a commercial endeavor and ended up being the workhorse of the Luftwaffe during WWII. The Ju 52 entered service in the Luftwaffe as a make-shift bomber in 1935, however, its primary function during WWII was as a troop and cargo transport throughout Europe, Russia, and North Africa. Toward the end of the war the Ju 52's main function was that of a flying ambulance. Many Ju 52s saw service after the war as passenger aircraft, military transports and military trainers.

Graupner's 1/20 semi-scale Ju 52 was designed to be flown with three Speed 400 electric motors. Their GR6070 Power Set includes everything you need to set up and mount the motors in this model—three Speed 400 motors, prop adapters, scale flying props, clamp-type motor mounts, capacitors, screws, wire, and Graupner connectors, and instructions. An exploded

view drawing makes things easy to understand even if this is your first electric model.

With only a single seven-cell 1700-mAH battery pack the Ju 52 has plenty of power, producing flight times of 5-7 minutes depending on your use of throttle. Shortly cropped grass runways should not present a problem for the model. On a paved runway the Ju 52 lifts off in about 20-25 feet. The kit is produced in Germany and imported and distributed in the U.S. by Hobby Lobby in Brentwood, Tennessee.

THE KIT

The kit quality is exactly what you would expect of Graupner, which has been producing models since WWII. The wood is of exceptional quality (Graupner has its own balsa plantation in South America) and the die-cutting is way above average. The clear canopy and windows are a nice

touch. The side windows are molded on a single strip that matches the spacing on the fuselage, making installation of the fourteen side windows (seven on each side) quick and easy. The entire piece is simply bonded to the inside of the fuselage—no cutting for each window. Plastic engine nacelles and cowls round out the molded parts.

Everything you need to know about the construction of the Ju 52 is included on four large instruction/plan sheets. One contains the instructions and parts list in English and French, two sheets have the full-size plans and construction detail drawings, and the fourth has the German instructions along with 14 construction photos and a small three-view drawing.

CONSTRUCTION

Construction is basic and shouldn't present problems for anyone with a couple of kits under their belt. You'll need to have



If there was a little snow on the hills in the background you'd almost think you were in Bavaria! Jay reports the Junkers kit is very complete and includes most of the required hardware. The box label provides an excellent guide for finishing, although there are any number of other color schemes you could copy—text gives a good source of documentation info. Bob Bank's Scale Model Research has Foto-Paints (photo documentation studies) for seven different existing Ju 52s, including this one in Swiss markings.



Graupner's 1/20-scale trimotor paints a pretty convincing picture both on the ground and in the air. Hobby Lobby now offers a video of the Junkers in action; you can order the video for \$9, watch it and return it later for \$6 credit. Ask for Video #40.

the Graupner GR6070 Ju 52 Power Set on hand before you start construction, as it's necessary to install the wiring for the two wing-mounted motors into the structure as it is being built.

The wing is a conventional D-tube

structure with spruce spars, cap strips and shear webs. The scale ailerons hang below the wing and are actuated by a single servo via flexible cable pushrods built into the wing. Each wing motor mounts to a plywood keel and is then covered with the plastic engine nacelles. Take care to trim the nacelles to get an exact fit to the wing profile; if you just follow the cutting line on the plastic you will probably end up with some small gaps between the nacelle and the wing. The simple wire landing gear is mounted by straps to a hardwood block in the wing.

The fully sheeted fuselage has flat sides and bottom with a curved top. Applying the top sheeting over the bulkheads and stringers can be made much easier if you first soak the sheeting in an ammonia/water solution to make it pliable, then pin it to the structure until dry, after which it can be easily glued in place. Be careful during this part of construction; the top and bottom fuselage sheets were incorrectly

marked in the English instructions, but were correctly identified on the drawings.

A clever design feature of the fuselage is that the battery tray is positioned behind the windshield so that the batteries can be removed for charging without taking off the wing. Simply remove the windshield and the batteries can be accessed through the opening in the front of the fuselage.

The tail surfaces are built-up structures that are very light, yet quite stiff. The elevator and rudder are sheet surfaces with the latter having three large lightening holes to reduce weight. The tailwheel wire mounts directly to the bottom of the rudder for steering.

RADIO SYSTEM

You should plan on using micro or mini gear in the Ju 52 to help keep the weight down. Every ounce saved in an electric model translates into better performance. I used three Futaba S-133 micro servos for the flight controls. The Graupner Power

GRAUPNER'S ELECTRIC JU-52

WINGSPAN 59 in.

WING AREA 403 sq. in.

FLYING WEIGHT... 56 oz. (58 oz. as tested).

WING LOADING 20.7 oz./sq. ft. as tested.

OVERALL LENGTH 39 in.

RADIO Lightweight four-channel system required.

POWER Three Graupner Speed 400 7.2V

motors (GR6070 Power Set, includes motors, motor mounts, scale propellers, wiring and connectors), running on a single seven-cell 1700-mAH battery pack.

PRICE Kit and GR6070 Power Set together runs about \$250 from Hobby Lobby.

Produced in Germany by Graupner, imported and distributed in the U.S. by Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444. New Catalog #27 available to new customers for \$2, includes a \$5 discount for first order.

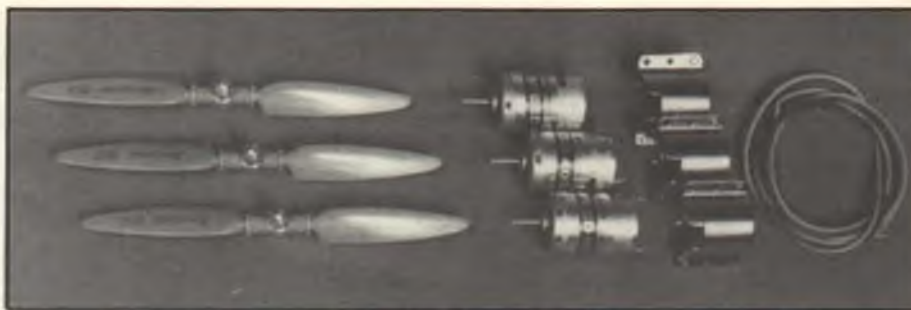


An excellent design feature of the Junkers is the quick and easy access to the motor battery via the removable canopy. A single seven-cell 1700-mAH SCRC battery pack runs all three motors and is good for flights of seven minutes or more, depending on how aggressive you are on the throttle.

MOS 30 proportional speed control with BEC eliminates the need for an airborne battery, helping to further reduce the model's all-up weight. The radio I used is a four-channel Airtronics that has proven itself reliable over the years.

FINISH

My entire model was covered with Oracover Silver Buff to match the finish as shown on the kit box. Testor's Model Master Aluminum and Dark Blue paints were used to trim the canopy and paint the engine nacelles. A copy of *Schiffer Military/Aviation History Junkers Ju 52* by Heinz J. Nowarra will supply you with a wide variety of color schemes to choose from. The Ju 52 was flown by many different nations and in many different roles.



Graupner's GR6070 Power Set was put together specifically for the Ju 52 kit and provides you with all of the power components needed to get it airborne—motors, scale-locking props, mounts, wiring, connectors, etc. Photo supplied courtesy of Hobby Lobby.

You'll find color schemes from basic ambulatory white up through beautiful splintered camouflage. Whatever finish you choose, *remember to keep it light!*

FLYING

With an all-up weight of 58 ounces (only 2 ounces over the specified flying weight), my Ju 52 has a wing loading of only 20.7 ounces per square foot. This produces an agile model that lifts off quickly, flies well, and best of all, lands slowly.

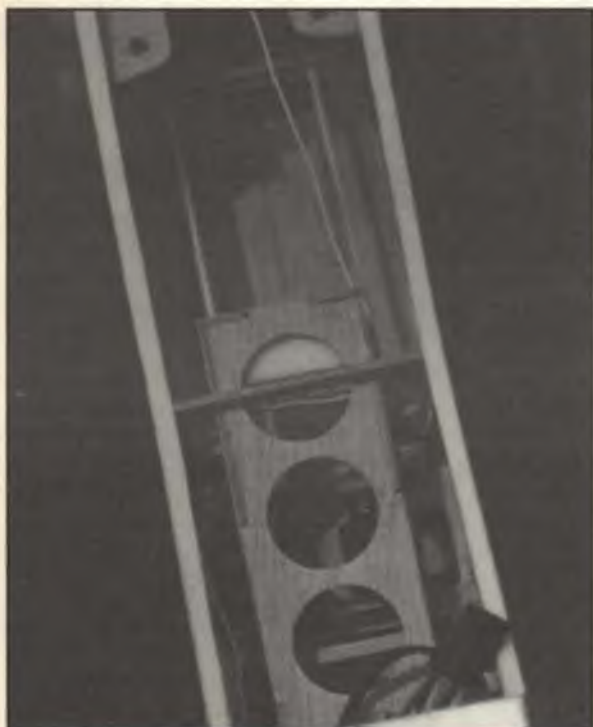
Initial test flights are always a time of jittery nerves, but with the Ju 52 there is no need to get the shakes. This is one of the nicest behaving scale models around. The wide-stance landing gear makes ground handling easy. On the first takeoff I advanced the throttle a little, held a bit of right rudder, more throttle, ease up on the right rudder . . . and suddenly I was airborne. The climbout was better than I expected and I found myself reducing the throttle back to cruise speed after making my first turn. Flying at scale speed requires about half throttle. At this setting the Ju 52 will give you flight times of over

7 minutes.

The best part of flying the Ju 52 is the sound. Yes, I know, electricians are quiet. But if there are no engine-powered models flying you can still hear the three props singing their beautiful synchronized song. And, unlike a gas model, there is no chance of an engine-out as all three electric motors work as one. Multi-engine flying without the engine-out landings, balky engines, trying to synchronize engines that don't want to run at the same rpm, and worrying if one engine will run out of fuel before the other—what more could you ask? When the juice does start to run down, all three motors stay in sync and you set up for an uneventful final approach. Why would anyone want to fly a multi with anything but electric power?

After several flights I cannot find any fault with the handling qualities of the Ju 52. Takeoffs are easy, general flight characteristics are great, stalls are gentle and straight ahead, and it's probably one of the easiest landing scale models you'll ever fly. Scale flying has never been a big thing with me until the Ju 52. After flying a multi electric I find myself looking at other multis and wanting to scale them to fit Speed 400s.

If you've ever wanted to build a scale multi engine model but were afraid to, the Graupner Ju 52 is the model you've been waiting for. Overall it's a great looking model, an excellent flier, and a real attention getter that is truly fun! **MB**

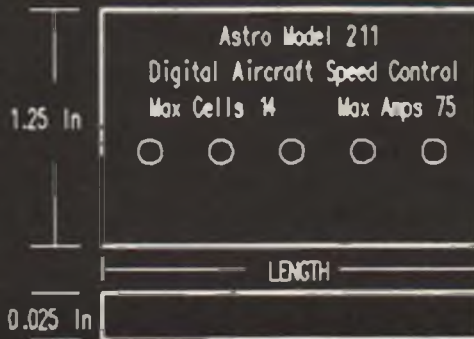


View of the inside of the cavernous fuselage with the wing removed. Just barely visible are the rudder and elevator servos (Futaba S-133 micros), which are mounted upside down, above the battery tray. Tray is screwed in place and is removable in case you need to make servo adjustments later.

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Switching Rate	2800 Hz	2800 Hz	2800 Hz	2800 Hz
Heat Sink	Yes	Yes	Yes	Yes
Connectors	Zero-Loss	Zero-Loss	Zero-Loss	Zero-Loss
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HANNAN'S HANGAR

BY BILL HANNAN

**“Friendship
is one mind
in two
bodies.”**

Our lead quotation, by ancient (B.C.) Chinese philosopher Menicus, seems an appropriate introduction to this month's sole topic, the 49th annual Flightmasters flying scale model contest—a meeting of one mind in many bodies . . . rather along the lines of a high school reunion. Although they come from various walks of life and geographical locations, these friends really are an extended family, avidly dedicated to our hobby. Since some of these folks had not seen each other for 20 or more years, nostalgic conversations were continuous and the camaraderie was contagious.

Organized by Bill Warner, Fernando Ramos, Byron Calomiris, Flightmasters president Dick Smith and probably others, the two-day event attracted modelers and their families from at least eight states and Canada. As with many elderly organizations, various members had moved away during the years, and yet, most retained a vital interest in the club, as proven by their willingness to travel long distances in order to attend this gathering.

My own journey from northern California involved a two-hour bus trip, plus an 80-minute flight in a 500-mph Boeing 737. Not being a frequent flier, I still find jet travel to be thrilling, and arranged to sit aft of the wing, where I could view the “wing-disassembly”



One of the many fine model displays in the San Diego Aerospace Museum. How many can you identify? Photo by Jim Alaback, of the San Diego Scale Staffel.

flaps in operation. And, seeing how little aileron deflection was required to initiate a bank gives one a fresh understanding of why even minor wing warps in our models can have such drastic results.

Upon arrival in San Diego, I was greeted by artist Bill Noonan, who whisked me away for a tour of the famed Aerospace Museum, home to a fabulous collection of models as well as full-size aircraft. This was followed by an evening in Bill's studio, catching up on the happenings in his life.

Next, Scale Staffel newsletter editor Tom Arnold provided transportation to Mile Square Park in Fountain Valley, as well as delightful conversation enroute. Friends greeted us in such profusion that it was almost impossible to finish any one conversation before commencing another. To mention only some of them is to risk slighting the many, but to drop a few names, imagine the opportunity to chat with a veritable Who's Who in modeling, including Sal Taibi; Larry Renger of Cox; Sandy Peck of Peck-Polymers; Ken Sykora of Oldtimer Model Supply; John Garrett of the Western Air Racing Society; Bob Banka of Scale



Flightmasters member Frank Faraco fabricated this fabulous “cartoon scale” 1012 Avro F from the. When mounted on a counterbalanced arm, the spring-driven propeller “flies” the model in a circle.



Jovial Bob Haight, of the Las Vegas (Nevada) Vultures, prepares to test his Hispano-Suiza powered Sopwith Camel during the Flightmasters contest.

Model Research, Tony and Addie Nacarrato of T&A Hobby Lobby; Granger Williams of the Williams Brothers; Carl Hatrak, director of the Northrop Flying Wing model meets; Don Srull and Tom Schmitt, sparkplugs of the Washington D.C. based

Maxcutters club; Bruce Hamilton, Dick Howard and so many others.

And that was just in the first hour! How about a propeller discussion with retired M.I.T. Professor Eugene Larrabee, the man who designed the prop for the Gossamer Albatross pedal-



Maxcutter Terry Pittman, of Annandale, Virginia, flew his unique CO₂ powered French Delaune 26T-02 in the Flightmasters competition.

powered English Channel crosser. Or Bill Watson, who played such an important role in building that aircraft. Not to mention the many faithful readers of *Model Builder* who so kindly introduced themselves.

Trying to see all the models in action was equally challenging, not only because there were so many, but also because they were being flown in widely separate locations. I had brought along five models of my own, but after finally qualifying the oldest of them (18 years!), thanks to Jim Lueken and all the others who assisted, I decided my time was better spent in conversation rather than competition. After all, how often does one have such a priceless opportunity to visit with so many like-minded friends and see so many models flying under such perfect weather conditions?

Taking place simultaneously were Flying Aces Club style mass-launch events, always exciting to watch. But likely the most active flier on the field was Otto Kuhn, who had brought an amazing variety of crowd-pleasing aerial oddities. How about an Avro Baby with seven wings? Or a Westland Pterodactyl, a Deperdussin floatplane, a Martin T3M, an ARUP flying wing, a Bates monoplane and a Rieseler parasol? All were powered by tiny CO₂ engines, and all were capable of flying as well as they looked. Spectators were especially impressed with "Otto's Otto," a Lilienthal biplane hang glider propelled by a Brown Junior CO₂ engine held in Lilienthal's outstretched hands, the CO₂ tank being concealed in the pilot's carved balsa body. Few of the onlookers were aware that Otto Lilienthal had actually planned a motorized version of his hang glider, with a carbonic acid powerplant (CO₂!) back in 1896! Thus, one Otto fulfilled the dreams of another Otto, about a hundred

years later.

In the afternoon, static scale judging was conducted in the Jolly Roger Hotel, located near Disneyland, providing an opportunity to closely examine the models, some of which were vintage "retirees" from early Flightmasters contests.

That evening, a banquet was held for the modelers, their families and friends. Model builders seem to attract unusually supportive (and beautiful!) spouses and companions, who deserve a great deal of credit for their patience and understanding.

A highlight of the banquet was the presence of keynote speaker Bill Turner, well known for his full-size racer reproductions, ably assisted by his "blonde grandmother" Dianne, who was surprisingly tolerant (or good humored, depending upon your point of view). Bill shared insights into the building and flying of his Miss Los Angeles, Gee Bee Z (star of "The Rocketeer" movie), Miles and Atwood Special, De Havilland Comet, and the restoration of the Howard Pete. Ironically, back when still an overly eager youngster, Bill had been forcibly evicted from Pete's cockpit by Benny Howard himself! Perhaps it may come as no surprise that Turner is a former model builder?

More non-stop entertainment followed, in the form of slide shows about early Flightmasters contests, running well past most of our bedtimes. How much nostalgia can one really absorb? Plenty!

On Sunday, we returned to Mile Square Park for another day of flying (and talking). The weather was so perfect and clear both days that someone suggested it had been specially orchestrated by such departed and fondly remembered Flightmasters as Russ Barrera, Kelvin Pardoe, Jim Warner, Jack Lueken, Bob Peck, Warren Shipp, Walt Mooney and Ken Hamilton. Great job, fellows!

A new event called "Peanut Replica" was introduced by

HANNAN'S HANGAR



Candice Hannan admires Otto Kuhl's Gasparis CO2 driven ARUP S-2, one of many unusual models flown at the Mile Square Park meet.



The Flightmasters Peanut Scale judging table. At left is Dave Smith, leader of the Arizona Cactus squadron, and on the right is Jane Schlosberg, well-known model builder/flier, also from Arizona.

Dick Baxter and his movie/TV star grandson Austin O'Brien, garnered eight entries, six of which were flown. Simpler to construct than traditional Peanuts, but more realistic than Profiles, these semi-scale models demonstrated spectacular flying qualities, and deserve more exploration.

Even after two full days and a night of almost non-stop conversation, the visiting continued, and following the prize-awarding ceremony (sorry, we don't have the list of winners yet), many of the modelers drove to another restaurant for more chatting. At

last, as darkness descended, Tom Arnold and I reluctantly headed back to San Diego, reminiscing all the way. As Tom put it, we were fortunate enough to have taken part in a "two-day stick-and-tissue Woodstock!"

So what did we find waiting for us at Bill Noonan's place? Vintage movies of San Diego Aeroneers club contests! Happily, we will not need to rely entirely upon our memories to relive this remarkable weekend, because the entire affair was profes-

sionally captured on videotape by Richard and Zaida Lin. Copies should now be available, and we hope to have ordering information soon.

SIGN-OFF

We'll return to our "regular irregular" format next month, but meanwhile, appreciate each other more; your model builder friends are the greatest!

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Electric Sailplane Competition . . . Via E-Mail!

Australian modeler Raymond Pike is organizing the first-ever international electric contest via e-mail, to take place in April. This month Roger discusses the contest rules and what you need to do to get in on the fun.

I'd like to start out this month by telling you about what to my knowledge is the world's first electric model competition via e-mail. The event is open to all electric-powered sailplanes—no limits on size or the motor or number of cells used. The rules are as follows:

1. You must make your flights sometime during the month of April.

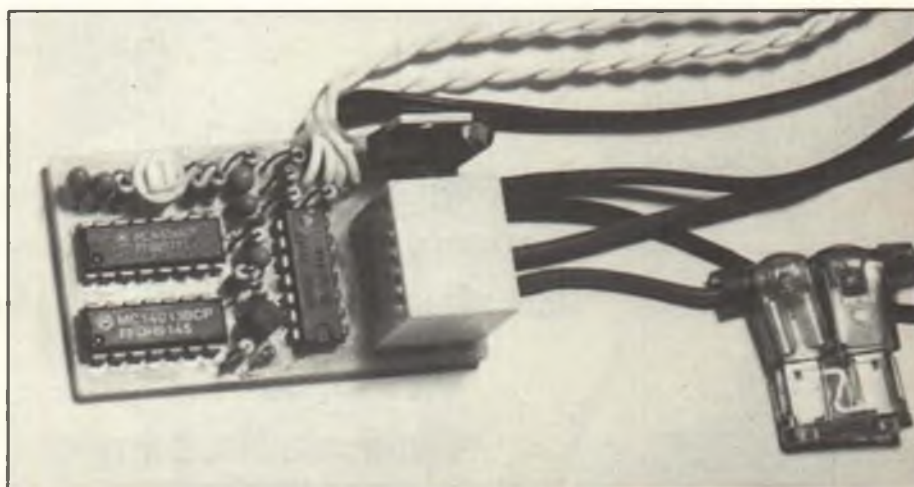
2. The aim is to: a) Fly three consecutive flight duration tasks of exactly 5 minutes without landing; b) Use as little motor run as possible; and c) Land on a designated spot.

3. Repeat step 2 four times. The four flights do not have to be made on the same day.

4. All results must be delivered via e-mail before Saturday, May 4. Preferred e-mail method is via the MAAA WEB page at: <http://www.netc.net.au/briley/maaa/> or direct to Raymond Pike at stingray@enternet.com.au.

Let me clarify the rules a little bit. First, launch your model and start your two stopwatches. It will be necessary to have someone help you with the timing and calling tasks, since you won't be able to do it all yourself. One stopwatch is used to time the total motor run—start the watch when the motor is started, and stop it when you stop the motor. The second watch is used to time the total flight duration.

The task is to fly the model under an imaginary "limbo" line 6 meters (19 feet, 8 inches) above the ground at exactly 5 minutes after launch. As the plane passes the mark the timer records the exact time. At 10 minutes after launch, the pilot again performs the limbo pass and the timer records the second time. At 15 minutes the



The MC-2 on-off motor controller produced by American Precision Technologies—one of three different units offered. These inexpensive controllers would be just the ticket for six- or seven-cell electric sailplanes or other models where proportional speed control is unnecessary. More in text.



Testor's enamel—an electric modeler's best friend to trim a model finished with an iron-on covering. Roger says it's easy to apply, sticks well to the plastic and doesn't need to be fustproof. More in text.

final limbo pass is performed and the time is again recorded. The pilot then attempts to land on the landing spot.

Scoring is computed in three parts. Each

of the three flight tasks is taken as individual 5-minute flights. For each limbo pass, 1 point will be awarded for every second of flight up to 5 minutes; 1 point will also be



This sleek 42-inch span sport/aerobatic electric is the Akro Pro 25E, the latest kit from Stream Inc., P.O. Box 1113, Newport News, VA 23601; (804) 691-0720. It's designed for the Model Electronics Turbo Plus geared motor and a 18-cell battery pack. Quoted flying weight for the 410 square inch low-winger is only 84 ounces.

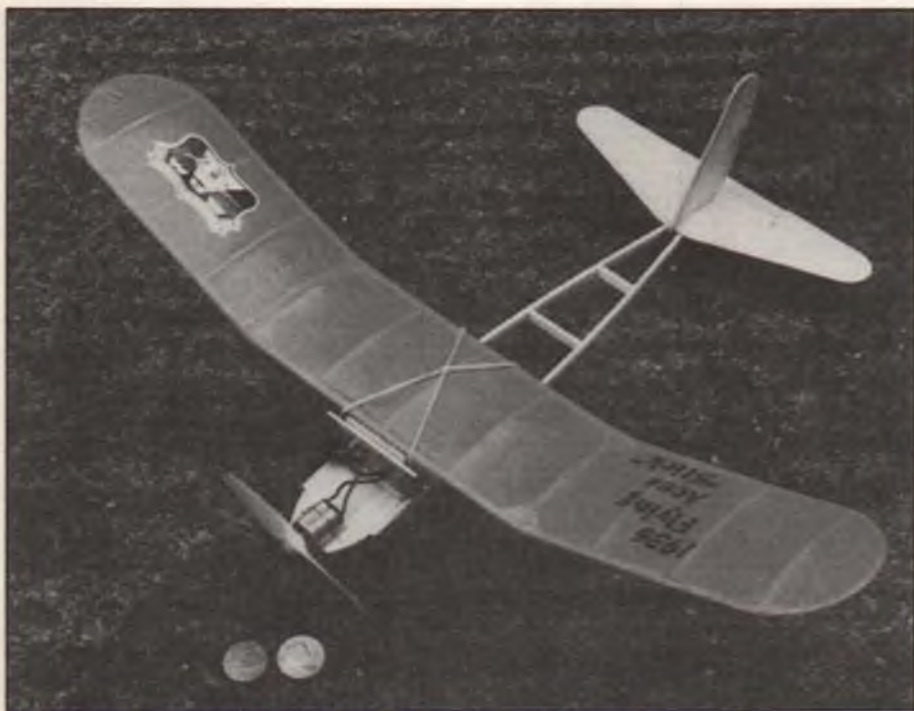
deducted for every second of flight over 5 minutes. For example, a first flight task of 4:51 will score 291 points; a flight of 5:06 will score 294 points. The second and third flight times will also be scored as 5-minute flight tasks even though they occur at 10 and 15 minutes after the start of the flight. For example, a pilot with limbo pass times of 4:57, 10:21 and 15:02 will be awarded a score of $297 + 279 + 298 = 874$ points.

The motor run score is computed by assigning a "free" motor run time based on the number of cells used in your plane. If you use seven cells, you'll be allowed a free motor run time of 60 seconds. Eight- to ten-cell planes get 45 free seconds, and if your plane has more than ten cells, you'll

get a 30 second free motor run. You will lose one point per second for each second of motor run time over your allowed free run time.

If you can land your plane so that the nose is within 7.5 meters (24.5 feet) of a marked landing spot you'll get an extra 50 points. If you're within 15 meters (49 feet), you'll get a 25 point bonus. Since the distance is measured from the nose of the plane, it's not necessary to land so that the entire plane is inside, say, the 7.5 meter circle to get the 50 bonus points.

For this contest, each competitor should submit four flight scores. The best three scores will be used to determine the final places, and the fourth score will be used



Cute Pocket-size 1836 Flying Aces Stick free flight model built by British modeler Dave Durrford. Kenway motor and three 50-mAH batteries.

as a tiebreaker if necessary. Finally, if you don't have access to e-mail facilities, don't worry. If you submit your scores to me by mail or by fax at (619) 461-1227, I'll e-mail them to Raymond. Just be sure I get your entries by Thursday, May 2 so I'll have time to e-mail them. Raymond lives in Australia, which is about 17 hours ahead of California time, so I'll need to e-mail your scores to him on Friday to reach him by Saturday.

(Editor's note: Roger says he'd like to do a follow-up report on this contest when the results are in and have been tallied, so we'd like to encourage all entrants ahead of time to take a few good, bright, sharp photos—slides or glossy prints—of their models and send them to Roger for possible use in that column. Be sure the background for your photos is clean and uncluttered—no shots taken in your living room or with the model sitting on the hood of your car, please—and also include complete particulars about the airplane and its power system. Close-up photos of any unusual details would also be appreciated.)

DURATION CONTEST REMINDER

Remember the postal duration contest organized by Jerry Smartt last June? As promised, Jerry is putting together the 3rd Annual Duration Challenge for June 15-23. This one will last longer than before (through two full weekends) and will also include competition from other countries. Some British fliers, including Dave Durrford, former editor of the British Electric Flight Association's journal *Electric Flight UK*, are very interested in pursuing this type of flying.

As reported here a couple of months ago, the '95 postal duration contest was won by Hardy Benson and Phil Pearce, flying a modified 1937 Lanzo Bomber for the astounding time of 3 hours, 23 minutes and 19 seconds, of which 1 hour and 44 minutes was motor run time. Yes, something as simple as a Bomber can fly for over 3 hours and win the contest. More information about how to enter this contest will be forthcoming. In the meantime, if you have any questions, please drop me a line. Also, Jerry Smartt can be reached at RR 3 Box 300, Warsaw, MO 65355-9588.

A NEW MOTOR CONTROLLER

Charlie and Brenda Huettner of American Precision Technologies have introduced three new relay-type on-off motor controllers. The MC-1 can power six- or seven-cell motors up to 30 amps and has battery eliminator circuitry (BEC) with an automatic motor cutoff at 4.5 volts. The MC-2 is similar to the MC-1, but includes a digital receiver interface that will turn the motor off should radio signal reception be lost. Both of these units incorporate a 30 amp fuse for relay overload protection. Finally, the MC-HD is like the MC-2, but it

uses an unfused heavy-duty relay suitable for high power applications up to 40 amps. Each of these units is about the size of a servo, so they can fit into just about any size fuselage. Prices range from \$23.95 for the MC-1 to \$36.95 for the MC-HD; shipping is extra. They are available from APT, Inc. direct at P.O. Box 53, Nutting Lake, MA 01865; (508) 667-2023.

BECs— LOVE 'EM OR HATE 'EM

BECs are one of the few things I haven't discussed much in this column. "BEC" is an acronym for Battery Eliminator Circuitry, a feature of many of the smaller proportional speed control units and electronic on-off switches on the market—usually those designed for six- or seven-cell power systems. The circuitry simply steals a small amount of power away from the motor battery to run the airborne radio, eliminating the need for (and weight of) a separate radio battery. Almost all motor controls that incorporate a BEC also have automatic motor cut-off circuitry that will kill power to the motor when the battery voltage drops to a certain pre-set level. In theory, you will still have plenty of battery left to power the receiver for some additional flying after the motor cut-off kicks in and shuts off the motor.

In a recent club newsletter editorial, Bob Boies, president of the Watts-Up Electric Flyers in San Bernadino, California, commented about an incident with one of his fellow fliers losing his plane while using a BEC. It turned out that four of the seven cells in the battery pack failed under load and the remaining three were not enough to power the receiver. Of course, you should fault the battery pack and not the BEC, but Bob has decided to stick with a dedicated receiver battery from now on.

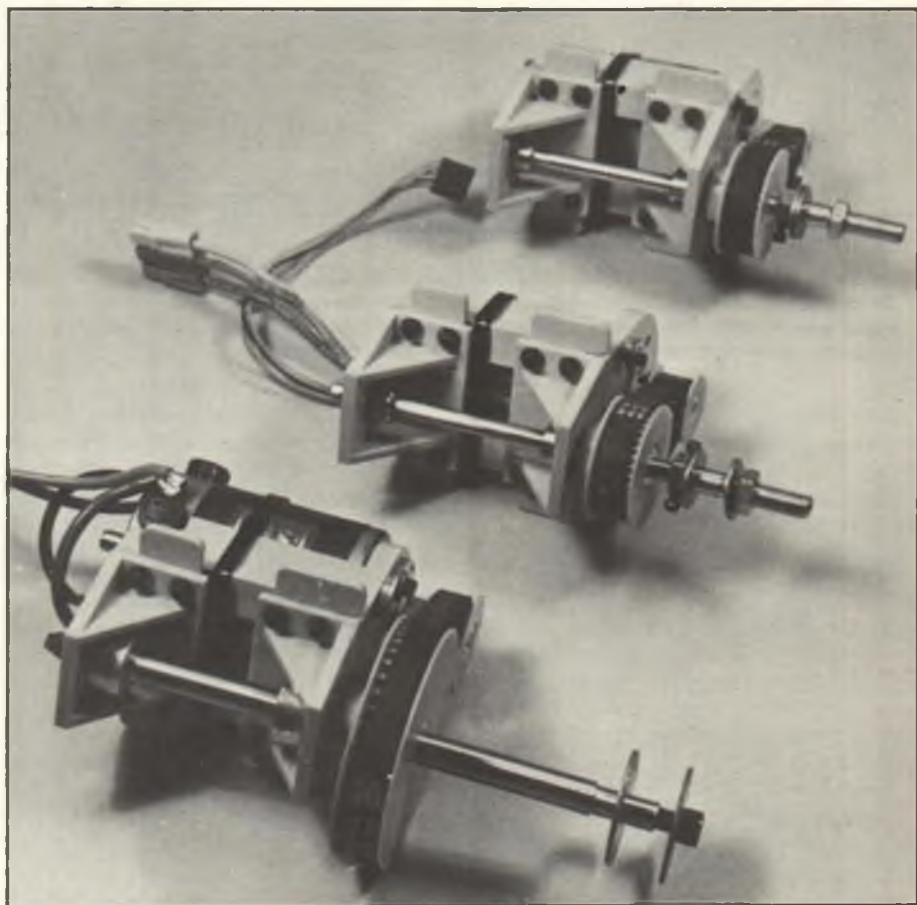
Indeed, over the last few years, I've

heard scattered grumblings from electric fliers about the effectiveness and safety of BECs. Comments range from "I use a BEC all the time" to "I wouldn't use a BEC if my life depended on it!" I'd love to hear your opinions on BECs—your likes and dislikes,

which models of BEC-equipped motor controls you use and if you've ever had problems with them in the air.

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continued on page 86

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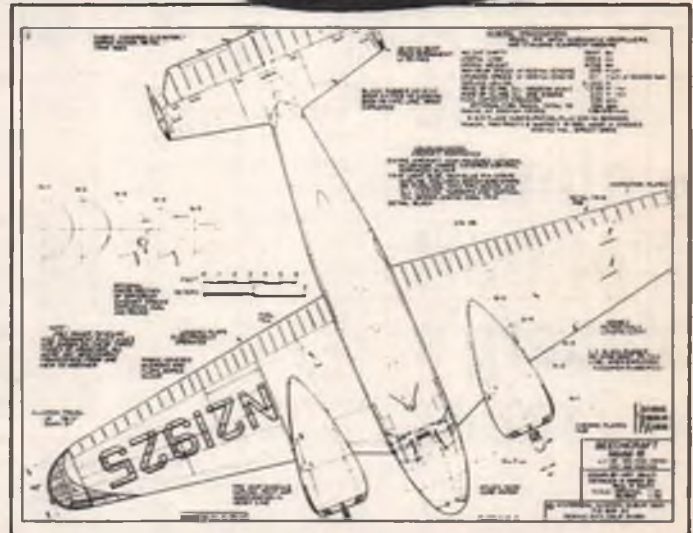
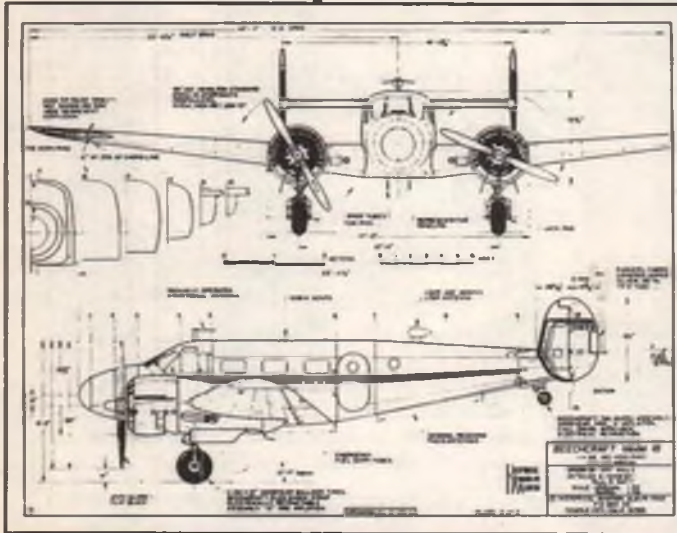


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PLUG SPARKS

BY JOHN POND

•The Evolution of Carl Goldberg's Zipper

One of the biggest surprises to this writer is the general lack of knowledge on Carl Goldberg's original pylon model. Several years ago this columnist actually ran across this original model due to Russ Barrera's efforts to establish a real model aviation museum.

Russ was extremely knowledgeable and very friendly with all modelers. To start his enterprising museum, Russ buttonholed all the leading figures for items that would be of interest to prospective viewers. To that end, he was able to get Johnny Brodbeck's engine collection, numerous manufactured items from Irwin Ohlsson, spark coils and accessories from Nathan Smith and Clyde Austin, etc., plus numerous models donated by Frank Swaney, this author, Joe Weathers, and a host of others.

During the infancy of the museum, Carl Goldberg moved to California with some of his modeling paraphernalia. Being a true museum art collector, Russ wasted no time in contacting Goldberg, obtaining some historical items of which his "Diamond" was the outstanding prize item. Of course, after all these years, the model was in a bad state of disrepair (see Photo No. 1).

During this time, Russ had talked several modelers into building a series of historical Wakefield models for display. With his very genial personality and persuasive manner, he was able to convince Jack McCracken, of the North American Flightmasters scale club, to restore the model to original shape—see Photo No. 2. This



Photo No. 1. The legendary Carl Goldberg poses with his original Gas Bird, before the model was subjected to a total restoration for Russ Barrera's model museum.



Photo No. 2. Here's Carl's Gas Bird, complete with the original Denmyrite engine, after Jack McCracken's immaculate restoration job. The model is currently on display at the Frank V. Ehling Model Aviation Museum in Muncie, Indiana.



Photo No. 3. Similar to the Gas Bird in several aspects is the big Anderson Pylon, this Forster .99 powered free flight model being launched at TaR by the late Bud McMorgan. See text for our columnist's comparison of the Anderson Pylon and Gas Bird designs.

operation did not pass unnoticed by this writer, who was operating his plan business in a rented corner of Russ Barrera's hobby shop/museum. Before sending the model off to

McCracken, Pond made accurate drawings of the model.

In the process, this columnist was struck by the close similarity to Alva Anderson's large 90-inch pylon model,

known today simply as the Anderson Pylon (Photo No. 3). It turns out that Goldberg and Anderson flew similar models in 1938 in the midwest competitions. The model as beautifully restored by Jack McCracken looked every bit competitive with a good Dennymite engine in a 48-inch wingspan model! These hot models terrorized the contestants of the summer of 1938.

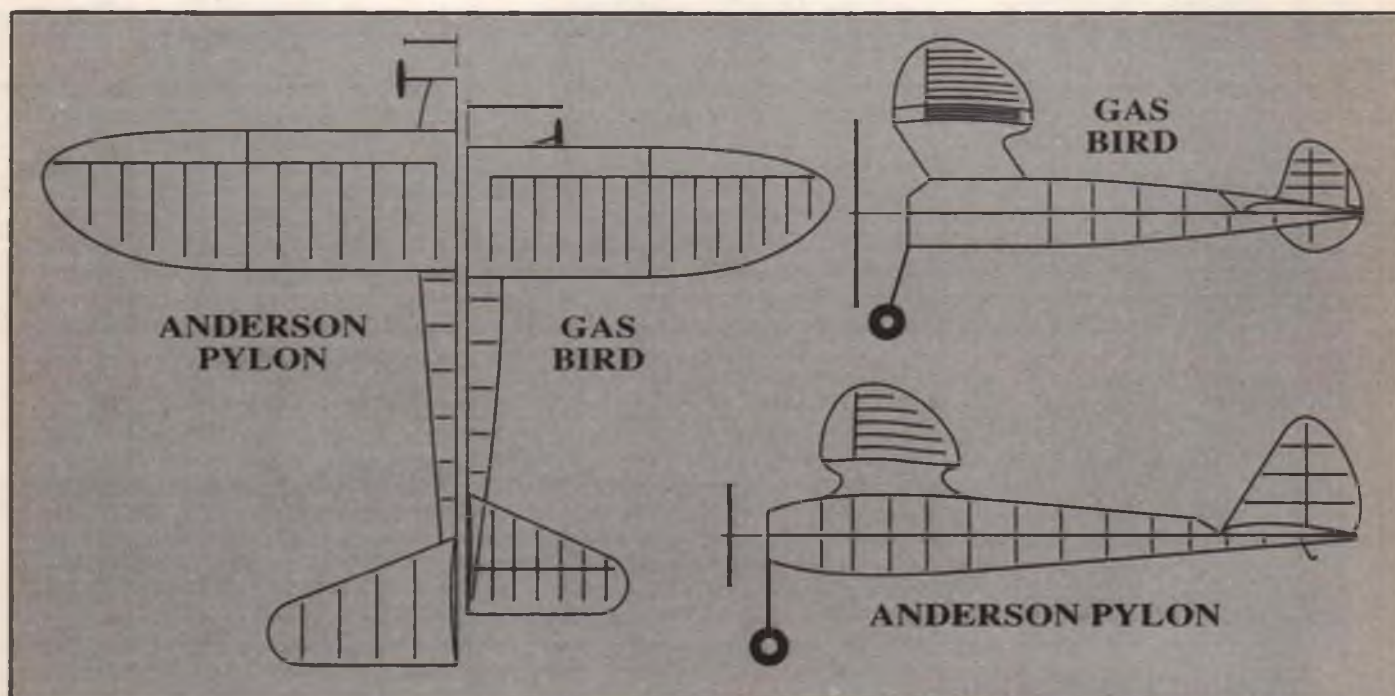
The similarity between the Goldberg and Anderson models is quite pronounced, as shown in the accompanying illustration. The Anderson design in most any size has proven to be a winner. Ask the SAM 30 (Hayshakers) members, who dote on this design

"Zipper" development which appeared in *Model Airplane News*, written by Bob Larsh.

The Gas Bird was officially approved by SAM as an Antique and the rush was on to build this sure winner. The situation rapidly developed into a "Lanzo Bomber" syndrome as both the FF and RC contingents adopted the design wholeheartedly. Inasmuch as scaling was allowed in RC O.T., Don Bekins had the original model doubled in size



Photo No. 4. In the late '70s/early '80s, scaled-up Gas Birds with O.S. .68 four-strokes were all the rage in West Coast RC O.T. Texaco events. Here Don Bekins shows off two big ones, a double-size version on the left, a slightly smaller one on the right.



This drawing illustrates the similarities between Goldberg's Gas Bird and Alva Anderson's earlier 90-inch pylon model (shown here at different scales). Columnist Pond seems to feel that Anderson, who is all but forgotten today, should have received at least some of the credit for originating the concept of the pylon-mounted wing.

all the way from large 110 percent scaled-up versions for Texaco to small 1/2A Texaco size. A threat in any class!

With practically all modelers calling their design a "Diamond," the following is offered to avoid confusion with the Goldberg design and its follow-on designs. After a series of conversations between Carl Goldberg and John Pond (the SAM Historian at that time), it was recommended the original design be called the "Gas Bird." This definition has been successful in defining the various diamond-shaped models. This augments the three-views of

(Photo No. 4) to give a spectacular gliding model. This set off a series of models this size at the 13th Annual SAM Champs, culminating in the two excellent models by Bekins and Jim Kyncy winning 2nd and 3rd places.

Summarizing the foregoing, the writer feels that Alva Anderson is the forgotten man in the development of pylon designs. No question about Carl Goldberg being a fine modeler and his record-setting models always set the pace. Only a few modelers perceived Goldberg as a good entrepreneur who could recognize the dollar value of new ideas.

When the Comet Zipper design was suitably refined for kit production (Photo No. 5), the initial spectacular announcements of the Zipper showed Goldberg in a large photo. What let the cat out of the bag was a smaller picture of Alva Anderson acknowledging his "help" in the Zipper design. When Carl got all the credit for the pylon design, I wrote Alva Anderson about this situation. Alva was rather non-committal about any credit. From then on, Goldberg was regarded as the originator of the pylon and Anderson was completely ignored. Alva then went

into full-size aircraft propeller manufacturing. His return letter (before his death) was couched in subdued tones, indicating the disappointment the man must have felt.

To put it mildly, the Zipper as developed by Carl Goldberg was absolutely sensational, with the design sweeping almost all places in the various 1939 class gas events. Nothing like this has ever occurred since at the AMA Nationals.

The original Zipper as restored by Jack McCracken was placed on display at Russ Barrera's Model Aircraft Museum near Morgan Hill in Northern

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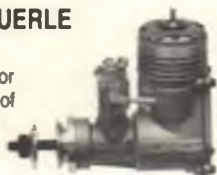


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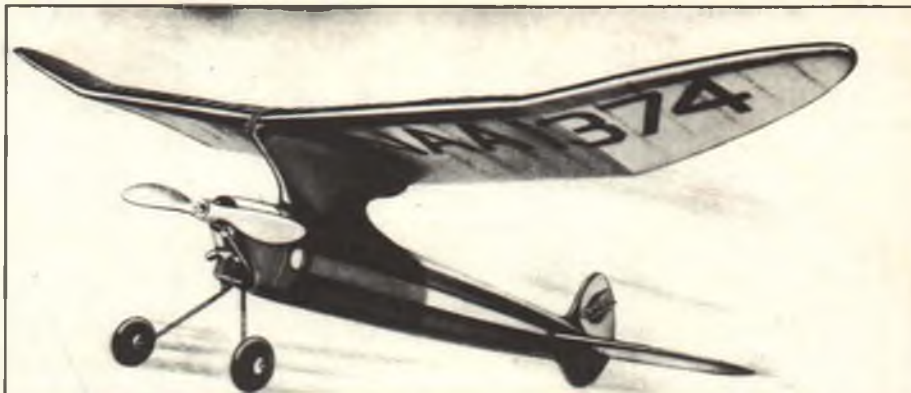


Photo No. 5. Drawing taken from an old Camel ad shows the final and by far most familiar version of Goldberg's fabulous Zipper. The design is refined considerably over that of the Gas Bird, featuring an elliptical wing and stub pylons and a sleekly rounded streamlined fuselage. Slightly bigger too at 54-inch span and 400 square inches.

California. When Russ Barrera contracted pancreatic cancer, frantic efforts were made to save the museum.

Carl Goldberg, who came up from Los Angeles, sensed the end was not long for Russ and requested I rescue the Gas Bird from the museum display. This was accomplished and the model was placed on display at the Pond O.T. Plan Service shop in San Jose.

Eventually the AMA was prevailed upon to accept the offer of the accumulated historical material. A contingent of AMA officials, including John Worth (Executive Director), Earl Witt (AMA President) and Carl Goldberg arrived to inspect the museum contents. Russ died shortly thereafter, fully assured that his museum pieces would be displayed at the AMA's Model Aviation Museum in Muncie, Indiana.

After Russ died, a comedy of errors ensued as Carl Goldberg asked that the restored Gas Bird be sent to him. Unfortunately, Carl died shortly thereafter and his widow was unaware the model had been shipped. After numerous requests for the return of the model, it was finally located

at the Goldberg residence. It now resides in the AMA Museum.

OBIT NOTICE

While reading the latest SAM 7 newsletter we ran across the unfortunate news of the passing of Frank Fay. This writer was first attracted to Frank because of the unusual model he favored: the "Pylon Buster" as designed and flown by Armand Vasquez.

Frank, who departed for better flying FF heavens, was so enamored by the Vasquez design, which featured a drooping fuselage somewhat resembling a banana in shape, that he built a series of Pylon Busters in all sizes, from 1/2A Texaco on up.

We are all going to miss "The Quiet Man," as was called by his fellow SAM 7 members. Frank's closest buddy, Frank Rende, who wrote the epitaph, felt the loss most keenly. Fay was a great guy to know, and he never failed to share his copious knowledge or help as it was needed. So long, pal!

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

KEN SYKORA 1928-1995

Just received a call from Don Bekins, SAM president, saying that well-known SCIFS member Ken Sykora died unexpectedly on December 13, 1995 in his home workshop.

Ken, a longtime modeler and staunch supporter of free flight, was born in Waco, Texas. He was a former member of the NAA Flightmasters, the Southern California Aero Team (SCAT) club, and was a founding member of the Southern California Czech Team. Most recently he was quite widely known as the editor of the *Flight Plug*, the newsletter of the Southern California Ignition Fliers, which he put out for a number of years. Although Ken's caustic wit did not always appeal to everyone, there is no question he wrote some thought-provoking articles.

Ken will be best remembered for Oldtimer Model supply, the cottage industry he ran for the past several years. Ken did an excellent job of bringing the business back to life after several attempts by others who took over from the original founder, Jim Noonan. This columnist is going to miss the "old grouch." Now who is going to pick on me?

In a serious vein, sincere condolences are offered to Ken's widow and family. The SCIF members are going to miss Ken sorely.

—John Pond



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The 10th Annual Seaplane

Among RC seaplane fliers, the annual Lake Havasu City gathering is considered one of the biggest and best. Eloy reports on the action at the latest Seaplane Classic, held this past November.

By Eloy Marez

When you first start looking for it, you'll start to think you'll need GPS (Global Positioning System—satellite navigation) to find it. But eventually you'll find Lake Havasu City, Arizona, home of the annual London Bridge Seaplane Classic—right there on the Colorado River, along the California/Arizona border! But it can't really be all that hard to find, because



This lineup of airplanes awaiting their turn to fly shows just a small fraction of the large number and the wide variety of designs that were flown over the three-day weekend.



Everything being big in Texas, Charles John of San Angelo, Texas showed up with not one but two 1/3-scale seaplanes, one of them being this well-accomplished Sopwith biplane.

London Bridge Classic



No doubt the oldest airplane at the meet was this 1950's-era Berkeley SeaCat. It's been in Don Thorson's Air Force all that time; he used it as a trainer back then.



Charles John's other 1/3-scale bird, a Sachs-powered Curtiss R3C Schneider Trophy racer.



This O.S. four-stroke powered Sig Kadet Senior Grande, appropriately dubbed "Bushwacker," was entered and flown by owner/pilot William Koster of Santa Monica, California.



It got wet and shrunk! Andy Clancy's .049 powered, 18-inch span version of his Lazy Bee is presented to us in the capable hands of Miss Mina Reynolds, of Tucson, Arizona.



■ ABOVE: One of the few true hull seaplanes currently available as a kit, this Super Tigre powered Ace R/C Seamaster was the entry of Don Roberts of Glendale, California. ■ RIGHT: Unfortunately there's no surface area to verify the fact, but Don's Seamaster demonstrated its aerobatic capabilities—and those of its pilot—with smooth inverted low passes.



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The 10th Annual London Bridge Seaplane Classic



Bob "The Colonel" Thacker's Supermarine S-6 Schneider Trophy racer in all its glory. The original set a record of 407.5 mph way back in 1931.



Ronald Young and his son Chris, of Silverthorne, Colorado, flew this attractive DeHavilland Beaver, modeled after the full-size aircraft they previously operated in Alaska.

over 100 RCers—the kind who are into water sports—had no problem doing so last November, the tenth time for this now well-established RC event. Whether or not flying off water is high on your list of fun things, you'll have to admit that any event that lives to see its tenth anniversary has to have a lot of appeal.

And appeal is there in abundance, starting with the site, the Nautical Inn complex. This hotel sits right on the edge of Lake Havasu, with its own private beach, which is completely invaded by RC airplanes and their pilots for this weekend. You can sit on your balcony along the edge of the beach and enjoy the flying, or simply walk out and within a couple of minutes, you—or your airplane—can be in the water. Add some palm trees, sunshine and for the non-fliers, a pina colada from the bar, and as the commercial used to say, "It doesn't get any better than this!"

This event is about as un-contest as you can get. There is a registration and there is frequency control, but that's about it. Two awards are given, one a Pilot's Choice, and a kind of Best of Show, determined by a panel of "experts." There's no scale or flight judging; the intent is to fly and share in expertise and the camaraderie. To fly, you simply place your airplane in a ready line; when you get to be first in line, you are given your transmitter and assigned a spot from which you can go "feet wet," as Navy fliers report when they're clear of land and are flying over water.

There's no scale or flight judging [at Havasu]; the intent is to fly and share in expertise and the camaraderie.

The airplanes were as varied as you will see at any busy field on any weekend—with the exception that instead of wheels, these models sported floats of some kind. There were a few classic seaplanes to be seen, a couple of Schneider Cup racers and some Ace R/C Seamasters, one of the few kits of this type available, now made in .40 and 1.20 sizes. Everything else, from Piper Cubs to Clancy Aviation's stable of Bees, was on hand. Flying is intense, with as many as five airplane in the air at one time, and always a long line of those awaiting their turn.

Even a casual event such as this one requires organization and a lot of hard work. Contest Director Jack Wilson and the Lake Havasu Desert Hawks are to be commended for a job well done. We wish them luck, and hope for an invitation to the 11th Seaplane Classic in 1997. Now enjoy the photos—and since some of you will be seeing them during the middle of winter—Eat Your Hearts Out! And make your plans for next year. Information can be obtained from Jack at 4199 Highlander Ave., Lake Havasu, AZ 84606-8080; (520) 855-1370. **MB**

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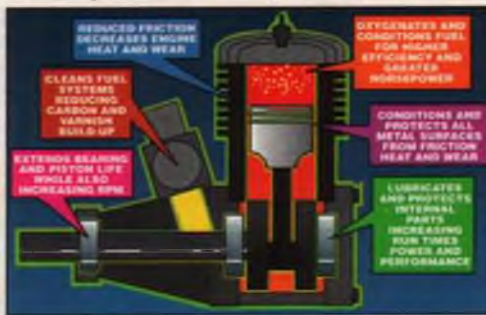


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The Twin-Air .20 from Northeast Aerodynamics

Ready to try your hand at a multi-engine model? The Twin-Air .20 features completely conventional design and construction, and makes an excellent choice for a first twin.

As soon as you announce to your friends that you're thinking about building a twin, you begin to hear reasons why you shouldn't—too expensive, too much work, too hard to synchronize, uncontrollable if one engine quits, etc. True as some of that may be, I had a couple of reasons of my own to tackle the project: 1) I wanted to, and 2) twins sound great in the air. As those of you who have had similar urges already know, there isn't much available in the way of kits for twins. I finally settled on the Twin-Air .20, an attractive Cessna 310 lookalike kitted by Northeast Aerodynamics. The power requirement calls for two non-Schnuerle .20-.30 two-strokes. I opted for a couple of Schnuerle ported K&B Sportster .28s, as the airplane will sometimes be flown off a very short runway at 3,500 feet MSL and the extra power will provide some added safety.

The prime requirement for engines in a twin is *reliability*. If at all possible, start with new engines, and break them in properly on a test stand (none of that running them once or twice in the airplane to "break them in"!) until they will hold a lean setting and throttle properly with no hesitation. Obviously, a tachometer is essential here. If you're lucky, you will have two engines that peak at the same rpm with the same propeller. If one engine tachs lower, start it first in the airplane, peak it and then richen it 300-400



The lines of the Twin-Air .20 are shown here to good advantage by Miss Agne Barauskaite, of Redondo Beach, California. The airplane has a slight resemblance to the Cessna 310, with enough other scale looking features to definitely take it out of the "box" airplane class.

rpm, then set the stronger engine to the same speed. Doing the reverse will result in a lean setting for the weaker engine—a good candidate for an in-flight stoppage.

The K&Bs have performed perfectly, so

I can't report on the engine-out performance of the Twin-Air .20. Just be sure to set the throttle so that the engines can be shut down with the radio. Should one stop in the air, the other can be cut, resulting in



Eloy finished his model in bright yellow MonoKote for good visibility; the white areas are painted with K&B Super Poxy, and the graphics are self-adhesive trim from Midwest Products.

just another dead-stick airplane looking for a place to land.

The Twin-Air .20 is obviously not a beginner's airplane, though it employs no unusual construction techniques. A built-up wing, solid tail surfaces, and a slab-sided fuselage are used. The plans and 24-page instruction booklet are clearly done and explicit in all respects, with only a couple of discrepancies to be found.

CONSTRUCTION

The parts are largely pre-cut or pre-formed. I give both an 8, as I ran into a couple of trouble spots. One was a too-hard and too-heavy pre-shaped aileron; I had a real problem cutting the hinge slots, and then it threw the wing off balance, requiring a lead weight on the other side. Also, the pre-cut wing trailing edge pieces were too narrow, and had to be replaced. Personally, I have no problem with an unusable piece made from flat sheet, as I can easily make another. But an unusual part like an aileron poses a different problem.

Whenever I build from a kit, I make it a practice to examine all such pieces before starting construction, and request that any unusable pieces be replaced by the kit maker.

The wing leading edge sheeting technique calls for first gluing the top and bottom sheets to the spars, then pulling them down and gluing them to the leading edge at the same time, holding them with strips of tape while the glue sets. Though not called for in the instructions, I wet the outside of the sheets to help them curve. This is a good procedure which I will use from now on. By so doing, the stresses in the wood cancel each other since they are applied simultaneously, preventing unwanted warps.

One construction detail that some may find intimidating is that the cabin, nose and nacelles are all built up from balsa blocks and/or thick sheets. Improper or insufficient shaping will result in an ungraceful, square-looking airplane. The proper shapes are shown in two dimensions on the plans; the

THE TWIN-AIR .20

FROM

NORTHEAST AERODYNAMICS

WINGSPAN 58 in.

WING AREA 625 sq. in.

FLYING WEIGHT 5.5-6.5 lbs.
(6 lbs. as tested).

WING LOADING 20.3-24
oz./sq. ft.

OVERALL LENGTH 43 in.

RADIO Four channels
required.

POWER Two .20-.30
two-strokes.

KIT PRICE \$145.

Produced by Northeast Aerodynamics,
Inc., 150 Robinson Rd., Hudson, NH
03051; (603) 881-5899.

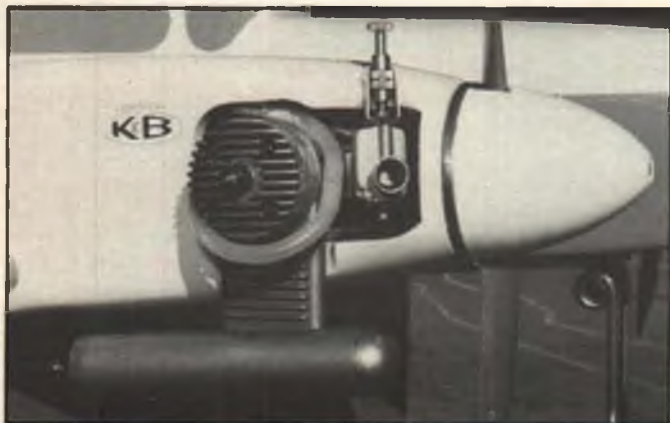
rest is up to you. In these cases I find it best to make some plywood female templates to assure that both sides are exactly the same shape. The whole process, while not difficult, will be time consuming and cannot be ignored.

As the throttle servos (one for each engine) are wing mounted, it's important that openings be made in all ribs inboard of the nacelles for the servo leads. Route a piece of string through these openings before the wing halves are sheeted and joined, to pull the servo leads through once the servos are installed. The servo mounts, fuel tank and throttle linkage should all be installed and trial-fit before the wing and nacelle sheeting is in place.

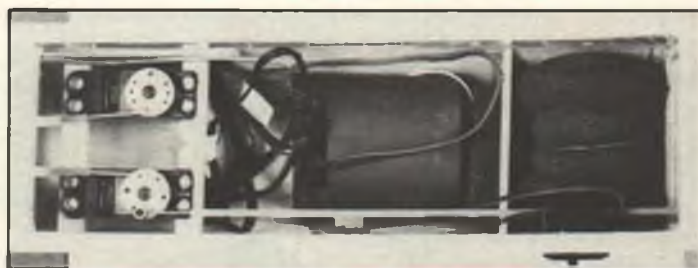
The Twin-Air .20 is trike gear equipped,



The attractive flowing lines of the Twin-Air .20 start off with balsa blocks and thick sheet pieces, requiring some careful shaping and a fair amount of work. The result looks pretty darn good, huh?



It's what's up front that counts—in this case, twin K&B Sportstar 2Bs provide the necessary thrust. Eloy can't report on the Twin-Air's engine-out performance—he's never had one of the K&Bs quit in flight.



The Twin-Air's fuselage is 3-1/2 inches wide at the cabin, leaving plenty of room for full-size four-channel radios. This interior view shows the elevator and rudder/nosewheel servos in the fuse, along with the foam-wrapped receiver and flight battery.

a little higher than I like, but made so for flying off grass. There's a discrepancy in the photo of the nose gear on page 16 of the instructions, in that the spring is shown facing forward. Such springs should always face the rear, so that compression occurs at the moment of touchdown. I used an RF350 dual strut nose gear assembly from Fults Tooling (P.O. Box 155, Savoy, IL 61874; 217-351-3550). This requires a slightly different mounting procedure from what is detailed on the plans and the booklet, but it's not difficult and the Fults

instructions provide the needed information. In any case, be sure to drill the necessary holes for the gear mount and pushrod before the fuselage formers are in place, and check the nose gear operation before completely sheeting the fuselage.

Using the nose gear dimensions shown on the plan results in a slight (1-2 degrees) nose-up attitude that will lead to premature liftoff, especially on paved runways. The reverse nose-down attitude is recommended; the strut length and/or placement should be adjusted as required.

FINISHING

The booklet states: "This aircraft has

been designed to be covered with heat shrinkable plastics." For me, this means the airplane must be one big flat piece, without any bends, curves, or even edges. I'm not good with such coverings, especially around compound curves such as the nose and nacelle areas. Besides, there is always the problem of fuel seepage, especially around the engine compartment.

Following a procedure that works for me, I used a combination of K&B Super Pox and MonoKote, with the paint overlapping the film by about 1/4 inch where they meet. Referring to the photos, the yellow portions are the plastic covering; the white, which includes the nacelles and most of the contoured parts, which I find difficult to cover with film, is sprayed with K&B epoxy. The latter sections had the full treatment, with 3/4-ounce fiberglass cloth and K&B primer before the final white coat. The results match the smoothness of the MonoKote and most viewers simply assume I'm far better with it than I am! Midwest Products "Easy Trim" stickies, trimmed to an appropriate size, add the finishing touches and add a lot to the overall esthetics of the airplane.

FLYING

My Twin-Air, with two Airtronics 94102 standard servos in the fuselage, another 94102 in the wing for the ailerons, two 94831 mini servos for the throttles, and other necessary Airtronics electronics, came in at exactly 6 pounds. The CG is shown on the plans, and the airplane flew perfectly with the forward-most location given. Locating the airborne electronics properly achieved the correct CG without having to add dead weight anywhere. The control surface movements recommended in the instructions were followed for the initial flights, and resulted in perfectly controllable flight. Maybe a little less aileron authority would be better, but that's a matter of personal preference.

All in all, the Twin Air exhibits no undesirable traits, either on the ground or in the air; it's just a well-behaved, predictable, tricycle gear, low-wing airplane. It might not do aerobatics well enough to make the Masters, but in the hands of a competent pilot, it will do all the basic maneuvers—and it will have that distinctive, head-turning sound while doing so. If you're not scared of a little work, try a Twin-Air .20! MB

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**It's big, it's beautiful-
and it's easy.**



81" SPAN
IMAA LEGAL

SPECIFICATIONS: Wingspan: 81 in (2055 mm), Wing Area: 908 sq in (58.4 sq dm), Fuselage Length: 64.5 in (1635 mm), Weight: 10-12 lb (4540-5440 g), Wing Loading: 23-28 oz/sq ft (70-85 g/sq dm), Engine Required: 2-stroke .61-.91 cu in (10-15 cc) or 4-stroke .91-1.20 cu in (15-20), Radio Required: 4-5 channel with 5-7 servos

Cessna 182 SKYLANE™



Easy off the boards

Don't let the Top Flite Cessna 182's huge size and incredible scale detail intimidate you.

With Gold Edition Engineering to guide you, making the jump to IMAA-legal, 1/5 scale (actually, 1:5.33 scale) size and true-scale looks is easy...and enjoyable, as well.

Advanced computer-aided design technology helps the interlocking ply airframe and wing assemblies slide together straight and strong. Formers are marked with pushrod routing. Flaps and ailerons are designed for simple, two-servo operation. The wooden wing struts are shaped and ready to go. All make serious progress easy without skipping steps.



Extruded ABS plastic strips easily simulate the familiar corrugated surface of the Skylane's Fowler Flaps, ailerons and elevator.

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Formed plastic fairings for the strut and landing gear make it easy to transition from easy assembly to superb scale fidelity in a heartbeat. Precision-formed ABS parts (including wheelpants and tail cone) help define its classic looks; wingtips, stabilizer and cowl refine them, with built-in "bowls" and clear lenses for optional operating landing lights.

Concealed linkages for flaps, rudder and elevator, plug-in side windows, scale aluminum landing gear that bolts

on from inside the fuselage add scale looks instantly — and with an optional header and muffler, the cowl will completely conceal the engine, for a scale appearance that just won't quit.

But as good as it looks on the ground, the Cessna Skylane is even more impressive in the air. Mellow as an old song, it offers the gentle, predictable handling and stability of a trainer — qualities that will make it a Sunday favorite from the moment you fly it.



Its IMAA-legal, 81" wingspan makes the Cessna Skylane a smooth, easy-handling eyeful anywhere in the air.

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All photos shown were taken using Top Flite's 1/5 scale Cessna 182 Skylane model kit.

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THE FARMAN F-190 AIRLINER

We presented Hurst Bowers' electric free flight and 1/2A RC versions of the Farman F-190/192 in the July '94 *Model Builder*; now here's a 13-inch span model for you Peanuteers who favor unusual vintage aircraft.

Scale Ace Hurst Bowers, who modeled the Farman F-190 and its sister ship, the F-192, as a 28-3/4 inch span electric free flight (full-size plans are available from *Model Builder*), says that no two of these planes were alike—they often had minor differences, such as engine or color. For this reason, he calls models of this series "Impressionistic Scale," since not much scale data is available. This 46-foot span airliner prototype carried four passengers at a cruise of 100 mph—not bad for France in the early 1930s.

Are you ready to build this historic flier? Start by making two 11x17-inch copies of the full-size centerfold plan (press it tight to the glass) at your local copy shop. Tape one to your building board, cover it with waxed paper or plastic food wrap to prevent glue bonding to the paper. Use the other copy for patterns, tracing



The Farman's simple lines show up well in this photo. Generous wing area should give the Filco and Lacoys a run for their money!



PROP: 4 1/2" NO. PACIFIC OR 5" SILVER

PHOTO

NOTE STRUTS, ENGINE, LETTERS

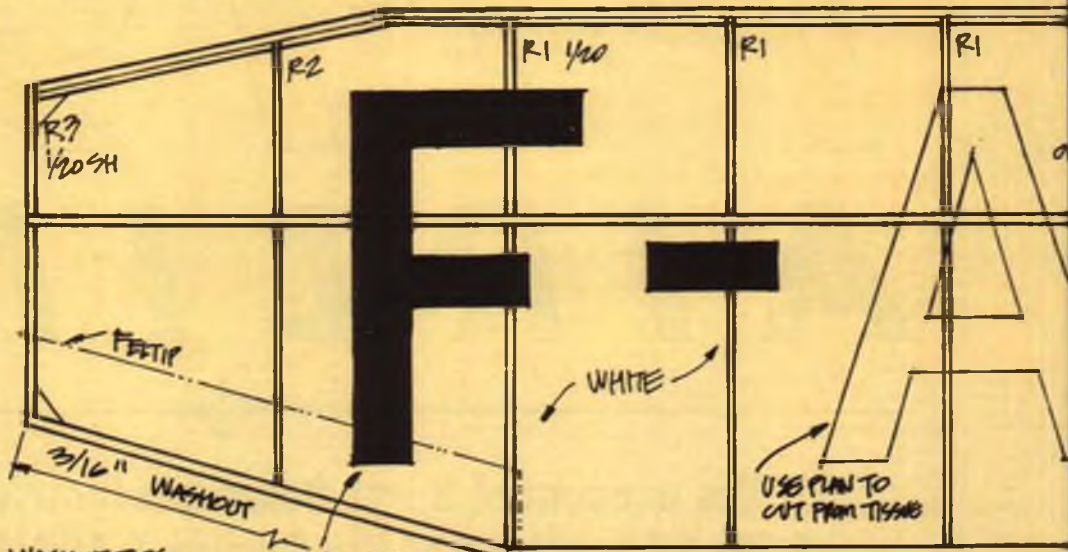
EXPERT: FLAT WING NO PIKED

PHOTO: JAKE'S "ALL THE WORLD'S AIRCRAFT" 3-VIEW SAME SOURCE THANKS, HURST! THIS IS TRULY "IMPRESSIONIST SCALE"

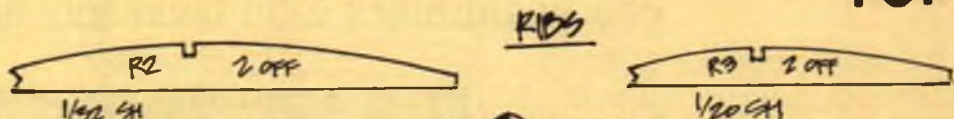
OPTIMUM PITCH FOR NOISE

1/8" x 1/8" NOT STRUTS TRUSS LENGTHEN

NOT FULL SIZE! REPAIRED FRONT



TOP

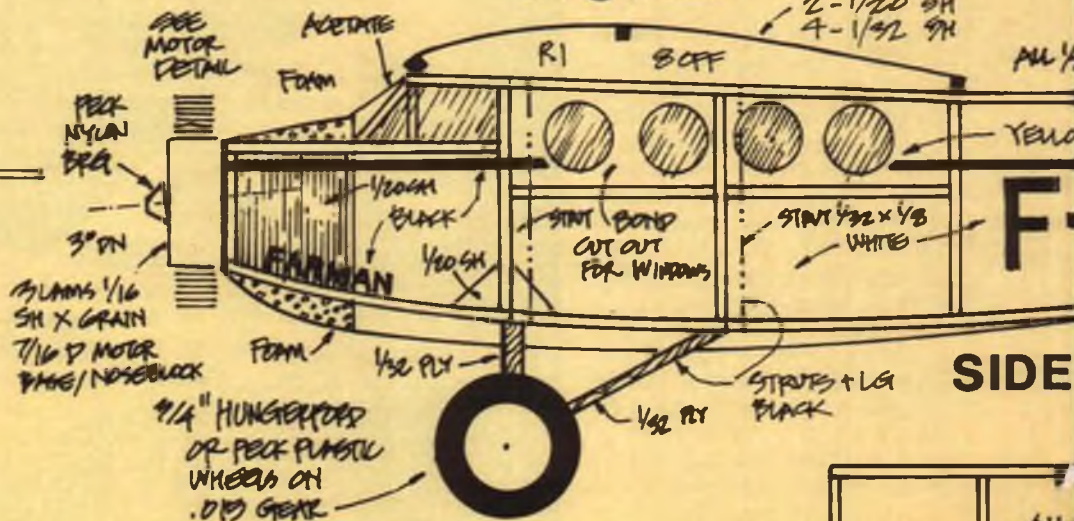


RIBS

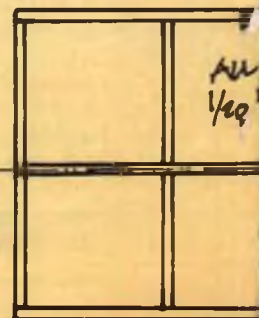
C.G. BALANCE

2-1/20 SH 4-1/32 SH

ALL 1/4

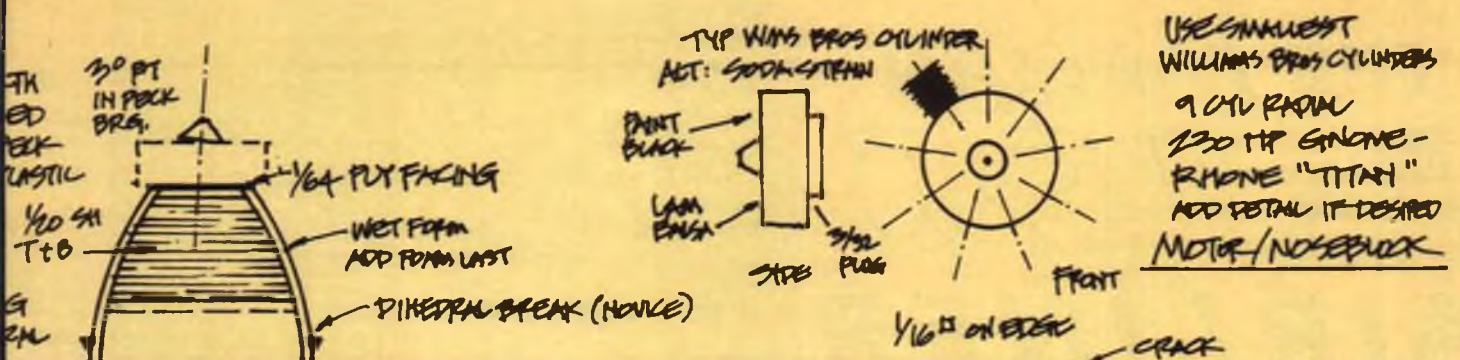


SIDE

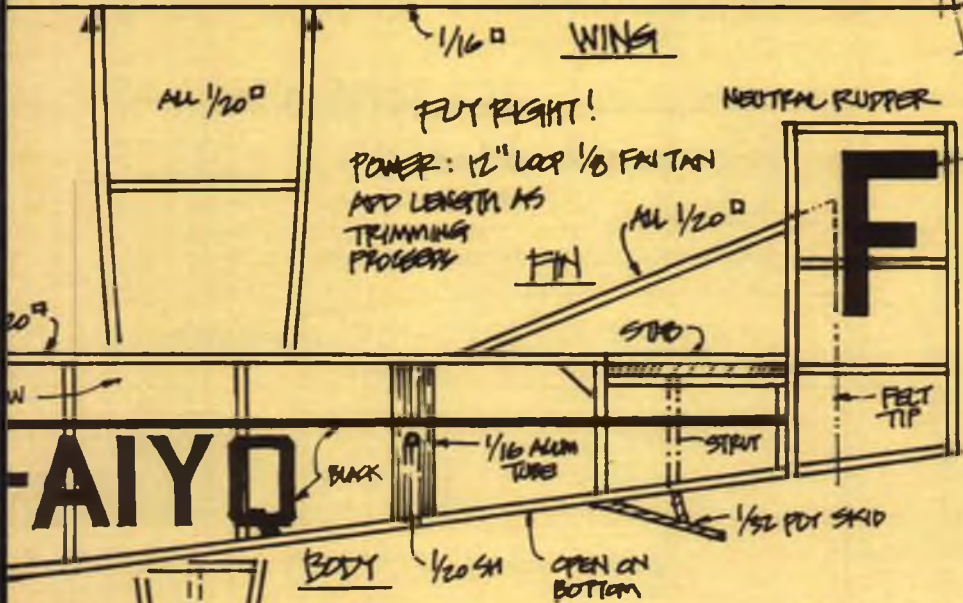
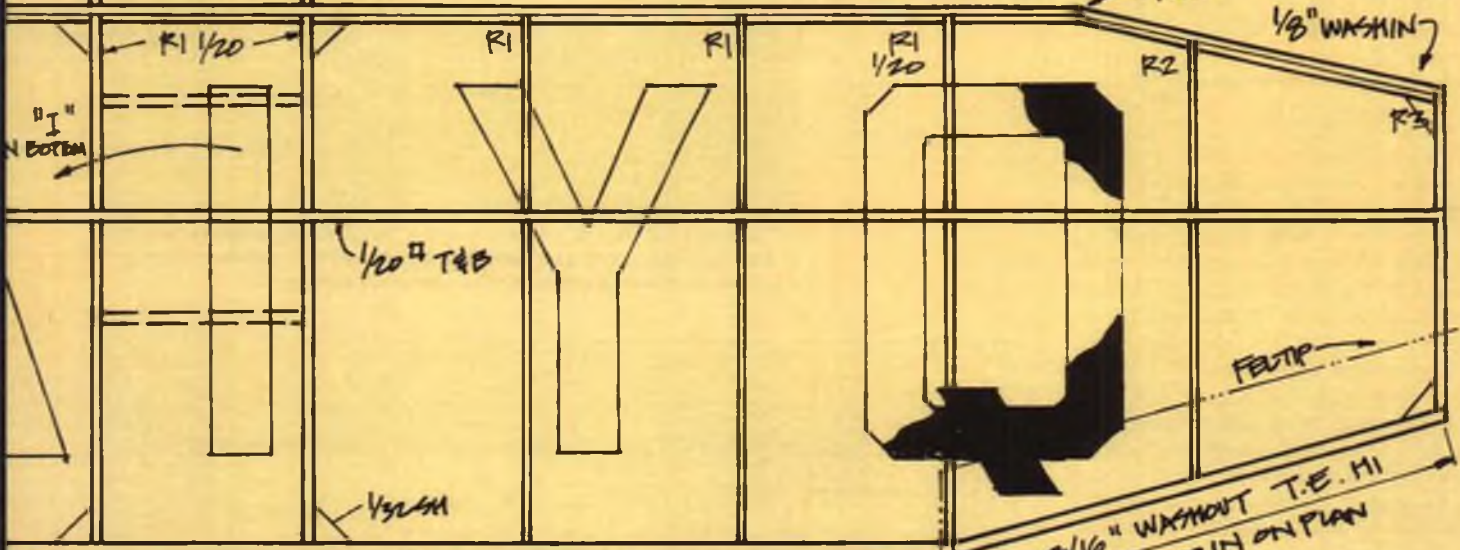


M.I.A.M.A.
 miami indoor aircraft
 model association





USE SMALLEST WILLIAMS BROS CYLINDERS
 9 CYL RADIAL
 120 HP SINGE-
 RHONE "TITAN"
 ADD PISTON IF DESIRED
 MOTOR/NOSEBLOCK



FLY RIGHT!
 POWER: 12" LOOP 1/8 FAR TAN
 ADD LENGTH AS TRIMMING PROGRESS

FOR INDOOR USE 4-6LB Balsa FROM I.M.S. OR M.A.L.

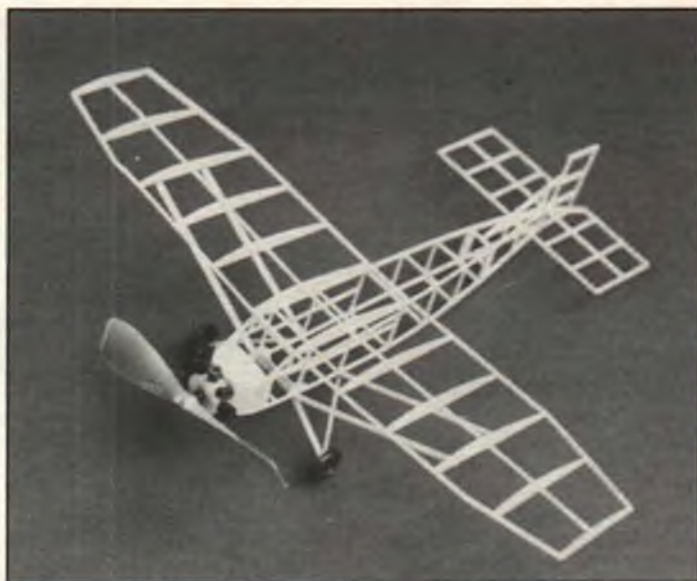
COVER W/ PECK WHITE JAPANESE TISSUE PRE-SHRUNK & IRONED. ADD COLOR TO TOP OF BODY W/ YELLOW TISSUE. ADD STRIPE + LETTERS CUT FROM BLACK TISSUE. USE SM SPRAYMENT TO APPLY.

EARLY FRENCH AIRLINER PROTOTYPE. F.190 AND F.192 (BOWERS ELECTRIC) SIMILAR EXCEPT FOR MOTOR/COLORS THIS F.190 CARRIED PILOT + 4 PASSENGERS AT 115 MPH MAX, CRUISE 100 MPH. 46' SPAN THANKS TO HURST BOWERS FOR SCALE DATA WALT MOONEY LIVES IN ALL OF US!

13" SPAN

PNUT Farman F-190

THE FARMAN F-190 AIRLINER



Nothing complicated about the Farman's framework. The dummy engine detail is essential for scale appearance and is easily replicated using Williams Bros. cylinders or wrapping short lengths of soda straw with heavy thread and painting black.

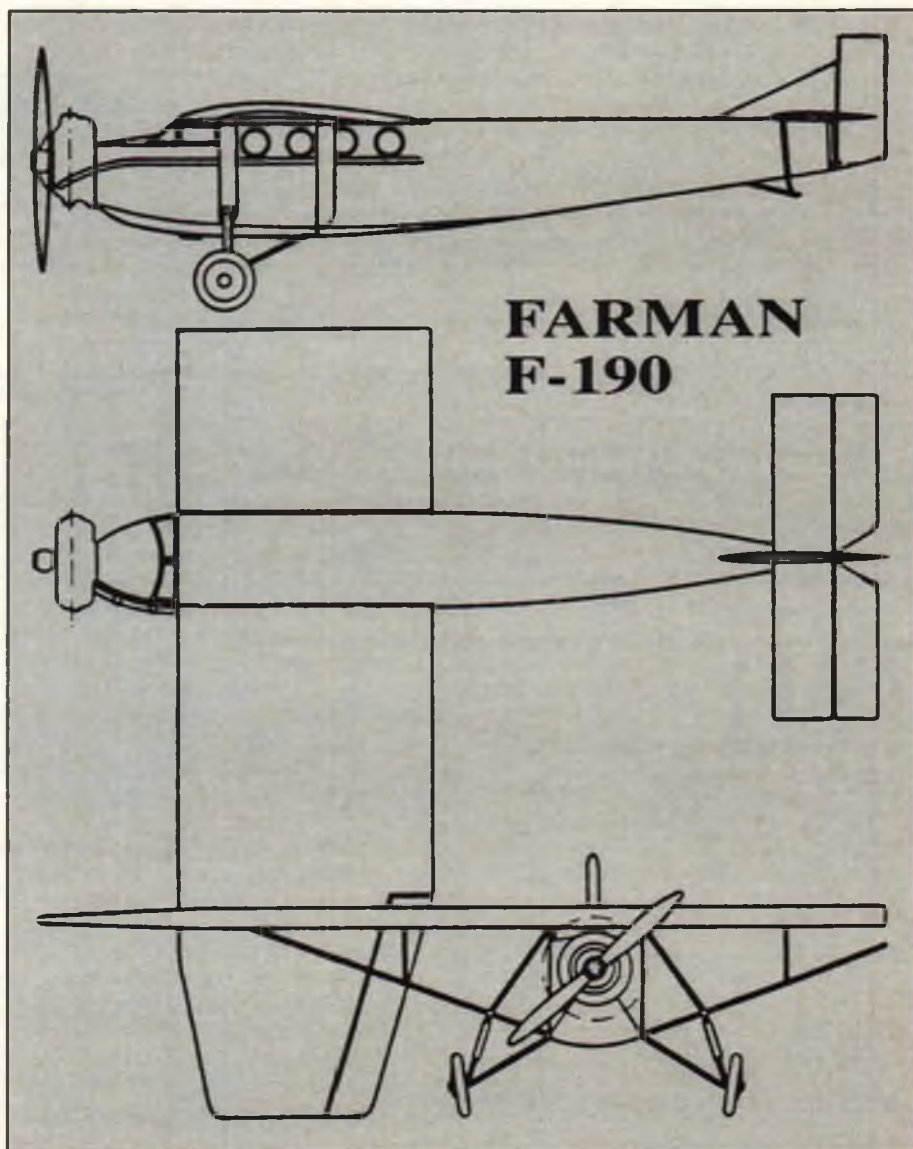
decorations, etc. Be sure to read all of the callouts on the plans and assemble all of the required tools, balsa (use 6-pound stock for indoor, 10-pound for outdoor), tissue, glue and paints (if you choose to airbrush rather than just use colored tissue). Do *not* dope this model—it will warp like a pretzel! Use rubbing alcohol to shrink the tissue, or pre-shrink the tissue on a frame before covering the model. A basic workshop tool inventory would include an X-Acto knife with a #11 blade or broken double-edge blade (be careful!), dressmaker's pins—preferably with bead heads, self-healing cutting board (a scrap of dark artist's mat board will do), glue applicator, fine-point artist's sable brush, and needle nose pliers.

The uncovered framework photo shows the major framework assembled and the plans are fully annotated, so there's no need for step-by-step assembly instructions here.

It's best to add details like I.D. numbers before covering but after any airbrushing of the tissue. Cover the model using thinned white glue. Remember, *no dope anywhere on the model!* A #8 and #5 Micron Pigma India ink technical pen make a great pair for lettering and control surface outlines, etc. It's non-smear and permanent.

We have found that trimming high-wing monoplanes like this one is easier if you build in some down and right thrust, adjusting for a loose right-hand circle in the climb. Outdoors the glide is a minor part of the flight; indoors the prop should turn in cruise until touchdown. The balance point should be as shown on the side view. Add solder under the nose to adjust the balance—we prefer this to greasy clay, though the latter is traditional. Be sure you have the correct amount of wing wash-out at the tips. A bit of wash-in (trailing edge low) in the right wing or a paper trim tab bent down can keep the right wing up in a turn.

Alors, Mon Ami. Le Avion—she will fly. Hold onto your seat as the brave French pilot takes you up into those clear blue skies that inspired the French Impressionist painters. **MB**



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...dedicated to your success!

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The sporty AirCore 40 is a large-format trainer capable of all basic aerobatics, including loops, rolls and inverted flight!

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IF YOU CRASH AND DESTROY YOUR AIRCORE 40™ BEFORE YOU LEARN TO SOLO, WE'LL REPLACE IT, FREE*

Some restrictions apply, so read the fine print below and send for full details of this outstanding program!

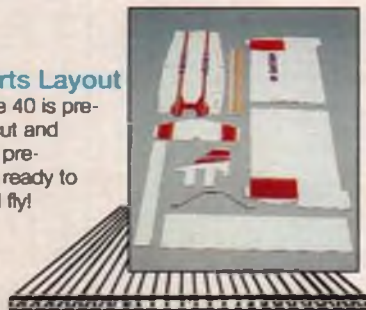
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Who says you have to buy a new radio, engine, battery pack, gas tank, and servos every time you build a new plane? You'll soon want a second airplane, like our Colt 40™ or the exciting Barnstormer™ biplane. The patented Power Cartridge™ (PC) is a slide-in tray included with each AirCore kit. You mount your "expensive" stuff to the PC, and it slides



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AirCore 40 Specifications

- High Lift, Multi-mission Airfoil
- Wingspan - 64"
- Wing Area - 704 sq"
- Wing Loading 18.8 oz/sq"
- Weight - 5.75 lbs
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- Radio required - 4 channel

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AirCore 40 Trainer (pictured above)
"...great first airplane...the AirCore owner is way ahead of the game!" *Model Airplane News*



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Howard Huntington's 1914 "Clam"

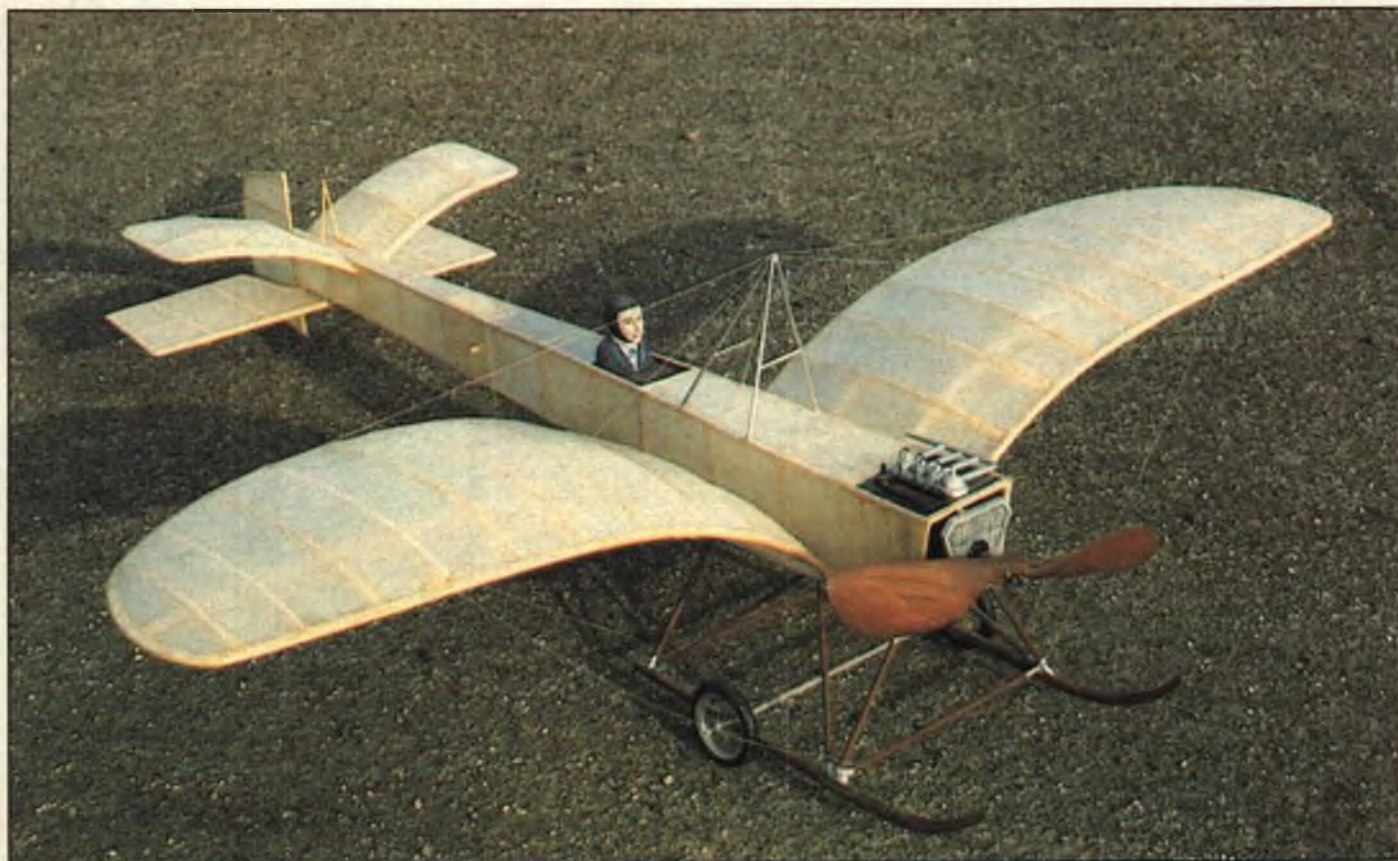
If it's an obscure subject, our author likes it; the Clam fills the bill and is a fine flier, too. Don't let that elliptical dihedral scare you away—it's really not as difficult to build as you might think.

Several years ago, while working as an artist at the *Los Angeles Times*, I dropped in at an employee book sale. I spotted an interesting-looking aviation book which was sitting atop a set of rather boring technical books. The title read *The*

Picture History of Aviation on Long Island—1908-1938. But before I could pick it up, a young woman tugged at my sleeve and informed me that she had already bought the book. Later I met up with her in the elevator and we began to chat. When she told me that she had bought the book for her

boyfriend, I offered twice the price for it, and wound up taking the book home.

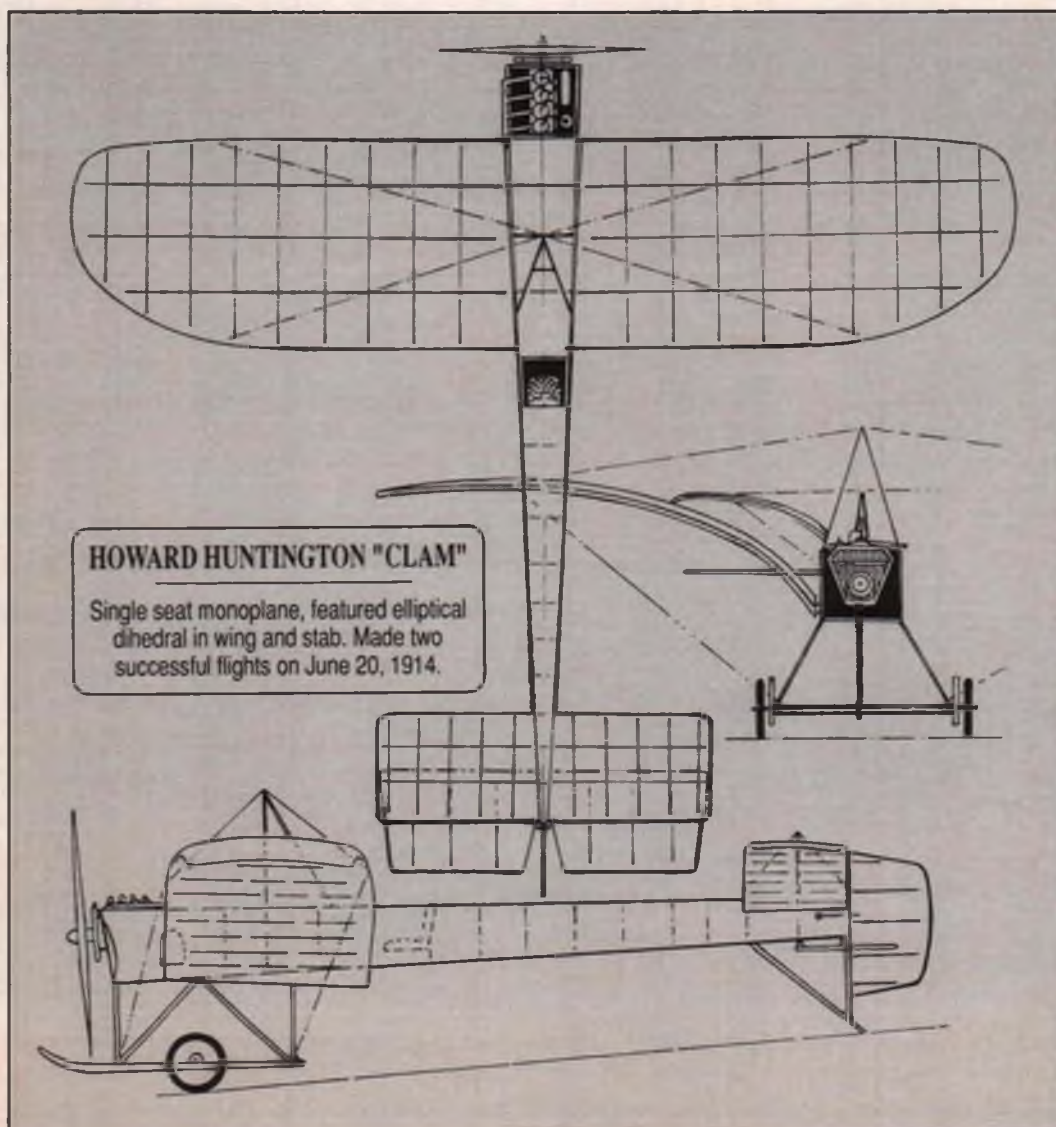
Years later, while searching for an unusual subject to build, I remembered the Long Island book and leafed through it. I found what I was looking for on a page that contained two photos of the efforts of



Free flight scale guys are masters at coming up with unusual subjects, this curvaceous pre-WWI flying machine being a good example. Ken happened to have a pair of 1-3/8 inch Hungarford spoke wheels on hand for his model, but for those less fortunate, a pair of Peck-Polymers 1-1/2 inch black tire/clear plastic hub wheels (#PA101, \$3 per pair) would be a good substitute.



Our author definitely leans toward the weird and wonderful. Ken is best known for his offbeat models—ornithopters, flying saucers, a mogyros, flying wings . . . and Clams.



Mr. Howard Huntington in 1914. The top photo showed a six-winged aircraft, while the other revealed a later version featuring only one wing. The similarity was that both had wings with elliptical dihedral—shaped sort of like a clamshell. The later aircraft was in fact called the Clam. I decided to draw up and build both airplanes.

Of the two, the multi-wing plane was much more difficult to trim. It was grossly tail heavy and required moving the rubber motor forward. Eventually it flew rather well, considering. I was happy with the results.

The single-wing Clam was also fun to build but flew much better. Besides the unusual wing, the plane had a keystone-shaped radiator in front of the engine; the propeller shaft ran through the radiator. A tall metal bracing mast held the wings in position. The horizontal stab was similar in shape to the wing and used the same elliptical dihedral. The center of gravity on the model was at about 65 percent of the wing chord. A higher-pitch propeller was also used.

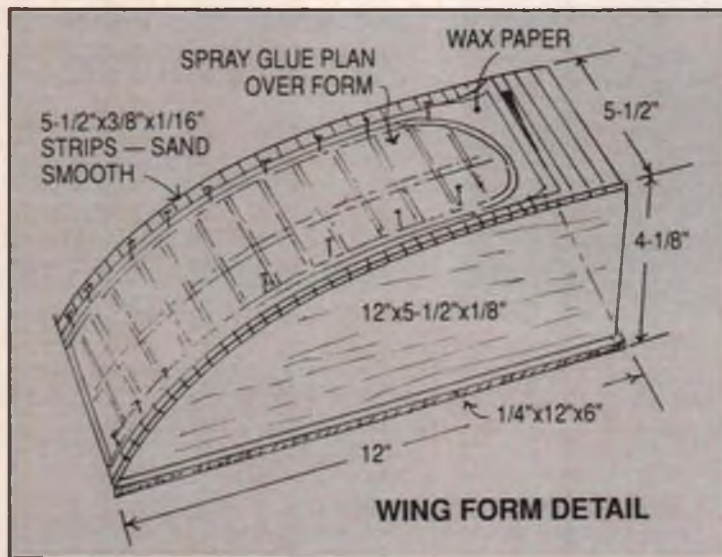
The single-wing Huntington Clam is the model I've chosen for this article. I know you will enjoy building and flying it. Believe me, it will draw a lot of interest at your next scale contest. A scale three-view drawing of the plane is provided here for scale documentation.

CONSTRUCTION

Begin with the fuselage. It is fairly straightforward if not simpler than most models. Use straight, medium-hard 3/32 square balsa for the longerons, and 1/16 balsa sheeting at the front and at the area where the bamboo rubber motor peg goes through the fuselage. The second fuselage side is built directly over the first. When dry, remove the sides from the plan and add a small piece of 1/16 balsa (cross-grain) under the sheeting at the motor peg to add strength.

Assemble the fuselage into a box. Note on the top view that the fuselage sides are a straight taper from the nose to the tail; they do not curve. Add the top and bottom sheeting at the nose and the motor peg. Also add gussets where the wing joins the fuselage, and

1914 "Clam"



sheet the area at the rear where the stab attaches.

The nose assembly is shown graphically on the plan. The dummy engine is made from scrap balsa. Paint it silver and don't forget the key blocks that position the noseblock in the front of the fuselage. See the plan for details on the propeller and noseblock areas. A plastic prop could be used, but I hope you'll build the one shown on the plan.

Make the front landing gear struts from round bamboo; the other struts are 1/16 round hard balsa. Check the alignment to make sure they're at the correct angles before adding the

cross-members. The axle is .025 music wire and is cemented along the bottom of the round cross-piece. The basswood gear skids are wrapped with thread where the parts are glued.

Since it's so easy, build the rudder next. Poke a row of pinholes through the plan and into a piece of 3/32 balsa to get the curved trailing edge.

The wing is built on a curved wing form—refer to the sketch. Get a Xerox copy of both wing plans and cut them out carefully; spray glue the back of one of the plans and burnish it to the wing form. Spray glue a piece of waxed paper over the plan.

Choose several lengths of

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	Tire Dia.	Tire Width	Tire
Width			(Metric)
400TL	4" (102mm)	1.150"	29.21mm
450TL	4-1/2" (114mm)	1.325"	33.65mm
500TL	5" (127mm)	1.500"	38.10mm
550TL	5-1/2" (140mm)	1.700"	43.18mm
600TL	6" (152mm)	1.850"	47.00mm
400TL - 600TL Tires have a 3/16" (5mm) Axle Dia.			

Field Testing Reports

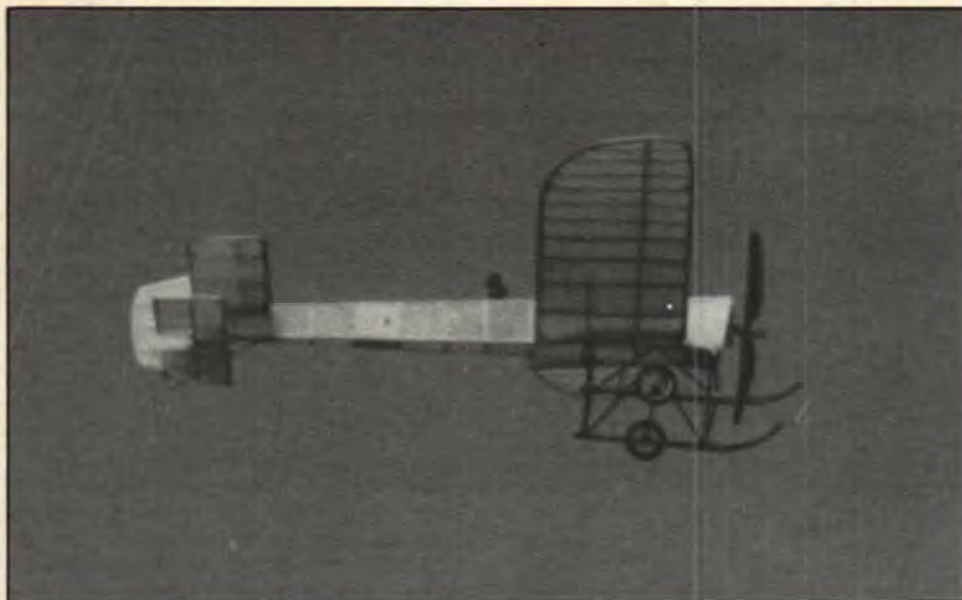
Dan Webb, 1st Place Winner of the Post 1935 Military class competition at Bomber Field, notes:

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Despite its unusual appearance, the Clam is actually a fine flying model. Sure to turn heads at any flying field.

medium-soft 1/8 square balsa for the wing outlines and spar. Soak them in hot water for 30 minutes, sponge-dry with a paper towel and carefully pin the leading and trailing edges onto the wing form. Use care with this because the wood is bending around a compound curve. Pinhole the wingtip outlines through the plan, cut out and cement in position.

Select a number of 3/32x1/8 soft balsa strips, cut to the size shown for the lower wing ribs and cement in position. Take another of the soaked 1/8 square strips and pin it down lengthwise to become the spar. Add small 1/16x1/8 balsa spacers on top of the spar at each rib position. Use a template to cut the wing rib tops from 1/8 sheet balsa and cement them in position at each station. Note that the root rib top piece is angled to make it parallel to the fuselage.

Sheet the outside of the root rib with 1/32 balsa. Add the short spar at the root. Cut and cement the gussets where shown.

Remove the wing from the plan and prepare the form and repeat the building process with the other wing half. Make sure the halves are identical in curve and shape.

The upper tailplane is also built on a form, this one cut from a 3-inch wide soft balsa block. Make a template to the shape of the dihedral curve of the stab and use it to cut six pieces of 3/32-inch thick balsa 3/32-inch wide; these will be the leading and trailing edges and the spar. Xerox the stab plan halves as with the wing, then cement to the form, one half at a time. Add waxed paper. Pin down the leading and trailing edges you have cut and assemble as with the wing. (If you think this is laborious, imagine what fun I had doing this with 12 wing halves for the Multi Clam!) Add the tips and the gussets. Cement a piece of 1/32 sheet balsa to the outside of the root rib and sand flush top and bottom. Remember to angle the root rib to line up with the fuselage side. Repeat with the other stab half.

Sand the entire model carefully and cover with Oldtimer tissue. It is off-white in color and can be purchased from Micro-X Products, Box 1063, Lorain, OH 44055. The wing and stab are covered one section at

a time to assure a good clean look in the covering. Because of the curves in the wing and stab, it is much better and easier to cover in this manner. After all of the parts are covered and water shrunk, spray on one coat of Aerogloss clear dope.

ASSEMBLY

Attaching the wings to the fuselage is a little tricky. Cement a piece of 1/16-inch round bamboo through the fuselage where the front of the wing attaches; cut corresponding holes in the root rib sheeting. Mount each wing with 3-1/8 inches of dihedral under the tip, measured level with the bottom of the fuselage. When dry, make the basswood wing support that cements to the rear landing gear strut. Match the round dowel part on the basswood support to a round hole in the root rib toward the rear of the wing. Set at the correct angle and cement in position.

Make the wing bracing mast. String the flying wires on the wings. I prefer smooth, hairless nylon thread from the local fishing fly-tying store. I thread a small sewing needle and pass it through the wing where the gussets are located; a small dab of cement will hold the thread in place. Draw the bracing wires taught but don't warp the wing by overtightening the wires.

Mount the stab halves by cementing each to the balsa sheeting on the sides of the fuselage. The dihedral is 1-1/8 inches on the stab. Make the stab bracing mast from hard balsa sanded round. Cement the mast to the fuselage top at the center of the stab. String the wires like the wings.

Build the lower horizontal elevator and cover it. Mount it to the fuselage using the small spacer blocks shown. Make sure the elevator is square to the fuselage.

The propeller blades are cut from 1/16 medium-hard balsa. The blanks are soaked in hot water for 30 minutes and taped around a 3-inch diameter can at a 15-degree tilt from vertical (top to left) and baked at 300 degrees for 30 minutes. The hub is made of basswood. Drill the center hole and cut the pitch angles on each side, align the blades and glue them to the hub.

FLYING

The Clam should be ready for flight testing now. Check to make sure the surfaces are free of warps. The balance should be at about 65 percent of the wing chord (with no rubber in the plane). Make up a motor of 3/16-inch rubber, one loop 14 inches long, lube it and insert in the model. Test fly on about 300 winds. My model needed only a 1/32-inch shim of downthrust to make it fly. Add clay where needed. Test-fly over high, soft grass if possible. I don't like rebuilding models that come down on hard ground or rocks—I trust you feel the same. When you take the Clam to a contest, don't forget to take along the three-view to authenticate it. Good flying! *MB*



Our author launches for another great flight. The scene is Mile Square Park in Fountain Valley, California, and the occasion was the Flightmasters 49th Annual Free Flight Scale meet this past December.

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5.5 X 2	1.59	8.5 X 7.25	5.395	11 X 4	2.49	12.5 X 11.5	7.995	14 X 14N	10.1295	18 X 16	22.00	22 X 14	45.00
5.7 X 3	1.59	8.5 X 7.5	5.395	11 X 5	2.49	12.5 X 12	7.995	14.4 X 10.5	10.1295	20 X 8	12.2500	22 X 16	45.00
6 X 2	1.59	8.75 X 7.0	5.395	11 X 6	2.49	12.5 X 12.5	7.995	14.4 X 12	10.1295	20 X 10	25.00	24 X 10	55.00
6.3 X 4	2.395	8.75 X 7.5	5.395	11 X 7	2.49	12.5 X 13	7.995	14.4 X 13	10.1295	20 X 12	25.00	24 X 12	55.00
6.5 X 2.9	2.395	8.75 X 8.0	5.395	11 X 8	2.49	13 X 6	4.25	14.5 X 14N	10.1295	20 X 14	25.00	24 X 14	55.00
6.5 X 3.7	2.395	8.75 X 8.25	5.395	11 X 9	2.49	13 X 7	4.25	14.5 X 14.5N	10.1295	20 X 16	25.00	24 X 16	55.00
6.5 X 5.0	3.395	8.75 X 8.5	5.395	12 X 6	2.89	13 X 8	4.25	15 X 8	10.1295	21 X 12	25.00	3 Blade Hub 17 - 19	54.00
6.5 X 5.5	3.395	9 X 4	16.199	12 X 7	2.89	13 X 9	7.995	15 X 10	10.1295	22 X 8	31.00	3 Blade Hub 20 - 21	66.00
6.5 X 6.0	3.395	9 X 5	16.199	12 X 8	2.89	13 X 10	7.995	15 X 11	10.1295	22 X 10	13.3100	3 Blade Hub 22	78.00
6.5 X 6.5	3.395	9 X 6	16.199	11 X 10	7.995	13 X 11	7.995	15 X 12	10.1295	22 X 12	13.3100	3 Blade Hub 24	108.00
7 X 3	15.159	9 X 7	1.99	11 X 11	7.995	13 X 12	17.995	15 X 13N	10.1295	22 X 14	31.00		
7 X 4	15.159	9 X 8	1.99	11 X 12	7.995	13 X 13N	9.795	15 X 14N	10.1295	22 X 16	31.00		
7 X 5	15.159	9 X 9	1.99	11 X 12W	7.995	13 X 13.5N	9.795	15.5 X 13N	10.1295	24 X 10	38.00		
7 X 6	15.159	9 X 10	1.99	11 X 13	7.995	13.5 X 9	7.1295	16 X 8	12.95	24 X 12	38.00		
7 X 7	15.159	9.5 X 6.5N	5.395	11 X 14	7.995	13.5 X 10	7.1295	16 X 10	12.95	24 X 14	38.00		
7 X 8	15.159	9.5 X 7.0N	5.395	11.5 X 4	8.289	13.5 X 11.5N	7.1295	16 X 12	12.95	24 X 16	38.00		
7 X 9	15.159	9.5 X 7.5N	5.395	12.25 X 3.75	8.349	13.5 X 12.5	10.1295	16 X 13N	10.1295	2 Blade Hub 18 - 19	30.00		
7 X 10	15.159	9.5 X 8.0N	5.395	12 X 9	7.995	13.5 X 13.0	10.1295	16 X 14	12.95	2 Blade Hub 20 - 21	35.00		
7.625 X 3.25 14	3.95	9.5 X 8.5N	5.395	12 X 9W	7.995	13.5 X 13.5	10.1295	16 X 16	12.95	2 Blade Hub 22	40.00		
7.8 X 4	3.95	9 X 6.5	5.395	12 X 10	7.995	13.5 X 14	10.1295	16 X 16	12.95	2 Blade Hub 24	60.00		
7.8 X 6	6.395	9 X 7.5	5.395	12 X 10W	7.995	14 X 5N	12.95	9 X 6P	3.95				
7.8 X 7	6.395	9 X 8.5	5.395	12 X 11	7.995	14 X 6	12.95	10 X 6P	3.95				
8 X 4	14.179	9.5 X 4.5	11.229	12 X 11W	7.995	14 X 8	12.95	10 X 7P	3.95				
8 X 5	4.179	10 X 3	2.29	12 X 11.5	7.995	14 X 10	12.95	11 X 6P	3.95				
8 X 6	4.179	10 X 4	2.29	12 X 12	7.995	14 X 10	12.95	11 X 7P	3.95				
8 X 7	4.179	10 X 5	2.29	12 X 12.5	7.995	14 X 11	17.1295	14 X 6P	12.95				
8 X 8	4.179	10 X 6	2.29	12 X 12N	7.995	14 X 12	10.1295						
8 X 9	4.179	10 X 7	2.29	12 X 13	7.995	14 X 12N	10.1295						
8 X 10	4.179	10 X 8	2.29	12 X 13N	7.995	14 X 13	10.1295						
8.5 X 5	4.395	10 X 9	2.29	12 X 14	7.995	14 X 13N	10.1295						
8.5 X 5.5	4.395	10 X 10	2.29	12.5 X 9	7.995	14 X 13.5	10.1295						
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PRODUCTS IN USE

■ By Eloy Marez

THE DIGIPACE 3 FROM ACE R/C

Don't call it a "cyclier"! Ace's Digipace 3 is more properly referred to a "battery management system," a microprocessor-based instrument that takes the guesswork out of the care and feeding of your all-important RC system NiCds.

There is nothing that we RCers can do to insure the proper operation of our electronic equipment other than to care for the rechargeable NiCd batteries. This includes not only proper charging, but the periodic accurate measurement of their operational capacity, obtained by discharging the previously charged battery at a known constant rate and measuring the time required for the voltage to drop to 1.1 volts per cell, the established point at which NiCds are considered too low to provide usable power. *Operational* capacity differs from a battery's *rated* capacity, which is the figure established by its maker as the amount that a cell in good condition should furnish under normal use.

In the RC world, this process has come to be known as "cycling." The term is actually incorrect, as the word "cycle" is normally used to describe a complete sequence of events; charging and even partially discharging a battery in normal use constitutes a cycle. Discharging it as described under controlled conditions for test purposes can best be described as "analyzing" or "measuring capacity." This is a recognized method of gauging the worth of a given NiCd battery, and is the task of the latest member of Ace R/C's "Digipace" family, the Digipace 3, which Ace refers to as a "battery management system."

In addition to a modern-style case that allows the unit to sit on its front or on its base or to be stacked with other similarly packaged Ace products planned for the future, the Digipace 3 features modern microprocessor circuitry and the functions that previous experience proved to be the most needed. The 1/2-inch LED digital display is bright and readily visible, and all switches are logically labeled for foolproof operation. The instructions are clear and complete, although modelers with previ-



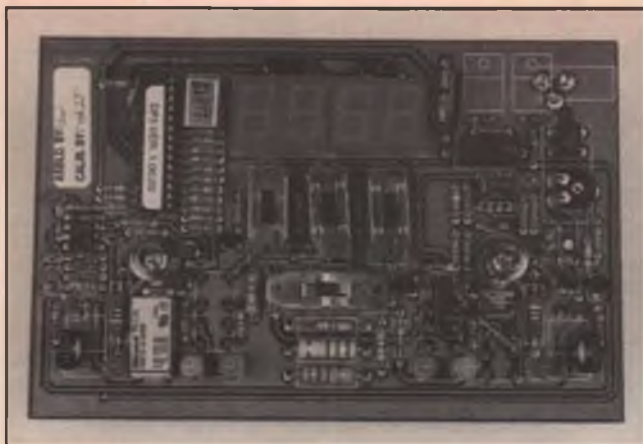
The new look in Ace R/C's electronic products is seen first in its Digipace 3. However, with its modern microprocessor circuitry, it's not just another pretty face.

ous experience with any similar instrument will understand its operation almost immediately.

The Digipace 3 is intended to process those batteries most used by the RC flier: four and five-cell receiver and eight-cell transmitter NiCds. Batteries are discharged at a 360 mA rate down to the recommended 1.05-1.10 volts per cell, then charged for 16 hours at 70 mA for the transmitter and either 35, 70 or 140 mA as selected for the receiver batteries. After the charge cycle, the unit automatically

switches to a 10 mA trickle charge rate, at which the NiCds can be left connected indefinitely. Conditioning NiCds in this cyclic manner serves to eliminate internal problems caused by incomplete discharging and incorrect charging, a phenomenon usually referred to as "memory."

During the above operations, the LED digital display first provides the discharged battery capacity in mA_H (1 to 1999), and then the time remaining until the subsequent charge period is ended. This is the first Digipace to display battery capacity;



The new Digipace 3 is as simple to operate as such a device can be, the reason being that it is more than slightly complicated circuitwise, as seen here.

previous ones simply measured the discharge time, after which the actual capacity was obtained by multiplying time by the rate of discharge. However, should the discharge time be needed for some reason, simply divide the milliamps displayed by 6; the results are in minutes.

Three LEDs indicate the present status of each battery connected: Discharge (red), Trickle (yellow) and Normal (Green). The latter is in reference to the charge cycle.

Battery input connections are made with common coaxial power plugs of the type generally used to connect a charger to a transmitter. Ace furnishes two such connectors, including instructions on how to mate them to those connectors required by your particular radio system. Polarity is important; the center pin of the plug is the positive connection. Reversed connections can be expected to cause damage to the unit and/or the batteries.

Power for the Digipace 3 is furnished by an external wall-mounted transformer (20VAC, 800 mA) which plugs into the right side of the case with one of those coax connectors just mentioned. Personally, I like switches instead of plugs to turn things on and off; I added one to my Digipace 3 on the side, next to the power input socket. To connect a switch, it's necessary to remove the socket from the PC board and reinstall it with the center connector not soldered to the board. The switch goes between that connector and its original land on the board.

How often should one "cycle" NiCd batteries? Well, like most everything else, there is some controversy and differences of opinion. You'll hear from some that it should not be done too often, as it uses up one of the battery's life cycles. But good quality NiCds are rated at 1,000 cycles—almost three years of weekends, so in the interest of safety and reliability, I think we can sacrifice a cycle now and then! Personally, I like to do so every three or four months, and definitely if the NiCds have not been used for some time. In addition, you should remember to charge them for a couple of hours every month or so.

Another important piece of information the Digipace 3 can furnish is the exact flying time for a given NiCd in a given airplane. Note that this information is good for only one airplane, as different ones have different current drains, which is influenced by the number of servos, the quality of your control installation and even the airspeed and how nervous you are on the sticks.

To obtain this important bit of data, run the NiCds through to obtain their charged capacity. Now comes the good part: go flying! Only this time, keep an accurate record of the radio "on" time. Afterwards, and without recharging, discharge the battery to obtain remaining capacity. Say you started with a 1,200 mAh battery, and after flying 30 minutes, had 800 mAh remaining. Some simple math tells us that the consumption (400 divided by 30) is 13.33 mAh per minute. Dividing that into 1,200 gives us 90 minutes of available flying. Don't push it to the minute, though—best to err on the safe side.

Keep in mind that some transmitters have a diode in the charging circuit that will prevent you from discharging its batteries. The diode will have to be removed



Should you prefer an on-off switch to installing and removing the power plug, one can be added simply, as seen here located just under the power plug. Details in text.

or bypassed, or the batteries removed and appropriate connections made (remember that important polarity). You will, however, be able to charge, both normal and trickle, these batteries as in no-diode transmitters.

The Digipace 3 is available now, is retail priced at \$149.95, and comes with a lifetime warranty (I love it!). It is a well-designed instrument that will provide you with worry-free flying as far as your NiCds are concerned, and properly used, may even extend the life of your favorite bird! **MB**



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Designed by Nick Ziroli, as seen in January 1994 Model Airplane News!!!



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DEAR JAKE

Advice for the Propworn

DEAR JAKE:

I am tired of looking at truly ugly model airplanes. Do you think the ARA could look into outlawing tastelessness in model airplane designs and color schemes?

I am not overreacting here. You've seen them, too, haven't you? Horrible boxy things with misshapen surfaces and grotesque proportions. Or worse, so sleek and streamlined and contoured that they don't even look like airplanes anymore.

And what colors! If my eyes could wretch, I'd have to clean the inside of my glasses. Purple and green with pink trim. Day-glo oranges, neon yellows, and electric blues. It's enough to recycle your lunch.

This has got to stop! Whatever happened to classic lines and understated paint schemes? It's too late for television, movies, and magazines that have all degenerated into garbage, but can't we legislate some old-fashioned good taste into

modeling before shrink coverings are available in the same plaids as golfers' pants? Concerned Citizen in Council Bluffs

Dear Concerned:

You self-appointed watchdogs of good taste really give me a pain!

Haven't you ever heard that beauty is in the eye of the beholder? If I want to put a constant-chord, straight wing on a sailplane with swept and tapered tail surfaces, then I have the God-given and Constitutional right to do so. And if I want to paint that airplane chartreuse with lavender polka dots and put a blue Smurf doll in it for a pilot, then I can do that, too, and make two of them if I feel like it.

If you happen to find such an airplane offensive, then you don't have to look at it! (In which case I would appreciate it if you would return the photos of my new design, the "Soar Spot.")

Taste is a very personal thing and people should just butt out of other people's likes and dislikes. I once went to a diner and ordered vegetable soup, pancakes with sausage, and a chocolate milkshake. Everyone else there, including the waitress taking the order, went "Blech!" Well, what's their problem? They didn't have to eat it, I did!

And even though it was "Blech," I had every right to give myself those cramps for a week.
Jake

DEAR JAKE:

What kind of helicopter was it that was used to transport injured soldiers on the popular TV series M*A*S*H? Austin in Rockport, ME

Dear Austin:

It was an Army helicopter.

Jake

DEAR JAKE:

Jeez, you're a moron! Of course it was an Army helicopter. The "A" in M*A*S*H stands for Army. I was asking what manufacturer and model number the helicopter was, and as usual, you were no help at all. So, never mind. I asked somebody else and they told me the correct answer was Bell 47.

Austin Again

Dear Austin:

That's only a partial score. The complete outcome was Bell 47, Sikorsky 55.

Jake MB

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FREE FLIGHT

BY BOB STALICK

●Mystery Models—Help!

●Mel Chafin's "Whirly" P-30

●AME Engine Tests

Time changes our perspectives on what's important about our lives and our hobbies. When I first started writing this column in January of 1974, later relinquishing it to Tom Hutchinson, only to re-acquire it in January 1982, both of us carried on several continuing features each month. We had the Darned Good Airfoils (DGA), the Three-View of the Month, and the Mystery Model. Over the years, we used up all of the good, reasonably good, and downright ugly free flight airfoils. The differences among those being published became more and more esoteric. Soon, it was time for this feature to end.

Now, as I continue to search old issues of magazines for unusual but reasonably familiar Mystery Models, it has become apparent that the more obscure designs are remembered only by an ever-diminishing minority of column readers. And almost all of the more popular but unusual designs have already been featured. Consequently, the time has come to reassess the monthly Mystery Model feature. Beginning with this issue, it will become an irregular column feature. What I hope to do is to solicit suggestions from you readers for these mystery ships.

The general guidelines I've



Here's Mel Chalk, designer of the Whirly, this month's featured model, showing off his Captain Wakefield Winner. The site is Harts Lake Prairie, Washington.

followed over the years are these:

1. The model must be a free flight design from the Nostalgia period until the present.

2. The model must be unique and easily distinguished from other designs.

3. If possible, the model should have some unique spot in the history of free flight, or its designer should have done

something to distinguish him (or her)self.

4. The model should have been built in some numbers or should at least be able to be identified by more than just a few die-hard free flight historians like me.

If you can find a design that fits this description, send a clean copy of the complete magazine article with the plans

included. You will be mentioned as the contributor, and the person whose name is pulled from the hat will still win the one-year subscription to *Model Builder*. Suitability of the design for this feature will rest with the columnist (that's me).

If you want to know what I feel was the perfect Mystery Model feature, it was the Martian Space Ship, by Roy Clough. This unusual design drew comments and guesses from



The lineup of SAM 27 members with their .020 models, both old Timers and Nostalgia's. Many different types are represented. According to Wes Funk, who submitted this photo, the fliers pictured are Jerry Raska, Wes Funk, John Carlson, John Hiebear, Rick Maddox, Ray McGowan, Dick O'Brien, Rod Parsons, James Terry, Tim Malsberry and Rocco Ferrario.

FREE FLIGHT



Nice photo of a Vic Smeed designed Chernub, as modeled by Mike Parker of Great Britain. It's powered by a scaled-down Mills diesel of .048 cubic inch displacement. These engines are produced in Russia and are known as "Milliskis" in Britain.

design to a fine edge. Always a strong competitor in rubber events, Mel designs and builds his own models, which he then trims out well and flies competitively. The Whirly is one such model. If you are looking for a simple design that not only flies well but will give you that "wow" factor when it dethermalizes, the Whirly might just be your choice. Full-size plans are available through *Model Builder* plans service.

AME ENGINE TESTS

If you're like me, you're always on the

lookout for the latest engine or device to buy and experiment with. Recently I saw the advertisements for the AME .049 engine. It was just another 1/2A Russian engine, I thought, and since I have several VA engines, another one in the collection, even at \$29 apiece, didn't have much appeal. Then I read the most recent issue of the *CIA Informer*, where noted power flier Gil Morris relates his experiences with the engine. Here's what Gil has to say:

"After breaking in my AME using two additional washers, a Glo-Bee SRX plug, 60 percent nitro fuel and a Poti 1/2A prop trimmed to 5-1/4 inches diameter, it turned 27,500 rpm. With 40 percent nitro, it turned 26,500. With a 5-1/2x2 APC cut down to 4-1/2 inches and 60 percent nitro fuel it did 32,000.

"I used the 4-1/2 inch APC prop and 20 percent fuel for break-in with about 20 runs of 2 minutes each. First, I hand-lapped it with the piston in upside down to accentuate the taper in the cylinder. Also, I had to chamfer the bore in the casing for the crankshaft since the shaft fillet was riding on this sharp edge. It is a great engine! Better than

either the VA or the second batch of Stels. I think Norm Poti said he is getting 27,500 rpm with 50 percent nitro and his 1/2A prop cut down to 5-1/4 inches on his Galbreath C.S. engine. I plan to get another AME."

So, I ordered an AME for myself, and it arrived just in time to do a quick preview for this column. The engine comes in a bubble package and is fitted with an expansion chamber muffler, which is easily removed. It also has a spring starter that hooks up to the back of the drive washer. The engine itself has a cast type case and some excellent machining.

As far as specifications go, the AME weighs in at 44 grams sans muffler and starter spring. For comparison, the Cox Tee Dee .049 weighs 48 grams. The AME case is slightly larger than the Tee Dee case, but it will fit either the Kraft type glass-filled nylon mount or a Tatone-type aluminum mount, if you do a bit of filing on the T-mounts first. The AME's beam lugs are identical to the Tee Dee, but the backplate cover is larger in diameter than the Cox, so the KK ring mounts do not fit.

The workmanship on the AME engine is excellent, and the price is very competitive. According to Gil Morris, the engine also performs very well. So, where do you get these hot rocket engines, you ask? A company called Northern Velocity, Ltd. Call (800) 665-9575.

TEXAS TIMERS PRICE INCREASE

By the time you read this announcement, Hank Nystrom, proprietor of Texas Timers, will have raised the price by about \$2 per timer. You may still be able to buy some at the old price from your local hobby dealer. Even with the minimal price increase, these little jewels are a really good buy, and Hank's selection only continues to increase. With good selection and superb quality, it's products like these that keep our free flight hobby going strong. Your support is essential. For a complete price list, send a dollar to Hank Nystrom, 3317 Pine Timbers Dr., Johnson City, TN 38604.

FINDING NOSTALGIA ENGINES

I receive a number of letters each month from modelers who are either re-entering the hobby after a vacation of some length or who are newcomers to free flight modeling. Invariably, the questions contain a request for information about how to build, how to trim or how to find engines and other components. Answers to these questions get somewhat routine after

continued on page 84



Good action shot taken by Charlie Reich at the '95 SAM Champs shows Hal Cover getting his Kraft Hi-Fly off for another max. Hal flew the ship in Class C Nostalgia with a Johnson .35, then swapped the .35 for a Johnson .29 for A-B Nostalgia, taking 1st place in both classes.



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ELECTRONICS CORNER

BY ELOY MAREZ

•Adapting Airtronics Servos to Other Brands of Receivers

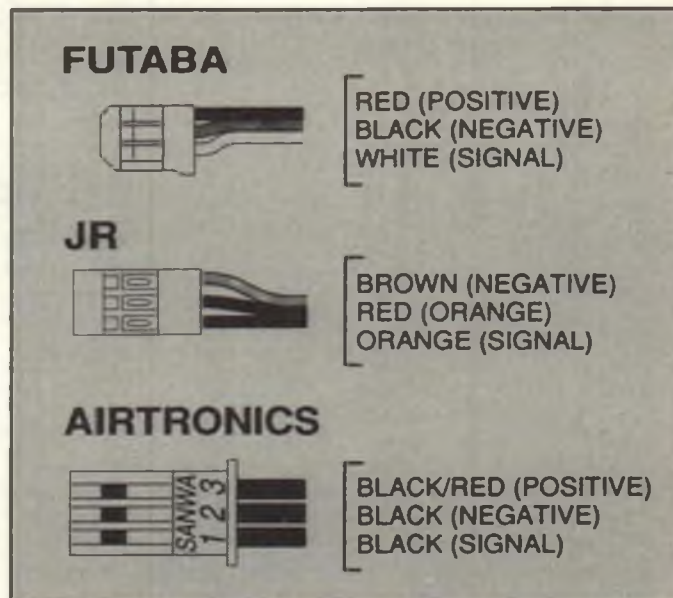
•On-Board Lights: A Low-Drain Circuit for Lighting High-Intensity LEDs.

We recently learned that the well-known and talented Chip Hyde is no longer associated with or flying the JR/Horizon Hobby Distributors colors. Along with countless others, we have enjoyed watching his fantastic skills both in competition and in exhibition flying. As of this writing, we have not heard that he is or will be associated with any other RC company, but we certainly want to wish him luck in any and all future RC associations.

THE CHANGING OF THE PLUGS

Airtronics plugs are *not* being changed, rumors to the contrary. At least not right away, and I have this straight from the appropriate part of the horse—although they are considering it and will probably change in the distant future. The change will involve the polarity of the plugs. Right now Airtronics connectors use a Signal-Negative-Positive sequence, while the other major brands use a Signal-Positive-Negative wiring order. This inconveniences those who wish to mix Airtronics servos with other receivers but don't know how, or are reluctant, to make the wiring changes necessary.

I know some of you are thinking, *Well, they oughta be all the same anyway.* Possibly there is some logic to that statement from our (the user's) end, but none from the other side. Chevy parts won't fit your Beemer, and closer to home, K&B parts don't fit your O.S.! Why then should we expect standardization of servo plugs?



The servo connectors as used by the three major RC system manufacturers, showing the mechanical and electrical polarization.

I would also like to point out that it has always been that way. In the early days of RC, equipment manufacturers bought plugs from other branches of electronics and soldered on their own wiring. Even then, they didn't all use either the same plugs or the same wiring sequence.

Changing the polarity sequence of an Airtronics servo plug is one of those tasks that's simple and can be demonstrated in minutes, but telling how to do it can be a bit more complicated. Let's give a try.

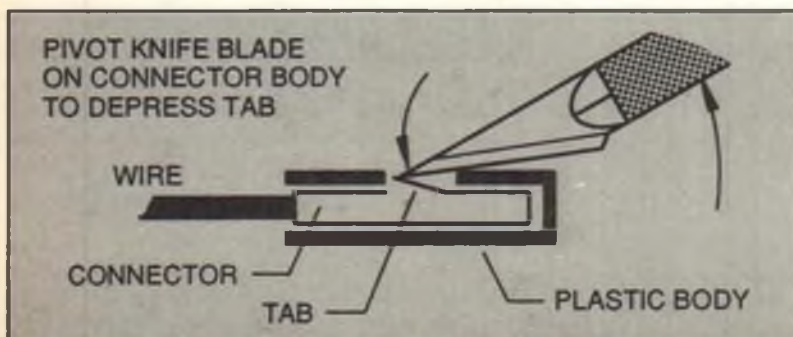
The servo plug is the male plastic piece that is inserted into the receiver receptacle. Some confusion can easily creep in during such a discussion in that while the plastic piece is male, the individual metal connector inserts they house are always female. It's important to keep this gender straight.

In referring to the metal inserts, all modern servos use one of two types: those that have a metal tab that keeps them in place, preventing them from backing out of the

plastic when they are plugged into the receiver; and ones for which the locking device is part of the plastic plug body. Airtronics plugs are of the first type; all other brands are of the second type. This precludes the possibility of removing the individual wires and connectors from an Airtronics (Sanwa) plug and inserting them into the plastic body of some other brand—they simply won't lock or stay in place.

However, all is not lost. The problem has been solved for us by the makers of RC car accessories, who face the problem of matching their electronic speed controls and servos to even more brands of radios than are commonly used in RC airplanes. They have evolved replaceable plastics, fortunately all of which are designed for the Airtronics type of tab-equipped fittings. These plastic pieces are readily available at the RC car counter of most hobby shops. There are a few brands available so I can't tell exactly what you will run into—just ask for servo plug plastics.

These plastic plug bodies are all mechanically polarized—that is, they can be easily inserted in only one orientation. Refer to the



Eloy's suggested method for removing the metal connectors from Airtronics servo plugs without distorting and possibly breaking the locking tab. Fully discussed in text.

sketches of the various popular servo connectors. In addition, most use multi-colored wires, generally red for positive, black for negative, and white for signal. The two exceptions are JR, which uses brown for negative and orange for signal; and Airtronics, which uses two black wires and one red-striped black wire. However, to clarify things, the Airtronics connector also bears some numbers as seen in the sketch.

The task here is to remove the metal connectors from the Airtronics plastic pieces and insert them into the proper ones to mechanically mate with your brand of receiver. It's an easy job, but there is a correct procedure for removing the connectors, which should be followed to prevent irreparable damage to them. Looking at your Airtronics connector with the metal connectors showing, locate the metal locking tab. It needs only to be depressed to release it from the plastic, allowing it and its attached wire to be withdrawn. The trick is not to over-depress the tab, as it has to be bent back up in order to lock in the new plastic, and bending it back and forth will eventually cause it to break off.

The tab can be depressed with any small pointy object; I find a #11 X-Acto blade to be just the thing. Rest the knife blade against the plastic body and gently push the point down against the metal tab, while at the same time pulling gently but firmly on the wire. When the tab is depressed far enough, the connector and the wire will slip out of the plastic.

Using the same knife blade, the tab should now be raised just a tad, enough so that it will lock when inserted into the new plastic, but not so much that it sticks up and out of the cavity. One or two tries will make you an expert. Obviously, when inserting the Airtronics fittings into the new plastic of your choice, you must follow the proper electrical polarization. It's a good idea to have an original connector on hand to check against.

Yes, I know you can carve the plastic body pieces to make them fit any and all receivers, but I won't go into that for a couple of reasons. One is that chopping on things is simply not my way of doing things; another is that removing the mechanical polarization makes the plug susceptible to being plugged in backwards, and I know you won't like the results. In all things dealing with flying, the sure way is always the best way.

Airtronics female plugs, the other end of the above connectors (as used on chargers and switch harnesses), cannot be changed in this or any other manner, as the metal connectors are molded in or otherwise not removable from the plastic body. You'll have to either replace the whole item or purchase or make adapter cables. Adapter cables are available from Ace R/C; others are produced by Custom Electronics. Ace can also furnish the Custom Electronics Universal (female) connector, which can be configured to be electrically and mechanically compatible with popular RC systems. The CEU, as it is called, is available both with and without wires.

CaRa PRODUCTS REVISITED

I'm glad to report that Ralph Croaning and his company, CaRa Products, discussed here in a couple of previous columns, is alive and well and is still producing and servicing an excellent line of lead-acid and NiCd chargers. Ralph and company moved to Ohio from a previous location in South Dakota, and we lost contact—the subject arising after a reader reported that his defunct CaRa charger had been returned by the post office as undeliverable, and we went on a search. The current address is CaRa Products, 121 Urban Dr.,

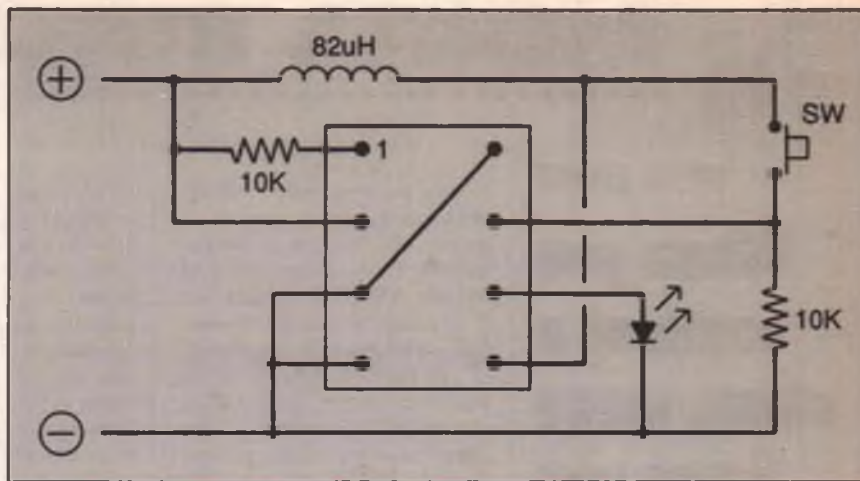
Painesville, OH 44077; (216) 639-8274, should you be in the market for a good charger or need one of theirs serviced.

"NEW AND IMPROVED"

That overused phrase often means just that when it comes to consumer electronic products; we see an almost constant improvement in all high-volume items like TVs, computers, telephones, etc. Some of this technology eventually trickles down to us RCers, in that we often benefit from new circuitry and components that were originally developed from something else. Two areas that the electronic industry is placing a lot of emphasis on are visual displays and energy management. Visual displays include everything from thinner television and monitor screens to the lowly LED (light emitting diode), while energy management deals not only with better batteries and chargers, in the case of rechargeables, but also in the more efficient use of the stored energy.

We've become used to seeing LEDs in a lot of our equipment, from transmitters to electronic speed controls. They've found another use as lights for wing, tail and strobe applications, and as actual position indicators for those brave souls who like to do their flying after the rest of us go home—i.e., at night. Like everything else, LEDs consume electrical current, a significant amount in some cases, and various methods have been used to reduce it and thus increase battery life.

This month we have such a



Using a Maxim Integrated Products MAX 778 IC, this circuit will light a high-intensity LED for 35 hours from a single AA alkaline cell; useful for position lights and even night flying.

circuit for you. It is designed to operate with a single alkaline cell, and to operate LEDs that normally require higher voltages; those designated as "high intensity," which also means they normally consume more current than the common garden variety LED.

The circuit is simplicity itself, taking advantage of the complexity of an IC (integrated circuit) that was actually intended for other applications. In addition to the IC, only two resistors, one capacitor and an inductor are required. You can't get much simpler than that—especially in a circuit that will light the LED at maximum brightness for 35 hours continuously from a single AA alkaline cell.

The circuit is self-explanatory, requiring no adjustments or tuning, and can be assembled on one of Radio Shack's pre-etched, pre-drilled printed circuit boards. High-intensity LEDs are available from most electronic suppliers, including one listed by Radio Shack (276-087); Maxim Integrated Products can be contacted at (800) 998-8800 for spec sheets and suppliers.

Have you a useful circuit that you would like to share with your fellow RCers? If so, send it in, with all pertinent details. We will publish it, with credit of course, and not only will you be lending a hand to some perplexed tinkerer somewhere, you will be forever immortalized here in the pages of EC! Eloy Marez, 2626 W. Northwood., Santa Ana, CA 92704. MB



MODEL BUILDING 101

BY J.J. LEVINE

When you conduct a class, many times you learn more than you teach.

Not too long ago we had the privilege of instructing approximately 250 seventh grade students to successfully build and fly MB101's Tennyson Step Two (T-2) plane. It was an interesting and informative experience.

For the first time, we incorporated aerodynamics as would relate to the T-2. The photo, taken by Marvin Malicki during our session, shows some of the "chalk talk" that was conducted on the first day of one class. As the discussion progressed, more information was displayed and explained. As mentioned in our heading, we began to understand to what degree the average student will comprehend and retain this knowledge. Our training tapes and standard operating procedures are being modified accordingly.

The concept on which Model Building 101 has been created is one of using model airplanes to reinforce a student's understanding of physics, math and science, as they apply to aerodynamics. We are convinced that all basic terminology and theory can and should be simplified sufficiently to have students relate these subjects to the airplane they are building.

However, as mentioned in this month's column heading, you learn a great deal, teaching. One of the lessons, which will save us a tremendous amount of energy and concern

in the future, is the simple hypothesis that only teachers who have a commitment to the program and its objectives be given the opportunity to participate. In last month's column we spelled out what we believe is the physiological profile of those individuals who have the burning desire to participate in this particular field of teaching. Without that particular drive, or if encumbered by curriculum disallowing sufficient time to accomplish the task, the course will become tedious, exasperating and exhausting.

Finally we came to the conclusion that it would be disastrous for us to entice, convince or persuade anyone that teaching the MB101 program is what they should do. Rather, we readily and happily support fully, any teacher who feels the calling to instruct middle school students, using our format as pertains to model airplanes.

We are grateful to the Thermal Thumbers of Metro Atlanta for their cash contribution to our organization. This donation is particularly sweet. Please understand that it was during the first two weeks of May, 1994 at Simpson Middle School that the president of TTOMA, Gary Baughman, seasoned contest winner John Barker, free flight champion George Perryman, and myself donated 20 consecutive working days, 8 hours per day, getting

almost 300 sixth grade students to successfully build and fly Delta Darts. Since that time, MB101 has continued the tradition and has expanded the program to the balance of middle school classes.

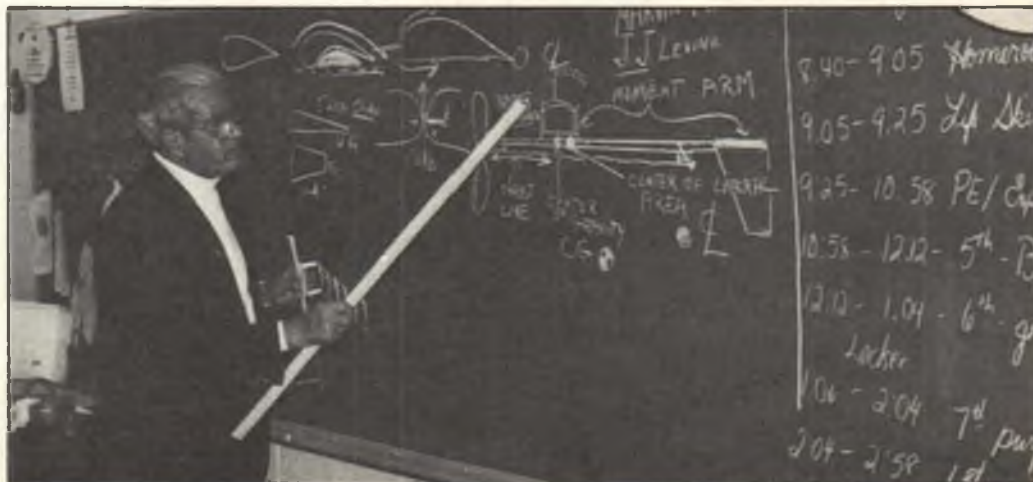
However, the club has always expressed a deep interest in the progress made at Simpson, and as I said, the donation is hard evidence of their sincerity.

During our 73+ years we have noticed that people do not normally run away from a situation; rather they find themselves running to something more desirable. It is no different with youngsters. Let them experience the fun, thrill, excitement and challenges of model airplane building with all its ramifications and suddenly some of them "catch the fever." Therefore they will have acquired a creative, wholesome interest in a subject that will be with them for the rest of their lives. As a byproduct, you will always be in their thoughts as the one who helped them get started.

As a not-for-profit IRS 501(a)1 designated company, we solicit your tax deductible donation for this worthy cause.

Please make any contributions payable to Model Building 101, Inc. and mail to Model Building 101, Inc., 1891 Branchview Dr., Marietta, GA 30062. In addition, we may be contacted by phone at (770) 973-3598 and/or fax at (770) 422-2765. MB

Our columnist, for the first time in class, leads a discussion about how fundamental aerodynamics apply to the MB101's intermediate Tennyson airplane and how these forces affect the flight of aircraft.



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THE SECOND ANNUAL WINTER SOARING FESTIVAL

A successful second time around is proof that this California meet is only getting bigger and better.

With a turnout of scale sailplanes that surpassed its debut one year ago, the Winter Soaring Festival (WSF) has established itself as one of the West Coast's premier scale soaring events. The brainchild of a number of scale enthusiasts including (but not limited to) Dr. Larry Fogel and his son Gary, Buzz Waltz, and Rex Powell, the WSF is dedicated to the promotion of vintage and modern scale RC sailplanes. Co-sponsors of the meet are the model division of the Vintage Sailplane Association and the Desert Union of Soaring Thermalists.

The WSF, held on the second weekend in December, has achieved remarkable success and fame in a very short time. In a way, this success can be interpreted as a confirmation of what I wrote last year—that scale soaring is growing in the USA. I couldn't be more pleased that it is!

By on-site straw poll estimations, there were 60 to 70 scale sailplanes on display and/or in the air during this one-day event. This great turnout came in spite of a complete change of venue that was a good 130+ mile uprooting.

Biggest model at the WSF was this monster 1/2.5-scale Grob Twin Astir owned by Bill Winans and flown by Martin Bell (pictured). This giant weighs 58 pounds and requires a special 12-volt race car starter motor to winch it into the air—and never have we heard a winch work so hard! The big ship never got very high on launch but was able to float around majestically for several minutes at a time on the prevailing light lift, and seemed to be very easy to fly. It's produced as a semi-kit by Rohn in Germany.



This year the John Robinson Perpetual trophy AND the Best Vintage Sailplane trophy went to Dennis Brandt and his Minimoia. (Last year's John Robinson also went to a 1/4-scale Minimoia.) Dennis was taking no chances on which tow with his bird, so he fashioned a U-shaped metal towing harness to attach to two hooks near the skid, directly under the L.E. of the wing. The "Mini" tows straight as an arrow!





Second place honors for Best Vintage Sailplane went to Rex Powell and his Gruman Baby 2. Here's a shot of it going up the winch line under the guiding thumb of Dave Hall. Towhook position at the 1/4-chord point at the skid produced rapid rotation on takeoff. The Baby's lows were straight and steeper than most.



One of the most unusual "modern" sailplanes in attendance was this Swiss Mosway built to 1/4-scale by Ron Gustin. Ron's friends Dave Hall (left) and Rex Powell brought the model to the contest on Ron's behalf, as he was away on business and unable to attend.



Mark Foster with his AS-W 17. Love that big vertical stab and those high aspect ratio wings!



Randy Spencer's 1/4-scale DG-308 saw quite a bit of air time. Randy loves not only the modeling aspect of scale, but the graceful and relaxing flying also. It's quite a change from his more famous Team USA FAI/F3B models!

Last year the WSF was held in the Indio (Palm Springs) area of Southern California, at the Empire Polo Club. Empire actually welcomed the WSF and let us use their perfectly groomed, billiard-table-flat, all-grass polo field. With no obstructions for 1/3 of a mile in any direction, it was perfect! Unfortunately, due to a busy polo schedule this winter, Empire could not repeat the offer.

This created a problem that this year's co-host, the Soaring Union of Los Angeles (SULA), helped to solve. They generously

offered DUST the use of their home field for the second annual meet, an unselfish act which is typical of this great club. SULA flies at a very large open field in the southwest corner of the Los Angeles metropolitan area. It's the site of the velodrome built for the 1984 Olympics and is located on the western edge of the Cal State University Dominguez Hills campus in Carson.

Except for a grassy landing area which is maintained by SULA for its contests, this

field at this time of year is bare dirt as hard and unforgiving as concrete. This isn't the kind of place you would normally prefer to fly an expensive, meticulously finished, labor-of-love scale sailplane! But, as I said, it didn't deter a record number of static entries



Almost looks full-scale, doesn't it? The sailplane always lifts off first, then tries to stay just a little above the towplane—which in this case is a modified Red Nosen Trainer powered by a Zenosah G-38. The tow cable attachment centered above the towplane's main spar allows for quite a bit of pilot error on tow. Tow pilot and glider pilot can each bail out of a tow if it gets too dicey.



"If I can do this, you can too!" So says Ryan Grosswiler after successfully building this balsa-planked 1/8-scale Panther from the Krick kit. Having never before built such a model, he was pleased with the results and brought the incomplete model to the WSF as a show-and-tell. He says, "Planking isn't hard, it just takes patience and time." Fuselage is built in right and left sides, then joined.



Gary Fogel has slope soared this 1/4-scale SG-38 primary glider many times, but this year's WSF was the first time it was ever winch towed aloft. He made several tows, all of which were successful. The model actually goes airborne very quickly after release.



Wayne Spani, who owns and flies the sole remaining example of an original full-size Bowles Baby Albatross, also has it in mind to build a full-size version of this "concept model" he calls the Albatross. Does this mean the full-size version will be the scale model?

■ ABOVE: A 1-1/2 year project almost came to a finish the night before the '95 Winter Soaring Festival for Al Omsion of Rancho Mirage, California. He had everything ready on his pre-WWII vintage 1/4-scale Kirby Kite but the numbers on the wings. Had he managed to finish the numbers, the judges say he would have taken the John Robinson trophy! Fuselage framework of 1/4 and 3/8 balsa sticks is planked over with 1/8 balsa, then sanded smooth and round. Copper wire stab trailing edges are in keeping with the original. Cockpit featured full instrumentation.

and actual fliers.

Profuse thanks to SULA notwithstanding, efforts are now underway by Buzz Waltz (proprietor of Just Plane Fun Models) and the DUST club to secure another

polo field or similar grassy expanse for next year's WSF meet back in the Indio/Palm Desert area.

In the Winter Soaring Festival, trophies are given for the Best Modern Sailplane and

Best Antique Sailplane, with no flight time required for judging. The Longest Flight, Best Landing and the John Robinson Perpetual Trophy awards, however, do require that your model be flown. Because the John

Robinson trophy is associated with the Vintage Sailplane Association, it is awarded only to the most deserving vintage model sailplane. In case you're thinking that John Robinson is a famous football coach, this is a different man with the same name. He is a pioneer in full-scale soaring and holds many firsts in engineless flight established in the '20s and '30s (see the April 1995 column for John's photo and write-up).

I'm going to cut short this text for the sake of running more photos from the meet, which are probably much more interesting than listening to me ramble on anyhow! So make plans to attend the Third Annual WSF next December and bring a scale sailplane with you!



Second place in Best Modern Sailplane went to Dan Trozell and his ASK-13, which wasn't flown. This unusual two-seater has swept-forward wings of 5.3-meter span. Model weighs 17 kilograms (37 pounds), which makes it a relative heavyweight, but is a very realistic flier.



Dennis Brandt's Piliatus B4 gets a perfect send-off by Dan Trozell. Colorful model is very agile in the air. Aerobatics are the B4's strong suit.

Other scale sailplane meets coming up are the Elmira meet in New York, June 1-2, featuring five or six aerotowing power planes; contact John Derstine at (717) 596-2392 for info. A second meet is planned for Fayetteville, North Carolina, the second weekend in June; contact Ray Cindrie at (704) 549-5511. A third scale meet will be held in Canada, near Buffalo, New York, June 29-30; contact Jerry Knight at (905) 934-7451. If you attend one of these meets, I'd love to have a few good photos (slides or glossy prints) and a short write-up for this column!

Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530; (909) 674-0939 (between 8 and 10 p.m. weekdays, potluck on weekends). Fax (909) 245-1702, or e-mail at BFORREY@AOL.COM.

MB

Helicopter World

■ BY JAMES WANG



A LOOK AT KYOSHO'S CONCEPT 30 SR-X HELI, THE O.S. .32 SX-H ENGINE, AND FUTABA'S SKYSPORT 6VH HELI RADIO

Kyosho's Concept 30 heli continues to evolve. Pair it up with the newest O.S. heli engine and Futaba's inexpensive 6VH heli radio, and you have what James considers a perfect combination for beginners and advanced sport fliers.

Kyoosho's Concept 30 DX and 30 SE, introduced in 1987, revolutionized pint-size RC helicopters. Their inexpensive price and super-easy-to-fly characteristics helped introduce many beginners into RC helis. The Concept 30's ruggedness and agility also made it ideal for learning 3-D hotdogging and inverted flight. Since then, Kyosho has updated the design with the SX, SR, SR-T and SR-X versions. The SR-X represents the epitome of the Concept 30 series. Let's take a closer look at the Concept 30 SR-X, along with the powerful O.S. .32 SX-H engine and the Futaba SkySport 6VH radio.

The 30 SR-X uses a push-pull control system on the cyclics for more positive control. Ball bearings are used at all control pivot points; there is very little play on the controls. The tail rotor is driven by a beefy 2mm wire, which gives very positive yaw control. Even when the gyro gain is cranked up, the tail

doesn't wag. The model does very high rate pirouettes—great for hotdogging. The SR-X, like the SR and SR-T, comes with a long tail boom that permits using 550mm main rotor blades. These longer blades improve autorotations and give more positive collective and cyclic response. The Concept 30 SR-X is docile in flight, yet fully capable of performing full-on 3-D hotdogging. The SR-X can take a beginner all the way from learning how to hover into advanced aerobatics.

Two months ago, I stopped in Japan on a business trip. I discovered that Curtis Youngblood's style of 3-D hotdogging is very popular in Japan now. Everyone is doing 3-D flips, tumbles and hovering rolls. Interestingly, the Concept 30 SR-X was one of the most popular models used for 3-D. The reason is that glow fuel there is very expensive, plus the flying areas are usually very constrained. The 30-size models are therefore ideally suited for



The Concept 30 SR-X is the latest evolution of the popular Concept 30 series. It has the same physical dimensions as its predecessor, the Concept 30 SR-T, but the SR-T has fewer ball bearings, no autorotation bearing, and a smaller 1.6mm tail drive wire. The SR-X's canopy is a different shape, too. Photo courtesy of Great Planes Model Distributors.

Helicopter World



New from O.S., the .32 SX-H heli engine. James says it's every bit the equal of the powerful Thunder Tiger .36H he reviewed in his January '96 column and which impressed him so much. Photo supplied by Great Planes.

practicing those daring 3-D stunts. I use my SR-X for the same purpose. But I also recommend the 30 SR-X as a top choice for beginners, too.

In the tradition of the Concept series, the SR-X's swashplate, collective slider and washout unit are pre-assembled at the factory. This saves time and minimizes error. The SR-X canopy is different from the other Concepts, but is still made of the same indestructible white plastic. About half of the parts are interchangeable with the other Concept 30s.

I love the SR-X's flying characteristics. Even in a strong wind, it's a joy to hover. It easily reaches 55 mph in forward flight. When you're ready, Kyosho offers its "Zeal" line of high-grade aftermarket accessories, including a metal swashplate, hex-shaped metal washout mixing base, anodized blue tail boom and skids, Z-31 and Z-32 main rotor heads, etc. I like the Zeal Z-32 head because it's inexpensive, and its teetering design allows you to stiffen the blade flapping by tightening down on the rubber damper; this makes the SR-X even more responsive. Combined with the powerful O.S. .32 SX-H engine, I just love the way the SR-X handles!

The O.S. .32 SX-H is at least as powerful, if not more so, than the Thunder Tiger .36H that we reviewed in the January 1996 *Model Builder*. The .32 SX-H has noticeably more power than the popular O.S. .32 FH. O.S. claims the .32 SX-H puts out 1.2 horsepower, which is about 20 percent more than the .32 FH. I was already very happy with my old Concept 30 SR and SE fly-



The SkySport transmitter's trim pots and servo reversing/mixing switches are protected underneath the transparent front cover.



The SkySport 8VH is Futaba's low-priced entry-level FM heli radio, comes with four S148 standard servos, a 1000-mAh airborne battery, and a reliable R127DF FM receiver. The transmitter has a rounded, ergonomically shaped case and only the essential heli features that beginners and sport fliers need. Futaba photo.

ing on the .32 FH; you can imagine how much happier I am now with 20 percent more power in an even better Concept 30.

The .32 SX-H is a ringed engine. It's extremely smooth and powerful on 15 or 30 percent nitro heli fuel; the latter gives about 10 percent more power. For learning or leisure flying, the 15 percent is more than adequate. The 30 percent is only necessary when you want to keep the rotor at a constant, screaming 1,800-1,900 rpm for nonstop 3-D hotdogging. With 15 percent fuel, sometimes the engine can get bogged down during non-stop 3-D maneuvers.



Typical of Kyosho kits, the Concept 30 SR-X is well packaged. The instructions are clear and heavily illustrated, and the parts are bagged and grouped according to construction steps.

Helicopter World

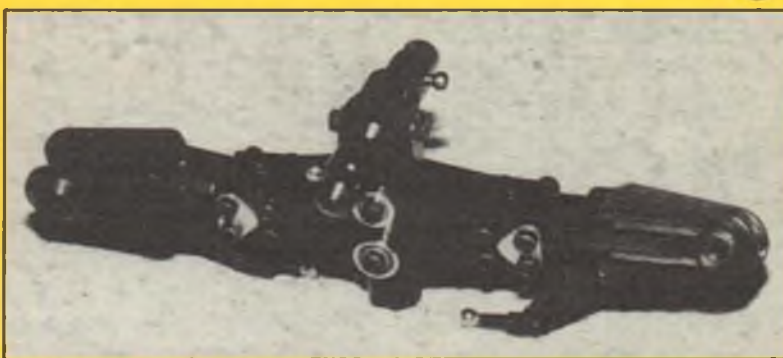


I didn't break in my .32 SX-H on the bench. Since it's a ringed engine, I just kept the motor running rich during the first five flights and avoided hovering near dusty ground. After five flights, I leaned the needle about two clicks; since then I haven't needed to change the settings at all. The O.S. .32 SX-H and the older .32 FH have the same mounting dimensions and crankshaft thread size. Therefore, they will fit any of the Concept 30 models.

Now let's take a look at the Futaba SkySport 6VH radio, which I'm using in my Concept 30 SR-X. The SkySport is one of the least expensive helicopter radios on the market; the street price is around \$250. It comes with a 1000-mAH airborne NiCd battery pack, Futaba's R127DF FM receiver, and four of my favorite servos, Futaba's S148. I love the S148s because they give the best performance for the money. The S148 does not employ ball bearings on the output shaft, hence some free play does develop in the servo arm, but only after many, many flights. Compared to other sport servos, I find the S148 has the least amount of play. (Futaba's S3001 is the same as the S148, except the output shaft is ball bearing supported.)

What makes the S148 really shine is its reliability. I've used many S148s over the last five years, and none of them have ever failed, even after several devastating crashes. I think the S148 is ideal for .30-size helicopters.

The SkySport 6VH transmitter is very



Kyosho's optional Zeal Z-32 teetering main rotor head fits all of the Concept 30 helicopters. Flapping stiffness is adjustable by compressing the rubber damper.

simple to use. It doesn't have a lot of complicated heli features which may not be necessary to some users. It does have all the essentials, such as servo reversing on all six channels, dual rates on aileron and elevator, revolution mixing for the tail rotor, adjustable travel volume for throttle, high and low end pitch curve adjustment, throttle hold, and idle up. Let's quickly go over each of these features and see why they are essential for beginners and sport fliers.

Obviously, reversible servo direction facilitates setting up the linkages for different helicopters. Dual rates are used to reduce cyclic control sensitivity. High rate is usually used in forward flight, low rate during hover. I don't use dual rates that often, because I set up my models such that I can still comfortably hover the model at high rate. But sometimes I switch into low rate to enjoy more relaxed hovering. Typically, low rates are set at about 80 percent of high rates. For the SkySport 6VH, set the ail and elv D/R trimpots to 8.

Revolution mix is used to automatically change the tail rotor pitch when the pilot makes a collective input. Up Revo Mix increases tail rotor pitch when col-

lective is raised; down Revo Mix reduces tail rotor pitch when collective is lowered. For my Concept 30 SR-X and most other models, the up trimpot is set at around 3, the down trimpot at around 4.

Throttle ATV allows you to fine-tune the throttle servo arm's travel so it will not over-drive the carburetor barrel arm and cause binding. In the old days, we had to make sure we selected a proper size servo output arm to give just the right amount of travel. Now we can be lazy and fine-tune with the Th. ATV.

The high and low end pitch curve adjustments are very useful. In general, most helicopters, including the Concept 30, hover at +5 to +6 degrees of collective pitch; the top end is usually set at +10 degrees and the low end at -3 degrees. This means that from half throttle stick to full throttle stick, the collective pitch only increases by 4 degrees, while from half stick to low stick, the collective drops by 9 degrees. This non-linear behavior can be easily achieved electronically using the high and low pitch curve trimpots on the transmitter.

Throttle hold is a must-have for practicing autorotations. By flipping the throttle hold switch, we can drop the engine to idle and still retain full collective pitch control. When we're about to touch down, we switch off throttle hold to re-engage the engine and just fly away.

Idle-up has become a must for doing most helicopter aerobatics. The 6VH has a very simple idle-up system. It simply stops the carburetor from closing further when the throttle/collective stick is lowered to below half stick. This allows you

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NATS '96

This July 6th and 7th, the greatest names in modeling past and present will meet in Muncie on the eve of Nats '96. They're coming to swap remembrances with old friends... to fly in the vintage Free Flight, Vintage Control Line, and Vintage RC events. They're coming to celebrate AMA's 60th anniversary and to meet you!

Saturday, July 6th: a full day of Vintage Control Line and Vintage Free Flight flying, followed by a major reception at the Frank V. Ehling National Model Aviation Museum.

Sunday, July 7th: a full day of Vintage Control Line, Vintage Free Flight and Vintage RC, followed by a "Gathering of the Clan" banquet. Nats '96 registration begins.

Area hotels offer special AMA rates. Or, if you act fast, you can stay in the new dorm at Ball State

University. Each room sleeps two and shares a bath with the adjoining room. Take your choice of single or double occupancy... both well under \$30 per person. If you decide to stay more than four nights, the rest of the seven-day week is free!

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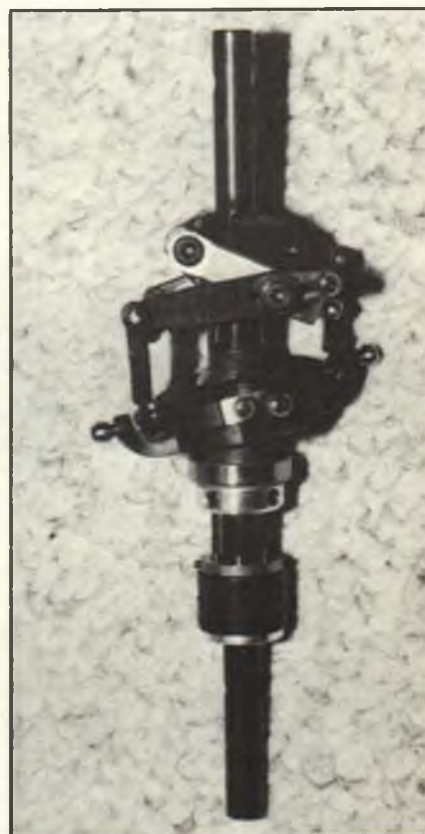


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Homebound bound from AMA Nats '96
In front of bus: Carl Hatzek, Richard Scott, Leonard Chubb,
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to do, for example, axial rolls or loops and maintain a healthy rotor speed while giving some negative pitch during the inverted portion to maintain altitude. This type of idle-up is sufficient for doing loops, rolls, stall turns and simple switchless inverted hover. To do more advanced 3-D



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maneuvers you need a more advanced radio like Futaba's new eight-channel computer system, which allows you program different throttle openings at different collective pitch settings. Then you can optimize their relationship to achieve a constant rotor speed at any collective pitch setting.

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

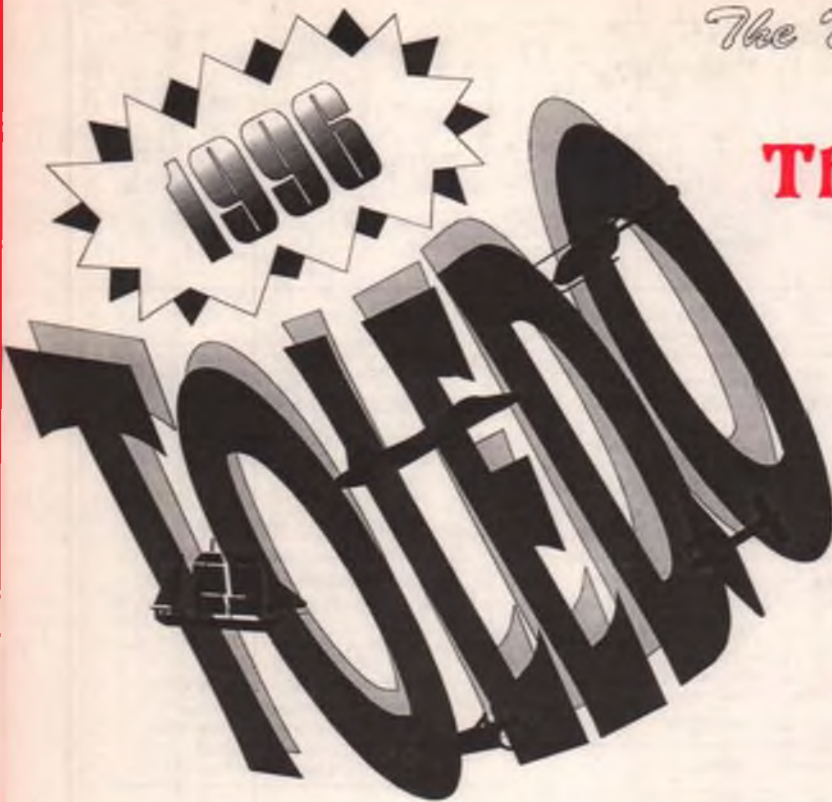
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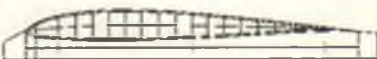
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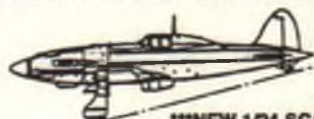
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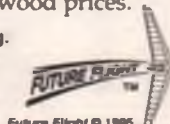


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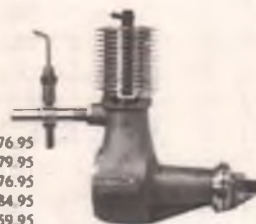


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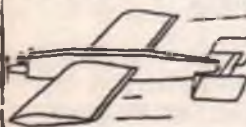
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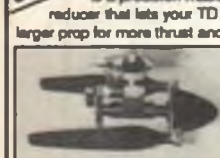
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CONTROL LINE *cont. from page 18*

Control line Contest Board works:

September 1 of each even-numbered year is the deadline for proposed new rules or rules changes. Proposals may be submitted by any AMA member, by the board members, or by special interest group advisory committees. Those proposals are published in an AMA publication, and distributed to all board members. They also are distributed to the members of appropriate advisory committees (combat, precision aerobatics, racing, speed, carrier).

After a period for membership comment, the CLCB holds an initial vote. Proposals receiving a 2/3 majority advance to the final stage. Once again the proposals are published, and there is another period for comment. After a final vote, again requiring 2/3 "yes" for approval, the surviving proposals are published in the AMA rule book, which is available to members at the beginning of each even-numbered year. It's a two-year process that gives fliers plenty of opportunity to be part of the process. Those who speak up with letters, phone calls, e-mail, or their own proposals, are the ones who are heard by the board members who do the voting.

Current board members' names and addresses are listed regularly in AMA publications, and advisory committee members are drawn from regular competitors on the contest circuit. If you have ideas or opinions about competition rules, contact your CLCB member or advisory committee representatives.

CONTROL LINE ON-LINE

As we've noted here before, CL model aviation is becoming increasingly an "on-line" activity in more ways than the traditional steel wires.

One of the latest developments is a control line page on the World Wide Web, set up by Iskandar Taib, editor of *MACA News*, the publication of the Miniature Aircraft Combat Association. The web page has information on all kinds of CL flying, and Taib is looking for ideas and help in developing it.

The address is: <http://bigwig.geology.indiana.edu/iskandar/models.html>.

Other on-line sites worth noting are the Control Line section of Modelnet on CompuServe and the Control Line message area in the Model Aviation section of the Aviation Forum on America Online.

• • •

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

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FREE FLIGHT *cont. from page 62*

awhile, and usually end up pointing the questioner in the direction of a local free flihter of my acquaintance. Engines and components are a little different. Here is my usual answer:

"Become a member of the Model Engine Collectors Association (MECA). Membership is \$25 per year and entitles the member to free advertising space in the monthly Swap Sheet, and periodic bulletins regarding the history of one or more engines or modeling events. Not only can one find engines in these ads, but other items are also for sale, such as engine timers, kits and accessories. Many of these parts are not available at your local hobby shop, since they haven't been manufactured for many years, but the collectors will sell them.

"Also included in the Swap Sheets is a listing of the upcoming Swap Meets (called Collectos). If one is in your area, go to it. Many of the things for sale at the Collecto can be purchased for less than through the Swap Sheet, and you get a chance to look it over before you buy. MECA is an organization that can not only help you get what you need, it might also open up a different part of this hobby to you. MECA memberships should be sent to Bob McClelland, 3007 Travis St., West Lake, LA 70669.

"Now, if you find yourself with an old engine and it's missing a few parts, there are members of our hobby who specialize in collecting, remanufacturing and selling engine parts. Spark plugs, coils, other spark ignition parts as well as needle valve assemblies, crankshafts, nuts, washers and the like are usually available via this aftermarket service. Two good sources for missing parts are AeroElectric, 1301 W. Lafayette, Sturgis, MI 49091 (a 26-page catalog is \$6); and Parts is Parts, 6027 W. Ken Caryl Pl., Littleton, CO 80123-7086 (a 44-page catalog is \$2)."

MINIATURE MODELS

Building miniature versions of old favorite models is an enjoyable and inexpensive way of reliving some of our youth. The Cox Tee Dee .020 is an excellent size engine for these smaller types of models. A number of clubs along the West Coast have actually sponsored events for these pint-sized replicas. The free flight club I belong to, the Willamette Modelers Club, sponsored an .020 event last year, and it drew very well—even though we only gave about three month's notice. The rules are the same as AMA gas classes, except the engine is restricted to .020 cubic inch displacement.

Fred Guilfoyle, who does business as Plan-It Industries, has put his CAD machine to work and has produced a number of replicas of those good old models of yesterday. Fred has found that models with a wing area of around 150-180 square inches are the most competitive. If you

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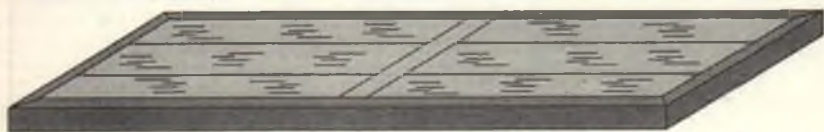
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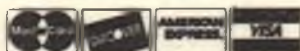
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A SPECIAL ISSUE OF SCATTER

One of my favorite free flight newsletters is *Scatter*, the publication of the Southern California Aero Team. This active club focuses primarily on FAI events, and the newsletter usually contains the most complete reports of FAI activity on the West Coast and around the world. Many of the members of the club have been successful in U.S. and World FAI competition.

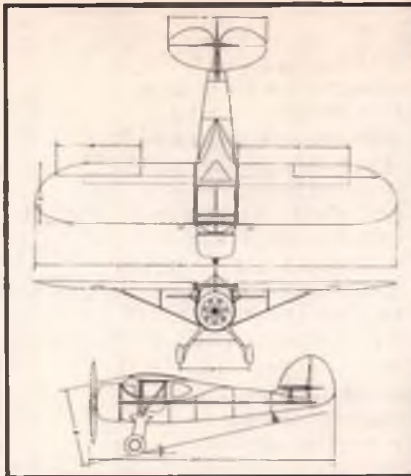
The most recent issue, which arrived just as I was completing this column, contained nine full pages of tribute to Bob and LaVera Isaacson, who were killed in a freak automobile accident in Bakersfield, California. Members of the SCAT club and other friends took some time to write out a few thoughts about the lives that had just been lost. It is a moving experience and one that is unique to our hobby—that we would have so many friends who are bonded together not so much by the sport of free flight, but by its brotherhood. No matter where you are, or how long it has been since the last time you met, the next meeting is just as though it's been only a few minutes since the last one. So it was with Bob and LaVera.

Scatter can be obtained via paid subscription from Bill Bogart, 14837 Los Robles Ave., Hacienda Heights, CA 91745.

LAST THOUGHTS FOR APRIL

Readers who want to submit suggestions for consideration as future Mystery Models can do so by writing to me at 5066 N.W. Picadilly Circle, Albany, OR 97321. I'm always looking for good action pictures from the free flight site as well, so send them along too!

(Editor's note: Can't help but put in a comment here about photos. You readers have no doubt noticed that the photo reproduction in Model Builder over the past year is a far cry from what it used to be. There are a couple of reasons for this, but the upshot is that we have to be more selective than ever about what gets used in the magazine. Photos submitted to Bob for publication in the column should be either slides or glossy prints, sharp and bright, and in the case of a static shot of either the model sitting by itself or being held by someone for the photo, should have a simple, uncluttered background. Lastly, if you get someone to hold a model for a photo, please have them take off their cap first, otherwise their face will be in shadow and will reproduce in the magazine as an unrecognizable solid black blob. 'Nuff said. Now that you know what's needed, let's see what you can do!) MB



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ELECTRIC POWER *cont. from page 30*

you in on a little secret: If you would like some new and different material on which to base your next scale model, pick up a copy of *Kitplanes* magazine. I've been a subscriber for many years now and am always picking up some new ideas.

Kitplanes is edited by fellow modeler Dave Martin and caters to those who enjoy building full-size planes from plans and kits, and there is no end to the number of different aircraft featured. Everything from



Never mind the "1995" on the cover, this is the brand-new 54-page catalog from New Creations R/C, a rapidly growing full-service electric power supplier. Everything you could possibly want relating to electric power is listed in this catalog, which is available free of charge to those who mention they read about it in *Model Builder*. Write or call New Creations R/C, P.O. Box 490, Willis, TX 77378; (409) 856-4830.

the slowest ultralight paraglider to jet planes are displayed, and most of them would make interesting and unusual electric scale models.

In the April 1995 issue there is a feature article on the Fieseler Fi-155 Storch, a WWII German observation plane. It is a very distinctive aircraft with a long nose and even longer wheel struts. An Australian homebuilder named Nestor Slepcev first constructed a 1/3 scale RC model to prove the design, then built a 75 percent size man-carrying scale version. His replica has a claimed takeoff distance of only 17 feet into an 8 mph headwind. Now this would make an impressive scale model!

I've found that in most cases, a short letter and an SASE to the kit manufacturers will get you a three-view and maybe some photos, especially if you tell them you're planning on making an RC model of their airplane. So, if you have a need

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for some scale aircraft material consider subscribing. The annual rate is \$26.97. Contact *Kitplanes'* subscription department at P.O. Box 420234, Palm Coast, FL 32142-0234, or call them at (904) 445-4608.

FINISHING TIP

Here's a useful tip for putting the final trim touches on your new model. Let's say

THE BEST IN ELECTRIC PLANS CATALOG

12710 The Best in Electric Plans Catalog is a comprehensive collection of 90 different electric model airplane plans that have appeared in the British and German model press. Both the plans and the catalog are available from Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402.

In the mood to do some building? Bob Holman's "Best in Electric" plans catalog sells for \$3 (which you can deduct from your first order over \$15) and lists something like 90 different electric model plans that have appeared in the British and German model press. Both the plans and the catalog are available from Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402.

you need a stripe of a particular color on top of your iron-on covering and you really don't want to hassle with self-sticking trim tape or a small strip of iron-on covering.

To get a superb trim line, use some black vinyl electrical tape to mask off the area you want to paint, grab a small bottle of Testors model enamel and a paint brush, and brush the trim color right on. The enamel sticks very well to iron-on coverings and won't peel off. Since there's no fuel to attack the paint, you won't get any smearing. It's economical, too, since you don't have to buy a whole roll of covering when you just need a 2-inch trim line.

The electrical tape makes a sharp edge—just make sure you peel it off about 5 minutes after you apply the paint. The enamel dries quickly; you don't need to wait a long time to get good-looking trim lines.

And there goes another month! Feel free to write me at 6462 Sunny Brae Dr., San Diego, CA 92119; or call me at (619) 463-4453 (weekdays between 8 and 5 Pacific time), or via e-mail at 74164.3237@compuserve.com. **MB**

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TECH STUFF cont. from page 14

In a regular servo we use a feedback potentiometer or "pot" which directs the servo to run in the commanded direction to get the control surface to the commanded position; then it shuts off the servo motor. This is necessary because the servo motor alone is stupid and blind—it happily runs when told to, but it needs the pot to tell it to stop because it has gotten the surface to where it was told to put it.

Piezoelectric actuators and similar "smart" devices, by comparison, sense their own "destinations" without a pot, since their displacement or final position is determined by the voltage being applied to them. An electric servomotor's speed is a function of voltage, but a piezo element's position is a function of voltage.

So a piezo actuator doesn't need the feedback pot and its associated electronics, but it does need a relatively high voltage compared to our servos. The Auburn University group took model servos, removed the pots, motors, gears, and other parts they didn't need, then added light operational amplifiers to boost the control signals to plus and minus 62 volts, which was enough to satisfy the piezo elements.

Ron Barrett and his team have proven that piezoelectric actuation of control surfaces on guided missiles and airplanes will work. Whether or not these systems will ever prove to be practical and competitive with our present systems remains to be seen; but in the meantime, the challenging work goes on. We wish them further successes.

Dr. Barrett is offering jobs to other modelers, by the way. I quote from his letter to me: "Our lab is in a bind with respect to qualified students who are modelers. We have a lot of funding from the Air Force and NASA, but we desperately need [Auburn University] students who know how to use their hands. I know many engineers who are modelers, perhaps some of them will want to come back to school." Contact Ron at the numbers given.

E=MC² AND MODEL AIRPLANES

F=MA, E=IR, and many other basic equations are much more useful in everyday technology; but probably the most famous equation in the world, as far as the general public goes, is E=MC². Not one person in a hundred thousand will ever use it in solving a problem, or even know how to use it; but the magic name of Einstein made this convertibility between energy and mass a symbol of the atomic age.

I was one of the hundred thousand until I read a bit on Albert Einstein by Carl Sagan; but now I've worked a problem using E=MC², and I will likewise pass on to you the key to that small inner circle of the anointed. The things I didn't know, and had never bothered to think through or look up, were the units to be used with this famous formula. Sagan provided the answers.

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Prior to Einstein, the law of conservation of energy said that "Energy can neither be created nor destroyed." It is this fact of nature which dooms all attempts at perpetual motion to failure. Einstein expanded that law to include the facts that energy can't be destroyed to nothingness, and neither can mass; but energy can be converted into mass and mass can be converted into energy, through nuclear reactions. The sun and all other stars are doing it constantly, and so do atomic bombs, hydrogen bombs, and man-made nuclear reactors.

The "C²" is the speed of light squared. The speed of light is a very high velocity, and that number squared is far too large for me to comprehend. The equation shows us that a very small mass is equivalent to a very large amount of energy. Sagan says, "The complete conversion of one gram of mass into energy would release 9×10^{20} ergs, which is the equivalent of the explosion of roughly a thousand tons of TNT." He goes on to say that a hydrogen bomb is less than 1 percent efficient in converting mass into energy; so make that 9×10^{18} ergs available to us from 1 gram of mass, or the energy of 10 tons of TNT. Even the effects of a mere 10 tons of TNT is no more comprehensible to me than the speed of light squared; if you have similar cerebral limitations, join me in a comparison we can better appreciate. Using Sagan's arithmetic, let's talk

nuclear-powered model airplanes.

I did learn once how much an erg is, and just looked it up again. An erg is a small unit of energy; there are 2.7×10^{13} ergs in a horsepower hour. Let's put a 1-percent efficient, 1-horsepower atomic powerplant into our RC model, and let's provide a "tank" only large enough to hold 1 gram of fuel (1/28 of an ounce). I know this sounds awfully small, but I think we will find it's enough.

If I haven't messed up in placing the decimal point, our model will fly at full throttle (1 horsepower) for 3.3×10^5 hours—330,000 hours flying time before the gram of fuel is spent. That's 38 years of flying 24 hours a day. A nice long flight. Yes, the 1 gram of fuel seems like enough. If we had a 100 percent efficient nuclear powerplant instead of the 1 percent efficient system, we could fly for 38 years with only 1/100 of a gram of fuel—a single grain of rice, perhaps.

In theory, it doesn't matter what type of matter we put in this nuclear fuel tank, the answer comes out the same. In practice the choice of fuel would be of prime importance. We know how to do the job with uranium fission (on a large scale), we hope to know how to do it with hydrogen fusion soon; but doing it in a model airplane is a long ways off. If it is ever achieved, the cold fusion approach may be the one chosen. I don't think the rubber companies, the RC engine makers, the electric motor manu-

facturers, or the battery companies need to start worrying quite yet. For one thing, far less than a gram of fuel sounds wonderful, but let's not even talk about what the reactor and powerplant would weigh—or what they would cost.

FLY POWER

From very high-tech nuclear power, we switch our attention to a very low-tech power source for model airplanes. In the model airplane section of the National Air & Space Museum in Washington D.C., I looked at a couple of fly-powered model airplanes. I had read of this stunt year ago, but have never tried it. If you glue one or more flies in the right place and orientation on a very light model of about 6-inch span, it flies. It even flies under control, but under the control of the fly, not the modeler. One of the fly-powered models on display was twin engined. I think that configuration would be less satisfactory. How would you get both flies to fly at the same time and avoid one-engine-out spins and crashes?

I'm a little surprised that the S.P.C.A. or some animal rights group hasn't gotten this display removed from the museum—but we have no proof that flies don't enjoy powering model airplanes.

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

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- Three mixing functions

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