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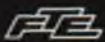


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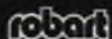
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ON THE COVER

This month's Model Builder features reviews of a couple of really high-performance models, both powered and unpowered. Stan Sadorf is shown launching his Monarch hand-launch glider, rated by many top soaring pilots as the highest performance competition HLG currently available. Stan's evaluation of the DJ Aerotech kit begins on page 64. Inset: Who says electric's are tame? Reviewer Jim Petro, an experienced electric flier, was totally blown away by performance of his Model Electronics P-39 Airacobra, pictured here with his daughter-in-law, Cathy. Jim's article appears on page 20.

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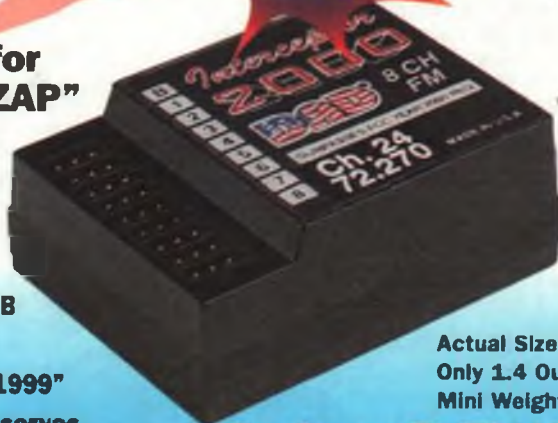
Scale soaring enthusiast Gregory Vasgerdsian, who did the report on the World Soaring Jamboree in the November '94 *Model Builder*, is pictured here with his 1/6-scale, 118-inch span Schweitzer 2-32, which he built from an old Fliteglass kit produced back in the early '70s. Greg writes: "My ship was modeled after a 2-32 that was at the Calistoga (California) sailport last year. It thermals great on

a Clark Y airfoil. Wings are covered in Ultracote Plus and I had an auto paint store mix matching paint for the fuselage. The lightness of this scale sailplane can be attributed to the built-up wings and light fiberglass fuselage—a combination for great light-air performance." Gregory Vasgerdsian, 4923 Thatcher Dr., Martinez, CA 94553.

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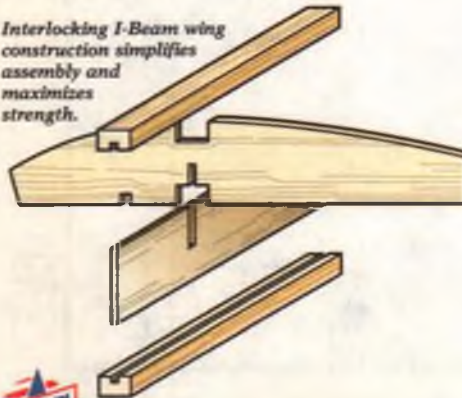
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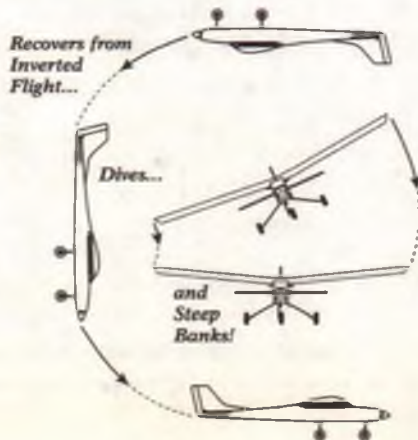
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As reported in the Control Line column in last month's *Model Builder*, the Chinese fliers swept 1st, 2nd and 3rd places in F2B Precision Aerobatics at the 1994 World Control Line Championships, held in Shanghai, China this past October. Several of the photos that accompanied that article were supplied by Chen Xin, pictured here on the right standing next to 1st place winner and new F2B World Champion, Han Xin Ping. Chen writes, "With this plane, Mr. Han has won many main championships of China. It is my honor to have this picture with Mr. Han after the result was announced." *Chen Xin, Shanghai University, 149 Yan Chang Rd., Box 313, Shanghai 200072, P.R. China.*



"Little Bits" is what Arizona modeler Mike Abeyta calls his cute little V-tail original design, a rudder/elevator (make that "ruddervator") ship powered with a Cox Tee Dee .020—fine for small fields, says Mike. The model spans a mere 27 inches and was easily covered with one roll of transparent yellow MonoKote. Mike says he's been building and flying small models

the past 10 years and has been helping others do the same. *Mike Abeyta, 6614 W. Kings Ave., Glendale, AZ 85306.*



Span is 64 inches, wing loading 22 ounces per square foot. Control is by elevons only. Dr. Lazerson writes: "The plane will float along like a trainer but has awesome performance on full power. Like all the Scimitars, it is easy to fly and has no bad habits. On 21 cells, its vertical performance is astounding." *Dr. Howard Lazerson, 8540 S. Sepulveda Blvd., Los Angeles, CA 90045.*

This is the first example we've seen of Graupner's electric-powered Sukhoi Su-26M, by Warner Lowe of Lake Oswego, Oregon. Hobby Lobby imports the kit into the U.S. and also offers a full range of power systems to fly it. Warner modified his kit by stretching the wingspan from the stock 57 to 62 inches; the wing area likewise jumped from 609 to 710 squares. At a flying weight of 109 ounces, the wing loading comes in at a very reasonable 22 ounces per square foot. Power comes from a geared Astro 25 running on 14 1700-mAH cells, controlled by one of Joe Ballasch's speed control units. *Warner Lowe, 1627 Village Park Lane, Lake Oswego, OR 97034.*



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MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS
REYNOLDS

• Model Radio Tech Stuff

I received a letter from Arthur Thoms of Berkeley Heights, New Jersey some months ago. (It's always "some months ago" in this column-writing game.) He wrote regarding some problems he had with his four-motor, electric-powered Boeing 314 Yankee Clipper flying boat. We won't discuss the aerodynamic and hydrodynamic problems here now, but the radio problems he had have never been discussed here before.

AM, FM OR PCM?

Art believes a crash with his Boeing 314 may have been due to failsafe lock-out of his PCM radio. I've heard other reports of failsafe-related crashes as well. Failsafe may be fine for old-time free flight models with RC added, but in my opinion they are very un"safe" for neutrally stable or unstable models.

Without failsafe, lost control is often regained due to improved signal reception when the plane turns (as it usually will), so there's a good chance the model can be brought home under control with a system that doesn't take remaining control away from the pilot at the first sign of a problem. Since most RC models won't fly by themselves, it doesn't make sense to throw out the possibility of RC recovery after any signal loss. *Don't* set your PCM transmitter for failsafe mode unless you're flying a model which will glide safely by itself, and don't buy a PCM set without a switch to disable the failsafe.

PCM per se is probably better than either AM or FM. For instance, PCM has been reported to be less affected by spark ignition "noise" from

gasoline engines. FM, in turn, is less subject to RF (radio frequency) noise than AM. My 18-channel Manitowoc crane (July 1987 MB) had radio interference problems, but converting its old AM radio to FM solved the problem completely.

RADIOS AND METAL OR CARBON PARTS

Art Thoms' 314 is covered with silver Micafilm, and he wonders if that could have caused at least part of his problem. Perhaps; I would be cautious with aluminum MonoKote or other metal-colored films or coverings, with either an inside or outside antenna. Even if the metal flakes which give the covering its metallic color and opacity are insulated from each other, I fear they would absorb some of the signal and reduce the range. But I'm guessing; I haven't run any range tests using these materials.

Art also wondered whether the carbon fiber reinforcement on his Boeing's wing spars may have contributed to the crash. I usually put the antenna inside the fuselage, or occasionally in the wing. I use metal or carbon tube pushrods and other metal and carbon parts and have had no range trouble.

Be very cautious with carbon (graphite). It's a good conductor, and is just as bad as metal with respect to radio antenna pattern distortion or blanking. Years ago I was on a Boeing design team to build a parabolic antenna reflector of epoxy/graphite. We didn't coat the inside surface of the dish with metal in any way, because it wasn't needed—the graphite looked just like metal to the radio waves.

I just went into my shop and

did some testing, using both FM and AM transmitters, a signal strength meter with a receiving antenna, and various metal and epoxy/graphite rods. The metal rods and the graphite rods upset the antenna pattern equally, as nearly as I could tell.

Whether or not a graphite or metal part near a receiver antenna will cause range trouble is somewhat difficult to predict, but let's try. It will depend on how the part is aligned with respect to the antenna, how both are oriented with respect to the line between the transmitter and the receiver at the moment, how long the part is, and how far from the antenna the part is.

Of academic interest, when the plane is at certain angles with respect to the transmitter, the conducting parts may actually *increase* the signal strength to the receiver. Look closely at a conventional "Yagi" rooftop TV antenna; you'll see that it has a number of "elements." Only one of these is the dipole antenna per se; the other elements, both in front of and behind the dipole, are parasitic "directors" and "reflectors" (radio-wave lenses and mirrors), to increase the signal strength ("pull in" more radio waves) to the active dipole.

In *Fundamentals of Radio*, Terman says: "The parasitic antennas abstract energy from the passing wave. This energy is then re-radiated to the main receiving antenna and modifies the direction characteristics." The reflectors and directors are parallel with the dipole, and the length of each element and its distance from the dipole and the other parasitic elements is somewhat critical.

By carelessness or ignorance, we may end up with metal or graphite parts parallel with our antennas, and of suitable length and at a suitable distance from the antenna to act as reflectors or directors. The resulting increased signal at certain attitudes of the plane does us no good, of course, since we had ample signal without this temporary boost.

continued on page 14

Art Thoms' beautiful electric-powered Boeing 314 had some technical problems which Francis discusses in this month's column. Model spans 114 inches and is powered by four geared Astro 05 cells running off of 36 1400-mAH cells. Silver Micafilm covering makes it difficult to see against the reflective surface of the lake.



over the counter

SLOPE COMBAT, WWII STYLE

An appropriate follow-on to the Model Tech P-51 Mustang



slope glider (reviewed in the January '95 *Model Builder*) is the new Messerschmitt Me-109, likewise being marketed as a pre-built and sanded airframe, virtually ready for final assembly and covering. Designed for aileron/elevator control, the new Me-109 spans 45-1/2 inches, covers 352 squares and weighs in at around 30 ounces. The kit is supplied complete with hardware, canopy, decals and photo illustrated instructions. Distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728-8610; (714) 963-0133.

JUST FOR ELECTRIC FLIERS

Hobby Lobby's latest catalog lists several new electric flight motors and gear drives, a couple of which are shown here. First, the Czech-built Mega motors have been radically redesigned and are start-



ing to really catch on among performance-oriented electric fliers, especially in Europe. We've seen a video of Hobby Lobby's aerobatic "Brigadier"

performing with a Mega R7 on 16 cells and it is indeed impressive. Also new is Graupner's 2.8:1 in-line planetary gearbox, offered with your choice of either a Speed 500 Race (six cells) or Speed 600 BB (seven cells) motor. The gearbox features steel gears and a combination of ball and needle bearings. There's even a new Graupner 12x10 folding prop available, specifically designed

for these motor/gear drive setups. All of these items (and lots more) are described in Catalog 25, yours free for the asking from Hobby Lobby, 5614 Franklin Pike circle, Brentwood, TN 37027; (615) 373-1444.

IKON'S BIG MULLIGAN

Sure to be popular with Big Bird fans, Ikon N'wst has just come out with a kit of an old favorite—Ben Howard's Mister Mulligan, winner of the 1935 Bendix and Thompson Trophy Races. At 1/4-scale, the model



spans 95 inches, weighs in at around 20 pounds and really should have something on the order of a G-62 under the cowl to emulate the performance of the original. The kit is all wood, the only glass parts being the cowl and wheel pants (included). Also included is an extensive assortment of hand-cut parts, an aluminum landing gear, a full set of decals, and full-size inked plans. The Mulligan and Ikon's 28 other kits are listed and described in detail in their catalog, available for \$4 from Ikon N'wst, P.O. Box 306, Post Falls, ID 83854; (208) 773-9001.

VAILLY'S BATTLE OF BRITAIN HERO

Also of interest to Big Bird fliers, Roy Vaillancourt of

Vailly Aviation has completely reworked his 92-inch span Hawker Hurricane drawings to incorporate a number of customer-requested improvements, the results being improved scale accuracy and easier construction. Among other things, the plans now include full-size formers and the complete wing structure. Vailly is also offering Hurricane short kits, consisting of pre-cut ribs

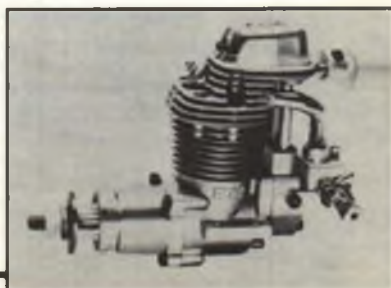


and formers—you supply your own stick and sheet stock. Optional parts available include a fiberglass cowl and belly scoop, clear canopy, spinner, retracts, wheels and pilots. One buck will bring you a complete catalog from Vailly Aviation, 18 Oakdale Ave., Farmingville, NY 11738; (516) 732-4715.

ENYA'S .41 FOUR-STROKE

Baby brother to Enya's popular .53 four-stroke is the

new .41-4C, being distributed in the U.S. and Canada by Altech Marketing. Enya's designers started from scratch on this one and came up with a new compact crankcase design that allows the engine to squeeze into narrow cowlings. The height of the engine from the bottom of the mounting lugs to the top of the valve cover is only 3-1/8 inches. Other specs: weight, 13.2 ounces; rpm range, 2,500 to 13,000; rated horsepower, 0.7.



All material published in OVER THE COUNTER is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by MODEL BUILDER does not constitute an endorsement of that product, nor does it guarantee its quality or performance.

Bore and stroke are .877 and .669 inch respectively. Further details are as close as your local hobby shop, or write to Altech Marketing, P.O. Box 391, Edison, NJ 08818-0391.

JUST A GIGOLO . . .

Hobby Shack's new "Gigolo" slope glider—so named because "there's no



maneuver it won't do to please you!"—has actually been around for something over 10 years, gradually being refined into what the folks at the Shack say is an outstanding three-channel aerobatic slope machine. A good part of its performance is due to the special wing airfoil, which, interestingly, is not symmetrical and yet is claimed to fly just as well inverted as upright. The kit sports die- and machine-cut balsa parts, wire-cut foam wing cores (which end up being sheeted front and rear with capstrips in between), basic hardware, rolled plans and illustrated instructions, priced at \$49.99. Available exclusively through Hobby Shack mail order and retail outlets. Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728-8610; (714) 964-0827.

MINI ELECTRICS

For those who prefer their electrics on the small side,



Dicky Bird Models offers a range of simplified 1-meter span WWII warbird kits designed for a single 50-watt mo-

tor or multiple 25-watt motors; the P-38 pictured is an example of the latter. There's also a DeHavilland Mosquito and B-25 for two 25-watt motors, a Junkers JU-52 trimotor for three, and a P-51 and Me-109, each for one 50-watt motor. A dollar will bring you a complete list of the kits, motors and complete electric power setups offered by Dicky Bird Models, P.O. Box 1249, Westminster, CA 92684.

MORE ELECTRIC NEWS

Well-known modelers Tom Hunt and Bob Aberle have joined forces to form a new company called Modelair-Tech, which will cater strictly to the needs of electric flight enthusiasts. Their initial product line includes



the H-1000 belt drive unit designed by Tom Hunt for larger electric motors (more on this in next month's "Electric Power" column); semi-kits for three scale electric twins originally kitted by Kress Jets, including an Argentine military aircraft, the Pucara, pictured here; and a series of innovative new electric designs, to be offered first as full-size plans and possibly later as semi-kits or even full kits. According to Bob, there's

even the possibility that custom fiberglass fuselages will be made available for the electric sailplanes. Right now, though, your best bet would be to get a copy of the catalog, yours

by sending a self-addressed stamped envelope to Modelair-

Tech, P.O. Box 12033, Hauppauge, NY 11788-0818; (516) 979-1475.

TOP FLITE'S SMARTSTRIFE

Here's a clever device that



lets you transform scrap covering material into constant-width trim stripes anywhere from 1/64 to 5-1/4 inches wide. Simply described, a length of covering material is taped to the wooden roller, the blade holder is positioned as needed, and as the roller is turned, the blade is brought to bear against the material, neatly peeling off a width of iron-on stripping. The blade holder pivots on a 32-tpi threaded rod; each turn of the knob therefore moves the blade 1/32 inch, allowing

you to position the blade with micrometer-like precision. Suggested retail is \$29.99. The Top Flite SmartStripe is distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021.

JR'S BULLETPROOF SERVO



At over 93 ounce-inches of torque, JR's NES-703 dual ball bearing, low-profile retract servo was delivering enough power to strip the gears if inadvertently stalled or bound up. To remedy this, the latest

version of the 703 features a machined brass gear in place of the one that was prone to strip, and the other plastic gears have been replaced by new ones made of a stronger composite material. The result, according to the folks at Horizon (the U.S. distributors of JR radios), is a totally bulletproof gear train that will not strip even when the powerful servo is fully stalled. The new gears are also available as a separate set for those who want to upgrade their older 703s. From Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

METRIC HARDWARE

Modern ARF airplanes and



helicopters often come with 2mm metric threaded linkage hardware that can be tough to replace from your local hobby shop stock, but Du-Bro has solved that problem by introducing a line of high-quality 2mm threaded hardware, including 2mm nylon Kwik-Links, 2mm threaded rods in 305mm (12-inch) and 762mm (30-inch) lengths, and 2mm brass threaded couplers. All are available now, produced by Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

MB

TECH STUFF *cont. from page 11*

What is of concern is that at other attitudes, these conducting parts will reflect or direct part of the signal away from the receiver antenna. Metal and graphite parts can and do cause RC crashes, especially if they are long and especially if they are approximately parallel with the antenna and in the order of say 2 to 25 percent of a wavelength away from the antenna. A wavelength in our 72 MHz band is roughly 164 inches, so avoid long conductive parts more than 3 inches from the antenna. Metal or graphite parts parallel with an antenna inside the fuselage need cause no trouble because they can be kept too close to the antenna to become effective directors or reflectors. I often put the antenna in the fuselage along with wire or carbon pushrods and have excellent range.

Modelers who put the antenna above the fuselage and run it back to the top of the fin "to get the best range" may actually be getting less range if they also use conductive pushrods or other metal or carbon parts in the fuselage. They are getting the antenna far enough away from the fuselage conductors that these become effective directors or reflectors and may cause serious loss of signal strength at certain attitudes.

It's true that we try to keep servo leads a distance away from and not parallel with the antenna, but that's a different situation. There we are trying to avoid capacitively coupling servo noise back into the receiver. In the case of long conductive parts of the airplane, we want to keep them close to the antenna to minimize reflection or direction of the electromagnetic field away from the antenna. A close parallel conductor of comparable length to the antenna probably has a harmless effect similar to simply making the receiver antenna fatter.

I've been using the word "parallel" a lot here. I don't know just how parallel is too parallel, but I'd beware of any long conductive parts with an angle of less than 45

degrees to the antenna. If the conductive parts are at right angles to the antenna, or nearly so, there will usually be no range problem. Metal or graphite spars or pushrods in the wing won't seriously affect an antenna in or parallel with the fuselage and vice versa.

Radio frequency problems can be a can of worms. Successful answers are often only found by test. Eliminating all metal and graphite parts will avoid range problems due to antenna pattern anomalies, but metal and carbon are too darn useful to give up in this day and age. Be smart and careful, and may your signal be with you.

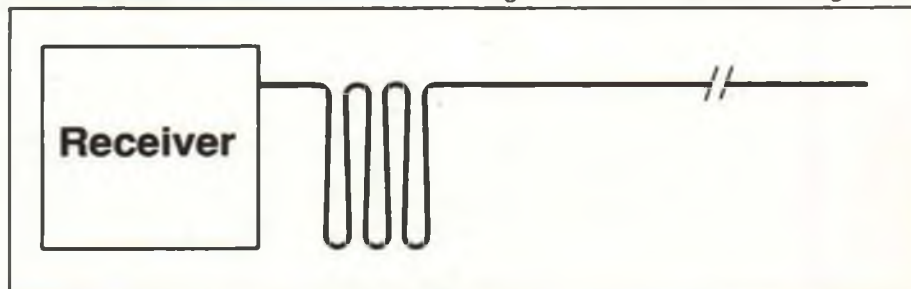
ANTENNA LENGTH

Those of us who have been in this game for a while know that the receiver antenna should be extended and reasonably straight; but for innovative beginners who wonder if they can leave the receiver antenna coiled up, or stuff it in some odd-shaped space, the answer is No! The antenna should be stretched out so it can in-

nary hypotenuse between the receiver and the antenna tip, not the true length of the antenna wire.

In general, the shorter the effective antenna is below its original optimum length, the poorer the range will be. But what about the short little antennas used on RC cars, boats and helicopters? They don't give the range that a full-length antenna does, but we usually operate these models closer to us, and don't need as much range. These special short antennas are better than one would guess from looking at their length alone, however. They have a base-loading coil hidden in a little lump at the bottom. The loading coil partly makes up for the very short antenna length.

Electrical engineer and old modeling friend Bob Florence uses a do-it-yourself shortened receiver antenna on occasion. He simply folds the antenna wire back and forth upon itself next to the receiver until he has room for the remaining antenna length. Have a look at the sketch. This folding amounts to "bifilar" winding. Since



For those who favor smaller RC models, enclosing the receiver antenna within the fuselage or wing can be a real problem. Folding the antenna wire back on itself as shown (known as "bifilar" folding) effectively shortens the antenna but also shortens the range—see text.

tercept roughly a quarter of the length of the radio wave. We can usually get away with running the antenna in one direction for a bit, then bending it at an angle and running the rest of its length in another direction—say from the fuselage out into the wing—but the angle will always reduce the signal strength somewhat. There the effective antenna length is probably the imagi-

each short length in the folded area is opposed by an equal length going in the opposite direction, the inductance is canceled out. The impedance of the antenna is unchanged.

I think the range of a bifilar-shortened antenna will be less, and will be the same as that of an antenna simply cut off to that

continued on page 77

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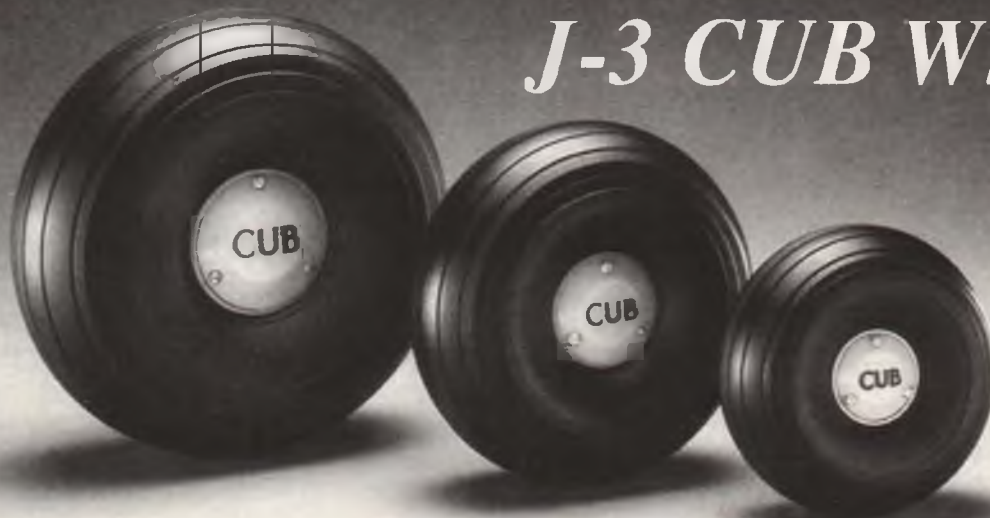
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- Use between 32-104°F. Extreme temperatures can cause rapid loss of stored charge.
- Use tabbed NiMH cells for pack building. Applying a soldering iron directly to untabbed cells may cause permanent damage.
- NiMH cells are designed for low-drain, long-duration uses. Discharge rates of 750mA or less are therefore recommended.

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HydriMax

LIVING IN THE PAST

Interest in vintage control line stunt is rapidly on the rise. Also discussed: Sources of kits, engines, plans and hardware; and CL's special interest groups as sources of specialized items and information.

It seems as though there are more old-timers out on the control line circles every time we go flying. And we're not just talking about the pilots.

Old-Time Stunt and its younger cousin, Classic Stunt, are now among the most popular events in organized CL flying. Part

In any case, that's the way Libby Campbell describes the event. Campbell is one of the forces behind the Eastern Golden Oldies Stunt Championships, one of several new vintage stunt meets that have appeared on the scene in recent years.

The second edition, held last Septem-

ditional "must attend" meets. This one intrigued one flier so much that he came all the way from Brazil; Oswaldo Pullen said he attended because, after 30 years of flying with North American products and reading about North American meets, the time had come to attend one.



Classic Stunt winners at the Eastern Golden Oldies Stunt Championships in Tifton, Georgia. Kneeling in foreground is Tom Dixon, 1st place. Standing, from left: Dave Horntrough, 2nd; Curtis Comer, 5th; John Simpson, 3rd; and Derek Barry, 4th. Photo by Walt Pyron.

of their appeal is that, while there is competition, the emphasis is on the "three Cs"—comfort, camaraderie and convivial competition.

ber in Tifton, Georgia, under the guidance of Contest Director Larry Draughn, was a successful two-day event that appears to be on its way to becoming one of the tra-

Campbell reports that the fliers ignored dire weather predictions—some of which came true—to get their official flights in.

Perhaps the best news following up on



Winner of Old-Time Stunt of the Golden Oldies meet was Tom Luper of Winston-Salem, North Carolina, pictured here with his Fox .40 powered Guided Whistle. Walt Pyra photo.

the Golden Oldies contest is that it will be repeated in 1995. This year's contest will again be held at Henry Tift Meyers Airport in Tifton, over the weekend of September 16-17. For information, contact Larry Draughn, 2028 McPherson St., Asheboro, NC 27203.

MORE CONTEST NEWS

The 24th annual Northwest Regionals are scheduled for Memorial Day weekend, May 26-28, at Eugene Airport in Eugene, Oregon. This contest is one of the largest in the country; this year's meet will feature 38 events covering the full gamut of combat, carrier, stunt, racing, speed and scale. The contest site offers three asphalt circles and four grass circles, plus an on-field hobby shop and food concessions. In addition to the competition, the contest features a banquet with an aviation program. For information, contact the Eugene Prop Spinners in care of John Thompson, 295 W. 38th Ave., Eugene, OR 97405.

MUST-HAVE CATALOGS

Among those attending the Golden Old-

ies meet was Tom Dixon, who is an important personage in CL precision aerobatics because he's one of those folks who make hard-to-find products available to CL enthusiasts.

Tom periodically updates his catalog of CL engines, kits, plans and accessories. He also throws in an occasional article on CL topics. New products listed in his latest catalog include the Discovery Retro .60, which is actually a .55 manufactured in the Ukraine; and the Double Star .60, made in Moldova and patterned after the Super Tigre .60. New kits include the Stiletto XL stunter, a redesign of the Les McDonald champion; and Box Car Chief, an Old-Time stunter. Also listed are several of the new Brodak kits in addition to several new plans.

To get the catalog, send \$5 to Tom Dixon, P.O. Box 671166, Marietta, GA 30066.

• • •

There's also a new catalog from Windy Urtnowski. Windy has changed both the name and location of his business; formerly called Pro-Stunt Products, it's now simply named for its owner. But Windy still offers

the same ever-expanding range of precision aerobatics products, including a large number of instructional videos. One of the latest videos covers the 1994 Control Line World Championships. Also new is a series of videos on finishing techniques. In addition to the videos, Windy offers plans, engines, kits, props and various accessories. The catalog is priced at \$2, from Windy Urtnowski, 93 Elliott Pl., Rutherford, NJ 07070.

• • •

For those nostalgic for the old classic Veco aircraft designs, there's a new catalog out from Aero Engineering, listing many of them, including the Brave, Warrior, Chief, Squaw, Papoose, Scout, Mustang, Smoothie, Tomahawk, Thunderbird, Tom-Tom, Little Tomahawk, Little Tom-Tom, and Hurricane. For information, send an SASE to Aero Engineering, 1305 Tuscaloosa Ave., Birmingham, AL 35211.

FINDING THE RIGHT STUFF

One of the skills required for successful CL flying is the ability search out the needed products, because, unfortunately, many hobby shops are no longer interested in serving non-electronic model aviators. The above sampling of catalogs gives only a hint of the range of CL-related products available to modelers who know how to find them.

Many of today's suppliers are of the cottage industry type, reported on in the various specialty newsletters. A wise investment for any CL flier, particularly the new flier looking for sources of products, is membership in the specialty organizations.

The following is a sampling of product information you might find in a typical edition of the various newsletters. (Remember, this is in addition to the regular offering of technical articles, contest reports, rules discussions, photos and so forth.)

• *Hi-Low Landings*, the newsletter of the Navy Carrier Society, in its July-August-September issue of 1994, published a survey of all the engines used in carrier contests for two years, based on contest reports. The article tells you the engine of choice for Profile (K&B 5.8), Class I (K&B 6.5), Class II (O.S. .46), Sportsman (K&B 5.8), .15 (Conquest .15), and Classic (Rossi .60), as well as the number of all other engines used.

For information on the Navy Carrier Society and its newsletter, write Michael F. Pugh, HCR 51 Box 220, Stephenville, TX 76401.

• *MACA News*, the newsletter of the Miniature Aircraft Combat Association, in its August 1994 edition, contained information on no fewer than 22 different manufacturers and suppliers of kits, engines, coverings, combat hardware and accessories, bearings, plans, engine mounts, tanks, engines and accessories from Russia, wood, props, lines, pit boxes, Fox engine custom parts, engine rework and parts, and more. To get the details, send \$15 dues to MACA, c/o Ross Leightner, 3007 Pirates Cove, Au-

ra, OH 44202.

•The newsletter of the National Control Line Racing Association doesn't always carry advertising, but this developing organization's newsletter has plenty of information useful to any new racer. The December 1994 edition had an article about how to make shutoffs and a chart showing the key aspects of 10 popular regional racing events, plus full rules for two such events. For information about NCLRA, write Jerry Meyer, 8 S. Grace St., N. Aurora, IL 60452.

•*Speed Times*, the newsletter of the North American Speed Society, is a bonanza for go-fast enthusiasts. The January-March 1994 issue, for example, had information about 33 different suppliers of everything from engines to speed pans, props, engine rework, jet engines, fuel and tanks, Cox engine custom parts, FAI speed pans, Irvine engines, engine reworking, control systems, high-tech building materials, TWA engines and parts, Nelson engines, OPS engines, custom jet parts, and lots more. To get *Speed Times*, send \$22 dues (U.S. and Canada) to North American Speed Society, Box 82294, North Burnaby, B.C. Canada V5C 5P7.

•*Stunt News*, the publication of the Precision

Aerobatics Model Pilots Association, comprises 96 pages full of stunt information. Included in the January/February '95 edition was information on 14 manufacturers and suppliers of kits, engines, mufflers, tanks, tuned pipes, instructional videos,

props, control systems, plans, engine rework, wings, and accessories. *Stunt News* can be received for the price of the \$20 annual dues. Write PAMPA at 327 Pueblo Pass, Anniston, AL 36206.

If the above doesn't convince you that there are plenty of CL products out there for enterprising CL fliers, consider that there are several good regional newsletters (such as *New England Combat News* in the east and *Flying Lines* in the Northwest) that carry product information, and most club newsletters also have such ads and articles. And nearly all of the newsletters contain classified ads.

So, if you want to find what you need for CL flying, join a club, and join one—or all—of the specialty groups. In addition to providing news of their competition categories, the specialty groups also represent the interests of their members to the Academy of Model Aeronautics.

Contest directors, how about sending some information on your latest meet and a few photos? Questions, club news, contest information, technical tips, photos and other items of interest to CL fliers is welcomed. Write John Thompson, 295 W. 38th Ave., Eugene, OR 97405. E-mail at 73473.1407@compuserve.com. MB



Charlie Reeves competed at the Golden Oldies meet with his distinctive twin-boom "Yo-Yo," a vintage design originally kitied by Ricks Mfg. Co. Photo by J.L. Campbell.



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Slots or Holes	A	A	A	A	A	D	D
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PRODUCTS IN USE

■ By Jim Petro
Photos by author and Phil Duker

The Model Electronics P-39 Airacobra

Combine Sure Flite's all-foam P-39 with Model Electronics' 10-cell War Plus Turbo 10 motor and gear drive and stand back! An outstanding package that sets new standards for electric aircraft performance.

This is the first time in my 50 years of model aviation that I was afraid to keep advancing the power past the halfway point. I wasn't alone; my son Jim and friends Art Quillen and Phil Duker each quit at half throttle on their first tries too. We all have engineering backgrounds and Art makes test equipment for electric car motors, so what scared us? Imagine holding a plane with a geared, generic-looking 05-size car motor that makes a noise like a jet engine (I mean a deafening *shriek*) and a prop blast that threatens to devastate your shop. Read on and learn what other surprises I received from Model Electronics while reviewing their electric P-39 Airacobra.

THE AIRFRAME

The Sure Flite kit is perfect for conversion to electric because it has the right wing area, internal space, light weight and easy construction we want, and it's hard to find a more streamlined airplane than the Bell P-39 Airacobra.

Sure Flite's friendly foam shapes smoothly and easily. The best foam cutting blade fits a utility knife and is available only at carpet supply shops; these are sharp enough to do surgery. Most of the worst part of foam construction—the static cling of scraps—disappears if you make formed cutting tools for a soldering gun out of thin music wire and melt out the cavity hunks and aileron cable grooves. The curved

The author's daughter-in-law, Cathy Petro, helps demonstrate that this P-39 is NOT a small model. Finish is water-base gloss enamel over a Tilebond sealer coat, done up in a color and trim scheme reminiscent of post-WWI Thompson Trophy racers. Jim says everyone thinks this is a conventional balsa model until they look into the battery chute.



cable grooves came out perfect by guiding the hot wire with a cardboard template.

A very important item not addressed in the instructions is alignment of the motor, wing and horizontal stabilizer. By good fortune, the lower edge of the depression for the exhaust stacks on the side of the fuselage is on the datum line that extends to the center of the spinner and gives good reference for the motor mount and downthrust. Extending the line rearward gives the reference for incidence. Trim the saddle so the wing has a 1/4-inch rise at the leading edge. The horizontal stabilizer should be parallel to the datum line.

I recommend increasing the fiberglass reinforcing of the nose to cover the whole motor area because the cowl top becomes too thin when the interior foam is removed for motor clearance. Hot air exhaust is very

important; if an outlet behind the wing is used, be sure the wing attachment is not weakened. I created an alternative outlet by cutting through the fuselage at the exhaust stacks and then opening the ends of the stacks, thus allowing the prop blast to draw out internal hot air through the stacks.

Would you believe this model came out nose heavy? It would have needed almost 3 ounces in the tail. Instead of weight, I moved the elevator servo rearward and then altered the rear of the foam battery chute. Now the center of the pack rests at the CG.

Sig Epoxolite filled the gaps at the wing saddle and also faired around the leading edge. At this point I thought, "This is a big plane!"

FINISHING

Ol' "Iron Dog" was usually pictured in war drab, burdened with over 2,000 pounds of "Government Issue" necessary for combat. By the end of WWII, the P-39Q had acquired a substantially stronger powerplant and landing gear. A smart pilot saw the speed potential and bought a surplus Q, stripped it until it was a greyhound and then led the entire pack to win the 1946 Thompson Trophy Race. Our P-39 was going to have racing colors.

Lightweight spackle filled all the joints and dings, was sanded and then the whole surface was brushed with two coats of Titebond glue thinned 50/50 with water. After a light sanding, the surface was now smooth, sealed and tougher. Red Devil Paint recently came out with Duratex, a high-gloss waterbase enamel, and I thinned this 25 percent with water and got a nice spray job using only one small can. The trim color was brushed on. Self-adhesive tape and lettering grip aggressively.

EQUIPMENT INSTALLATION

We could hardly wait to test the newest War Emergency Power motor—the War Plus Turbo 10! The only external clue that this is not a standard 05 car motor is the size of the brush holder, which has about twice the normal area and two shunts coming from each brush. Inside, however, we see where all the amps are going to work. Thirty of the critters rush down the huge brushes, cross a bigger-than-normal commutator and circle the armature on very low resistance triple-wire windings. We wouldn't be surprised if the magnets were some type of Superium material. Dynamometer tests show 60,000+ rpm no load on

■ BELOW: To close up a large gap between the nose and spinner backplate, the author moved the prop and spinner back; in doing so, the blades' folding action is substantially restricted by the motor mount ring. Still, the Sonic-Tronics blades are sufficiently flexible to resist breakage on most landings. ■ BOTTOM: Sure Flite's electrified Airacobra is a smooth flying, realistic airplane. Model Electronics' recommended components combine to produce a P-39 that is a pleasure to control and watch.



MODEL ELECTRONICS P-39 AIRACOBRA

WINGSPAN	51 in.
WING AREA	450 sq. in.
FLYING WEIGHT	58 oz.
WING LOADING	18 oz./sq. ft.
POWER	Model Electronics "War Plus Turbo 10" motor with 8:1 gearbox, running on 18 cells.
RADIO	Three or four channels required (ailerons/elevator/throttle, optional rudder).
ADVERTISED PRICES	P-39 Airacobra, \$79.95; War Plus Turbo 10 motor, \$98; Super Box 8:1 gearbox, \$48.50; 18-cell 1400 mAh Sanyo SCR battery pack, \$52.50; AI/Robotics FX-35 motor controller, \$89.50; Sonic-Tronics 13x7 folding prop, \$21.50; Spinner, \$8.

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The latest in the War Emergency Power series from Model Electronics: the War Plus Turbo 10 motor, attached to a stock Super Box 6:1 gearbox. The plywood disk with the large hole is the firewall that is glued to the fuselage. The happy-face disk is the motor mount that carries the gearbox and screws to the firewall. A 10-cell Sanyo SCR pack provides very steady power output. Jim later shortened the prop shaft to reduce the large gap behind the spinner.



■ TOP LEFT: A soldering gun fitted with a couple of different homemade music wire tools cleanly cuts the aileron servo pocket and the plastic sheath groove. Jim says the one-piece cable from aileron to aileron is as smooth and precise as you could want—don't change it! ■ TOP RIGHT: This photo shows the original interior, but a case of nose-heaviness was solved by moving the elevator servo back and also opening the end of the foam battery chute; the battery now is farther back with its center of the balance point. The FX-35 speed control unit is mounted in the motor cavity. The motor, battery and speed control get very effective cooling.



10 cells. A reinforcing brace comes down from the armature to help keep the wires from flying off the commutator. Don't use more than three cells if you use the water dip break-in method because the brushes seem soft and seat very quickly.

Model Electronics' "Super Box" 6:1 gearbox consists of 40-odd parts that have to be carefully assembled and then mated to the motor. The prop shaft's slight axial freedom is achieved by the number of small thrust washers used.

The large, rather flexible plastic spinner needs extensive modification to allow cooling air to flow through to the motor. Don't tighten the two spinner screws too much or you'll cut an oval instead of a round hole in the tip. Either the backplate or prop hub needs to be trimmed in order to get them to mate properly. A couple wraps of narrow tape are needed around the prop shaft to center the backplate's slightly oversized hole. After mating the prop and modified spinner, scratch index marks on the three pieces so everything will go back together properly. We used a Du-Bro Tru-Spin balancer to get the large spinner and prop in balance.

The plywood motor mount fastens to the firewall with four screws and is easily removable. A very obvious predicament surfaced when the spinner was attached and behind it was a huge 3/4-inch gap. The void was reduced by cutting 3/8 of an inch off

the prop shaft and also putting a 1/4-inch spacer between the gearbox and motor mount. The 6mm long mounting bolts were replaced by M3x20 machine screws cut to 15mm. The blades are now somewhat restricted but still fold far enough to prevent damage on landing.

Model Electronics now supplies the new FX-35 digital motor controller from AI/Robotics. It has so many features and options that it comes with a 20 page manual! The FX-35's smooth throttling sound produced by a 4000 Hz switching frequency is highly preferable to the raspy rumble characteristic of frame rate controllers. The best mounting place for the FX-35 is in the motor cavity on the ledge directly above the entrance to the battery chute.

The War Plus Turbo 10 motor runs on a pack of 10 Sanyo 1400-mAH SCR cells. Model Electronics assembles their battery packs with soldered flat braid connectors for minimal resistance. Our tests showed a 28 amp current draw at full power after the short initial surge. The thrust profile is a 70-ounce burst for 10 seconds, quickly settling to 50 ounces for 2-1/2 minutes. Propeller rpm during the 2-1/2 minutes was 7,000.

A really simple battery compartment is built into the fuselage. The battery stick inserts into a tunnel entrance in the lower cowl. The connectors stow away in an air

continued on page 68

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HANNAN'S HANGAR

BY BILL HANNAN

“Great minds fly on parallel paths.”



Another fine Topsy 52 as built by French scale expert Roger Alme from Siegfried Glockner's plans. Note that Roger employed translucent tissue covering, while Glockner's model is opaquely painted.



Siegfried Glockner, of Germany, proudly displays his Peanut Belgian Topsy 52, one of aviation's most graceful lightplanes. Ichiro Yamada of Japan took the photograph.

Our lead-in quotation, a variation of a much older saying, introduces this month's theme and photo gallery.

MOTIVES FOR MODELS

Why do certain aircraft appeal so strongly to scale modelers? Obviously

photos, may also rank in this exceptionally eye-appealing category.

But take a look at those "squarebirds," the Farnans and Volksplanes. Surely their appeal is not in the glamour department, yet they are frequently modeled. Perhaps their ease of construction and performance potential may be strong attractions? Beauty is, of course, in the eye of the beholder. How else could the proliferation of Fikes and Lacey's be explained?

The 1926 Farman "Carte

Postale" (Post Card) was an ungainly looking flying machine amalgamated from the fuselage of a Farman "David" biplane fuselage and a Farman "Goliath" transport wing. (David and Goliath flying together!) Featuring an incredible amount of wing area, the Carte Postale had an extremely low wing loading. For an indoor scale model, this configuration yields potential performance advantages, especially for Peanut and Pistachio events, where rules limit the model's span.

Emmanuel Fillon of France

some subjects are so esthetically attractive that they nearly qualify as works of sculptural art. One example might be the curvaceous Supermarine Spitfire. The Belgian Topsy 52, shown in two of our

Truly International! This French Farman Carte Postale parasol, constructed by Enrique Maltz, of Israel, is posed atop Model Builder magazine featuring an earlier photo of it. The Farman was based upon Alvarez plans from Uruguay, and this photo was taken by Jiro Segimoto of Japan.



Canada's Laddie Mikulasko scaled up his RC Farman Carte Postale from Pistachio-size three-view drawings. Power for the lightweight 58-inch span is furnished by a Saino .80 four-stroke, which must result in some truly remarkable vertical performance!

recognized this and published a three-view and Peanut plan of the Farman during the 1980s. Utilizing Fillon's documentation, Ulises Alvarez of Uruguay developed a lighter Peanut variation which achieved 80-second flights. Musician Enrique Maltz, who builds models during world-wide concert tours, based his Farman on Alvarez' plans, and the model has been successfully proxy-flown in Japan.

At the opposite end of the size spectrum, Laddie Mikulasko's 50-inch span RC Carte Postale is a crowd-pleasing attention grabber, so light that Laddie flies it only on calm days.

The Evans VP-1 is another almost curveless design. Originally called the "Volksplane" until Volkswagen's legal department raised objections, the aircraft may be one of the most popular homebuilts ever conceived. It has been constructed in large numbers in many parts of the world, and in even greater quantities as models. Its most powerful attractions? Ease of building, low cost and practicality. Here's a project which can be quickly built and easily detailed, and which flies nicely in sizes ranging from Pistachios to large-scale RC.

Further, unlike more obscure aircraft, scale documentation is readily available. VP test pilot Walt Mooney's three-view drawing appeared in the December 1971 *Model Builder*, and since so many full-size examples have been built in various places, the choice of color and markings schemes is almost unlimited.

VP model plans are also easily available, including Siegfried Glockner's Peanut version, which was featured in the August 1985 *Model Builder*. Most recently, Shiro



Takeuchi, of Japan, has published a Peanut VP-1, which will be the subject of a one-design model contest held in conjunction with the 1995 Nagoya Nuts Peanut event. Proxy entries are invited, and for full details and entry forms, send three International Reply Coupons (available from most post offices) to Shoichi Uchida, 3-24 Asanaka, Ogaki-shi, Gifu-Ken, 503 Japan. It's expected that categories will include Pioneer, WWI, Golden Age, WWII, and Modern, in addition to the VP class.

RESEARCH PROJECT

Model historian John Brown is gathering information for a comprehensive article or possibly a book about Dan Calkin and his

line of model airplane engines. John has been fortunate in gaining the cooperation of Calkin's relatives and former employees, but still hopes to fill in a few more missing links. Anyone who may have information to offer may contact John at 13362 Fairmont Way, Santa Ana, CA 92705.

NEW PRODUCTS

Tom Herr has announced the latest and perhaps most exciting addition to his line of rubber-powered model kits, the Ryan S-T. Spanning 30 inches, the Ryan features over 100 laser-cut parts to assist quick as-

sembly. The kit includes computer-drawn plans, scale three-view documentation drawings, complete instructions, balsa, rubber, tissue, decals and hardware. See the Herr Engineering ad elsewhere in this issue for price and ordering information on this and other kits in the series.

MODEL PLANS

Jim O'Reilly offers a variety of computer-drawn model construction plans employing what Jim describes as "industrial strength CAD software." Included are rubber and gas-powered types such as Old

Another of Roger Aime's projects is this electric-powered Evans VP-1. Note publish fuselage markings.



HANNAN'S HANGAR

Timers, a P-30, Bostonian, Coupe d'Hiver and flying scale models. A brochure with more detailed descriptions, reduced-size plan previews and prices is available for \$2 from Jim O'Reilly, 4760 N. Battin, Wichita, KS 67220.

LAIRD SUPER SOLUTION

Latest in the Williams Brothers racing series of plastic display model kits is Jimmy Doolittle's Laird Super Solution biplane. The 1/32-scale model kit features injection-molded plastic components, choice of hard or flexible tires, nylon monofilament rigging and authentic decals for the Super Solution reproduction displayed in the EAA Museum in Wisconsin.

The kit should be available in most hobby shops, however a descriptive brochure may be obtained directly from the factory at 181 Pawnee St., San Marcos, CA 92069.

MODELING TOOLS

Dr. Vernon Hacker, who recently took

part in the indoor model contest conducted deep in an underground Romanian salt mine, is again offering a line of medical tools which have proven suitable for modeling purposes. Particularly useful for ultra-delicate work is a 15 degree scalpel intended for use by eye surgeons and priced at \$5. A cautery tool with a battery-operated hot wire for trimming indoor model covering is available for \$12.

Perhaps the most unusual and intriguing instruments are the Ethicon Laproscopic offerings, which have scissor-like handles to remotely actuate tiny tools at the end of 12-inch long small diameter tubes. One type is equipped with tiny scissors blades (just the ticket for reaching deeply into a rubber-powered model fuselage to release a bunched-up broken motor); the other tool has what amounts to a precision alligator clip at its tip. Not only could you grasp an individual rubber strand with it, but you can also lock the jaws in position for safer extraction if you desire.

At \$15 each, these items are fascinat-

ing and make unique additions to your field kit. All items mentioned are marketed to modelers on a non-profit basis, with all proceeds being donated to the AMA indoor fund. Contact Dr. Vernon Hacker, 25599 Breckenridge Dr., Euclid, OH 44117-1807.

AERO MODELLING DIGEST

Merv Buckmaster's 1994 book is now available. The compact 208-page volume features a collection of articles by Australian and New Zealand model builders intended to "promulgate knowledge of model aeronautics and to provide enjoyment for aeromodellers."

Subjects treated range in variety from indoor model flying to the care and feeding of RC model engines. Other articles concern RC history, model covering techniques, control line developments, customizing models, electronic switches for electric motors and two exceptionally well-written aerodynamics articles by Martin Simons, the master of making complex theories easier to understand.

Indoor model specialists will appreciate the comprehensive treatment by the late Boyd Felstead. Like a latter-day Octave Chanute, Felstead corresponded with indoor modelers worldwide, and thus was constantly aware of every innovation, usually via direct reports from the originators themselves.

Aero Modelling Digest 1994 may be ordered from Samaria Concepts, RMB 1798, Benalla, Victoria, 3673, Australia. The price is \$19 plus \$3 postage by surface mail, or \$9 via air mail.

When writing to any of our mentioned firms, please tell them *Model Builder* sent you!

SIGN-OFF

We close this month with an item found in *Aero Modelling Digest*: "Happiness is five successful takeoffs. Enjoyment is five max flights. Satisfaction is five safe landings!" MB

George Benson's VP-1 Peanut sports German insignia and British registration, however, it resides in Mill Valley, California!



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PLUG SPARKS

BY JOHN POND

• A Tribute to Contest Directors

• The Pepperell Godwit .23

• Class A Sleeper: The Peerless Pippin



Photo No. 1. The Atomizer is one of a couple of SAM-legal designs by John Tatone of timer and engine mount fame. SAM 49's Tom Empey flies this one in 1/2A RC Texaco.

Seeing as the flying season is pretty well over by December, this columnist would like to take this time to acknowledge the unselfish efforts of various SAM Contest Directors who ran some pretty sensational meets this past year.

The first one that comes to mind is the "Crash and Bash" put on by Don Bekins and his SAM 27 (California) cohorts. This was the largest meet ever held at the Schmidt Ranch and without a doubt, the most heavily contested. With good weather prevailing, practically everyone who flew had excellent times, resulting in numerous flyoffs.

by Tom Empey has proven to be a real 1/2A Texaco winner.

We are indebted to John Targos of ARGO USA (producers of replica Elfin diesels) for Photo No. 2, taken at the Annual VAMPS FF meet held at the El Dorado Dry Lake, southwest of Las Vegas. Pictured are Larry Jenno and Millie Targos, who together did a fine job of running the contest. By the way, Larry is currently producing replicas of the Orr .65, a good running spark ignition engine of the early '40s. Larry Jenno can be reached at 4341 Flandes St., Las Vegas, NV 89121 to place your order. Price of the Orr .65 is \$295; ini-



Photo No. 2. Hard at work at the '04 VAMPS FF contest at El Dorado Dry Lake just outside Las Vegas, contest director Larry Jenno and his assistant, Millie Targos.

One of the more interesting models seen is shown in Photo No. 1: a John Tatone "Atomizer" (originally powered by an Atom .09). This model as flown

tial down deposit is \$100. Get 'em while they're hot!

The wrap-up of the West Coast O.T. flying season was staged by SAM 49 at Taft in

November. Tom Empey, Contest Director, did everything, including registration, recording, frequency control, and prize awarding. Tom and the rest of the boys really missed Marge Bernhardt, who has been either running or helping run the SAM 49 meets ever since her husband, Otto, of 77 Products fame, passed away some eight years ago. Marge was feeling a bit under the weather at the time of the contest, and we hope to see her on the field again soon.

Inasmuch as photos were sent in by John Targos, it's only fitting we feature Photo No. 3

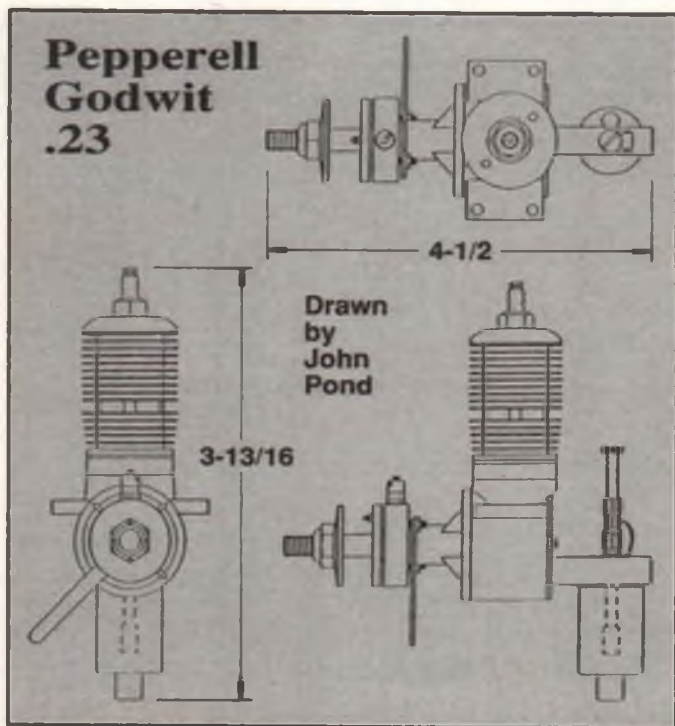


Photo No. 3. Beer drinkin' buddies John Pond (left) and John Targos, the guy who turns out those ARGO USA Elfin diesel replicas. Photo taken at the SAM 49 Fall Annual at Taft this past November.

showing John with his favorite beer drinking buddy, John Pond. Pond has been able to make a few of the fall contests, but is rapidly acquiring the reputation of bringing a car full of models and then not flying them. Sorry, men. There are a couple of things wrong with me at present that prevent my active participation. At present I will have to stick to photography and column writing.

ENGINE OF THE MONTH

In the February issue we featured the Pepperell Godwit .098 drawn from Dick Dwyer's outstanding collection of New Zealand-made engines. This month we've selected another



ENGINE OF THE MONTH

Pepperell engine, this time the Godwit .23, which incorporates some American features, including aluminum castings, steel piston and crankshaft with ball bearings.

Ira Pepperell, now at the age of 65, has been making engines since 1945. He has inherited the design and machine shop skills of his dad, who manufactured spark ignition engines in New Zealand before WWII. It's interesting to see how the glow plug forced manufacturers outside the U.S. to finally turn to diesel engines. Most of these were developed for easy starting, easy adjustment and best of all, more power than comparable size spark ignition engines. In many cases, they approached the fine running of the glow engines.

MODEL OF THE MONTH

The startling success of the Comet Zipper set the pace for the design of pylon models by

numerous firms. Such is the case of the "Pippin" as produced by Peerless Model Airplane Co. of Cleveland, Ohio,

with the coined name of "Apple of Your Eye."

Harold Covert, the highly acclaimed producer of beautiful models (and winner of the 1938 Berryloid Trophy for best finish), was commissioned to produce an improved version of the Zipper. Instead of hav-

ing numerous formers around a rectangular box (a la the Zipper) to produce an elliptical cross-section, the Pippin uses a former-and-stringer structure with numerous sections of 1/32 sheet balsa inlaid between the stringers, one bay at a time—a total of 40 individual pieces!

The Grant G9 airfoil, which came under this writer's scrutiny, makes construction of the wing a bit difficult on account of its very deep undercamber. The pylon fairings were made of soft balsa blocks to obtain those beautiful fillets—the hallmark of Covert's designs—and also to bring the fuselage cross-section area up to the minimum required for NAA sanctioned contests. Considerable carving and sanding is required to form the blocks to the desired shape.

This writer has yet to see a Pippin on the contest field. This is at least partially due to the plan's lack of fuselage formers, something this columnist has not found time to loft. Same goes for the ribs in the elliptical wingtips.

Summarizing, this 1940

is enjoying summer weather. Merv Buckmaster, editor of the Australian model magazine *Airborne*, sends in Photo No. 4 showing a little-seen Old Timer, a Shereshaw XP-3. Careful examination will show Merv has relocated the engine to the nose of the fuselage pod to cure an extreme case of tail-heaviness. West Coast O.T. free flyer Cliff Silva ran into this same problem when he built his XP-3. His model took a pound of lead in the nose to balance, resulting in a very shallow climb.

The field that Buckmaster flies from is part of his property in the outskirts of Benalla, N.S.W. Must be great to simply walk out of your house, set up and fly!

T-D COUPE MEMORIES

The October '94 Plug Sparks column brought back some very interesting memories for Don Johnson, 1048 Mikkelson Dr., Auburn, CA 95603. Don relates that first gas job was a T-D Coupe using a Brown Jr. for power. The engine, incidentally, cut into quite a portion of dear old dad's paycheck. Undeterred, Don scaled up the plans on butcher paper. He still has the plans, Brown Jr., and Ohlsson airwheels.

Ted Dykzeul, designer of the T-D Coupe, ran a small shop in front of his

parent's home located on Center St. in Bellflower, California. Being only two blocks from his home, Don put many hours in the evenings and Saturdays at Ted's shop. After joining the Army Air Corps in 1942 and getting out in early 1946, Don found Ted's house and shop



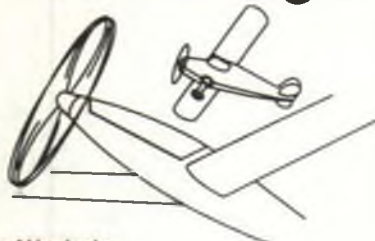
Photo No. 4. Airborne editor Merv Buckmaster recently finished this RC version of Ben Shereshaw's 10-foot XP-3, but mounted the engine in the nose to cure a bad case of tail-heaviness.

model is a beauty and should fly as good as it looks. For the faint hearted, you get out what you put in. This design is worth the effort.

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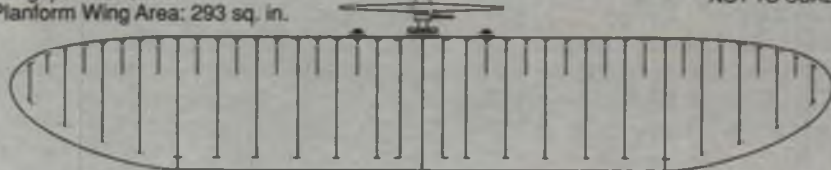


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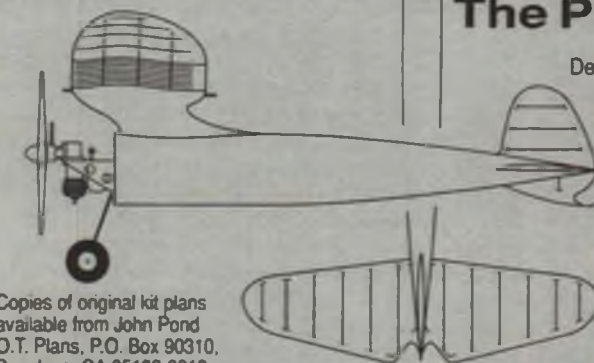
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- WING: Polyhedral, with three spars and half-ribs. Grant G9 airfoil.
- FUSELAGE: Elliptical cross-section, fully planked with 1/32 balsa. Pylon is faired with soft balsa blocks.
- TAIL: Conventional construction. Horizontal stab has thin lifting airfoil.

MODEL OF THE MONTH



Photo No. 5. A real rare one! The Silver Gull was mass-produced in 1939 as a movie matinee give-away prize. Louisiana modeler Vince Burton turned out this nice FF version, powered by what looks like a Forster .29.

were gone, having been replaced by commercial buildings. Don never did see Ted again and often wonders what happened to his "guru."

Don says his dad used to drive some of the gang over to the fabled Western and Rosecrans site to fly on weekends. It was a long trip, but well worth it as the smooth field was much superior to flying from the alfalfa fields in his area. Don concludes, "Sure miss those good old days as my T-D Coupe flew great."

MATINEE PRIZE

Yes! The "Silver Gull" shown in Photo

No. 5 was used as a prize for the movies in the late 1930s. In those days, films were generally followed by a "live stage show" which generally featured the giving of prizes to the young would-be modelers of the day.

The Silver Gull, as manufactured in 1939 by the Atlas Company of Santa Monica, California, was actually one of the first almost-ready-to-fly gas model airplanes. All one had to do

was assemble the wing ribs and spars as the fuselage came complete with sheet balsa tail. The low-cost version of the Dennykite was selected as the powerplant.

Vincent R. Burton, 4619 Bundy Road, New Orleans, LA 70127 submitted the photo of the Silver gull he built from Pond plans. Pond was quite lucky to find an old set of blueprints and a sketch of the balsa tails (full size on the back of the blueprint). A complete set of drawings were made showing the engine installation and general color scheme. Although not a real competitive duration model, it was a great model for the beginner. **MB**

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DO-IT-YOURSELF ELECTRONICS PROJECTS

There's a lot of enjoyment and satisfaction to be had in scratch-building your own electronic devices. This month, Roger details the building of a low-rate speed control as designed by Canadian modeler Keith Walker.

When I was about 11 years old my father bought me a book that gave an introduction to the basic theory of electricity. Of course, this was in the early infancy of digital electronics—a computer was something only NASA could afford and integrated circuits were still a mystery to most people and unavailable to the average electronic hobbyist. What a difference 20 years

makes! A trip to the local Radio Shack will net you a cornucopia of discrete electronic components, including various digital integrated circuits, specialized microprocessor and memory chips and even power MOSFETs like those used in our speed controls.

Now that it's so easy to obtain electronic components, let me tell you about a couple

Flyers Only club in Michigan. First up is his Miniature Low-Rate Speed Controller. Depending on the type of construction, this unit can weigh as little as 8 grams, and is designed specifically for Speed 400 racing. You can run from one to eight cells with it and it drops only 0.28V at 10 amps. Low-rate speed controls are not suitable for high-power motors or models where you'll be

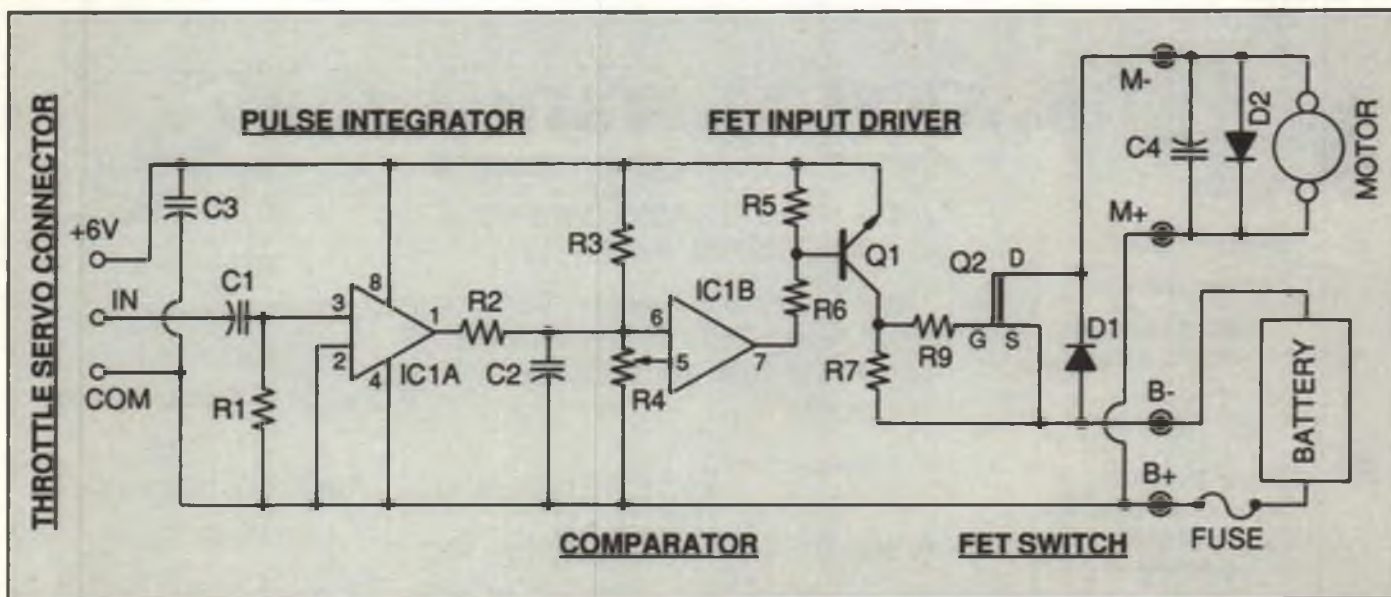


Figure 1. Ready to make your own low-rate electronic speed control? This is a design by Keith Walker, as published in *The Ampeer* newsletter. The parts needed are as follows:

Capacitors

- C1 0.1mF 6 volt
- C2 2.2mF 6 volt
- C3 10mF 6 volt
- C4 0.01mF 25 volt

Resistors

- R1 100K
- R2, 3, 5, 8, 10K
- R7 4.7K
- R4 10K linear potentiometer

Integrated Circuits

- IC1 LM358

Diodes

- D1, 2 1N4004

Transistors

- Q1 2N3906
- Q2 IRF240 MOSFET

of electronics projects that you can build with easily available parts, a minimum of experience and little patience. Although you won't be building an airplane with these projects, take satisfaction in the knowledge that you're building something that will go *in* the airplane.

All of these projects were created by Keith Walker, of Don Mills, Ontario, Canada, and were originally published in *The Ampeer*, the newsletter of the Electric

doing a lot of partial throttle flying, however, for an easy, inexpensive speed control for an OS-size sport plane, it is ideal.

Figure 1 is the schematic diagram for the unit and shows how the different components are connected. Each section of the schematic is labeled with its intended purpose. Let's look at each section and describe its function in plain language.

Your receiver sends out a series of pulses to each of its channels. A "frame" is the

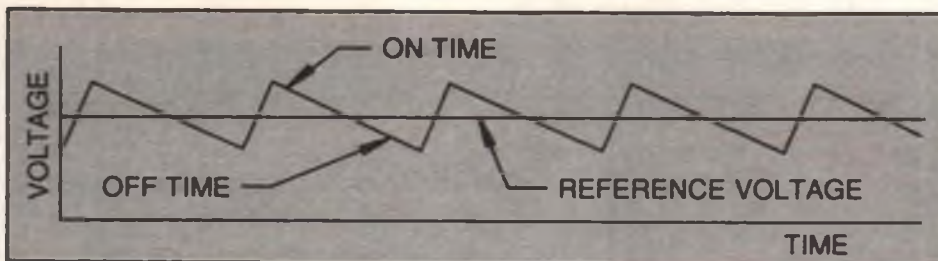


Figure 2. An illustration of the sawtooth wave used in an electronic speed control; its position relative to the reference voltage determines how long the power MOSFETs are turned on and therefore how fast the motor runs. Explained in detail in text.

period of time from the beginning of one pulse to the beginning of the next. The duration of each frame is fixed—that's where we get the term "frame rate." The length of the pulse is between 1 and 2 milliseconds and is determined by the position of the control stick on your transmitter. Typically, the "off" throttle position will give a pulse width of 1 millisecond and full-on throttle will produce a 2 millisecond pulse.

Now let's look at the circuit. The Pulse Integrator changes the rectangular-shaped wave from the receiver into a "sawtooth" wave (see Figure 2). Notice that the voltage of the sawtooth wave rises very quickly and decays very slowly. Now, we introduce a fixed voltage reference into the circuit. The sawtooth wave and the reference voltage are fed into the Comparator, which simply determines which voltage is higher—the reference or the sawtooth. When the sawtooth is above the reference, the FET Input Driver is turned on, which turns on the FET Switch. When the FET Switch is on, the MOSFETs turn on and power is supplied to the motor. Similarly, when the sawtooth is below the reference voltage,

the FET Input Driver is off, the FET Switch is off and the MOSFETs are off.

The width of the receiver pulse determines the decay time, and to a lesser degree, the height (amplitude) of the sawtooth wave. When the throttle is off, the height of the sawtooth wave never gets above the reference voltage and therefore the MOSFETs never turn on. When the throttle is full on, the combination of amplitude and very long decay time means that the sawtooth wave is always above the reference voltage, so the MOSFETs are always on.

The varying levels of the sawtooth wave cause the MOSFETs to turn on and off at a rate equal to the frame rate. The duration of the on time (the duty cycle) is what determines the ultimate speed of the motor.

Now that you know how it works, let me tell you how to build it. It's a fairly

simple circuit and can be built using a variety of different methods. You can build a printed circuit (PC) board, or if you're just going to make one or two units, you can buy a perforated board (perfboard) with holes spaced .1-inch apart and a small solder pad at each hole. This is the way I prefer to do things, since I have no facilities to make my own printed circuit board.

Simply arrange the components on the perfboard as shown in Figure 3 and solder the components to the individual solder pads. Then, using a very thin wire ("wire wrap" wire works very well) you can connect the components as indicated.

Don't let the details frighten you—once you start, it gets easy and you'll have it done quickly. You do need a somewhat steady hand, good eyes or a magnifying glass to put over your work, and a minimum assortment of tools, most of which you should already have. Included is a pair of needle-nosed pliers, a small diagonal clipper, some thin, rosin-core solder and a small, pencil-type soldering iron (25 watts). A pair of wire strippers capable of stripping small-gauge wire is also handy. Wire-wrap wire comes with the ends already pre-stripped. Be sure to use thicker wire suitable for higher current loads (18-20 gauge) for the battery, motor and MOSFET connections.

You can usually find the various components at your local electronic supply re-

continued on page 76

WORLD ELECTRIC CHAMPS RESULTS

Australia in August is a lovely place to be as the American electric contingent found out at the recent 1994 World Championships. Two teams representing the U.S. attended the meet: Jerry Bridgeman, Steve Neu and Bob Sliff entered the F5B (electric glider) event and Steve Condon, Larry Jolly and Darryl Perkins entered F5D (pylon). Each team and the individual competitors did very well against the best of the rest of the world.

In F5B competition, Jerry Bridgeman earned 1st place, Steve Neu took 6th and Bob Sliff took 14th. Overall, the U.S. F5B team finished in 2nd place. Interestingly, all three U.S. F5B fliers used a new Aveox brushless motor developed specifically for this event. In F5D competition, the German team took top honors, the three German fliers sweeping 1st, 2nd and 3rd places. The U.S. team took 2nd place overall with Larry Jolly finishing 6th, Steve Condon in 8th and Darryl Perkins in 9th place. Congratulations to the six members of the U.S. electric contingent!

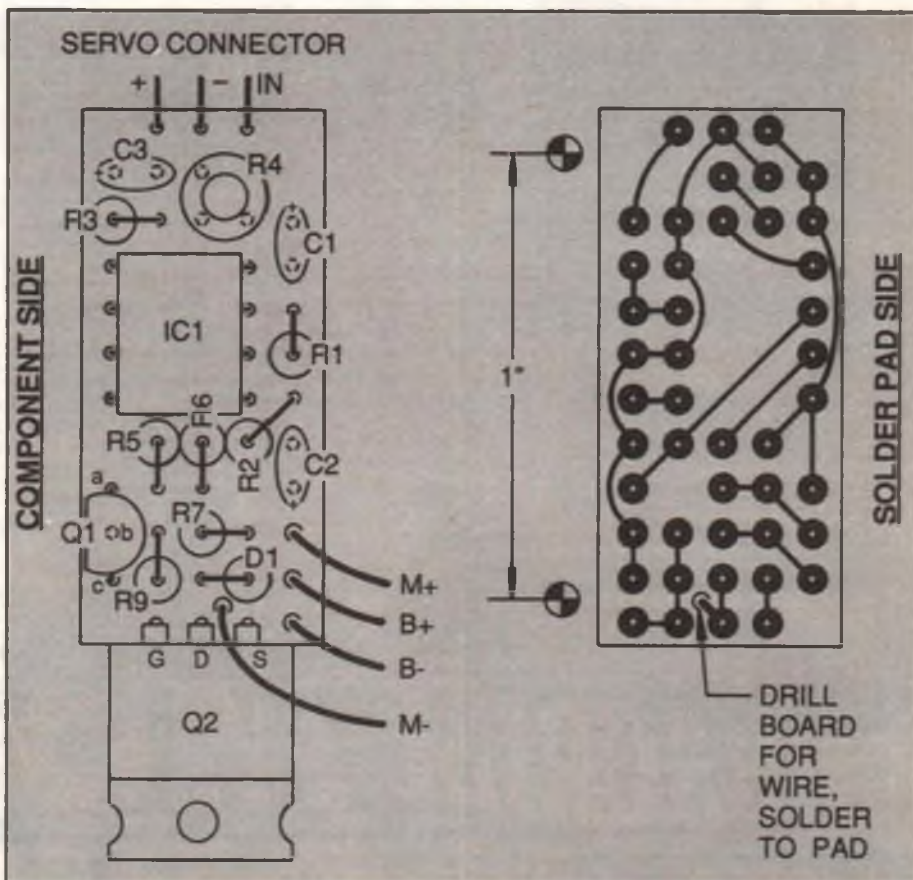


Figure 3. The arrangement of the individual components on .1-inch perfboard, a common electronics store item. The holes are spaced .1-inch apart, each with its own solder pad; a small wire makes the individual connections as needed. Not quite as elegant as a custom-made PC board, but much easier and cheaper.

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THE SIG STORY

PART 2

The conclusion of a two-part look at the history of Sig Mfg. Co., one of the largest manufacturers of model airplane kits and supplies in the U.S.

By Jack Lewis



Glen and Hazel Sigafosse signed up for flying lessons and received their private pilot tickets in 1957—In fact, Hazel didn't get a driver's license until after she was a licensed pilot!

"Glen and I had always dreamed of learning to fly," Hazel Sig recalls, "and in 1957 a friend said, 'I just got my instructor's license. Come on! You're going to learn to fly!' So we did. It was a lot of fun—we sort of competed with one another. We both had different problems—Glen had trouble landing and none whatever on takeoffs—I never made a bad landing but I was all over the field on my takeoffs!

"When it came time to solo, our instructor was apprehensive about letting me go, because I hadn't made a bad landing and he couldn't tell if I could do the right thing if I did. So he bounced a landing or two on purpose and let me recover, which I did okay.

"Then he said my time was up and Glen should have a chance. So he got to solo first. I did the next time and everything was okay. I did end up getting my license first because Glen was blind in one eye and had to wait to take a special medical check ride. He didn't have any problems with it, though."

Back at the plant, Glen's innovative genius with machinery and Hazel's bubbly personality and instinctive office management skills were proving to be a winning combination. Sig Manufacturing Co. had expanded steadily over the years. By 1960,



Well-known competition RC flier Maxey Hester joined the Sig crew in the mid-1960s as plant manager; today he holds the position of company vice-president.

the Sig catalog included plywood, spruce, model airplane dope, glue and hardware.

In response to requests from several hobby shops, Glen and Hazel decided at that time to get into the wholesale distributor business. Hobby dealers found themselves buying more and more products from the expanding Sig line. They indicated that if Sig would also carry the engines, radios, kits, etc. of other manufacturers, dealers could buy all of their model airplane needs from one supplier.

By the mid-1960s, Sig was ready to expand into the kit manufacturing business, an area Glen had wanted to be in from the beginning. Until now, though, the growing balsa orders had left little extra time for taking on new products.

But now the time was right. Duke Fox, the engine manufacturer, wanted to sell the dies and manufacturing rights to the then-defunct Berkeley line of model kits. He had acquired the rights in 1961 when Berkeley went out of business. Fox had hoped to get into the kit business himself, but his model engines were enjoying enormous popularity at the time and the jump from engine-making to producing balsa wood kits would be a big change of direction for him, requiring new machinery and techniques.

For Sig, the kit business would be a natural extension of the balsa cutting shop, which already had complete capability to shape all types of wood parts. Little in the way of new machinery would be needed; just the time to get the kit department off the ground.

To help with the new kit department,

Glen and Hazel hired a longtime friend and modeler, Maxey Hester, to be the plant manager. His background in model building and carpentry turned out to be the perfect combination of skills needed to get the new Sig kit business going. Many of the production techniques and manufacturing methods used in kit production were de-



"The Sig Mini Air Force." At one point Glen, Hazel and Maxey all owned Pitts Specials, in which they performed at airshows. Tragically, Glen was killed when his Pitts crashed while performing at an airshow in Centerville, Iowa in 1980.

veloped by Hester.

The first few kits produced by Sig were simply reintroductions of some of the old Berkeley kits, such as the Buster, Cessna 172, Piper Cub, PT-19, Privateer, Sinbad, Ramrod and several others. These sold well enough to convince Glen that newer designs were needed. To help with the design work, Glen hired other nationally

known model designers and competition fliers, such as control line expert Mike Stott in 1969, past AMA president Claude McCullough in 1971, and six-time national scale champion Mike Gretz in 1972. Glen believed competition modelers had the kind of expertise needed to design good flying airplanes, and that such models would practically sell themselves.

One of Claude McCullough's first efforts was the Kadet RC trainer, which has proved to be the most popular of all of Sig's kits. The Kadet was the first model on the market designed from the ground up as a trainer. Its single-purpose design, which included the very first detailed photo-illustrated instruction book, made the Kadet an instant hit. The Kadet series of trainers have taught thousands of people to fly RC, and their legacy continues to grow today with the introduction of the Kadet Senior and Kadet Seniorita.

Glen and Hazel had never lost their interest in full-scale aviation. It was a business-related hobby, and they were active in it. Their first airplane was an Aeronca Champ that they bought soon after getting their licenses. At the time, Montezuma had no airport, so land was leased for the first Sig Field.

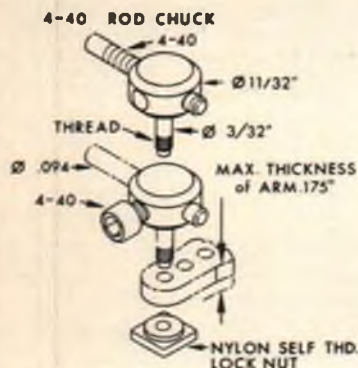
Like most aviators, the Sigs progressed to faster, higher performance airplanes as their budget permitted. One of their favorites was a Piper Comanche that they owned

and flew to model trade shows and contests. In 1966, Hazel participated in the All Woman's Transcontinental Air Race—better known as the Powder Puff Derby—flying a Cessna 206 from Seattle, Washington to Clearwater, Florida. In 1968 she acquired a classic Piper J-3 Cub for local fun flying. The next winter she, Glen and Maxey Hester stripped the Cub down for a

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About four years ago, Hazel and Maxey decided to take the ultimate plunge (literally), each of them making a tandem parachute jump with an instructor. They're a pair who really know how to live life to its fullest.

complete rebuild, including clipping 7 feet off the wingspan for better aerobatic performance. Hazel's famous blue-and-white Clipped Wing Cub has since become a Sig trademark.

In 1974, Hazel's interest in aerobatics led her to buy a Pitts Special. Shortly after, Glen bought a Smith Miniplane and Maxey bought an EAA Biplane so that the three of them could travel to flight breakfasts and airshows together. They became known as Sig's Mini Air Force. Glen's little Smith Miniplane eventually became the subject of a Sig kit.

It wasn't long before a friend asked Hazel if she would fly in an airshow he was sponsoring at the Ottumwa, Iowa airport, starring the Thunderbirds. She did and eventually both Glen and Maxey bought Pitts Specials and joined in flying airshows.

Their exhibition flying continued for seven years—until one fateful day in the summer of 1980. Modelers the world over were stunned at the news of Glen Sig's death in the crash of his Pitts on July 20 while performing low-level aerobatics at an airshow in Centerville, Iowa. Hazel sold her Pitts

and never flew in another airshow; however, she did eventually return to flying her Cub and other airplanes.

continued on page 73



How would you like to have all this wood in your shop? This is how the balsa comes from the supplier, before the Sig folks saw it up into the sheets and sticks for their kits and for distribution to hobby shops. Sig processes almost half a million board feet of balsa annually.



Like most other kit manufacturers, Sig uses a converted printing press to turn out die-cut parts for its kits. Last year, Sig entered the Laser Age by purchasing two double-headed laser cutting machines which can cut up to 24 balsa sheets at a time.

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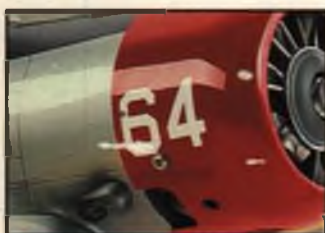
Wingspan: 69.4 in (1763 mm)
Wing Area: 713 sq in (46 sq dm)
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Wing Loading: 24-32 oz/sq ft (73-98 g/sq dm)
Length: 49.25 in (1250 mm)
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(10-15 cc) or 4-stroke: 91-1.20
cu in (15-19.5 cc)
Radio: 4-6 channels with 4-7 servos.

The SNJ version of the AT-6 shown here is covered in Top Flite MonoKote® Aluminum, Messing Red, Cub Yellow and Black. This kit includes the parts and decals to build either the Air Force AT-6 or Navy SNJ.

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Gold Edition Warbirds Roster



P-40E Warhawk Wingspan: 64 in



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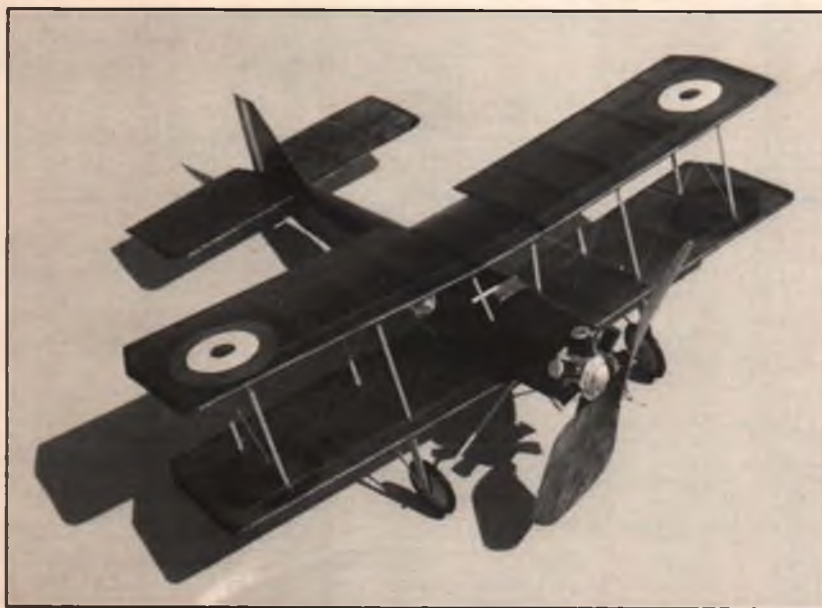
F4U Corsair Wingspan: 62 in

THE

B.A.T. BABOON

What better reason to pick a subject for a Peanut, than the fact that its name is unforgettable? Reprinted from the June 1975 *Model Builder*.

■ BY WALT MOONEY



The Baboon must have been designed by a modeler—lots of wing area (48 square inches!), simple lines, long tail moment.

In 1918, the British Aerial Transport Company constructed their Type F.K. 24 ("F.K." for Frederick Koolhoven) and gave it the name of "Baboon." The basic design was meant to be a trainer that was simple to build, rig and maintain.

The model's fuselage is constructed by first making two side frames directly over the plans. The side frames are shown

der to give the sharp corner.

When the basic box structure is complete, top formers A through F can be added. Use soft, flexible 1/32 sheet balsa to cover the upper deck, and carefully cut out the cockpit openings. Add 1/16x3/16 cross braces across the bottom of the box at positions in line with B and B. These are cemented to the normal 1/16 square

crossbraces and to the uprights, and will provide some structure between the roots of the lower wings.

The horizontal and vertical tails are simple structures, built directly over the plans using 1/16 square sticks. Carefully sand the outlines to a half-round section. Don't omit any of the gussets, as they are essential for keeping the covering from wrinkling in the corners.

The wings are also of conventional construction. Again, note and install the gussets. Note also that the spars are flush with the top of the tips.

The lower wings end just at the inside of the root ribs. The top wing has a centerline rib that ends at the aft spar; a triangular cross-section piece of balsa is used to fill in between the root ribs aft of the rear spar. The dihedral break for all wings is located at the outside of the thick root ribs. Carefully cut the outer panels free of the roots and reassemble the wings with 5/16-inch dihedral under each tip. Taper the ribs to give a good fit.

Sand the leading and trailing edges to the rounded and tapered cross-sections shown. The wingtips are also rounded.

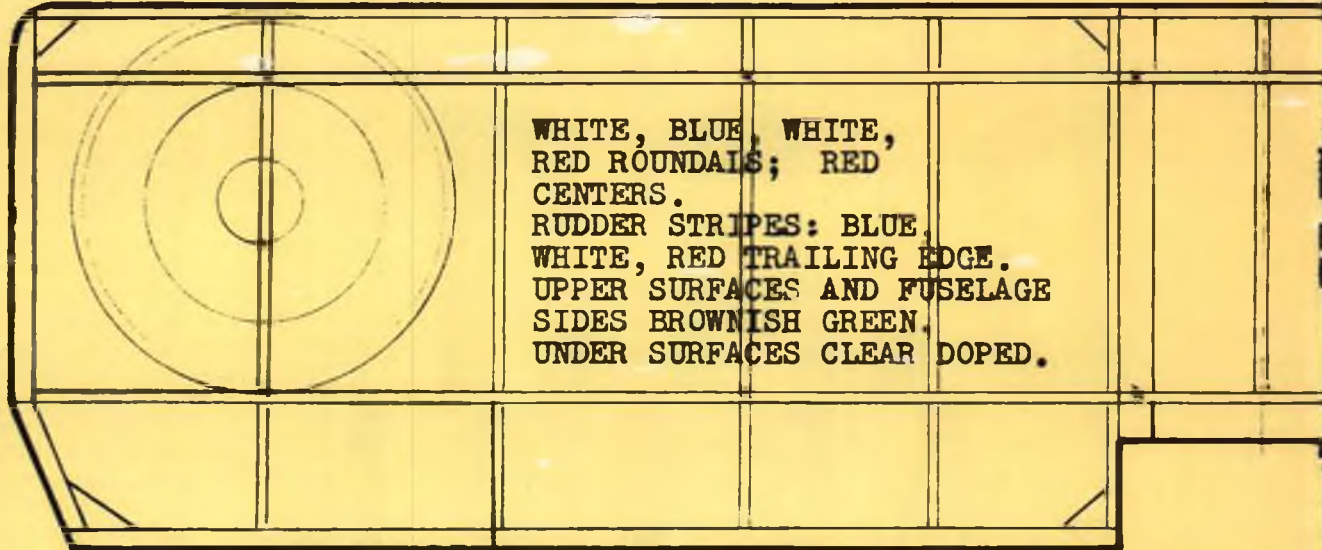
Use lightweight tissue for covering. To get an approximation of the right color for the upper surfaces I used brown and olive green RIT dye, dissolved in rubbing alcohol, to dye a sheet of plain white tissue.

After the parts are covered, use a light fog of water to tighten the tissue. A single coat of clear dope (thinned about 50 percent with thinner) is applied all over, and then a second coat applied to the fuselage. If you can get decals for the insignia, use them, otherwise paint them on.

The struts are made from 1/16 diameter dowel. Drill a small hole through each end of the struts; this is used after assembly of the wings to facilitate installation of the rigging. Cement the tail parts to the fuselage. Cement the lower wings to the fuselage sides. Make sure they are accurately aligned, and block up the tips to give the correct dihedral. Cement the four cabane struts in place on the top of the fuselage. A small hole will have to be cut into the top decking to accommodate each strut. Note that the rigging holes should be arranged to line up in a spanwise direction. Now carefully cement the top wing in place on the cabane struts. Look at the model from directly above and make sure the top and bottom wings are aligned.

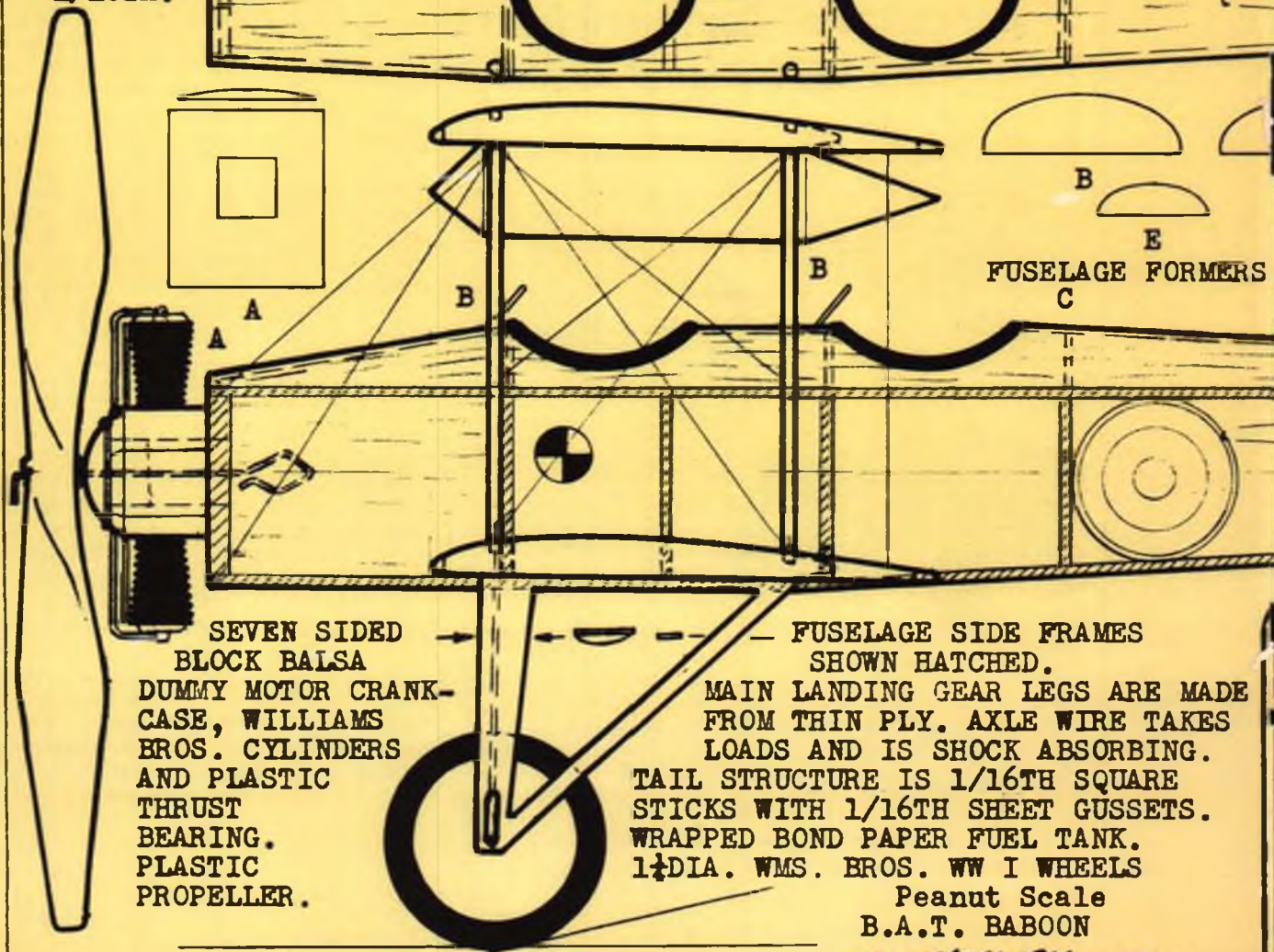
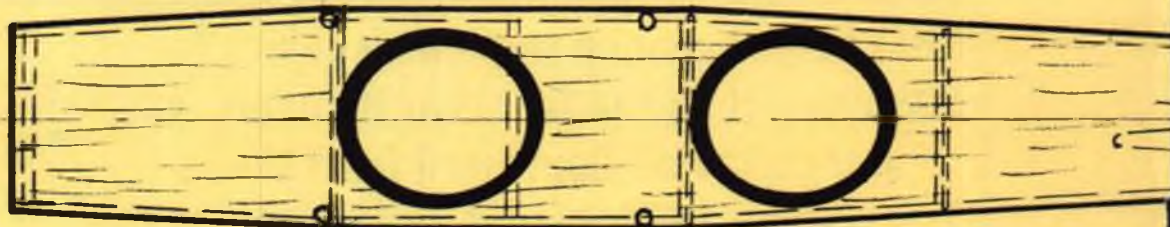
When the cement is dry, install the rigging, using 2-pound test monofilament fishing leader. Drafting tape is handy for holding the loose ends as the rigging is threaded through the holes. When all the rigging is in place, check the wing alignment and get it correct. Then put a small drop of cement at each of the strut holes to hold the rig-

WING TIP 1/8TH SQUARE, LEADING AND TRAILING EDGES 1/16TH by 1/8TH,



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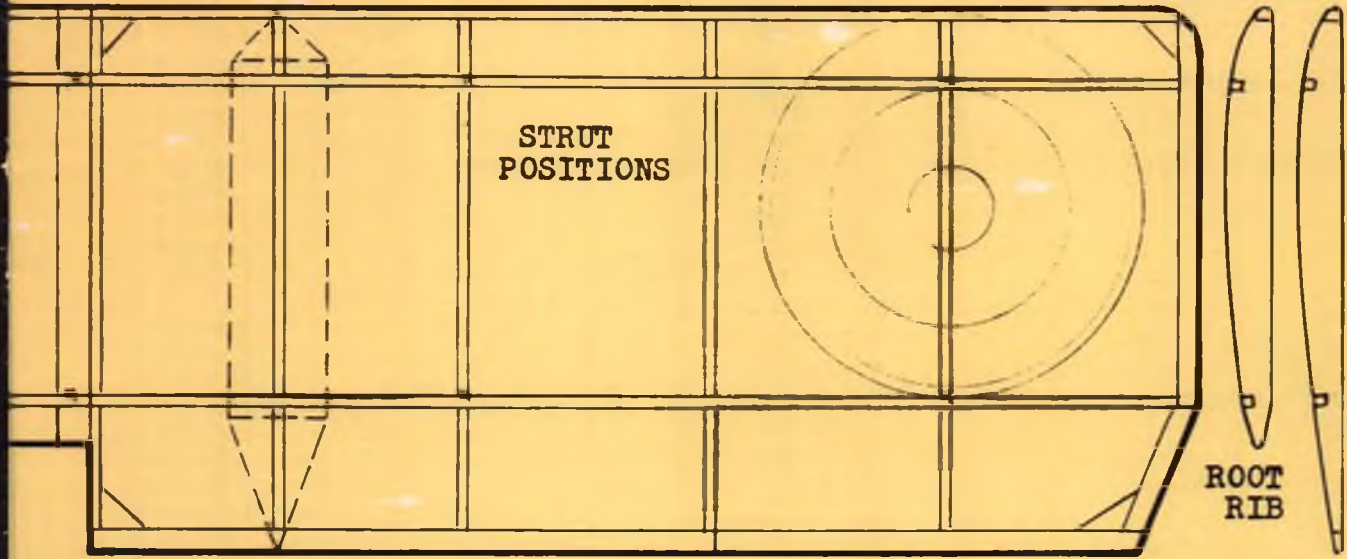
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Peanut Scale
 B.A.T. BABOON

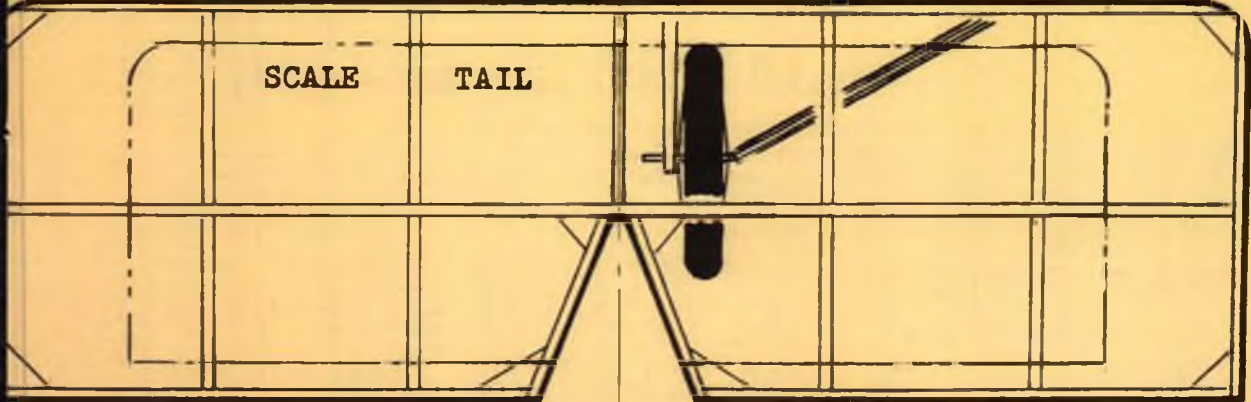
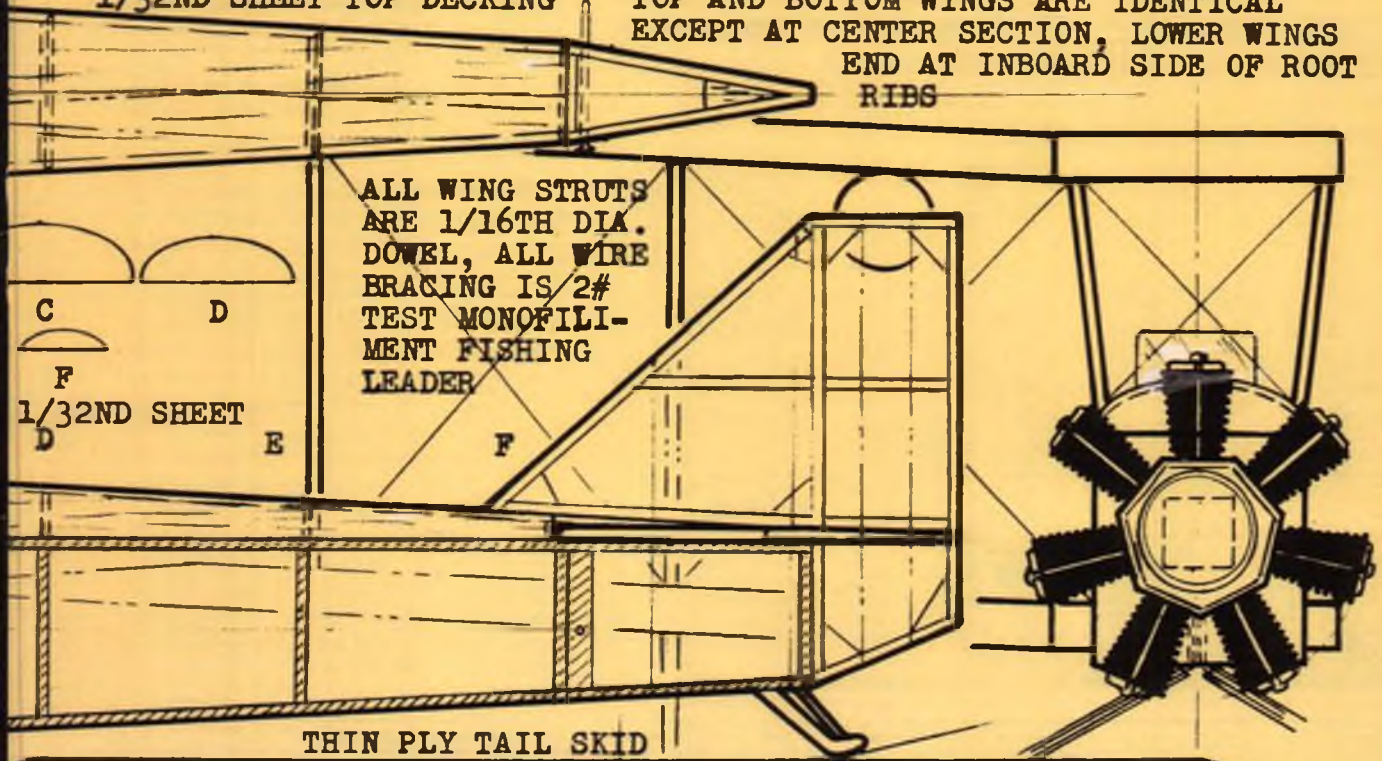
By Matt Moroney

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ging permanently. When dry, trim off all the overhanging ends.

Cut the tail skid and the two main landing gear legs out of 1/32 ply. Bend the main gear axle from 1/32 music wire. Cover the inverted "V" portion of the wire with 1/16 diameter spaghetti tubing to give the axle the right diameter. Cement the wire in place in the bottom of the fuselage. Add a filler to the bottom of the first bay of the fuselage to reinforce it. Cement the tail skid in place. Slip a wheel over each end of the axle wire and cement the gear legs in place on the bottom of the lower wings. A washer and a drop of cement will help retain the end of the axle in the leg.

The engine crankcase is a block of balsa with the grain parallel to the airplane centerline. Cut the square hole to fit the thrust bearing. Install the cylinders by making a hole to fit the base of each cylinder exactly in the center of each of the seven faces. Add a circular balsa cylinder head to each one and use cut-off straight pins to simulate the valve lifter rods. More detail can be added to this engine if you have access to a copy of the 1919 Janes, which has a photo of the engine as well as a three-view of the airplane.

The ends of the fuel tank can be carved from block balsa, and the center can be wrapped out of bond paper. Paint it silver and cement it to the wing.

Before flying your model, make sure it balances as shown on the plans. Look at the wings and make sure there is about 1/8-inch of washout at each tip. This can be added by holding the wings in the correct position and holding the airplane over a source of heat, which will shrink the loose wires and hold the wing permanently twisted with the correct washout. Too much heat will break the wires, so hold a bare hand between the heat source and the model. When it hurts, remove everything from the heat source.

This is a rather large, draggy model for a Peanut, and requires a bit more rubber to fly than you might expect. The original was powered just about right for outdoor flying with a single loop of 3/16 Pirelli, about 12 inches long. **MB**



REVOLUTIONARY NINJA PRO 30-46

Three years of intensive engineering and flight testing has produced the most versatile 30-46 size RC Helicopter ever! It exceeds the stringent flying demands of the FAI competitions, yet it is docile enough for beginners.

SPECIFICATIONS

- M/R diameter: 49.1 in.
- T/R diameter: 9.37 in.
- Overall length: 44.9 in.
- Height: 15.23 in.
- Gear ratio: 9.6 - 1 = 5.5
- Engine: 28 - 50
- Drive System: Belt
- Weight: 5.60 lbs (w/5 servos, 1200 MAH battery, receiver & gyro)
- Radio req'd: 5-Channel Hel

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Beauty in the Beast



Let's face it. Servos are not exactly eye-catching beauties. They are used and abused with scarcely a second thought. Nothing more than a beast of burden.

But when you realize that a servo is the last link between you and your model, beauty takes on a whole new meaning. That's why every Hitec servo comes with our own custom-designed I.C. to provide strong standing torque, a very narrow dead band and improved stability under low voltage conditions. Precise, heavy duty gears are used throughout the gear train to improve the neutral position with minimal backlash. When you combine all this with the latest in SMT circuitry, you have a servo that won't cut out on you when the going gets a little rough.

In the eye of the beholder, beauty takes on many forms. We think you'll find our entire line of quality servos a sight for sore eyes.

Most Hitec servos are available either individually or in packs with other popular connector types that cover the spectrum of R/C applications. See your dealer today and ask to see the complete line of Hitec servos.

HITEC #	DESCRIPTION	TORQUE@ 4.8 volts	SPEED@ 4.8 volts	BEARING	SIZE LxWxH	WEIGHT	AVAILABLE PACKS
HS-80 HS-80MG	Sub micro Metal gear	31 oz/in 31 oz/in	.15 sec .15 sec	NONE	1.1x0.6x1.1	.62 oz .76oz	RCD924 3 servos
HS-101 HS-101MG*	Mini servo Metal gear	24 oz/in 24 oz/in	20 sec 20 sec	NONE	1.3x0.6x1.2	.93 oz 1.07 oz	RCD920 3 servos
HS-205BB HS-205MG	Super mini Metal gear	44 oz/in 44 oz/in	20 sec 20 sec	TOP BALL BEARING	1.3x0.6x1.3	1.1 oz 1.3 oz	none
HS-300	Std. Sport	42 oz/in	.19 sec	TOP NYLON	1.6x0.8x1.4	1.57 oz	RCD905 4 servos
HS-422 HS-425BB*	Std. Pro Ball Bearing	43 oz/in 43 oz/in	20 sec 20 sec	DUAL OILITE DUAL BB	1.6x0.8x1.4	1.55 oz	RCD910 4 servos
HS-605BB HS-605MG	Ultra Torque Metal gear	77 oz/in 77 oz/in	.16 sec .16 sec	DUAL BALL BEARING	1.6x0.8x1.5	1.73 oz 2.12 oz	RCD605 3 servos
HS-615MG	Super Torque Metal gear	107 oz/in	.21 sec	DUAL BALL BEARING	1.6x0.8x1.5	2.12 oz	none
HS-700BB HS-705MG	Giant scale Metal gear	133 oz/in 161 oz/in	22 sec 27 sec	TOP BALL BEARING	2.3x1.1x2.0	3.5 oz 4.0 oz	RCD915 3+1 servos
HS-75BB	Retract servo	90 oz/in	.50 sec	TOP BB	1.7x0.9x1.0	1.3 oz	none
HS-725BB	Sail Winch 4 Turns	161 oz/in	1.62 sec 360 deg	TOP BALL BEARING	2.3x1.1x2.0	3.8 oz	none

*Denotes servo only available with Hitec/JR connector. All other servos available with FUT "J", AIRT and Hitec/JR connectors. Please specify connector type when ordering. All servo packs come with switch harness.

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Helicopter World

BY JAMES WANG



FLYING RC HELICOPTERS IN JAPAN AND TAIWAN

James recently spent a couple of weeks in the Orient, visiting the various hobby shops and RC helicopter flying sites. Quite a bit different from how we do things here in the U.S.!



Mr. Makoto Kunii hovers Yasuohi Muraki's Hirobo SST Eagle EX at the 1993 Hirobo Cup in New Jersey. Mr. Kunii is Hirobo's sales manager and also helps design new models.

ing one of his recent visits to the U.S. The following is part of that interview:

MB: How many RC pilots are there in Japan?

Mr. K: At least 100,000, because each month 100,000 copies of Radio Technique, the largest Japanese RC magazine, are sold in Japan.

MB: How many are helicopter and how many are airplane pilots?

Mr. K: About half and half.

MB: How many of those 50,000 heli pilots are beginners (can only hover)?

Mr. K: About 20 percent.

MB: Do the Japanese fliers favor pod-and-boom models or ones with fiberglass fuselages?

Mr. K: About 90 percent fly pod-and-boom models.

MB: Do most fliers use wood or fiberglass rotor blades?

Mr. K: Most use wood blades. Only competitors use fiberglass blades. Some competitors use wood blades covered with fiberglass cloth and resin.

MB: What is the breakdown of the different types of heli models?

Mr. K: About 10 percent are FAI competitors, 5 percent are into scale, the rest are sport fliers.

MB: Is 3-D hotdogging popular in Japan?

This past Christmas I took a three-week vacation to the Far East. Besides feasting on lots of delicacies, the other highlight was visiting several of the hobby shops in Taiwan and Japan. My feeling is that we in America are very lucky, because everything seems to cost more overseas—even for radios and engines made over there, it's cheaper to get them here in the U.S. Plus, our hobby shops generally have much wider selections!

Modeling in the Orient is considerably different from here in the U.S. Mr. Makoto Kunii, sales manager of the Hirobo Model Company, clued me in to this fact when I interviewed him dur-

Helicopter World



Mr. K: No, probably only 1 percent of the pilots can do flips and switchless inverted hotdogging. The top three hotdogging pilots in Japan are good, but not as good as Curtis Youngblood. No one in the world is as good as he is.

MB: Is finding a flying field a problem in Japan?

Mr. K: Absolutely! There are very few flying sites. Land is very expensive and rare. From downtown Tokyo, for example, the closest flying site is about a two-hour drive.

MB: I've seen photos of Japanese flying fields; they all seem to be near rivers.

Mr. K: Yes, the flying sites are all at riverbanks. You have only 30 to 60 yards between where you stand and the river. The riverbanks have a gravel surface. The rivers are usually 100 yards wide or more. At high tide the width of the riverbank shrinks to about 30 yards. If you crash into the river, it's bye-bye.

MB: Could people practice hovering at parking lots in the city?

Mr. K: No. Even the cars cannot find parking spaces in any Japanese city.

MB: Are these flying sites operated by clubs or city government?

Mr. K: They are mostly operated by hobby shop owners. The hobby shop would have its own club field and charges 10,000 yen [about \$90] for a yearly membership fee.

MB: Do most Japanese modelers buy from local hobby shops or from mail order?

■ TOP: Kyosho's new HyperFly is a good example of some of the innovative ball stuff coming out of Japan. It's an electric-powered two-channel machine with fore/aft and right/left cyclic controls only. Launched by hand, it lands when the battery runs down (flights average about four minutes), and a trip switch on the underside shuts the power off when the model touches down. We're hearing reports from the field are that this little machine performs amazingly well, and that several novice glider fliers have been able to handle it with ease. The HyperFly is available at hobby shops that deal with Great Planes Model Distributors. **■ LEFT:** Mr. Kunii (left) and Tom Dooley check out Tom's Eagle EX prior to one of Tom's flights at the '93 Hirobo Cup. The Eagle is a top-of-the-line FAI contest machine.

Mr. K: Almost everyone buys from local hobby shops because they need to fly at the local flying fields. And they go to chat at the local shops.

MB: Is mail order cheaper? How much of the sales go to mail order business?

Mr. K: Yes, mail order is cheaper, but accounts for only 20 percent of the hobby business.

MB: Most of the local hobby shops I've seen in Japan are small and don't stock too many items.

Mr. K: Yes. Because land and rent are so expensive in Japan, the stores are usually tiny and therefore their stock is limited. But they can get needed items from distributors very quickly. There are 15 distributing companies in Japan, with warehouses in every major city. They stock everything.

MB: How many hobby shops in Japan sell RC helicopter items?

Mr. K: About 1,000.

MB: Are there any American or European RC helicopters in Japan?

Mr. K: Very few. Experienced Japanese fliers prefer all-metal helicopters—metal frame and metal rotor head. Foreign brands usually have plastic rotor heads.

MB: But the Concept and Enforcer and Shuttle are mostly plastic.

Mr. K: Yes, but they are small models designed mostly for beginners.

• • •

I visited 10 different hobby shops in Japan—eight in Tokyo and two in Nagoya. One in Nagoya was one of the larger mail order stores.

The Japanese hobby industry changes rapidly. Japanese companies use their home market as the testing ground to determine what's successful and what isn't. Only the popular items are exported; the unsuccessful items are dropped. Most of the Japanese buyers also prefer expensive, high-end items.

I was shopping for some .60-size fiberglass rotor blades. The

continued on page 62

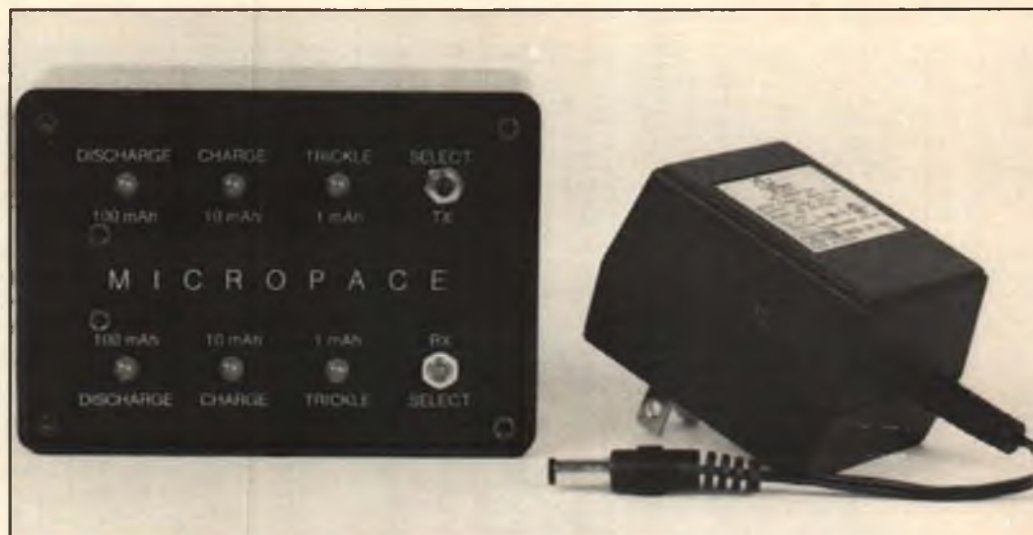
ELECTRONICS CORNER

BY ELOY MAREZ

• The Micropace NiCd Battery Analyzer

• JR's Model Beacon

• Battery Backers



Don't call it a "cyclor"! The Micropace is a true NiCd battery analyzer, probably the only such unit on the market to incorporate a computer microprocessor. Detailed in text.

I've often expressed the opinion that the various NiCd battery capacity measuring devices on the market are of considerably greater value than the highly touted expanded scale voltmeter (ESV) when it comes to measuring the quality of our all-important NiCd batteries. Often called "battery cyclers," this is actually a completely erroneous and misleading name, as "cycling"—the charging and discharging of the NiCds—takes place during normal operation. The process of first fully charging the battery, then discharging it at a carefully maintained known constant rate and measuring the time for it to drop to the point which has been determined as too low for proper equipment operation, is something else entirely; it is the measurement of its capacity. In truth, we could call such items "analyzers" rather than "cyclers." Regardless of the misnomer, the process is the only accurate method of measuring the capacity, and thus the quality, of a NiCd battery.

Now a new type of analyzer has recently become available, the "Micropace," by a manufacturer of the same name. The Micropace is unique in that to my knowledge, it's the first such device to incorporate a computer microprocessor, and it also uses a unique method

to display battery capacity.

Specs: Designed for four-cell (4.8V) receiver and eight-cell (9.6V) transmitter NiCd batteries, discharge current regulated at 300 milliamperes, discharges to 1.1V per cell (4.4V for receiver, 8.8V for transmitter batteries). Automatic switching to charge takes place after the cutoff voltage is reached, rates being 55 mA for the transmitter and internally switchable to 55 or 120 mA for the receiver battery. After 15 hours charge at those rates, automatic switching to a 10 mA trickle rate takes place, at which rate the batteries can be left on indefinitely. The unit can also be commanded to bypass the discharge function and go directly to the charge and subsequently to the trickle function.

The Micropace is small—4x2-7/8x1-1/2 inches. It uses an external transformer of the type now common to many electronic devices. The transformer wiring uses a coax power connector and plugs into the side of the Micropace. The unit is furnished without RC system connectors, allowing you to install those of your choice. The leads need to be connected to screw terminals inside the unit, per the instructions included.

Operation is simplicity it-

self, and is clearly described in the instructions. The Micropace will process both eight-cell transmitter and four-cell receiver batteries, either singly or simultaneously. Basically, after connecting the battery(s), you press the proper "TX" or "RX" button and go away. After discharge, the discharged capacity is displayed on three light emitting diodes (LEDs) by again pressing the proper button. The LEDs flash in sequence; the one marked 100 mA will do so once for every 100 mA, and similarly, the 10 and 1 mA lights will flash. This reading can be made as many times as desired while the battery is under normal or trickle charge.

Physically, the Micropace is well made in every respect, with a high-grade PC board and quality components throughout. My testing confirmed all claimed values, and the unit worked reliably every time and provided capacity values very close to the other analyzers on hand. The Micropace is available directly from its maker, Micropace Inc., P.O. Box 648, Northville, MI 48167, and is priced at \$59.95 plus \$4 for shipping (and 6 percent tax for Michigan residents). I find this inexpensive for the type of insurance and peace of mind that the Micropace provides. How

continued on page 63

Never balance your propeller?



Then you need to look at the damage prop vibration can cause to your model...

And see how easily Top Flite's Power Point Precision Magnetic Balancer can prevent it.

Five types of vibration damage:

1. Radio damage: Your radio system is the lifeline that keeps your plane under control. Punishing its on-board components with constant rattling and shaking weakens solder joints, harms fragile components and degrades sensitive electronics. Eventually, the lifeline could snap.

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3. Airframe damage: Over time, vibration lowers the integrity of your model's entire airframe. Screws work themselves loose and fall out. Adhesive bonds crack and separate. Every flight brings you a little closer to a potential catastrophe.

4. Engine cut-out: Agitated by prop vibration, the fuel in your tank forms bubbles. If one of them reaches your engine, it could cut out in mid-air...leaving your model powerless and helpless.

5. Excessive noise: Unbalanced props create more noise than balanced ones. Noise won't significantly affect your plane's performance—but it *could* damage your local airfield's standing with its neighbors.



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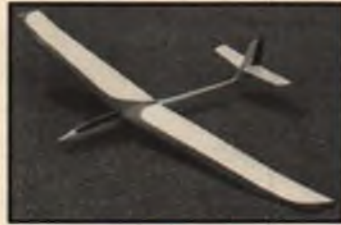
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With presheated wing

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Conceived as a two meter, the Dove thermals on a whisper, penetrates at 25 mph. Responding smoothly and accurately, this ship will peacefully out-turn and out-thermal anything in its class. So, zoom it, dive it, float it to the spot. This version features a presheated wing.

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5.7 X 3	1	1.59	8.5 X 7.5	5	3.95	11 X 5	2	2.49	12.5 X 12	7	7.95	14.4 X 10.5	10	12.95
6 X 2	1	1.59	8.75 X 7.0	5	3.95	11 X 6	2	2.49	12.5 X 12.5	7	7.95	14.4 X 12	10	12.95
6.3 X 4	2	3.95	8.75 X 7.5	5	3.95	11 X 7	2	2.49	12.5 X 13	7	7.95	14.4 X 13	10	12.95
6.5 X 2.9	2	3.95	8.75 X 8.0	5	3.95	11 X 8	2	2.49	13 X 6	4	2.25	14.5 X 14N	10	12.95
6.5 X 3.7	2	3.95	8.75 X 8.25	5	3.95	11 X 9	2	2.49	13 X 7	4	2.25	14.5 X 14.5N	10	12.95
6.5 X 5.0	3	3.95	8.75 X 8.5	5	3.95	12 X 6	2	2.89	13 X 8	4	2.25	15 X 8	10	12.95
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6.5 X 6.5	3	3.95	9 X 6	16	1.99	12 X 9	2	2.89	13 X 11	7	7.95	15 X 12	10	12.95
7 X 3	15	1.59	9 X 7	16	1.99	11 X 10	7	7.95	13 X 12	17	7.95	15 X 13N	10	12.95
7 X 4	15	1.59	9 X 8	16	1.99	11 X 11	7	7.95	13 X 13N	9	7.95	15 X 14N	10	12.95
7 X 5	15	1.59	9 X 9	16	1.99	11 X 12	7	7.95	13 X 15N	9	7.95	15.5 X 13N	10	12.95
7 X 6	15	1.59	9 X 10	16	1.99	11 X 12W	7	7.95	13.5 X 10	7	12.95	16 X 8	12	12.95
7 X 7	15	1.59	9.5 X 6.5N	5	3.95	11 X 13	7	7.95	13.5 X 11	7	12.95	16 X 10	12	12.95
7 X 8	15	1.59	9.5 X 7.0N	5	3.95	11 X 14	7	7.95	13.5 X 9	7	12.95	16 X 12	12	12.95
7 X 9	15	1.59	9.5 X 7.5N	5	3.95	11.5 X 4	8	2.89	13.5 X 10	7	12.95	16 X 13N	10	12.95
7 X 10	15	1.59	9.5 X 8.0N	5	3.95	12.25 X 3.75	8	3.49	13.5 X 11.5N	7	12.95	16 X 14	12	12.95
7.625 X 3.25 14	3.95		9.5 X 8.5N	5	3.95	12 X 9	7	7.95	13.5 X 12.5	10	12.95	16 X 16	12	12.95
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7.8 X 7	6	3.95	9 X 8.5	5	3.95	12 X 10W	7	7.95	13.5 X 14	10	12.95	10 X 7P	Pusher	3.95
8 X 4	14	1.79	9.5 X 4.5	11	2.29	12 X 11	7	7.95	14 X 10	10	12.95	10 X 8P	Pusher	3.95
8 X 5	4	1.79	10 X 3	2	2.29	12 X 11N	7	7.95	14 X 11	10	12.95	11 X 6P	Pusher	3.95
8 X 6	4	1.79	10 X 4	2	2.29	12 X 12	7	7.95	14 X 12	10	12.95	11 X 7P	Pusher	3.95
8 X 7	4	1.79	10 X 5	2	2.29	12 X 12.5	7	7.95	14 X 13	10	12.95	14 X 6P	Pusher	12.95
8 X 8	4	1.79	10 X 6	2	2.29	12 X 12N	7	7.95	14 X 14	10	12.95			
8 X 9	4	1.79	10 X 7	2	2.29	12 X 13	7	7.95						
8 X 10	4	1.79	10 X 8	2	2.29	12 X 13N	7	7.95						
8.5 X 5	4	3.95	10 X 9	2	2.29	12 X 14	7	7.95						
8.5 X 5.5	4	3.95	10 X 10	2	2.29	12.5 X 9	7	7.95						
8.5 X 6.5	5	3.95	10.5 X 4.5	11	3.95	12.5 X 10	7	7.95						
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torque: 133 oz/in
speed: .22 sec/60 deg
size: 2.3x1.1x2.0"

HS-705MG

*Metal gear
torque: 161 oz/in
speed: .27 sec/60 deg



HS-605BB & HS-605MG

Power Servo
*Dual Ball Bearing
wt. 1.73 oz
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HS-615MG

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The Giant Scale Stits Covering and Painting System from F&M Enterprises

Bruce tries out a matched covering and painting method specifically developed for Big Birds. Also discussed: Noel Wilson's 1/3-scale Jabiru kit.



F&M Enterprises has available a complete matched covering/paint system for models, based on the Stits Poly Fiber process used on full-size fabric-covered aircraft. Walt Wyrick used this finishing system to good advantage on his modified 1/3-scale Balsa USA Stearman; at the '95 Northwest Expo in Puyallup, Washington, the spectators voted it Best of Show, and the judges awarded it 1st place in Fun Scale. (It's actually detailed to Precision Scale standards, but a non-scale paint scheme relegated it to the Fun Scale class.) A truly beautiful model!

Covering and painting our scale and sport Big Birds has become easier over the years with the introduction of new heat-sensitive fabrics and films. Latex, polyurethane, acrylic and epoxy paints have also eased our way to nicely painted models. Basically, builders are looking for a user-friendly, inexpensive, durable, fuelproof and lightweight way to cover and finish their planes.

Now F&M Enterprises (22522 Auburn

down for large models, too.

According to the F&M manual, their covering process has five characteristics: 1) Paint bonding to the polyester is at least twice as strong as conventional dopes; 2) The coatings don't continue to shrink after application; 3) The coverings are fire resistant and will not support combustion; 4) The coating remains flexible with age; and 5) Repair

Dale, Lake Forest, CA 92630; 714-583-1455) has introduced their Giant Scale Stits Covering and Painting System, which is a modeling version of the Stits Poly Fiber System used on full-size aircraft. The polyester fabric used is the same type of material used for full-size aircraft but has a lighter weave and weight. The pinked tape is lighter and scaled

strength is equal to that of regular aircraft finishes. The F&M folks point out that the Stits fabric itself can be painted with any sort of paint you like, but that if you start with dope, stick with dope; if you start with Poly-Fiber paints, stick with them. Nitrate and butyrate dopes and thinners are not compatible in any way with Stits Poly Fiber products.

The F&M covering system starts with an adhesive called Poly-Tak, which is used to adhere the covering material to the airframe. I didn't have a complete ready-to-cover airframe on hand at the time but did try out the F&M Stits process on a rudder



F&M's Giant Scale Stits Covering and Paint System components are Poly-Tak, used to attach the lightweight Poly Fiber covering; Poly-Brush, to attach rib tape and fill the fabric weave; aluminum-pigmented Poly-Spray, for ultraviolet protection and weave filling; and Poly-Tone for the color coats.

from a Fleet bi-plane. The five steps involved in using the F&M system are to attach the covering with Poly-Tak, heat shrink, fill the weave with Poly-Brush, then apply one coat of Poly-Spray (a silver fill coat) and finish with Poly-Tone, which is the color coat.

The instructions stated that new wood surfaces may be sealed with Poly-Brush, but I called F&M and found

that this step isn't really necessary. Poly-Tak may be applied directly to the wood frame. Components other than wood require a coat of FC-900 or epoxy primer to insure good adhesion of the Poly-Spray and Poly-Tone.

I then proceeded to apply Poly-Tak to small areas of the rudder and used my fingers to press the covering down, forcing the Poly-Tak into the weave. This was repeated until the entire rudder was covered. Don't be tempted to lay the covering in place over the dry surface and apply the Poly-Tak to the outside of the covering, as it will not wick through the material. Application on the outer surface of the fabric will only result in a shiny surface that will have to be removed before painting.



Many scale enthusiasts may not be familiar with the Jabiru, an all-composite two-place general aviation aircraft currently being produced in numbers in Australia. The 1/3-scale Jabiru pictured here was built from a molded, highly prefabricated kit offered by Noel Wilson; text has particulars.

gree setting gives maximum tension.

I now had a covered rudder and proceeded to apply the pinked finishing tape around the edges of the rudder and on all cross-members. I laid a coat of Poly-Brush over the area where the tape was to be placed and then pressed the tape down with my fingers to force the Poly-Brush into the tape. Poly-Brush has a pink tint in it so you can see where you've been. Clear Poly-Brush is available for cockpit areas.

After about 15 minutes, another coat of Poly-Brush can be applied on top of the tape to fill holes in the weave. This top coat should be allowed to dry at least 15 minutes, after which a 225 degree iron can be used to lay down the tape edges and form the tape around the corners.

violet protection it needs and also provides a sandable undercoat for the color coats. Just don't go too far and sand through to the fabric, otherwise you'll have to re-spray in order to get a solid, opaque base for the color coats.

Poly-Tone is the pigmented color coat of the F&M Stits paint system. Two coats is the minimum recommended for good coverage. Poly-Tone's drying time is 30 minutes at 70 degrees F and 50 percent humidity.

The Stits Poly-Fiber paints can also be used over other fabric coverings with equally good results. Walt Wyrick covered his 1/3-scale Bull Stearman with Super Coverite, then switched to F&M's Stits system for taping, filling and finishing. Walt



Bruce experimented with the F&M process on a Fleet biplane rudder. Here the lightweight Poly Fiber cloth is being applied to the framework with the Poly-Tak adhesive.



Close-up of the Fleet rudder after the covering has been shrunk tight and the rib stitching tape has been applied with Poly-Brush.



Here a coat of silver Poly-Spray has been added to the rudder to provide ultraviolet protection and provide the first sandable layer. Fiberglass parts such as wheel pants and cowls should have an epoxy primer coat or Feather Coat (FC-900) prior to painting with Poly-Tone.

The temperature of the shrinking iron is critical. A heat gun is definitely not recommended! Four different temperatures are used for different results, depending on where you are in the covering process. A 200 degree iron setting will soften Poly-Tak and Poly-Brush to reduce ridges, sanding and creases with little shrinkage. A 225 degree setting will smooth tape and patch edges and slightly tighten the covering. A 250 degree setting will shrink the fabric and remove lapped seam wrinkles. A 300 de-

After all tapes, reinforcing patches, drain grommets and inspection hole reinforcements have been installed, a coat of Poly-Brush can be applied over the entire surface. A lot of sanding can be avoided if you examine the covering carefully and go over any loose edges or wrinkles with a 225 degree iron. A 200 degree iron can be used to clean up any build-up along the tape edges or on brush drips.

Poly-Spray is the aluminum-pigmented coating that gives the covering the ultra-

sprayed on a coat of the aluminum Poly-Spray, followed by cream Poly-Tone. He used a couple of different coverings on the tail surfaces—Sil-Ray on the horizontal stab and rudder and Solartex on the elevators. F&M's product worked equally well on them and Walt's Stearman looks great.

NEWS FROM DOWN UNDER

continued on page 80



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FREE FLIGHT

BY BOB STALICK

•Stalick's Top Ten Flying Tips •Nat Antonioli's Sandman 300



British modeler Jan Anderson sent along this photo of some of his free flights. Many unusual ships here, but the tailless designs must be the most unusual.

Last month we featured the 1995 FF Top Ten Building Tips; this month, it's the Top Ten Flying Tips. So, if you're looking

leave your shop, double check your CG location. It should be as indicated on the plans plus or minus just a percent or two.

Number 9: Check the incidence angles, all warps and other offsets, including stab tilt. Once again, see to it that the wing and stab are set up according to the angles shown on the plans.

Number 8: Check the engine side and down thrust, or on a rubber model the noseblock offset. Once again, make whatever adjustments are called for on the plan.

Number 7: Find a field that has some tall grass and a day that is mild and calm. Test-glide the model several times. Add shims under the leading edge or trailing edge of the stab as needed to get a flat glide.

Number 6: When satisfied that the glide is at least safe, it's time for your first powered flight. I like to have someone who isn't emotionally attached to the model present at the field during this stage of the trimming process. Ask your helper to stand off to

the side of the direction you intend to launch and observe the direction and tendencies of the flight. With the engine running a bit rich and the timer set for a 2-3 second run, or with the rubber motor wound about 50 percent, launch at a 45 degree angle into the wind. The climb should be to the right (for pylon models) or nearly straight with a slight right tendency. If your model does this, you're ready for more power and a longer run.

Number 5: Increase the engine run to 5-6 seconds and lean out the engine for maximum revs. In the case of rubber models, wind to around 85 percent or so. Once again, launch into the wind and check the climb pattern. If it continues on up with a slight right turn all the way until the power runs out, your ship is ready to go. However, the chances are that it won't "fly off the board" in this fashion. If it did, you can skip Number 4.

Number 4: If your model climbs, then levels out before climbing again (stairstepping), it has too much incidence. Add shims under the leading edge of the stab as needed. If your model climbs to the left at the start and then to the right as speed builds up, it needs some right thrust to get the nose pointed correctly at the start. If



Robin Mason prepares his K&B 0.5 powered Moon Shot for a flight at the Norwegian Free Flight Championships. Note the use of ear protectors, an excellent precaution for larger, higher speed engines.

out the window, holding a brand new untested model in your hands and wistfully wishing to go flying, read these hints (in reverse order) and go out and do it:

Number 10: Before you

FREE FLIGHT

it loops, reduce incidence or give it some right turn. If it dives, increase the incidence.

Number 3: Many free flights climb great but lose a lot of altitude when transitioning from power to glide. If your model has autosurfaces, this tendency can be corrected by adjusting the stabilizer kick-in time. For non-autosurface models, a smooth transition can be obtained by increasing the stab tilt or by increasing the number of turns in the climb, or both. Ron St. Jean, flying his RamRod, gets around this problem by climbing the model to the right and gliding it to the left. To get the transition, he uses left rudder tab, left stab tilt, right wing washin, and right thrust in the engine. The transition from right climb to left glide is definite and instantaneous. Most contemporary models, however, fly right climb and right glide, so the earlier adjustments are more appropriate.

Number 2: In non-autosurface models, glide turn is controlled entirely by stabilizer tilt. The model will glide in the direction of the high side of the stabilizer. The greater the amount of tilt, the tighter the glide circle. The size of your flying field will determine how tight the circles should be. The tighter the circle, the shorter the flight time since the result is a less efficient glide.

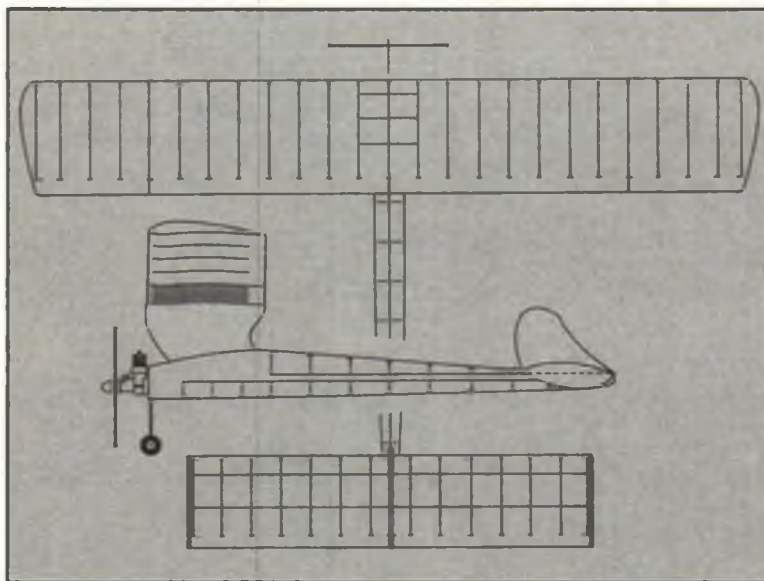
Number 1: Find that wonderful place where the grass is just high enough to cushion the landing of the heaviest model but not so high as to make it difficult to chase, a place where the weather is always in the middle 70s and the winds blow like vespers toward the long end of the field, a place available 365 days per year, where free fliers are welcome and encouraged to fly whenever the whim strikes, a place of such a size that all free flight events can be staged on site without drifting into neighboring areas.

If you find such a place, let us know, for you have truly found Free Flight Heaven, and I'd like to visit it with you!

Actually, I've found that there's no substitute for a well-trimmed model, lots of practice flying in all kinds of weather and competition events, and launching into thermals. It doesn't hurt to have a bit of luck either!

MAY MYSTERY MODEL

This 1/2A-A model was designed to be



MAY MYSTERY MODEL

flown with a Wasp .049 or an Anderson .065. With 200 square inches of wing area, it was a bit oversized for a Wasp but probably just right for the Anderson. The fuselage was built in a diamond shape. Probably the distinguishing characteristic of this ship is the odd shaped fin. The design appeared in a major model magazine during the nostalgia period.

The rules for this feature are that if you know the name of the model, send it to *Model Builder* on a postcard or letter. The winner is drawn at random from among the correct entries and gets a free one-year subscription to the magazine. Do it now!

FEBRUARY MYSTERY MODEL WINNER

Not much to report here, as only two readers were able to identify Bob Duffield's "Nor'wester" Wakefield, which appeared in the October 1966 issue of the NFFS Digest. The free magazine sub goes to perennial MM entrant Norm Reames, of Middleburg, Ohio.

PLAN OF THE MONTH: SANDMAN 300

Many years ago I was captivated by a photo I saw of Nat Antonioli holding his Sandman power model. The image of the model etched in my memory banks, I wrote to Nat to find out more about his model. Here's what he had to say:

"The Sandman is a 330 square inch Cox TD .09 design that I flew in the '70s. I still have the model, now collecting dust on a back shelf. I think one day I'll build a new wing and tail for it. I believe it would be competitive even today! It has a mid thrustline, features a profile fuselage, and

has an aft fin. It flew right-right with a little washin in the right inboard wing panel, 0-0 thrustline, no rudder tab adjustment and featured autothrusting. Transition to the glide was perfect even for Cat. III flying. It had a 7 percent wing section and a 5 percent stab section. With D-box construction, it was very fast under power, but it had no wing flutter because of good torsional rigidity.

"The Sandman 300 was a derivative of the .09 model. If you look closely, you might see that it was influenced somewhat by Denny Davis' original 1949 record holder, the San De Hogan. This model was the first to make a 30-minute record (10-minute

maxes)."

A short article in the *Orbiteers* newsletter indicates that this model simultaneously held Open records in both 1/2A and A Gas R.O.W. for several years. Neither record was ever broken, but rules changes obliterated them. Nat noted that the following changes would make the Sandman competitive today:

1. Shorten the tail moment to 15 inches.
2. Lengthen the nose to compensate for a possible CG shift.
3. Make the stabilizer area 35 percent rather than 40.
4. Leave out the rear spars in both the wing and the stab.

Thanks for the information and the drawing, Nat.

Full-size plans are not available for this model, but the drawing has all the dimensions needed to draw your own.

SILICA GEL REVISITED

Recently I noted the value of using silica gel (those little packets of glass-like beads that come in cameras or binoculars) to keep moisture out of delicate and easily rusted model airplane components. John Ahearn took me to task by noting that silica gel packets may not be usable as is unless you open them and look at the contents. The secret is that the blue-colored gel is good and the red-colored gel is not, because it's saturated with moisture. In order to make the red gel good to use again it needs to be baked until it turns blue once more.

John recommends that silica gel packets should be emptied out so you can tell what color the stuff is. The gel should be repacked into a clear container such as a

continued on page 78

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SHOOT-OUT AT THE R.C. CORRAL

Columnist Wild Bill Forrey gives us the low-down on the wild west show-down recently held in Long Beach, California: the Endless Horizons R/C Hobby Expo.

There's a new hobby trade show in Southern California, pardner, and it's aimin' to make some changes at the R.C. Corral out west. The lone, tall stranger's been bidin' his time, comin' west on the trail of the RCHTA Gang. Now he's here and lookin' for trouble.

Remember the RCHTA Gang? They're the Illinois wranglers who sought to take over the Golden State a few years back. They read about the untimely demise of the MAC (Model and Craft) show. They thought they stood a better chance against old Wild Bill Northrop. So they cast their RC poker chips near Miss Anita's IMS Saloon on a bet they held all the right cards, only to fold and fall victim to the smokin' gun of Wild Bill. They joined MAC as Boot Hill's most celebrated residents.

Well sir, the new stranger's name is the Endless Horizons R/C Hobby Expo. And like any sure-fire young gunfighter, he's aimin' to make a quick name for himself by callin' out and takin' down the "Best of the West" in a hobby show-down.

As the story goes, the first shot was fired at high noon, Saturday, January 7, inside the Long Beach Saloon—aka Convention Center. The weather outside was meaner'n a cornered grizzly bear, and the so-called Sunny State was seein' rainfall records bein' broke everywhere! Yet, in spite of the flash floods and broken-down wagon trains on the Long Beach Trail, the stranger's first show was as packed as the black powder in the barrel of his six-gun. Come sundown Sunday, the stranger was still standin', and fixin' to carve a notch in his Colt's 45.

Yup, this hombre's filled with liquid courage, but only time will tell if he's got the gumption to try it again next year! After all, Wild Bill's still standin' too!

• • •

Sorry about that folks. Earlier this year I read the biography, Wyatt Earp Frontier Marshal, by Stuart N. Lake, and couldn't resist recording some of the obvious parallels between the four SoCal trade shows of recent years and the old west stories I've read.

Tim Renaud showed off Airtronics Specialty Division's new 2-meter Swift thermal duration competition ship. Specs: 600 square inches, RB15 airfoil, 44 ounces flying weight. A first-class bit in every respect.

NEW MODELS AT ENDLESS HORIZONS

•House of Balsa

Don and Don Jr. Dombrowski showed their latest release, a 60-inch span, two-channel (ailerons and elevator) slope glider tentatively called the "Over The Edge," or OTE. Of all-wood construction, the OTE's wings feature a semi-symmetrical airfoil with leading edge sheeting on top only. The vertical stab on the prototype I saw had no moving rudder, but one could easily be added. Check with your local hobby dealer for availability. House of Balsa, 10101 Yucca Rd., Adelanto, CA 92301; (619) 246-6462.

•MM Glider Tech

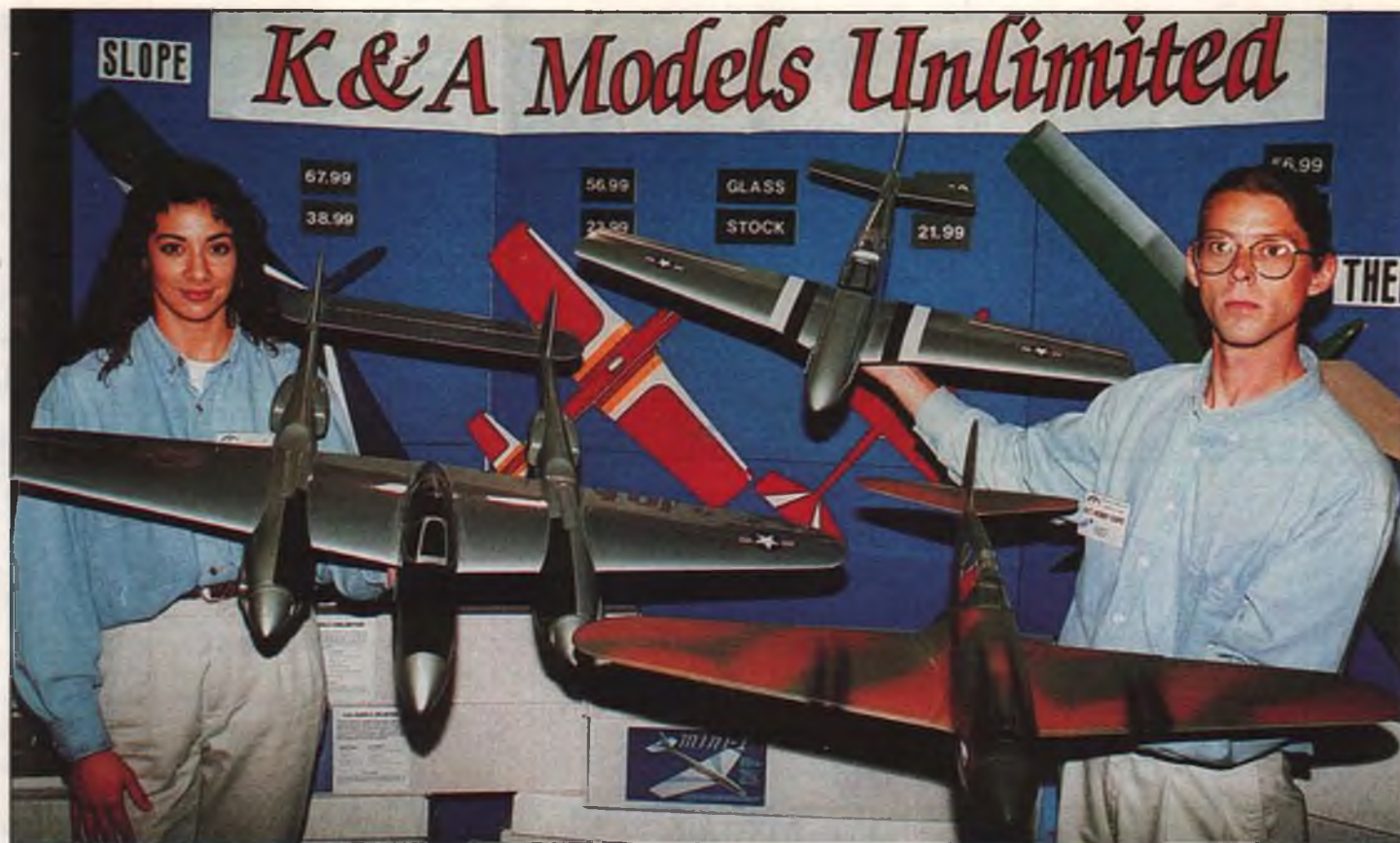
The two Ms, Merrill and Margaret, introduced a new 55-inch HLG called the Illusion. It appears to be similar to their Commoner, but the wing is quite different looking with its double-tapered tip panels. Merrill is very satisfied with the performance of the Commoner's SD7084 airfoil and has used it again on the Illusion. All

parts are hand machined and sanded. Look for it at the usual retail and mail order outlets or order direct. MM Glider Tech, P.O. Box 39098, Downey, CA 90239; (310) 923-2414.

•DCU

Mark and Sheryl Hambelton introduced four new slope and hand launch gliders. The Aggressor is a hot 60-inch slope racer featuring vacuum bagged foam wings with carbon fiber skins. The all-flying horizontal stab is also pre-skinned foam, as is the rudder. The Mystery uses the same airfoil,





■ ABOVE: Michelle Armijo and Ken Williams of K&A Models Unlimited run the PSS (Power Scale Slope) headquarters at the Long Beach show. These models, the first of a series called "Honest Scale Warbirds," are true-to-scale replicas of the P-38, P-51, and P-40. You can be sure these models will turn some heads at the next scale slope meet! ■ RIGHT: From MM Glider Tech (Margaret Newhouse and Merrill Farmer) comes a new competition HLG dubbed the "Illusion." Somewhat similar in fuselage and stab design to MM's Commoner, the Illusion features a shorter Schwann-inspired polyhedral wing with double-tapered tips. ■ BELOW RIGHT: According to Don Dombrowski, Jr., House of Balsa's new OTE (Over The Edge) sloper should be available by the time you read this. It's a 60-inch span all-balsa aileron/elevator sloper said to be ideal for advanced training and general aerobatic fun-flying.

same foam cores and same fuselage, but is more of a builder's kit; you build up the stabs from pre-cut balsa parts and skin the wing yourself.

DCU's Viper HLG features the aforementioned Kevlar/glass fuselage, plus pre-sheeted foam wings. The airfoil is the SD7037, which thermals beautifully at HLG Reynolds numbers and is thin enough to penetrate upwind or search out lift.

Last on the list is the hot little Micro Spark, an all-molded, pre-painted 55-inch sloper with the proven RG15 airfoil, which means it can handle a wide variety of slope conditions. DCU, 1564 S. Anaheim Blvd., Unit B, Anaheim, CA 92805; (714) 535-6969.

•K&A Models

Ken Williams and Michelle Armijo were on hand with a flock of new ships. K&A now offers its Honest Scale Warbird Series of PSS gliders; currently in the line-up are a true-scale P-38, P-40E and P-51D. These models are so realistic, I wonder how some guys would even risk flying them! Ken says they fly great and are a real blast to show off with on the slope.

K&A also has a new 370 square inch competition HLG in both balsa and molded Kevlar/glass fuselage versions, foam wing cores with SD7037 airfoil, and 1/32 balsa wing skins. K&A Models, 6059 Faculty Ave., Lakewood, CA 90712; (310) 804-0006.

•C.R. Aircraft Models

Charlie Richardson's company caters primarily to the experienced, high-performance glider guider. New this year is the Blazer, a 60-inch V-tail racer with amazing aerobatic ability. Charlie reports the airfoil combination of S3014 at the root and SD8020 at the tip just will not tip stall. The kit retails for \$79.95 complete with hardware, glass fuselage, foam wing cores and all other materials.

Also, C.R.'s Contender is now available in a smaller 72-inch version. For \$149.95 you get a complete kit with glass fuselage, plywood wing skins, HQ 1.5/8 foam cores, and hardware. C.R. Aircraft Models, 205 Camille Way, Vista, CA 92083; (619) 630-8775.

•Airtronics Specialty Division

Tim Renaud of Airtronics Specialty Division reports that all models in the ASD line are now in stock, ready to ship—including the first batch of Swift T-tail 2-meters. Features of the Swift are many: state-of-the-art RG15 airfoil, pre-sheeted obechi-over-foam wings with carbon fiber reinforcement, molded epoxy/Kevlar/fiber-glass fuselage, full hardware, and unsurpassed packaging. Airtronics Specialty Division, 11 Autry, Irvine, CA 92718; (714) 830-8769. MB



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HELICOPTERS *cont. from page 47*

Zigsaw, DY and Hi-Product fiberglass blades are about the only things that are cheaper in Japan than in the U.S. Interestingly, none of the hobby shops stocked them. All they had were some inexpensive .30-size blades. Typically, the stores do not stock the expensive items, but can get them for you from the local distributor within 24 hours.

I then visited two distributors near the Asakusa district in Tokyo. These facilities are awesome! Each occupies a six-story building. There were enough kits, radios, engines and spare parts to keep a hundred modelers happy for five years. On the wall were hundreds of engines, thousands of servos, stacks and stacks of Shuttle kits, Concept kits, car kits, and airplane kits. Anything you can think of, they have it. I counted over 20 JR PCM-10S radios on the shelves and an equal number of Futaba 9ZHPs. These distributors service only the hobby shops. With such a well-stocked inventory system, it's no wonder the local shops don't stock the expensive radios and kits.

Due to a limited number of flying sites, Japanese modelers on the average don't fly as frequently as the Americans. They compensate by purchasing the best equipment available, and spending quality time at home perfecting their building techniques. A trip to the local flying field reveals lots of exquisite looking models with gorgeously painted fuselages, all kinds of trick upgrade items, and mechanics that are polished and spotless. They do their homework well!

One nice thing about shopping for hobby supplies in Japan is that almost all the stores charge the same price. The big Tenshodo shop in the heart of the Ginza district in Tokyo charges the same prices as the hole-in-the-wall places. And all the prices they all charge are the retail prices! The mail order houses are the only ones that give some discount.

My next stop was Taipei, the capital of Taiwan, Republic of China. In recent years, Taipei has become a bustling commercial city. A few years ago, Taiwan lifted the 100 percent tariff imposed on many foreign-made goods. As a consequence, the price of hobby items has become more reasonable. Nearly all of the hobby products here are imported from Japan. Due to competition among the stores, the prices are driven down to the same level as the retail prices in Japan.

The buying habits among the Taiwanese modelers are similar to that of the Japanese—most of the modelers buy the very high-end items. For example, at the local helicopter club in Taipei, nearly all 30 members fly the top-of-the-line TSK helicopter with JR PCM-10S or Futaba 1024 radio. These combos run \$3,000 a pop. In Taiwan, RC modeling is still considered a

continued on page 79

much is your airplane worth?

JR'S MODEL BEACON

Here's yet another recently announced product intended to protect us from the vagaries of NiCd batteries. The Model Beacon is a small, lightweight device that plugs into one of the receiver's unused channels, or through a Y-harness if all the channels are active, and displays the charge status of the battery via LEDs. Additionally, it emits a piercing audio signal when the battery drops to a "no more flying" level, and as a bonus, makes the same noise if the transmitter is turned off.

The 13/16x1-1/2 inch device can be installed anywhere in the model that will permit viewing the LEDs. There are two of them, one red and one green. There's nothing to turn on or adjust; the Model Beacon sounds off briefly when the receiver is switched on to tell you it's working. The green LED operates at a voltage of 5.2V or higher, indicating it's safe to fly. At levels between 5.2 and 4.4V, both the green and the red LED are on, indicating a still safe condition. Should the voltage drop lower yet to 4.3V, only the red LED is on, and the



JR's Model Beacon is a small on-board device that gives both an audible and visible indication of your airborne NiCds' voltage status. Doubles as a model locator if your ship should go down in rough country.

audible alarms tells you in no uncertain terms that it's time to recharge—or go home!

The JR Model Beacon is intended for four-cell use only. It consumes 27 mA of

current in normal LED operation, which rises to 54 mA when the audio alarm sounds. It weighs only 11 grams, or .38 ounce.

The JR NEB-480 Model Beacon is distributed to JR dealers by Horizon Hobby Distributors, sole importers of JR equipment here in the U.S.

BATTERY BACKERS

This subject came up in conversation with a local flier recently; he stated that while he agreed as to their value, he didn't use one because of the added weight and the complications of charging two in-flight batteries, usually of different capacities. For those of you who may not be acquainted with these devices, they are an addition to the airborne system, which includes a secondary battery that is switched in should the main one become discharged or otherwise fail.

In general, I have to agree with my flying buddy on both counts. However, a 110 mA battery—quite adequate for backup use in most airplanes—weighs only 1.25 ounces; the EMS/Jomar Ultimate Battery Backer weighs even less. True, those few

continued on page 74

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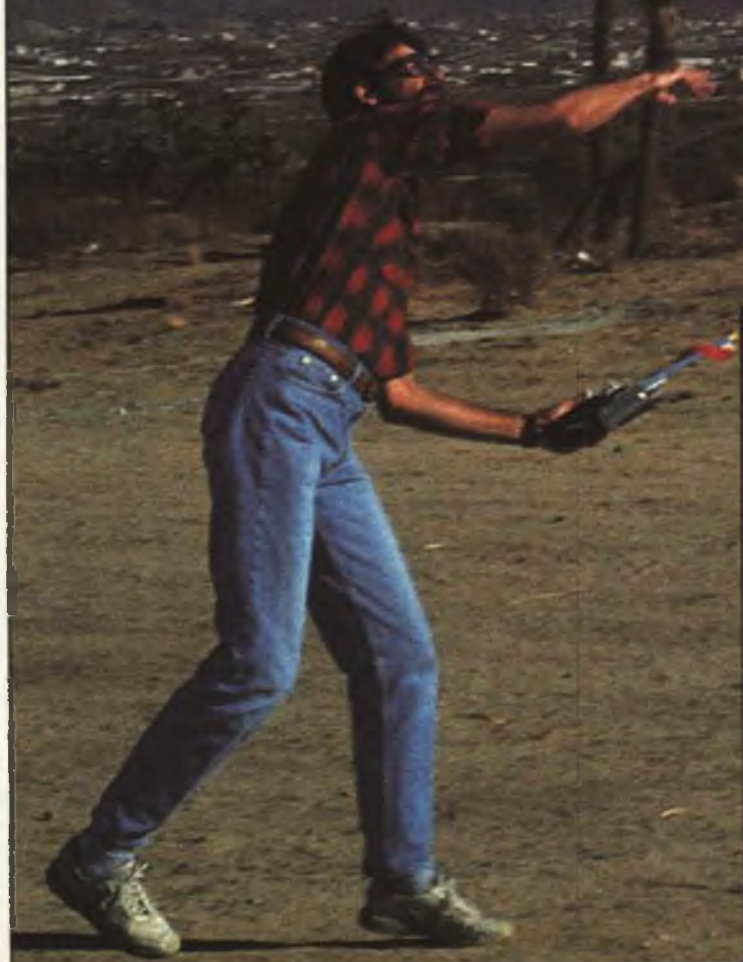
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PRODUCTS IN USE

■ By Stan Sadorf

DJ Aerotech's Monarch 94 RC Hand-Launch Glider

The first version of the Monarch was a real breakthrough in HLG performance, but the new Monarch 94 is better still. A state-of-the-art design that is cleaning up at contests throughout the country.





■ **ABOVE LEFT:** Champion RC soaring pilot Joe Werts is an avid hand-launch man; the Monarch 94 is his #1 choice for a kit-built competition HLB. Photo was taken by Bill Forrey at last year's Inland Soaring Society hand-launch contest at Riverside, California, where Joe took 1st place . . . again. ■ **ABOVE RIGHT:** Ten ounces and 390 square inches of all-out competition hand-launch glider. To keep the model as light as possible, the author chose to leave the fuselage unpainted, and applied only a couple of light coats of Varathane to the flying surfaces. Wing loading is a mere 3.7 ounces per square foot. ■ **BELOW RIGHT:** Nothin' to it! Stan demonstrates a typical contest "loading" before relaunching—hopefully back into the same thermal he just left. Hand-launch contests are flown in rounds, usually with a different task for each round. Some tasks require an absolute minimum of time on the ground, thus it's to your benefit to be able to snatch your glider out of the air and immediately relaunch.

The Monarch 94 is considered by many top competitors to be the best performing competition RC hand-launch sailplane kit currently on the market. Features include a balsa sheeted foam wing and V-tail, and a lightweight fiberglass fuselage. Micro radio gear is a necessity, as nothing larger will fit. The kit is produced by DJ Aerotech (Don Stackhouse and Joe Hahn) and is available exclusively from Northeast Sailplane Products in Williston, Vermont.

The Monarch has a distinctive fuselage that's flattened from the nose to the trailing edge of the wing, so as to decrease the frontal area. Even a micro servo standing upright is taller than the fuselage, so the servos must be installed on their sides. The fuselage comes with the main bulkhead, pushrod tubes and canopy hold-down hooks already installed. The wing and tail saddles are also molded in and form a natural fillet when these surfaces are mounted.

Also very impressive is the quality of the



■ **BELOW:** It's tight, but everything fits. Author is using an Airtronics 92745 four-channel FM micro receiver, two Futaba S-133 servos and a 110-mAH battery. No additional nose weight was needed for balancing.

■ **RIGHT:** Close-up of the V-tail installation. Alignment here is critical, and the author recommends that all angles be checked and double-checked before finally glassing the stab to the fuselage.



white foam cores and the lightweight 1/32 contest-grade balsa sheeting. With its thinned and highly modified SD7037 airfoil, the finished wing is only 7/16-inch thick at the root and 3/16-inch thick at the tip! The tail surfaces use a thinned SD8020 symmetrical airfoil.

In another departure from the norm, DJ Aerotech recommends attaching the balsa sheeting to the foam cores using white glue thinned with water and applied with a foam paint roller, a technique that I found works beautifully. It holds the sheeting to the foam as well as epoxy, and doesn't bleed through the balsa to the surface. And it cleans up easily with water.

I used Elmer's brand Carpenter's Wood Glue thinned to a 70/30 mix of glue to water, applied with an inexpensive 4-inch foam roller. I applied a very thin coat of glue to both the foam cores and the balsa sheeting before joining the two together. The manual recommends keeping weight on the cores and skins in their foam beds for at least two days to allow the glue to dry thoroughly.

During the sheeting process, I used epoxy to add the supplied 1-inch wide fiberglass tape between the top and bottom sheeting at the trailing edge for reinforcement. This also provides a rigid surface to sand down to when the trailing edge is tapered with a sanding block.



This photo clearly illustrates the Monarch's ultra-clean profile. Despite the light wing loading, this model is amazing in its ability to range upward in search of lift or penetrate back to the field when downwind. Wing airfoil is a highly modified SD7037; the white foam cores are only 1/8-inch thick at the tips!

The V-tail surfaces are constructed in the same manner as the wing, except the ruddervators are cut away and capped with

1/16 balsa. The two panels are joined at 112 degrees.

Properly aligning the V-tail to the fuselage proved to be the hardest part of building the Monarch. I recommend that the tail be lightly tack-glued in place, the alignment checked, and then securely glued with epoxy once everything is perfectly aligned. Care taken during this step will ensure that your Monarch flies straight and true without trim problems.

I used an Airtronics four-channel micro receiver along with my Vision transmitter, and two Futaba S-133 micro servos. I elected not to use an on-off switch—it's easy enough to take the canopy off to plug the battery in and out. The 110-mAH battery was installed last so it could be moved around to get the CG just right. This is the first sailplane I've built that needed no extra nose weight to balance at the recommended CG!

To save weight, I left the fuselage unpainted. The wing and tail were sprayed with three light coats of water-based Varethane; this makes the balsa water resistant without adding much weight. The final weight of my Monarch was right at 10 ounces, for a very light wing loading of 3.7 ounces per square foot.

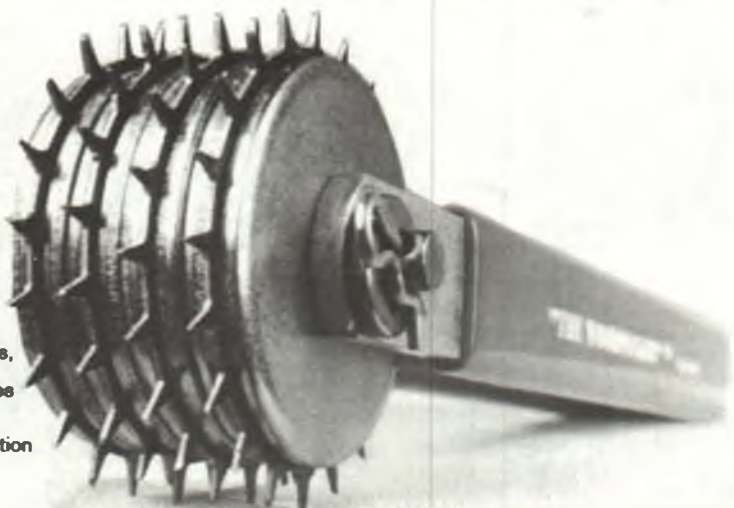
At the field, a gentle hand toss showed a straight, shallow dive, corrected with two clicks of up-trim. Two harder throws put the Monarch at least as high as any sailplane I've thrown, and showed it to be very maneuverable. A third hard toss put the Monarch into a gentle early morning thermal, and away it went!

The Monarch is an easy plane to thermal well. Its long tail moment gives it a

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very smooth rudder/elevator response so it does not look "jerky" in flight like a lot of hand-launch planes I've seen. There's no tendency to stall sharply, as I expected with such a thin airfoil. This, combined with its lack of tip stall, makes it possible to make very tight thermal turns and work the smallest bubbles of lift at very low altitude. Due to its low-drag design and efficient airfoil, the Monarch still manages to cover ground quickly when the nose is put down. To increase penetration when the wind picks up, lead ballast can be added at the CG using double-sided foam tape; it holds securely but is still easy to remove. I actually get slightly higher launches when my Monarch is ballasted.

The only change I wish I had made would be to substitute harder balsa for the leading edges of the inboard wing panels. The soft balsa supplied is very light, but doesn't stand up well to contact with flying-field obstacles or even the interior of my car. "Hangar rash" has taken its toll! If you are more careful than I am or fly off a nice grass field, the Monarch is perfect as is.

What sets the Monarch 94 apart from other hand-launch kits is the very high quality of the workmanship and the materials, and especially the flight performance. It was designed to be a fantastic competition machine of no compromise. Yes, it's more expensive than your usual "stick and tissue" built-up kit, but believe me, the extra cost is more than offset by the incredible performance. *MB*

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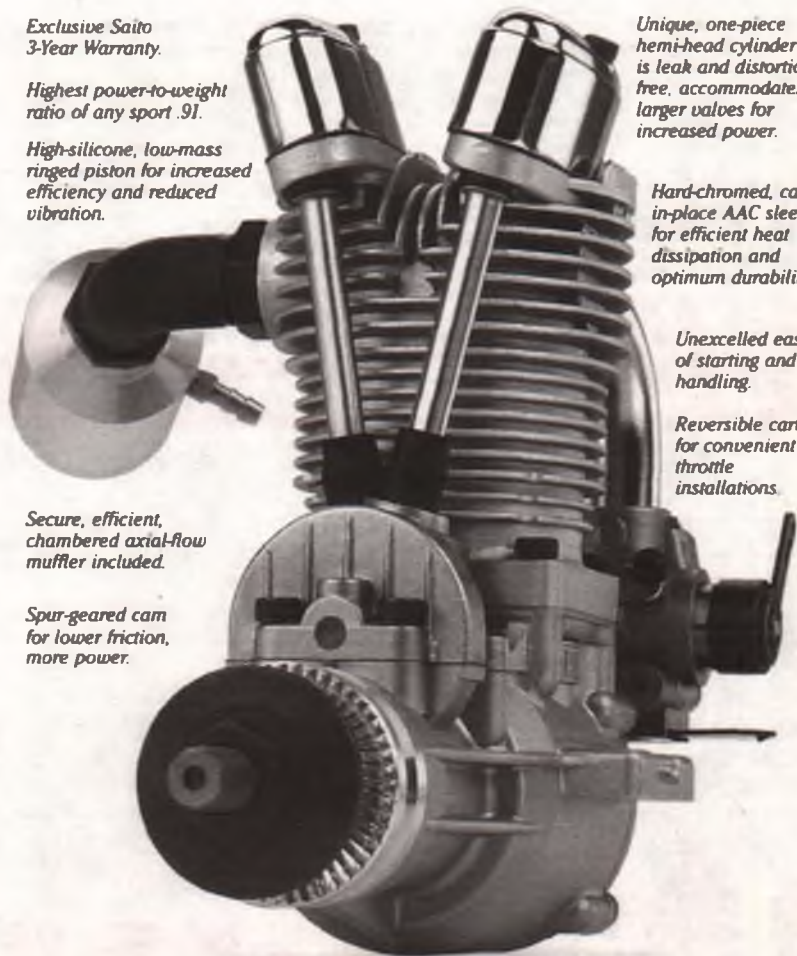
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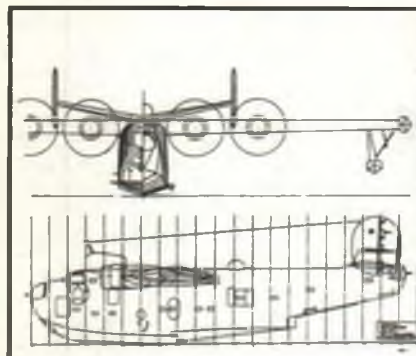
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P-39 continued from page 22

intake hole. A hard landing will jar the pack loose and let it slip out the chute, thus reducing airframe damage.

A crisis developed when the FX-35 motor controller specified an FM radio and I had already installed a Futaba 4NBL AM system. We tried it anyway; schoolyard range tests gave 105 feet motor off and 81 feet motor on. Maybe the motor control range would be greater with an FM radio, but what we have is perfectly satisfactory.

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I yelled over the screaming motor for



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Phil to make the first launch. Beautiful—she streaked away perfectly without any adjustments. All at once something didn't feel right and I discovered I had stopped at half-throttle *again*. The effect of going to full throttle was like climbing on afterburners! Meanwhile, Phil had turned to get the camera and was now searching the sky and asking, "Where'd it go?"

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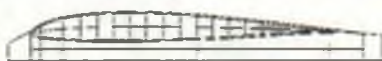
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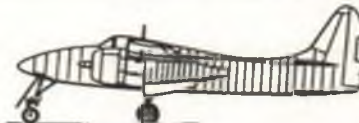
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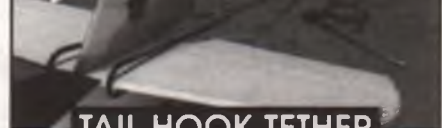
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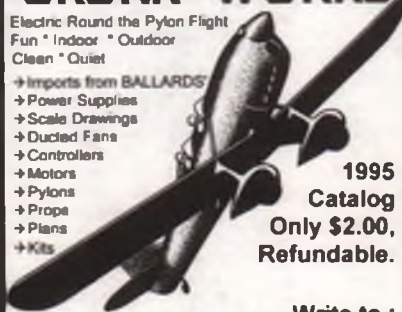


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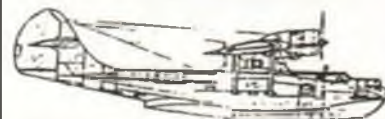
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Since then Hazel has remarried and now shares her life with Maxey Hester. Flying full-scale aircraft is still a large part of their lives. A few years ago they got involved in homebuilding by constructing and flying two identical low-wing, open-cockpit Spacewalkers. Naturally, a model of the Spacewalker (a big 1/3-scale replica) was added to the Sig line of kits, later followed



Sig Mfg. is probably the most self-sufficient model company in the country. They have complete facilities for balsa processing, plastic molding, decal silkscreening (seen here), catalog and instruction booklet printing . . . you get the idea.

by a 1/4-scale model of the two-place Spacewalker II.

Presently, Sig markets over 2,100 different model aircraft products, including kits, hardware, adhesives, paint, covering materials, fuel and many other items in addition to the balsa that got it all started. New kits and products are constantly being developed by Sig's staff.

In 1992, Hazel Sig-Hester decided it was time to slow down a bit. Jim Evans, a friend of 25 years, was named president of Sig Mfg. while Hazel retained the posts of chief executive officer and chairman of the board. Her husband Maxey is vice-president. Evans is looking ahead, realizing that the future of the business is in the hands of youthful enthusiasts. He says, "Anytime we can get one child out from in front of the television set and building model airplanes, it's amazing what happens. They graduate to RC planes, and the first thing you know, they're working on the car radio, then the engine, understanding why things work. Model airplane flying is not just a hobby. It is building and learning."

If you were to ask Hazel today why her company has enjoyed so much success over the years, she would say it was because of their constant dedication to the idea of old-fashioned, friendly service. "Providing personal service in every way possible has been the goal of our company since its beginning in 1951," Hazel says. "I've always believed that service is our number one product. While we take great pride in Sig balsa, model kits, glue and the other items that we produce, we understand our main reason for being in business is to help people enjoy their hobby. If we do that, our success is assured." MB

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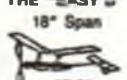
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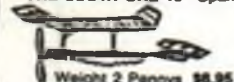
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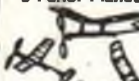
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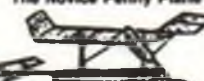
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ELECTRONICS cont. from page 63

extra ounces might make a difference in some competition aircraft, but for general sport flying I still feel that the insurance more than offsets the slight loss in performance that might occur.

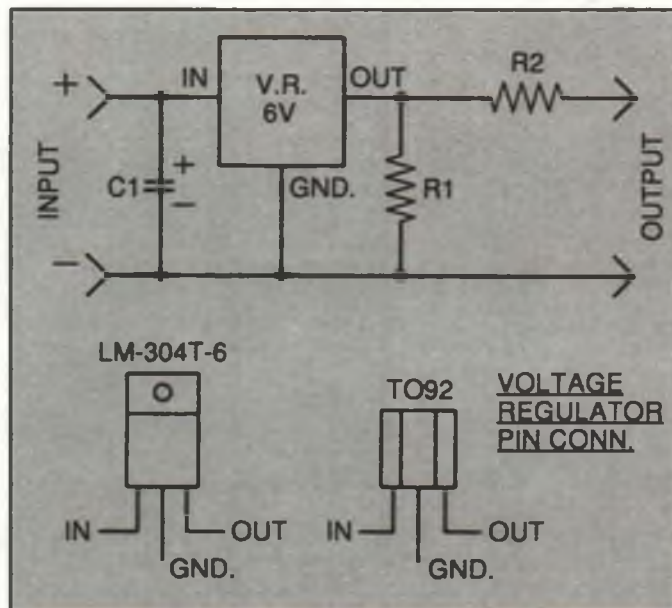
Charging two batteries might be something of a hassle to many, and I have a couple of suggestions to ease that necessary chore. One solution is Ace R/C's Dual Metered Variable Charger (DMVC). This handy unit can revive two 1- to 10-cell batteries of from 100 to 2500 mA capacity

all suffer from a common ailment, that of poor voltage regulation. They do an acceptable job with any modification to their output, but it's impossible to come up with a set of values that will work for all chargers.

What to do? We'll make the chargers better! Better in this case means feeding the 10+ volts of the transmitter side of the charger into a voltage regulator. Thus, at the business end we now have a fixed voltage to work with, regardless of whose charger is in use, and any resistor values calculated will always hold true. Don't get scared off, we're dealing with only three

or maybe four easily available components. And there will be no adjusting or tuning to do, simply wire it up and charge!

Basically, we are using a 6-volt regulator to stabilize the charger output at that value and then using a series resistor to adjust the current to the battery as needed. Sharp-eyed EC readers will immediately spot the 270 ohm resistor directly across the output of the regulator; it's there because the low current used to charge the batteries is not enough to light the LED on the charger, and we all like to see it glow and know that things are cooking properly; the 270 ohms, in addition



Schematic for the regulator circuit used to drop the transmitter side of standard RC system chargers to the level required for four-cell NiCd packs. Capacitor C1 should be 33µf, 12V minimum. Resistor R1 is not needed for 450 or 500 mA packs; use a 270 ohm 1/4 watt for all other sizes of batteries to make the charger's LED glow brightly. Resistor R2: for 270 mA batteries, 2.2 ohm; 225/4.7; 290/6.2; 150/13; 110/27, all 1/4 watt. Regulator specs are given in text.

it, either singly or simultaneously. There's no guesswork—you plug in the batteries, set the required charge rate for each battery on the clearly marked meter and go away until it's time to fly.

There are any number of other ways to revive two batteries. Most serious modelers now have more than one RC system, and of course more than one charger. And they are all dual chargers. Wouldn't it be convenient if we could use one of these dual chargers to charge the dual packs in the airplane? Well, we can, by using the receiver battery part of the dual charger to charge one pack and simply adjusting the transmitter side of the charger to revitalize the secondary battery.

All it takes is a resistor of the right size, right? Wrong! Well, yes and no. Yes if you're dealing with one charger and battery combination; by trial-and-error juggling of a few resistors, we can come up with the proper values. However, in most cases, these values will differ for a different make of charger, even one marked with the very same ratings. The fact is that all RC system chargers are not created equal, and they

to the load presented by the battery itself, is there to make the LED do its thing. Note that if you use this scheme to charge 450 or 500 mA batteries, the 270 ohm resistor is not required.

There is absolutely nothing critical about the assembly of the circuit. The various components can be merely soldered together, with insulation or isolation as required, and the whole thing protected with a piece of shrink tubing. Things could also be assembled on a small piece of perforated board, again with a shrink tubing cover.

The regulator required is a common LM-304T-6 or one of its equivalents from different makers. It's an LM-220 case; there is also a smaller TO-92 device called a 78L06, which is rated at 100 mA and quite adequate for the task. You will of course have to provide mating connectors; for the input use Radio Shack #276-1576 for Futaba, 276-1563 for all the others. Note that JR uses the center pin as negative while all the others use it as positive. The output will have to match your RC system—a normal servo harness will do. MB

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ELECTRIC POWER *cont. from page 33*

tailer. Radio Shack carries the resistors and capacitors, but they don't have IC1 or the MOSFETs. If you live in a good-sized city, you should be able to find these parts locally. If you prefer one-stop shopping and like getting boxes in the mail, you can try Digi-Key Corporation in Minnesota (800-344-4539) or JDR Microdevices in California (800-538-5000). Catalogs are available from these mail-order houses by calling their toll-free order numbers.

Keith has also published two other electronic construction articles of interest. Appearing in the June 1993 issue of *The Ampeer*, his high-rate throttle project is a bit more complicated than the low-rate unit, but is still very manageable by the electronic hobbyist. Of course, the circuitry is going to be more complex and I don't have space to print a schematic here. The heart of this circuit is, like the low-rate throttle, the comparator that compares the sawtooth wave level and the reference voltage level to determine how long to energize the motor. However, in this circuit, a sawtooth wave with constant amplitude and frequency is generated and used as the reference and the receiver pulse width determines the level of the constant voltage source. Thus, the roles of the two signals are reversed in the high-rate control.

Keith has used this unit with 035 to 25-sized cobalt motors with up to 14 cells. He installed it in a MiG 3 powered by an Astro 05 drawing 28 amps (230 watts) and had no trouble. This is a very sturdy unit!

In the April 1994 newsletter, Keith presented a circuit that electronically mixes two channels. This circuit is ideal for those who want to build a flying wing, V-tail or other model that requires mixing of two controls. I don't really care for mechanical mixers and I don't own a radio capable of electronically mixing two channels, so this circuit is a great idea. Simply plug it into the two receiver channels you want to mix, then plug in the two servos.

I have schematics for all of these projects along with the text of the articles as they appeared in the newsletter. If you'd like copies of them, just send me an SASE and I'll get them out to you right away. Any other questions, comments or ideas can be directed to me at 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 between 8 and 5 Pacific time. You can also send e-mail to me via CompuServe at 74164,3237 or via Internet at 74164.3237@compuserve.com.

There's no better feeling than the one you get when something into which you've put sweat and hard work does what it's supposed to. A new electric aircraft flying for the first time or an electronic circuit that performs like you want it to—these are all marks of achievement and something of which you can be proud. **MB**

TECH STUFF *cont. from page 14*

length. My guess is that a bifilar-shortened antenna won't have as much range as a commercial base-loaded shorby of the same length. As I see it, the only advantage of the bifilar stunt is that, range permitting, it allows us to shorten a receiver antenna temporarily for some special use, then have it full length again later without soldering back the length we might have cut off instead of bifilar folding it.

DISCLAIMER

I'm a mechanical engineer, not an electrical engineer. The above is from a few basic courses I've taken, considerable reading in the field, consultation with experts, and practical experience both in industry and in my hobbies. I can't promise that you'll never crash an airplane if you follow the above advice, but I *will* promise that you may crash a lot more airplanes if you don't heed some of it.

Thank you, Art Thoms, for asking the questions. I hope some of this will be of value.

THANK YOU MARIANNE AND PAUL

There have been two people behind the scenes in connection with this column, right from its beginnings over six years ago, whom I would like to recognize and thank publicly. When I crank out a new column, I always print out two copies; one goes to Marianne, my fine wife; the other is mailed to Paul Weston, creative full-scale airplane and model designer/builder/flier and friend for many years.

These two kind people carefully read each column and look for mistakes. Marianne is a whiz at English—she straightens out my grammar and syntax, and finds the misspelled words that the computer misses. Paul spots passages which don't read well from a modeler's standpoint, sometimes questions me on technical issues, and suggests ways by which my explanations could be clearer. So, a sincere "Thank You" to my dear wife and best friend, and another "Thank You" to my good friend Paul Weston.

PARTING WORDS

Marianne called my attention to a radio-controlled mouse in a gift catalog. The ad said: "Have fun with your cat." The transmitter was the size of a TV remote control. This is a far cry from the very early days of RC, with a car storage battery powering a 25-pound transmitter and a huge fixed dipole antenna mounted on the ground beside it. The mouse and its transmitter use two AA cells and one 9-volt battery. Oh yes, the price: \$19.95. I wonder if it meets our latest narrow-band requirements?

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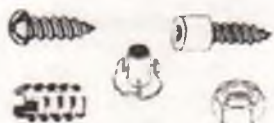
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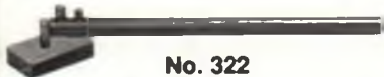
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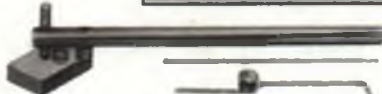
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FREE FLIGHT *cont. from page 58*

glass pepper shaker. When it turns red, you can see it, bake it, and return it to use. Thank for the advice, John.

FF HUMOR FROM GRANT CARSON

In closing this month's column, I offer you the following bit of whimsy from the pen of Grant Carson, who offers these immutable laws of aeromodeling:

"One of the familiar laws of modeling is that any piece cut to fit will be too short. Here are some others garnered from my own personal experience:

- "1. Four to six pound balsa by mail order, won't be.
- "2. Four to six pound balsa from a hobby shop will be 10 to 12 pound balsa.
- "3. Four to six pound balsa is a folk myth.
- "4. Dope in a spray can will clog without possibility of unclogging with half the dope left in the can.
- "5. Any balsa strip advertised as 1/8 square, won't be. The same applies to 1/16, 3/32 and the like.
- "6. Any trailing edge balsa manufactured will be too large for rubber models.
- "7. Various honing stones for sharpening X-Acto blades, don't.
- "8. Glue has a natural affinity for new X-Acto blades, razor blades and all other kinds of blades.
- "9. If you try to hold two pieces of balsa together while gluing, CA will glue your fingers to both pieces.
- "10. In your shop, CA glue sets before you're ready, but with great perversity, refuses to set for field repairs.
- "11. Everything weighs too much. This universal law applies to balsa, tissue, silk, dope, wire, you name it.
- "12. A Coupe d'Hiver will weigh 80 grams.
- "13. A P-30 will weigh 50 grams.
- "14. A gram will weigh 1.2 grams.
- "15. A scale model will require a weight equal to the airframe weight for nose ballast.

"16. Models have intelligence. They wish to be free. They wait until their fuses aren't lighted and then soar like eagles.

"17. Deadbeat models don't have spirits like eagles. The lazy beasts are content to gather dust in the loft of the model shop forever.

"18. Models have a magnetic affinity for trees, and likewise.

"19. God's eye is malevolent for Sunday flying."

THAT'S IT DEPT.

When you're out on the field testing those new models, take a few photos, attach some caption information and send them to Bob Stalick, 5066 N.W. Picadilly Circle, Albany, OR 97321.

And catch a thermal for me. **MB**

HELICOPTERS *cont. from page 62*

hobby for the affluent. The modeler must have a car, a workshop at home, and a deep pocket to buy imported parts and fuel.

A local hobby shop owner, Mr. Hong, told me there are about 20,000 modelers in Taiwan. There is a monthly RC model magazine, and an annual National Contest in April. Taiwan participated the 1993 F3A (pattern) and F3C (helicopter) World Championships held at Velden, Austria. Of the 64 participants in F3C, the highest placing contestant from Taiwan was in 30th place.

Mr. Hong says that most of the RC fliers in Taiwan fly both airplanes and helicopters. This is in contrast to America, where we tend to fly one or the other. Very few people in Taiwan can do 3-D hotdogging with their helicopters, and Mr. Hong says that maybe only one or two can hover switchless inverted. A radio license is required to operate RC equipment in Taiwan. In both Taiwan and Japan, the legal frequency bands are 27 MHz and 40 MHz. Recently, 72 MHz has become legal in Japan.

In summary, I had a splendid time visiting all these hobby shops and chatting with the local owners and fliers. However, my fingers got really itchy watching other people have fun. Next time I go, I'm gonna bring my Concept 10 along! **MB**

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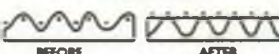
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BIG BIRDS continued from page 53

Neil Hart was once again kind enough to send me the latest copy of *Big Torque*. This is the official quarterly publication of the IMAA's Australian connection, the Southern Cross Squadron. I read through the entire magazine, knowing full well our friends in the Land of Oz would have something special I could share with you, and I wasn't disappointed.

Big Torque featured an article that told the tale of Australia's entry into the General Aviation field with a beautiful little airplane called the Jabiru S.T., which spans a mere 26 feet, 4 inches and is powered by a 1600cc, 54 horsepower Australian-built engine. The size is deceptive because the cockpit features generous side-by-side seating for two. Construction is fiberglass and the wing has been tested to 8 Gs positive and 4 Gs negative. At present the Jabiru is not approved for aerobatics but that may change with the development of a more powerful engine.

According to *Big Torque*, the Australian CAA is presently working with the FAA here in the U.S. to have the Jabiru issued an approved type certificate under the primary category. This should not be a problem because the United States and Australia have a bilateral certification agreement. For more information on the Jabiru write to Jabiru Aircraft Pty. Ltd., P.O. Box 5186, Bunaberg West 4620, Queensland, Australia.

Wouldn't the Jabiru make a great subject for Giant Scale? Australian modeler Noel Wilson thought so too and did something about it. His company, Noel's Custom R.C. Models, offers a beautiful 1/3-scale model of the Jabiru. The plane requires at least a 1.08 cubic inch engine and a six-channel radio.

The kit contains 45 fiberglass, ABS and PVC moldings, reduced to 34 components by pre-sale assembly. There are seven plywood braces, bows and bulkheads for the fuselage, six plywood wing ribs and subspars, foam core wings, tailplane and rudder. The wings are grooved for subspars, pushrods and bellcranks, and the two fiberglass wing struts have adjustable ends. A custom spinner and spring-action nose gear are also included, as is a scale photo pack with 24 photos, so scale documentation should not be a problem. Noel says a scale finish is not difficult to achieve because the full-size plane is also built from composite materials in a mold with no rivets.

If you want more information, call or write to either me or Noel Wilson, 120 Castlerea St., Tingalpa, Queensland 4173, Australia; (07) 890-2520. The kit is not inexpensive, but you'll probably have the only one at your local fly-in or scale contest.

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